November 2021
Plant Miller

Groundwater Remedy Selection Report

Prepared for Alabama Power Company

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Prepared for
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Engineer's Certification

This *Groundwater Remedy Selection Report* has been prepared in accordance with the U.S. Environmental Protection Agency's coal combustion residuals rule (40 Code of Federal Regulations Part 257, Subpart D) and the Alabama Department of Environmental Management Administrative Code Ch. 335-13-15. This report was prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below. The undersigned is practicing through Anchor QEA, LLC, which is an authorized engineering business in the State of Alabama (Certificate of Authorization license number 5073; a copy of this license is provided in Appendix A).

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ABBREVIATIONS

ACM	*Assessment of Corrective Measures*
ADEM	Alabama Department of Environmental Management
Admin. Code	Administrative Code
APC	Alabama Power Company
CCR	coal combustion residuals
CFR	Code of Federal Regulations
cm/sec	centimeters per second
COI	constituent of interest
Facility Plan	*Facility Plan for Groundwater Investigation*
GWPS	groundwater protection standard
MNA	monitored natural attenuation
Plant Miller	James H. Miller, Jr., Electric Generating Plant
RCRA	Resource Conservation and Recovery Act
RO	reverse osmosis
Site	Plant Miller Ash Pond
SSE	selective sequential extraction
SSI	statistically significant increase
USEPA	U.S. Environmental Protection Agency

Executive Summary

Since submittal of the *Assessment of Corrective Measures* in June 2019 (Anchor QEA 2019a), extensive investigations have been performed to select effective corrective measures for arsenic, cobalt, and lithium, also known as constituents of interest (COIs), in groundwater at the James H. Miller, Jr., Electric Generating Plant (Plant Miller) Ash Pond (Site). The following corrective measures were selected:

- Source control to include dewatering, consolidation, and capping of the Site
- Permeation grouting in areas of higher concentrations of COIs to prevent COI movement beyond the facility boundary
- Monitored natural attenuation (MNA) over the entire Site

Closure of the Site—including dewatering, consolidation, and capping—will greatly reduce source contributions to groundwater. Permeation grouting was selected because, as a corollary to barrier walls, it impedes groundwater flow and helps prevent the migration of COIs away from the source area and facility boundary. MNA was selected because substantial evidence indicates it is currently occurring at the Site.

Existing monitoring wells will be used to monitor the effectiveness of the permeation grouting, and piezometers will be installed in the vicinity of the grout wall to demonstrate that the wall has cut off or greatly reduced groundwater flow as demonstrated by lower groundwater elevations downgradient of the wall. Reduction in groundwater flow will also reduce or eliminate mass flux of COIs away from the pond.

Extensive site-specific geochemical studies performed in 2020 and 2021 demonstrate that MNA is a viable corrective action for COIs in groundwater at the Site (Anchor QEA 2020a, 2020b, 2021). The preponderance of evidence indicates that Site conditions meet the U.S. Environmental Protection Agency's evaluation criteria for the use of MNA, specifically: area of impacts stable or shrinking, identified mechanisms for attenuation, stability of the attenuating mechanisms, sufficient aquifer capacity for attenuation, and time to achieve groundwater protection standards (GWPSs) considered reasonable when compared to other corrective action alternatives. The *Assessment of Corrective Measures* identified other corrective measures that could be used in conjunction with MNA should MNA not perform as expected. One of these corrective measures, permeation grouting, is planned for the Site.

Investigations performed to support MNA included preparation of concentration versus time and concentration versus distance graphs for COIs in groundwater; groundwater, well solids (precipitates), and soil sampling; laboratory analysis of solid samples for bulk chemistry (X-ray fluorescence), mineralogy (X-ray diffraction and scanning electron microscopy), and cation exchange capacity; geochemical modeling; selective sequential extraction (SSE) to determine associations of

COIs with attenuating solids and stability of the COIs and their host minerals; and column studies to assess aquifer capacity for attenuation.

The trends observed in concentration versus time and concentration versus distance graphs provide evidence that natural attenuation is occurring at the Site. Concentration versus time graphs indicated that arsenic, cobalt, and lithium concentrations are generally decreasing or stable, even without source control. Also, concentration versus distance graphs along downgradient transects indicate arsenic, cobalt, and lithium concentrations are generally decreasing with distance from the Site.

Based on the geochemical investigations, multiple lines of evidence support multiple attenuating mechanisms, depending upon the COI. The major attenuating mechanisms include sorption on iron oxides (arsenic and cobalt), cation exchange on clays (cobalt and lithium), coprecipitation in iron oxides (cobalt), and precipitation in barium arsenate (arsenic). All COIs are subject to physical attenuation mechanisms such as dispersion and flushing, which will contribute to decreased concentrations with time and distance from the Site.

Column studies were performed to assess the ability of the aquifer media (soil) to remove COIs from groundwater. Column studies using different combinations of site soils and groundwaters showed arsenic and lithium are strongly taken up by the aquifer media. The column attenuation capacity was extrapolated to the entire mass of the aquifer downgradient of the consolidated Site. The extrapolation showed the aquifer has an attenuating capacity of many more times the mass of arsenic and lithium requiring attenuation. Concentration versus time and concentration versus distance graphs, as well as other geochemical studies, indicate that cobalt is being attenuated at the Site. While cobalt was not removed by the soils tested in the column studies, its attenuation at the Site may be controlled by slower processes such as coprecipitation that might not be observed within the time frame of a column experiment and may be limited by local groundwater geochemical conditions.

SSE was performed on samples of well solids (precipitates) and soils used in the column studies to assess the stability of the attenuated COIs and their host minerals. SSE data for the COIs are somewhat limited due to the small sample size for the well solids, and a relatively high number of samples measuring below the method detection limit for both data sets. Iron, which is commonly associated with arsenic and cobalt attenuation, is present in the exchangeable, reducible, and oxidizable fractions for well solids, but primarily in the oxidizable and residual fractions in the post-column soil samples. Arsenic is mostly in the exchangeable fraction in the post-column soils, with some in the oxidizable and residual fractions. In the post-column soils, cobalt occurs primarily in the exchangeable and reducible fractions, with some in the oxidizable and residual fractions. Manganese, which is associated with lithium attenuation, is distributed among all (except water soluble) fractions, depending upon the sample. Due to almost no COIs in the water soluble fraction, and the sum of the mass of COIs in the more stable fractions (oxidizable, reducible, and residual), attenuated COIs are not expected to remobilize back into groundwater.

The slope of trend lines through recent data on concentration versus time graphs and results from reactive transport modeling were used to estimate time to achieve the applicable GWPS. Depending on the COI and well (area), the estimated time to achieve natural attenuation ranges from 2 to 25 years, not considering source control. These time frames are reasonable to achieve GWPSs by MNA and are compatible with the closure and post-closure periods. However, due to short-term perturbations in groundwater flow and geochemistry due to consolidation (moving coal combustion residuals [CCR]) and dewatering, temporary increases in COI concentrations may be observed in some wells. Site closure and permeation grouting are expected to accelerate time to achieve GWPSs.

Extensive sitewide monitoring will be performed to evaluate the remedial effectiveness of individual corrective actions such as permeation grouting, as well as the cumulative effects of closure (source control), grouting, and MNA. The certified compliance monitoring network will be supplemented to establish a comprehensive corrective action groundwater monitoring program meeting the requirements of CCR Rule 40 Code of Federal Regulations (CFR) § 257.98(a) and Alabama Department of Environmental Management (ADEM) Administrative Code (Admin. Code) r. 335-13-15-.06(9)(a). The corrective action groundwater monitoring program will be submitted within 90 days of this *Groundwater Remedy Selection Report* and include the following: 1) the certified CCR compliance monitoring that meets the assessment monitoring requirements of 40 CFR § 257.95 and ADEM Admin. Code r. 335-13-15-.06(6); 2) additional wells that document the effectiveness of the remedy; and 3) sample locations and data evaluation that demonstrate compliance with the GWPS and protection of potential human and ecological receptors.

Alabama Power Company will employ an adaptive site management approach to perform ongoing remedy system evaluation, consider adjustments to the remedy, and ensure achievement of corrective action objectives at the Site. Adaptive triggers will be developed, and additional actions (monitoring, analysis, and supplemental corrective action measures) will be implemented as needed. Details on the sitewide corrective action groundwater monitoring program, including adaptive triggers, will be provided in a detailed monitoring program to be submitted within 90 days of this *Groundwater Remedy Selection Report*.

1 Introduction

1.1 Purpose

This *Groundwater Remedy Selection Report* was prepared to meet the requirements of the U.S. Environmental Protection Agency's (USEPA's) coal combustion residuals (CCR) Rule 40 Code of Federal Regulations (CFR) § 257.97, the Alabama Department of Environmental Management's (ADEM's) Administrative Code (Admin. Code) r. 335-13-15-.06(8), and Part C of Administrative Order No. 18-098-GW at Alabama Power Company's (APC's) James H. Miller, Jr., Electric Generating Plant (Plant Miller) Ash Pond (Site). Specifically, this report has been prepared to present a groundwater corrective action plan to address the occurrence of arsenic, cobalt, and lithium in groundwater at the Site.

Prior to preparing this final *Groundwater Remedy Selection Report*, semiannual progress reports were prepared to describe the progress made in evaluating the selected remedy and alternative remedies and designing a remedy plan (Anchor QEA 2019b, 2020a, 2020b, 2021).

1.2 Site Location and Description

Plant Miller is located in northwestern Jefferson County, Alabama, approximately 15 miles northwest of Birmingham, Alabama. The physical address is 4250 Porter Road, Quinton, Alabama 35130-9471. Plant Miller lies in Sections 21, 22, 27, 28, 29, 32, 33, and 34, Township 16 South, Range 5 West and Section 4, Township 17 South, Range 5 West. Section, township, and range data are based on visual inspection of U.S. Geological Survey topographic quadrangle maps and GIS maps (USGS 2018a, 2018b).

The Site is located south of the main plant. Figure 1 depicts the location of the Site with respect to the surrounding area. The Site was constructed in the late 1970s and is approximately 321 acres. The Site includes two dikes: the main cross-valley dike located on the western edge of the pond and a saddle dike located along the east side of the impoundment. The main dike is approximately 170 feet tall at its highest point and 3,300 feet long, while the saddle dike is 25 feet tall and 1,000 feet long. The main dike is a zoned embankment constructed with a relatively impervious clay core, random soil and rock fill on the embankment to each side of the core, and a chimney drain on the downstream side of the clay core.

1.3 Site Closure

The Site will be closed by removing free liquid from CCR, consolidating the area of CCR placement, sloping and grading the material to promote drainage, and installing a low-permeability final cover system to minimize infiltration. The proposed corrective action strategy incorporates the closure of the Site, which will effectively control the source of CCR constituents to groundwater by removing free liquid from the CCR, reducing the area of the Site footprint, and capping the CCR in place to prevent further stormwater infiltration. Specifically, the design for the Site closure calls for dewatering and consolidating the CCR material from the current Site footprint of approximately 321 acres to an area of approximately 191 acres within a diked area. Stormwater management features will be constructed around the perimeter of the consolidated CCR material, along with a final cover consisting of an engineered synthetic turf and geomembrane. The planned closure schedule of major milestones and approximate time frames are shown in Figure 2. Additional information on Site closure is included in Section 3.1.

1.4 Hydrogeology and Groundwater Flow

The Site is underlain by the Lower Pottsville Formation, with rocks of the Mary Lee, Gillespy, and Pratt Coal groups. Residual soils developed from the in-place weathering of the Pottsville Formation typically consist of clays, silty sands, and clayey sands. The Pottsville aquifer system is the primary aquifer at the Site and is composed primarily of Pennsylvanian Age sandstones, shales, conglomerates, and coal. Groundwater flows radially away from the Site through fractured rock, as shown on maps depicting groundwater flow direction inferred from groundwater elevation contour maps and presented in Appendix B. Groundwater flow rates generally range from 0.37 to 0.93 feet per day, and groundwater elevations vary seasonally (SCS 2018a).

Geologic cross sections depicting subsurface conditions and conceptual closure details at the Site are included in Figures 3 through 5. As shown in these figures, the major components of the hydrogeological conceptual site model include the following (SCS 2018a):

- Stratigraphy: complex lithologic sequences of shale, mudstone, sandstone, and coal with significant vertical and horizontal heterogeneity due to depositional environment
- Uppermost Aquifer: generally defined as the Pottsville Formation; can be subdivided into two aquifers beneath the Site: the Mary Lee and Pratt and Gillespy-Curry aquifers; depth to the uppermost aquifer ranges from 40 to 290 feet below ground surface; aquifers are generally considered confined due to large permeability contrasts within the Pottsville Formation; groundwater yield is generally via interconnected fractures, bedding planes, and coal seams; groundwater yield is often insufficient for low-flow purging of monitoring wells; successful wells generally yield between 0.01 and 0.8 gallons per minute

Groundwater flow characteristics at the Site are as follows (SCS 2018a):

- Groundwater flow is accomplished primarily by means of fracture flow, where groundwater flows along more conductive secondary discontinuities in the rock mass.
- Fractures at the Site are typically high-angle/near vertical (75° to 88°); bedding planes at the Site are near flat lying with dips ranging from 0° to 6° toward the south; paired well locations

and heat pulse flowmeter logging indicate downward vertical flow is an important component of groundwater flow within the uppermost aquifer at the Site.

- Complex lithostratigraphy, sharp permeability contrasts, and the fractured nature of the Pottsville Formation contribute to vertical groundwater flow at the Site.
- Hydraulic conductivity in the uppermost aquifer is typically between 10^{-4} to 10^{-5} centimeters per second (cm/sec) with an average of 6.15×10^{-4} cm/sec. Calculated horizontal hydraulic conductivities ranged from 6.0×10^{-7} to 6.0×10^{-3} cm/sec based on packer test and slug test results.
- Groundwater flows radially away from the Site, and the flow velocities generally range from 0.37 to 0.93 feet per day.
- Groundwater elevations fluctuate in response to rainfall. Seasonal variations of approximately 1 to 7 feet are typical at the Site, with a few other wells displaying variations up to 12 feet.

1.5 Nature and Extent of Groundwater Exceedances

Based on groundwater monitoring performed pursuant to the federal CCR rule and ADEM's rules, arsenic, cobalt, and lithium have been identified in Site groundwater at concentrations exceeding the groundwater protection standard[1] (GWPS).

Statistically significant increases (SSIs) of Appendix III to 40 CFR Part 257 constituents were noted during the September 2017 compliance detection sampling event as described in the *2017 Annual Groundwater Monitoring and Corrective Action Report* (SCS 2018b). The Appendix III SSIs triggered assessment monitoring for Appendix IV constituents, with the first assessment sampling event occurring in January 2018.

The extent of GWPS exceedances based on recent delineation data are presented in Figure 6. As shown in Figure 6, lithium concentrations greater than the GWPS occur across much of the north, south, and west portions of the Site. The occurrence of arsenic and cobalt at concentrations greater than the GWPS are constrained to smaller areas.

A *Facility Plan for Groundwater Investigation* (Facility Plan; SCS 2018a) at the Site was completed to meet the requirements of Administrative Order No. 18-098-GW issued to APC by ADEM on August 15, 2018. Part B of the order required completion of a Facility Plan by November 13, 2018.

Details on groundwater data evaluation and monitoring well abandonments and installations (including wells installed for delineation) are provided in annual groundwater monitoring and corrective action reports (SCS 2018b, 2019, 2020, 2021). Several phases of investigation have been completed at the Site to delineate the extent of Appendix IV constituents exceeding GWPSs

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[1] During recent sampling events, molybdenum has been detected at increasing concentrations in wells MR-AP-MW-10 and MR-AP-MW-12.

(SCS 2019, 2020, 2021). Delineation wells were installed to characterize the horizontal and vertical extent of arsenic, cobalt, and lithium exceedances identified during assessment monitoring. Horizontal delineation wells were installed using a stepping-out approach based on groundwater flow direction relative to monitoring wells exhibiting exceedances.

2 Groundwater Remedy Selection Process

Groundwater remedy selection has occurred in two stages: 1) completing an *Assessment of Corrective Measures* (ACM) to identify potentially feasible remedies for the Site after the initial determination that GWPSs have been exceeded; and 2) evaluating potential remedies to develop this specific remedy plan.

2.1 Assessment of Corrective Measures

In June 2019, the ACM was prepared pursuant to USEPA's CCR rule (40 CFR Part 257.96), ADEM's Admin. Code r. 335-13-15, and an Administrative Order issued by ADEM (AO 18-098-GW) to evaluate potentially feasible groundwater corrective measures for the occurrence of arsenic, cobalt, and lithium in groundwater(Anchor QEA 2019a). This ACM was the first step in developing a long-term corrective action plan to address GWPS exceedances identified at the Site.

As described in the ACM, the following remedies were considered as potentially feasible groundwater corrective measures:

- Geochemical manipulation via injection of treatment solutions
- Monitored natural attenuation (MNA)
- Hydraulic containment (pump-and-treat)
- Permeation grouting

As part of the ACM, some potential remedies were eliminated from consideration because they were technically infeasible or not applicable at the Site. Specifically, permeable reactive barrier walls and vertical barrier walls would need to be installed deep into bedrock, which is not technically feasible. Due to its shallow depth of effectiveness, phytoremediation is not applicable at the Site. Since submittal of the ACM, desktop studies, field work, and laboratory studies have been performed to evaluate potential corrective measures for the Site. Results of these studies are summarized in the semiannual remedy selection progress reports (Anchor QEA 2019b, 2020a, 2020b, 2021).

2.2 Remedy Performance Standards

The ACM was only the first step in the process for developing a groundwater remedy. The CCR rule contemplated that multiple potential remedies would be identified as potentially effective at achieving the corrective action objectives outlined in 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b). Thus, following the ACM, remedial options were evaluated to identify a remedy plan that meets the five performance criteria listed in 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b). As required in the rules, a remedy must do the following:

1. Be protective of human health and the environment.
2. Attain applicable GWPSs as specified in the CCR rule.

3. Control the source(s) of the release to reduce or eliminate, to the extent feasible, further releases of Appendix IV to 40 CFR Part 257 constituents into the environment.
4. Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, considering factors such as avoiding inappropriate disturbances of sensitive ecosystems.[2]
5. Comply with any relevant standards (i.e., all applicable Resource Conservation and Recovery Act [RCRA] requirements) for management of wastes generated by the remedial actions.

2.3 Remedy Selection Considerations

In selecting a remedy plan to meet the above performance criteria, consideration factors are set forth in 40 CFR § 257.97(c) and ADEM Admin. Code r. 335-13-15-.06(8)(c) to weigh which option(s) may be most appropriate based on site-specific conditions. These factors include the following:

1. The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on consideration of the following
   i. Magnitude of reduction of existing risks
   ii. Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy
   iii. The type and degree of long-term management required, including monitoring, operation, and maintenance
   iv. Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal of contaminant.
   v. Time until full protection is achieved
   vi. Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment
   vii. Long-term reliability of the engineering and institutional controls
   viii. Potential need for replacement of the remedy
2. The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:
   i. The extent to which containment practices will reduce further releases
   ii. The extent to which treatment technologies may be used

[2] The preamble to the CCR rule explains that this requirement is "more directly related to remediation of contamination associated with a release, such as from a collapse or structural failure of a CCR unit," not a release to groundwater (80 Federal Register 21302, 21407 [April 17, 2015]). The 40 CFR § 257.97(b)(4) remedial objective is not applicable to the groundwater corrective action for the Site, but it is included here for completeness when referencing the rule requirements. Because there was no release of material as contemplated by the rule, this requirement is not evaluated as a performance standard for the proposed remedy.

3. The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors
    i. Degree of difficulty associated with constructing the technology
    ii. Expected operational reliability of the technologies
    iii. Need to coordinate with and obtain necessary approvals and permits from other agencies
    iv. Availability of necessary equipment and specialists
    v. Available capacity and location of needed treatment, storage, and disposal services
4. The degree to which community concerns are addressed by a potential remedy(s)

None of the factors identified in 40 CFR § 257.97(c) and ADEM Admin. Code r. 335-13-15-.06(8)(c) are given greater weight over others. After balancing the various factors, the rules provide facilities with discretion in selecting the final remedy plan, so long as it will achieve the remedial objectives in 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b). Therefore, more technically or mechanically complex and aggressive approaches may not be the most suitable remedy option.

The CCR rules do not establish a set time frame for a facility to evaluate potential remedies and develop a final remedy plan. 40 CFR § 257.97(a) and ADEM Admin. Code r. 335-13-15-.06(a) require an owner or operator to select a remedy "as soon as feasible," and 80 Federal Register 21407 explains USEPA declined to set a specific time frame for selecting a remedy because sites vary in complexity.

2.4 Remedy Evaluation

As discussed in Section 2.1, the ACM identified potentially feasible remedies for groundwater corrective measures for the Site. Sections 2.4.1 through 2.4.4 provide details regarding the evaluation of each remedy relative to the considerations listed in 40 CFR § 257.97(c) and ADEM Admin. Code r. 335-13-15-.06(c).

2.4.1 Permeation Grouting

Permeation grouting was evaluated relative to the considerations listed in 40 CFR § 257.97(c) and ADEM Admin. Code r. 335-13-15-.06(c) and is retained as part of the planned remedy. At the Site, permeation grouting would be performed using cement-based grout to fill void spaces and fractures in weathered and intact rock to greatly reduce permeability and resultant impacted groundwater flow. Permeation grouting, which is a fractured rock corollary to a conventional vertical barrier wall, impedes groundwater flow and helps prevent migration of COIs away from the source area and facility boundary. Slower groundwater travel times should aid MNA because slower travel times allow more time for attenuation mechanisms to operate. At the Site, permeation grouting is proposed for areas with higher concentrations of COIs and would be effective over the short and long terms. Based on the remedy selection considerations, permeation grouting is a viable and effective alternative for the Site.

2.4.2 *Monitored Natural Attenuation*

MNA was evaluated relative to the considerations listed in 40 CFR § 257.97(c) and ADEM Admin. Code r. 335-13-15-.06(c) and is retained as part of the planned remedy. Extensive geochemical and related studies demonstrate that MNA is a viable corrective action for groundwater impacts observed at the Site. The preponderance of evidence indicates that Site conditions meet USEPA's evaluation criteria for the use of MNA, specifically: area of impacts stable or shrinking, identified mechanisms for attenuation, stability of the attenuating mechanisms, sufficient aquifer capacity for attenuation, and time to achieve GWPSs reasonable as compared to other corrective action alternatives. The ACM identified alternative corrective measures, the last criteria should MNA not perform as expected. Permeation grouting is proposed in areas with higher concentrations of COIs in groundwater; therefore, MNA is one component of corrective action, rather than a stand-alone remedy. The *Monitored Natural Attenuation Demonstration* report is included as Appendix C.

2.4.3 *Geochemical Manipulation via Injection of Treatment Solutions*

Geochemical manipulation via injections may be a viable remedial technology but is not currently selected because it has not been proven in field applications for effective treatment of inorganic constituents in fractured rock settings. Treatment solutions have been proven effective for arsenic in both laboratory treatability studies and field applications in sand aquifers, as well as for lithium and cobalt in laboratory treatability studies (Anchor QEA 2017, 2018, 2019c, 2019d; EPRI 2021). Injection treatments require that sufficient quantity of treatment solution be introduced into the aquifer and distributed adequately to capture the mass of COIs. Implementation techniques have not yet been tested for treatment of inorganic constituents in fractured rock aquifers. Related to distribution, injection treatment for inorganic constituents relies on creating solid particles in situ that incorporate COIs in their mineral structures and capture COIs on their surfaces (sorption). The solids created from injection treatment may clog the relatively narrow fractures in rock such that distribution of treatment is not adequate. Geochemical manipulation via injections may be considered for further analysis if the selected technologies do not perform as expected (which is unlikely).

2.4.4 *Hydraulic Containment (Pump-and-Treat)*

Based on the remedy selection considerations, hydraulic containment is not recommended for the Site because the long- and short-term effectiveness and degree to which the approach would be successful is uncertain. Furthermore, compared to other alternatives, hydraulic containment would be very difficult to implement, operate, and maintain over the long term. In summary, hydraulic containment is not being considered for the Site for the following reasons (in no order of importance):

- Requires drilling a relatively high number of extraction wells relatively deep (up to 290 feet) in bedrock

- Uncertainty that the wells would intersect enough permeable (water-bearing) fractures to effectively capture and contain the impacts
- Inefficiency of the system extracting and treating high volumes of unimpacted water concurrent with impacted groundwater
- Difficult long-term operation and maintenance requirements
- Long time required to achieve GWPSs, likely beyond the post-closure period of 30 years
- Low sustainability (excessive use of resources)

Many pumping wells, extensive piping, and a water treatment system would be required to implement pump-and-treat at the Site. Depending upon fracture spacing and orientation, a high number of relatively deep wells (based on depths of COIs) would be required. For example, near-vertical fractures, as is typical for the area, would require close spacing of wells to intersect sufficient water-bearing fractures to extract impacted groundwater as compared to porous media, which has greater interconnectivity.

Pump-and-treat systems typically have high operation and maintenance requirements (USEPA 2002). These include keeping the wells, pumps, piping, and water treatment system in working order and replacing components as needed. Fouling of well screens and piping is not uncommon in pump-and-treat systems. Pumping wells often require cleaning; rehabilitation; and, under the most adverse conditions, periodic replacement of the wells due to fouling. Pumps and components of the water treatment system will need to be replaced periodically. In addition, water treatment for the three COIs at the Site will require an ongoing supply of water treatment chemicals such as ferric chloride and sodium hydroxide (for pH adjustment) and will produce significant volumes of sludge that will require dewatering and proper disposal. Water treatment for lithium may require reverse osmosis (RO). RO produces a significant amount of reject water, where the COIs are concentrated. RO reject water will likely require treatment (such as evaporation) and may produce a solid waste that requires disposal. Water treatment systems usually require an operator.

Hydraulic containment (pump-and-treat) will likely not offer any time advantage to achieving GWPSs over geochemical manipulation and MNA due to the slow release of COIs from the attenuating solids such as iron oxides in weathered rock or fractured filings. As described in Appendix C, COIs are adhered to relatively stable solids, such as iron oxides, in the aquifer. These attenuating solids will release COIs to groundwater very slowly (if at all) through time. To remove even very small amounts of the COIs from the solids, many pore volumes (possibly hundreds) of water would need to be passed over the attenuating solids. Passing this number of pore volumes over the aquifer solids would take decades, possibly more than 100 years. The long time period and resultant small concentrations in pumped groundwater produce large volumes of water requiring treatment for very small amounts of COIs. Natural attenuation is occurring at the Site, and pump-and-treat would operate against (essentially try to reverse) the natural processes already occurring. Pump-and-treat systems for inorganic constituents such as the COIs at the Site typically operate for decades (SCS 1997; Geosyntec 2021), some with no end in sight.

Pump-and-treat is also one of the least sustainable groundwater corrective actions, as it requires extensive resources to implement and operate. These resources are expended for decades and include raw materials for the infrastructure, ongoing electricity use, water treatment chemicals, water treatment system operation, pump replacement, well redevelopment and maintenance, equipment maintenance, and laborers for monitoring and maintenance.

3 Selected Groundwater Remedy

Since submittal of the ACM in June 2019 (Anchor QEA 2019a), extensive investigations have been performed to select effective corrective measures for COIs in groundwater at the Site. Semiannual status reports regarding investigation and evaluation have been submitted to ADEM and posted to the Site's CCR compliance webpage. Based on investigation and evaluation, the following combination of corrective measures are proposed to address GWPS exceedances at the Site:

- Source control
  - Dewatering and consolidating the Site footprint by approximately 40%
  - Installing a low-permeability geosynthetic cover system over the consolidated footprint
- Permeation grouting
  - Emplaced in areas of relatively high COIs in groundwater
  - Create a cutoff wall to prevent migration of COIs from the facility boundary
- MNA
  - Establish no-exceedance boundary monitoring
  - Monitor concentration reduction and natural attenuation mechanisms
- Adaptive site management (discussed in Section 5)
  - Routinely evaluate remedy system performance
  - Measure performance against interim performance standards (adaptive triggers)
  - Systematically re-evaluate remedy system performance against adaptive triggers

The selected remedy plan meets the four performance standards of 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b) and will achieve the following:

- Be protective of human health and the environment.
- Attain the GWPS specified in the rules.
- Control the source of release to reduce or eliminate, to the extent feasible, further releases to the environment.
- Comply with any relevant standards (i.e., all applicable RCRA requirements) for management of wastes generated by the remedial actions.

As required by 40 CFR § 257.97(a) and ADEM Admin. Code r. 335-13-15-.06(8)(a), Sections 3.1 through 3.3 describe the selected remedy.

3.1 Source Control

The Site will be closed in a manner that controls "the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment," as required by 40 CFR § 257.97(b)(3) and ADEM Admin. Code r. 3351315.06(8)(b)3.

Closure of the Site will be accomplished by dewatering, consolidating the footprint to a smaller area, and capping the CCR with a final cover system. The proposed corrective action strategy incorporates the closure of the Site, which will effectively control the source of CCR constituents to groundwater by removing free liquid from the CCR, reducing the area of the Site footprint, and capping the CCR in place to prevent further stormwater infiltration. Specifically, the design for the Site closure calls for dewatering and consolidating the CCR material from the current Site footprint of approximately 321 acres to an area of approximately 191 acres within a diked area. Stormwater management features will be constructed around the perimeter of the consolidated CCR material, along with a final cover consisting of an engineered synthetic turf and geomembrane.

Site closure activities began in 2019. As presented in the *Amended Closure Plan for Ash Pond* (APC 2020), closure of the Site will be accomplished by the following:

1. Dewatering and consolidating the CCR footprint from approximately 321 acres to approximately 191 acres
2. Construction of a perimeter soil buttress
3. Installing a low-permeability geosynthetic final cover system over the consolidated CCR

3.1.1 Dewatering and Consolidation

As part of closure, the CCR will be dewatered sufficiently to remove the free liquids. Removing free liquids will reduce the volume of water available to migrate from the Site during closure and minimize hydraulic head within the pond, thereby reducing pressure to cause migration from the CCR pond. CCR will be consolidated into a smaller footprint and graded prior to installation of the final cover system.

Excavation will include removing all visible ash and over excavating into the subgrade soils. Consolidation of the horizontal footprint by approximately 40%, from 321 acres to an area of approximately 191 acres, will reduce the CCR surface area potentially exposed to groundwater, thereby reducing the leaching potential of COIs to groundwater.

The perimeter around the consolidated footprint will contain updated stormwater components to convey runoff flows through a series of berms and channels on the closure cap. Stormwater will be conveyed off the cap and into perimeter stormwater channels or to a restoration area, and eventually into the stormwater ponds. Additional details regarding consolidation and dewatering are provided in the previously submitted *Amended Closure Plan for Ash Pond* (APC 2020).

Excavating and subsequent placement of CCR could result in temporary releases of COIs due to physical disruption and, possibly, geochemical changes (e.g., temporary introduction of oxygen). Dewatering will also produce changes in groundwater flow. Therefore, geochemical and groundwater flow disequilibria are expected during and, likely, for a few years after closure. Until the new flow and geochemistry equilibria are established, temporary increases in COI concentrations may be observed in some wells.

3.1.2 Soil Buttress

The closure design incorporates a soil buttress to maintain the stability of the closed CCR area. The containment buttress will provide long-term stability to the closure area and be constructed of a combination of engineered earth and rock fills. The buttress will be constructed according to the structural fill specifications so the quality and strength of the soil fill can be verified. The main soil buttress extends from the natural ground surface exposed at the base of the excavation up to an elevation of 420 feet. The buttress also incorporates a drainage system designed to convey remaining interstitial water to a collection sump, further decreasing the chance of COI migration into groundwater.

3.1.3 Final Cover System (Cap)

The final cover will be constructed to "control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration" of stormwater into the closed CCR unit, which will mitigate potential releases of COIs to groundwater. The final cover system is designed to prevent the future impoundment of water and includes measures to prevent infiltration and sloughing, and minimize erosion from wind and water, settling, and subsidence. The final cover system, at a minimum, will meet or exceed the requirements of 40 CFR § 257.102(d)(3)(ii) and ADEM Admin. Code r. 335-13-15-.07(3)(d)3.(ii) (alternative cover system). Current design for the cover consists of a three-component system composed of a structured geomembrane, an engineered turf, and engineered sand or cementitious infill.

The geomembrane in the system provides a near-impermeable barrier and can either be a 40- or 50-mil geomembrane. A textured geomembrane is used for the flatter top deck, while a geomembrane with an integrated drainage layer has been specified for use on slopes. The sand infill protects the geotextile from ultraviolet degradation and provides ballast for the system. Final design will ensure the disruption of the integrity of the final cover system is minimized through a design that accommodates settlement and subsidence, in addition to providing an upper component for protection from wind or water erosion. The final cover system will have a permeability of 10^{-5} cm/sec or less (APC 2020).

Infiltration will also be impeded by providing sufficient grades and slopes to achieve the following: 1) preclude the probability of future impoundment of water or sediment on the cover system; 2) ensure slope and cover system stability; 3) minimize the need for further maintenance; and 4) be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices (APC 2020).

3.2 Permeation Grouting

At the Site, the intent of permeation grouting will be to create a low-permeability subsurface wall to impede the flow of impacted groundwater away from the source. The wall is created by filling fractures, bedding planes, and other void spaces in the rock with cement grout. Permeation grouting has been performed successfully for civil engineering applications at nearby Plant Gorgas, which has a very similar geology to Plant Miller.

As shown in Figure 6, a permeation grouting pilot test is proposed along the northwest side of the pond upgradient of the MR-AP-MW-3 well cluster. To determine the effectiveness and refine the implementation process of permeation grouting at the Site, a pilot test will be performed for approximately 100 feet in the vicinity of wells MR-AP-MW-3S, MR-AP-MW-3D, and MR-AP-MW-3V to a depth of approximately 240 feet. A detailed pilot test plan will be prepared prior to implementation of the permeation grouting pilot test. However, the pilot test is expected to contain the components as described below or similar components. Figure 6 includes the extent of both the Phase 1 (Pilot Test) areas and potential Phase 2 permeation grouting areas. The locations of the pilot test and potential Phase 2 areas were selected based on COI concentrations and trends. The horizontal and vertical extent of the Phase 2 permeation grouting program are dependent on further evaluation and the results of Phase 1 (Pilot Test).

The following grouting Phase 1 (Pilot Test) description is based on an ongoing (as of 2021) proof-of-concept field demonstration at Logan Martin Dam, which was approved by civil and geotechnical engineers at the Federal Energy Regulatory Commission. The proposed pilot study utilizes the most current techniques for permeation grouting developed by the team of experts emplacing a grout wall at the Logan Martin Dam site in Vincent, Alabama.

Grouting programs typically include the drilling and testing of primary grout holes, followed by the injection of cement-based grout. Primary grout holes are drilled on a prescribed spacing, then secondary holes are placed between the primary holes. One measure of success of the grouting program is the reduction in permeability (as measured by packer hydraulic conductivity tests) in the secondary holes, and resultant less grout injection into the secondary holes, as compared to the primary holes. In addition, a grout wall typically consists of more than one row of grout holes as shown in Figure 7.

Both low- and high-mobility grout will be utilized in the pilot test program to ensure adequate filling of spaces in the rock, and a resulting wall that is as impermeable as possible. The reactive ingredient in both grouts is Portland cement. Low-mobility grout typically contains sand to increase its viscosity, limit its distance of travel, and fill larger spaces in the rock. High-mobility grout does not contain sand, can penetrate smaller spaces (e.g., smaller fractures) in the rock, and will travel greater distances from the grout hole. Other ingredients may be added to the grout to improve its properties and serve as fillers. Any additional additives used in the pilot test program will be determined to be environmentally acceptable based on their safety data sheets and other information. Prior to injection of grout into ground, a test block using the grout mix will be created, and USEPA Method 1315 (monolith leaching test) will be performed on the test block to ensure that the cement grout will not introduce COIs into the rock aquifer.

Grouting programs are, by nature, adaptive, and this approach is consistent with the adaptive site management approach for corrective action at the Site. Though an approximately 100-foot test grout section is proposed, cells within the section will be approximately 40 to 50 feet long. After emplacement of each cell, data will be analyzed, and specifications for the next cell will be adjusted accordingly.

The major measures of success of a grout wall include permeability reduction within the wall and a lower potentiometric surface on the downgradient side of the wall after grouting. Reduction in groundwater flow will also reduce or eliminate mass flux of COIs away from the closed pond. Slower groundwater travel times should aid MNA because slower travel times allow more time for attenuation mechanisms to operate. Most grout holes will be drilled using sonic drilling techniques. A few holes will be cored using wireline techniques to enable logging of rock and identification of permeable features. All grout holes will be permeability tested using packer tests. Permeability tests may be repeated in the same hole after grouting adjacent holes to quantify the permeability reduction during the grouting program. In addition, piezometers will be installed upgradient, side-gradient, and downgradient of the grout cells to monitor water levels and potentiometric surfaces. Instruments (multiparameter sondes such as Aqua TROLLs) will be installed in select grout holes and piezometers to collect continuous water level and pH data. A rise in pH indicates grout influence in the vicinity of a grout hole or piezometer due to the influence of the higher pH of Portland cement. A pH rise from grouting is expected to be temporary and observed very locally, i.e., in adjacent holes near the grout hole during grouting. pH is expected to move back toward pre-grouting (ambient) values after the grouting is completed.

3.3 Monitored Natural Attenuation

MNA has been a component of corrective action at RCRA and Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) sites since the 1990s. MNA describes a range of physical, chemical, and biological processes in the environment that reduce the concentration, toxicity, or mobility of constituents in groundwater. For inorganic constituents, the mechanisms of natural attenuation include sorption, dispersion, precipitation and coprecipitation, and ion exchange (USEPA 1999, 2007a, 2007b). MNA as a remedial alternative is dependent on a good understanding of localized hydrogeologic and geochemical conditions and may require considerable information and monitoring over an extended period of time.

USEPA defines MNA as the "reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods" (USEPA 1999, 2015). An MNA evaluation consists of the following steps or tiers (USEPA 2015):

1. Demonstrate that the area of impacts (plume) is stable or shrinking.
2. Determine the mechanisms and rates of attenuation.
3. Determine that the capacity of the aquifer is sufficient to attenuate the mass of constituents in groundwater and that the immobilized constituents are stable and will not remobilize.
4. Design a performance monitoring program based on the mechanisms of attenuation and establish contingency remedies (tailored to site-specific conditions) should MNA not perform as expected.

Where site conditions are conducive to MNA, it has the potential to provide a more sustainable, lower-cost alternative to aggressive remediation technologies such as pump-and-treat. The Electric Power Research Institute has prepared a document describing implementation of MNA for 24 inorganic constituents, which include most Appendix III and IV constituents (EPRI 2015).

Attenuation mechanisms can be placed in two broad categories, physical and chemical. Physical mechanisms include dilution, dispersion, flushing, and related processes. All constituents are subject to physical attenuation mechanisms, so physical processes should be considered in MNA evaluations.

When properly implemented, MNA removes constituents from groundwater and immobilizes them onto aquifer solids. Decisions to use MNA as a remedy or remedy component should be thoroughly supported by site-specific data and analysis (USEPA 1999, 2015). In addition, though not an MNA tier per se, source control is presumed to precede MNA implementation. Extensive MNA investigations were performed for the Site in 2020 and 2021 and are documented in the MNA demonstration report provided in Appendix C.

Site closure (dewatering, consolidation, and capping) and the soil buttress will meet the MNA criteria for source control. As described in Section 3.1, the Site will be closed by consolidating the Site footprint from approximately 321 acres to approximately 191 acres. CCR removed from outside the consolidated footprint will be dewatered, excavated, and compacted within the consolidated footprint. All visible CCR and a portion of the subgrade soils will be excavated outside the consolidated footprint. The final cover of the consolidated footprint will have a permeability of 10^{-5} cm/sec or less and be constructed to control and minimize or eliminate (to the extent possible) post-closure infiltration of precipitation into the waste and potential releases of CCR from the unit. Site closure will greatly reduce any future discharges to groundwater.

3.3.1 Site-Specific MNA Evaluation Summary

As described in greater detail in Appendix C, the trends observed in concentration versus time and concentration versus distance graphs provide evidence that natural attenuation is currently occurring at the Site, even without source control. Concentration versus time graphs indicated that arsenic, cobalt, and lithium concentrations are generally decreasing or stable in several areas. Also, concentration versus distance graphs along downgradient transects indicate that arsenic, cobalt, and lithium are generally decreasing with distance from the Site.

Based on the geochemical investigations, several lines of evidence support multiple attenuating mechanisms, depending upon the COIs. The major attenuating mechanisms include the following:

- Sorption on iron oxides (arsenic and cobalt)
- Cation exchange on clays (cobalt and lithium)
- Coprecipitation in iron oxides (cobalt)
- Precipitation in barium arsenate (arsenic)

Rates of attenuation were determined by extrapolating decreasing trends on the concentration versus time graphs to the GWPS for areas where decreasing trends were observed. Depending on the COIs and well (area), the estimated time to achieve natural attenuation ranges from 2 to 25 years, not considering source control. Most of this range is reasonable compared to durations of other corrective action technologies. Though these time frames are reasonable to achieve GWPSs by MNA, closure and permeation grouting are expected to accelerate time to achieve GWPSs. However, due to short-term perturbations in groundwater flow and geochemistry due to consolidation (moving CCR) and dewatering, temporary increases in COI concentrations may be observed in some wells. Based on MNA case histories for inorganic constituents, MNA time frames typically range from a few years to decades (EPRI 2015). Because pond closure activities (dewatering, consolidation, and capping) at the Site are projected to take approximately 7 additional years, the time frame for MNA is compatible with the closure period.

Column studies were performed to assess the ability of the aquifer media (soil) to remove COIs from groundwater. Column tests using different combinations of Site soils and groundwaters showed arsenic and lithium are strongly taken up by the aquifer media, likely due to sorption and ion exchange reactions. The column attenuation capacity was extrapolated to the entire mass of the aquifer downgradient of the Site but within the property boundary. The extrapolation showed that the aquifer has an attenuating capacity of many more times the mass of arsenic and lithium requiring attenuation. Concentration versus time and concentration versus distance graphs, as well as other geochemical studies, indicate that cobalt is being attenuated at the Site. While cobalt was not removed by the soils tested in the column studies, its attenuation at the Site may be controlled by slower processes such as coprecipitation that might not be observed within the time frame of a column experiment and may be limited by local groundwater geochemical conditions. All COIs are also subject to physical attenuation processes (dispersion and flushing).

Selective sequential extraction (SSE) was performed on samples of well solids (precipitates) and soils used in the column studies to assess the stability of the attenuated COIs and their host minerals. SSE data for the COIs are somewhat limited due to the small sample size for the well solids, and a relatively high number of samples measuring below the method detection limit for both data sets. Iron, which is commonly associated with arsenic and cobalt attenuation, is present in the exchangeable, reducible, and oxidizable fractions for well solids, but primarily in the oxidizable and residual fractions in the post-column soil samples. Arsenic is mostly in the exchangeable fraction in the post-column soils, with some in the oxidizable and residual fractions. In the post-column soils, cobalt occurs primarily in the exchangeable and reducible fractions, with some in the oxidizable and residual fractions. Manganese, which is associated with lithium attenuation, is distributed among all (except water soluble) fractions, depending upon the sample. Due to almost no COIs in the water soluble fraction, and the sum of the mass of COIs in the more stable fractions (oxidizable, reducible, and residual), attenuated COIs are not expected to remobilize back into groundwater.

3.3.2 Site-Specific MNA Monitoring Program

Corrective action performance monitoring consists of two major components: 1) monitoring for sitewide corrective action, which would include MNA and the positive benefits of source control and permeation grouting at the Site scale; and 2) remedial effectiveness monitoring in the areas of grouting. Sitewide monitoring applies to MNA because MNA will be implemented over the entire Site.

Implementation of MNA at the Site will be relatively easy. Most of the wells for MNA are already in place, though some additional wells may need to be installed to monitor progress in critical areas. The site-specific MNA plan will be composed of the following:

- A network of sentinel or clean-line monitoring points beyond the extent of GWPS exceedances
  - The clean-line network will consist of monitoring wells and surface water sampling locations and will be monitored to verify that GWPS exceedances do not occur at or beyond the locations.
- Monitoring wells located within the areas exhibiting GWPS exceedances
  - These wells will be monitored to verify attenuation mechanisms, document decreasing concentrations, calculate plume mass or mass flux, and provide monitoring data to demonstrate MNA effectiveness.
- A comprehensive data analysis and reporting plan
- Components of an adaptive site management plan

A key component of MNA is a detailed monitoring and reporting plan. Pursuant to 40 CFR § 257.98(a) and ADEM Admin. Code r. 335-13-15-.06(9)(a), a remedy and monitoring program must be implemented within 90 days of selecting a remedy. As documented in Appendix C, natural attenuation is already occurring at the Site. A comprehensive and specific MNA corrective action groundwater monitoring plan will be developed within 90 days of this report. A conceptual summary of the anticipated MNA monitoring network is included in Figure 8.

MNA monitoring will primarily be accomplished by sampling MNA monitoring wells for the following list of constituents on a semiannual basis:

- Appendix IV constituents
- General parameters that influence geochemistry such as pH, temperature, oxidation-reduction potential, dissolved oxygen, and specific conductivity
- Natural attenuation indicator parameters specific to the identified attenuation mechanisms such as ferrous and ferric iron

Because MNA does not require design and construction of infrastructure other than new monitoring wells, the monitoring can be initiated within 6 months to a year, contingent upon regulatory review and approval of the monitoring plan. At least 1 year of groundwater monitoring data post closure is recommended to establish baseline conditions and trends. During closure, temporary variations in groundwater data are expected due to CCR disruption (excavation and placement within the consolidated footprint), dewatering, resultant changes in groundwater flow, and the time required for capping to reduce leaching from CCR.

The following will be performed to implement the MNA monitoring plan:

- Begin MNA-specific sampling and analysis using existing monitoring locations.
- Install additional monitoring wells as needed.
- Provide the first MNA evaluation monitoring report, considering the changes in groundwater chemistry due to closure activities.

4 Corrective Action Monitoring Program

As required by 40 CFR § 257.98(a) and ADEM Admin. Code r. 335-13-15-.06(9)(a), the owner/operator must implement the groundwater remedy within 90 days of selecting a remedy, including establishing a corrective action groundwater monitoring program. That monitoring program must perform the following actions: 1) meet the assessment monitoring requirements of 40 CFR § 257.95 and ADEM Admin. Code r. 335-13-15-.06(6); 2) document the effectiveness of the remedy; and 3) demonstrate compliance with the GWPS. A Site *Corrective Action Groundwater Monitoring Program* providing site-specific remedy monitoring details will be submitted within 90 days of this *Groundwater Remedy Selection Report*.

To meet the first requirement of the remedy monitoring program, assessment monitoring of the certified groundwater monitoring network must continue pursuant to 40 CFR § 257.96(b) and ADEM Admin. Code r. 335-13-15-.06(7)(b). The other two requirements are satisfied by the developing a remedy-specific performance monitoring program. The corrective action groundwater monitoring program for the Site will include the following:

- Continued assessment monitoring of the certified CCR compliance groundwater monitoring network
- Groundwater monitoring to document remedy system effectiveness
  - Source control (dewatering, consolidation, and capping)
  - Permeation grouting performance
  - MNA
- Adaptive site management guidelines
- Sentinel and clean-line boundary monitoring
  - Verification of delineation boundaries
  - Potential receptor monitoring using risk-based screening levels

Within 90 days of selecting a remedy, a corrective action groundwater monitoring plan will be developed that describes the monitoring program and details the following:

- Sample locations
- Sampling schedules
- Monitoring parameters
- Data analysis methods
- Adaptive site management evaluation guidelines
- Reporting and notification requirements

Following certification of the Site's groundwater monitoring network, several additional wells were installed to perform delineation of GWPS exceedances. These wells have been added to the semiannual monitoring program pursuant to 40 CFR § 257.95(g)(1) and ADEM Admin. Code

r. 3351315-.06(6)(g)2. Based on remedy-specific monitoring needs, certain delineation wells may not be included as part of the groundwater remedy monitoring program. If wells are proposed for exclusion from the corrective action monitoring program, a justification for exclusion will be provided in the plan. A conceptual groundwater monitoring network for the Site is shown in Figure 8.

As shown in Figure 8, sentinel and clean-line boundary monitoring points will be located between known GWPS exceedances and the property boundary or potential receptors. These wells will be sampled at the same frequency as the CCR compliance monitoring wells.

As discussed in Section 5, APC will incorporate adaptive site management into the corrective action at the Site. Adaptive triggers will be developed, and additional actions (monitoring, analysis, and corrective action) will be implemented as needed. Adaptive triggers could include statistically increasing trends for multiple events after closure is complete and verified GWPS exceedances at sentinel/clean-line boundary monitoring points.

During closure and dewatering, the pond-groundwater system will be in a state of hydraulic and geochemical disequilibrium, possibly leading to temporary increases in COI concentrations at some locations and decreases at other locations. Additionally, temporary increases could occur as the subsurface is disturbed by permeation grouting and possible localized changes in groundwater flow direction. Closure-induced variability will need to be considered when evaluating remedy performance monitoring data and establishing triggers for the adaptive management component of the monitoring program. Due to the probable geochemical and groundwater flow disequilibria, adaptive triggers will not be implemented until the second year post closure, after one year of baseline data has been established. However, data generated between the implementation of corrective action and post-closure period may be compared to risk-based screening levels to determine if immediate action is warranted.

5 Adaptive Site Management Plan

As applied here, adaptive site management is a component of the corrective action monitoring program, in which monitoring results are continually evaluated to determine if the system is making progress toward achieving remedy goals. Based on system performance—either achieving goals or not making expected progress—the remedy system may need to be adapted or changed. Adaptation of the system may include ceasing actions no longer necessary or changing the system because it is not performing as expected. The adaptive site management approach plans for changes at the Site and provides a process to make changes as necessary. Details regarding site-specific adaptive management metrics (adaptive triggers) and response will be included in the Site *Corrective Action Groundwater Monitoring Program*.

Changes in groundwater geochemistry are expected as closure (excavation, dewatering, and capping) of the CCR unit proceeds. Expected changes include concentration variability and short-term increasing or decreasing trends. Therefore, although the remedy will be monitored and evaluated continually during the closure period, the adaptive site management plan will not be implemented completely until closure activities are complete or near the end of closure, and groundwater chemistry has stabilized. Interim adaptive site management will be implemented during the closure period to evaluate groundwater concentrations with respect to standards that are protective of potential human or ecologic receptors, and prompt action will be taken if those standards are at risk of potentially being exceeded.

40 CFR § 257.98(b) and ADEM Admin. Code r. 335-13-15-.06(9)(b) require an owner or operator to implement other methods or techniques if it is determined that compliance is not being achieved by the existing remedies. As discussed above, the adaptive site management plan helps monitor to ascertain compliance with these rules.

In summary, adaptive site management for the Site will include the following:

1. Establishing adaptive triggers: adaptive triggers are performance goals or standards that will be used to measure progress toward achieving the long-term remedy goal of reducing concentrations to below the GWPS. Adaptive triggers may change over time as more is learned about system performance and as Site conditions change. Adaptive triggers are synonymous with "short-term goals" and "interim performance standards."
2. Evaluating remedy system performance against adaptive triggers: monitoring data from each monitoring event will be evaluated against the adaptive triggers established to measure the performance of the remedy system over the short term. Adaptive triggers will vary based on the system being monitored. For example, monitoring locations and adaptive triggers for the injection grouting system will differ from those established to monitor MNA performance.

3. Potentially adapting the system based on comparison to the adaptive triggers: if monitoring results hit an adaptive trigger, an evaluation process will be initiated. The process will include re-evaluating the adaptive trigger to ascertain if it is suitable or should be adjusted. The process may conclude that the remedy system requires adaptation to meet remediation goals.
4. Updating the Site conceptual model and knowledge base as new data become available: as the remedy is implemented, more will be learned about how the hydrogeologic system responds to remedy activities. Additional data that enhances the Site conceptual model may also be collected. The remedy plan, site conceptual model, and adaptive triggers will be updated and evaluated as more is learned.

Figure 9 presents a generalized flow diagram of the adaptive site management process. It shows the process that will be used to evaluate monitoring data, determine if performance objectives are met, and determine if adaptation of the groundwater remedy system is needed. Performance monitoring is an integral component of the adaptive site management plan.

5.1 Interim Performance Standards and Monitoring

The long-term performance standards for the groundwater remedy system are defined in 40 CFR § 257.98(c) and ADEM Admin. Code r. 335-13-15-.06(9)(c): demonstrate compliance with the GWPS at all points that lie beyond the groundwater monitoring system established under 40 CFR § 257.91 and ADEM Admin. Code r. 335-13-15-.06(2) for 3 consecutive years based on semiannual monitoring.

Interim performance standards, or adaptive triggers, will be established to monitor each component of the remedy system as a means of assessing progress toward the final goal. The interim performance standards will measure short-term progress and not regulatory compliance standards.

5.1.1 Permeation Grouting

The interim, or short term, performance goal of the permeation grouting system is to document the following two items: 1) reduced permeability (hydraulic conductivity) within the injection areas; and 2) an increase in groundwater pH in the vicinity of the grout wall during grouting. A series of piezometers will be installed within the grouting zone and monitored to demonstrate the performance of the grouting system during grouting.

After verifying that a low-permeability zone has been established, the next interim performance goals will be to demonstrate that reduced groundwater levels (potentiometric surfaces) occur downgradient of the grout wall and that decreasing trends in COIs are observed downgradient. The performance monitoring system will account for potential variability created during ongoing closure activities such as dewatering, excavation, and capping.

As described in Section 2.4.1, effectiveness of permeation grouting will be determined primarily by reduction in groundwater levels downgradient of the grout wall and reductions in COIs in the existing monitoring wells. However, if determined to be useful, select piezometers installed to monitor grouting performance during grouting may be left in place for future groundwater level and chemistry monitoring. The possibility exists that nearby groundwater monitoring wells (e.g., the MR-AP-MW-3 well cluster) may have greatly reduced water flow to them as a result of grouting such that sampling these wells would no longer be possible. If this happens, it is a clear indicator of success of the grouting program, and replacement wells (if needed) would be installed downgradient of the grout wall.

To the extent to which permeation grouting is performed during the ash pond closure period, appropriate adaptive triggers will be established to evaluate the short-term goals directly related to the permeation grouting performance.

5.1.2 Monitored Natural Attenuation

The interim goal of MNA is to document that, in conjunction with source control and permeation grouting, natural attenuation of the constituents is occurring. As described by USEPA (2015), the four tiers of MNA can be summarized as:

- Tier 1: plume size and stability
- Tier 2: attenuation mechanisms and rates
- Tier 3: attenuation mechanism capacity and reversibility
- Tier 4: performance monitoring program and alternative remedies should MNA not perform as expected

The performance of the MNA Tiers 1 through 3 will be monitored by evaluating the following:

- Plume size and stability
  - The size and stability will be monitored by a network of groundwater monitoring wells within and around the perimeter of the area of groundwater exceedances (i.e., the plume). From a practical implementation standpoint, plume stability refers to an area of groundwater impacts that is not substantially expanding or adversely changing (by exhibiting new constituents or increasing mass). The interim (prior to completion of closure) performance standard for plume stability may be monitoring wells installed around the areas of groundwater impacts to exhibit trends that are statistically steady or decreasing and for no new constituents detected at statistically significant levels to occur within the plume area. The long-term performance objective is for statistically decreasing trends, continual reduction in the number of constituents detected at statistically significant levels in the MNA performance monitoring network, a reduction

in size of the plume, or a reduction in magnitude of COI concentration within the plume.

- Plume mass and mass reduction
  - MNA performance relative to Tier 2 criteria for attenuation mechanisms and rates, and Tier 3 criteria for attenuation capacity and reversibility may be demonstrated by monitoring the mass of each COI within the plume area and documenting changes in mass over time. Steady or decreasing mass indicates that attenuation mechanisms continue to be effective, attenuation capacity remains, and attenuation mechanisms have not reversed. The interim performance standard for mass reduction is for monitoring wells installed in and around the areas of groundwater impacts, in aggregate, to exhibit statistically steady or decreasing mass. Per USEPA guidance, mass flux across transects (cross sections) located in meaningful areas will also be calculated. The long-term performance objective is to demonstrate COI concentration decline to below GWPSs and reduction in COI mass.

Adjustments to the MNA performance monitoring network may be made as needed as MNA proceeds.

5.2 Adaptive Trigger Evaluation and Corrective Action System Adaptation

If monitoring results hit an adaptive trigger (e.g., statistically significant trends are observed for more than the prescribed years), the first step will be to re-evaluate the interim performance standard and determine if it is a suitable measure of performance or if it requires updating based on other factors. Similarly, the nature of the adaptive trigger hit will be evaluated to determine if it warrants further response. For example, confirmed statistically significant increases in concentration may warrant immediate response; in contrast, a gradual and slight increase in concentration may be addressed differently.

If it is determined that the adaptive trigger is appropriate and that the groundwater remedy system is not achieving the interim goals, then the system may be adapted, optimized, or changed. Within a reasonable time following the adaptive trigger hit, a work plan or implementation schedule for remedy system adaptation will be provided. A semiannual report describing the progress made adapting the groundwater remedy system will be completed and placed in the operating record following 40 CFR § 257.105(h)(12) and ADEM Admin. Code r. 335-13-15-.08(1)(h)12. Amendments to this *Groundwater Remedy Selection Report* and the *Corrective Action Groundwater Monitoring Program* will also be completed and placed in the operating record as described in 40 CFR § 257.105(h)(12) and ADEM Admin. Code r. 335-13-15-.08(1)(h)12.

6 Remedy Performance Requirement Demonstration

As required in 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b), the groundwater remedy for the Site must meet the following performance standards:

1. Be protective of human health and the environment.
2. Attain applicable GWPSs as specified in the rules.
3. Control the source of release to reduce or eliminate, to the extent feasible, further releases to the environment.
4. Comply with any relevant standards (i.e., all applicable RCRA requirements) for management of wastes generated by the remedial actions.

The following subsections describe how the selected remedy plan meets the performance requirements of 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b).

6.1 Protection of Human Health and the Environment

A remedy is protective of human health and the environment when a quantitative risk assessment, conducted according to well-supported scientific principles, demonstrates that chemicals in relevant environmental media are at or below regulatory or health-based benchmarks for human health and the environment. Quantitative risk assessment approaches and the derivation of health-based benchmarks may vary by the competent authority or regulatory application. The State of Alabama has several reports that provide specific guidance on risk assessment approaches and the selection and derivation of appropriate health-based benchmarks for chemicals in groundwater and in surface water that will be protective of human health and the environment.

Current conditions are protective of human health and the environment. The proposed remedy plan will improve groundwater quality and result in a reduction in concentrations; therefore, the proposed remedy will be protective of human health and the environment as required by 40 CFR § 257.97(b)(1) and ADEM Admin. Code r. 335-13-15-.06(8)(b)1.

6.2 Attain Groundwater Protection Standard Requirements

As stated in 40 CFR § 257.97(b)(2) and ADEM Admin. Code r. 335-13-15-.06(8)(b)2, a groundwater remedy plan must be able to attain the GWPS specified in the rules. As described in this report, a three-pronged approach will be used to achieve the GWPS. A significant component of the groundwater remedy plan is the closure and source control measures being implemented at the Site. The combination of CCR consolidation, dewatering, and installation of a low-permeability geosynthetic cover system will greatly reduce release to the environment.

Permeation grouting in areas with significantly elevated concentrations of constituents will reduce or eliminate mass flux of COIs away from the Site. Applications of permeation grouting will be evaluated in the context of decreasing trends from source control and natural attenuation.

Finally, as discussed in Section 3.3.2 and Appendix C, COIs are currently being attenuated, and concentrations are declining as a result of natural attenuation processes. In concert with closure, source control, and permeation grouting, MNA will continue until COI concentrations are below the GWPS. Closure activities and permeation grouting will serve to enhance the natural attenuation already occurring.

Remedy evaluation has demonstrated that actions proposed for the Site result in decreasing concentrations in groundwater (Appendix C). Decreasing concentrations will ultimately result in constituents occurring at concentrations below the GWPS. Therefore, as required by 40 CFR § 257.97(b)(2) and ADEM Admin. Code r. 335-13-15-.06(8)(b)2, the groundwater remedy plan will be able to attain the GWPS specified in the rules.

Depending on constituent and well (location), the estimated time to achieve GWPSs from natural attenuation alone ranges from 2 to 25 years, not considering source control and permeation grouting. Though these time frames are reasonable to achieve GWPSs by MNA, source control and permeation grouting are expected to accelerate time to achieve GWPSs. Pump-and-treat for inorganic constituents typically takes decades because that process must reverse the natural attenuation processes already operating by desorbing constituents from aquifer solids by passing many pore volumes (sometimes hundreds) through the aquifer. Supporting information for time to attain GWPSs, including concentration versus time and concentration versus distance graphs, is included in Appendix C. Source control and permeation grouting are expected to accelerate this time frame, particularly in areas where little attenuation is currently observed.

6.3 Control Sources of Releases

As discussed in Section 3.1, Site closure will greatly reduce potential discharges to groundwater as required by 40 CFR § 257.97(b)(3) and ADEM Admin. Code r. 335-13-15-.06(8)(b)3. Source control will be accomplished by:

1. Dewatering and consolidating the CCR material and reducing the footprint from approximately 321 acres to approximately 191 acres and contained within a soil buttress. Slopes will be graded to provide stability, promote drainage, and prevent ponding in the disposal area. As shown in Figure 2, dewatering and consolidation are anticipated to proceed into 2026.
2. Placing final cover, consisting of an engineered synthetic turf and geomembrane, over the disposal area. The low-permeability cover system will promote and control runoff from the disposal area and prevent infiltration. Eliminating infiltration will prevent the mobilization of constituents within the disposal unit and further reduce the potential for future releases from

the Site. The final cover will be installed after consolidation is complete and the soil buttress is constructed. The planned completion of the installation of the final cover system is scheduled for 2028.

The closure activities are, in themselves, anticipated to improve groundwater quality by isolating the source area, preventing infiltration of water, minimizing the mobilization of constituents, and impeding release to the environment. The closure and source control measures meet the requirements of 40 CFR § 257.97(b)(3) and ADEM Admin. Code r. 335-13-15-.06(8)(b)3 and will control the source of release to reduce or eliminate, to the extent feasible, further releases to the environment.

6.4 Standards for Waste Management

As specified in requirements of 40 CFR § 257.97(b)(5) and ADEM Admin Code r. 3351315.06(8)(b)5, any waste must be handled and disposed according to all applicable requirements under RCRA. Specifically, any liquid or solid waste generated must be handled and disposed according to applicable regulations in 40 CFR Parts 239 through 282 and ADEM Admin. Code chapters r. 335-13-1 through 335-13-16.

Based on the technologies selected, very little waste will be generated. Waste may be generated by additional well installations, completing permeation grouting, and monitoring. All waste generated during completion of the remedy will be handled and disposed according to RCRA requirements for the type of waste. Therefore, the remedy plan meets the requirements of 40 CFR § 257.97(b)(5) and ADEM Admin. Code r. 335-13-15-.06(8)(b)5 for managing waste generated by the remedy.

As demonstrated here, the groundwater remedy plan meets the performance criteria of 40 CFR § 257.97(b) and ADEM Admin. Code r. 335-13-15-.06(8)(b).

7 Schedule

The following factors were considered when determining the schedule for remedial activities as required by 40 CFR § 257.97(d)(1 through 5) and ADEM Admin. Code r. 3351315.06(8)(d)1 through 5:

- Nature and extent of exceedances
- Reasonable probabilities of remedial technologies in achieving compliance with CCR rule GWPSs and other objectives of the remedy
- Availability of treatment or disposal capacity for CCR managed during implementation of the remedy (not applicate for the Site)
- Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy
- Resource value of the aquifer

In accordance with 40 CFR § 257.97(d) and ADEM Admin. Code r. 335-13-15-.06(8)(d), the following schedules are provided for implementing and completing remedial activities at the Site.

7.1 Site Closure and Source Control

Site closure and source control activities are currently being implemented and are expected to be completed as shown in the timeline in Figure 2. Anticipated project milestones are as follows:

- Early 2022: final cover system installation begins
- Mid-2026: CCR consolidation complete
- Early 2027: final cover system installation complete
- Early 2028: site closure certification complete

7.2 Permeation Grouting

The anticipated permeation grouting implementation schedule is as follows:

- Design: 1 month
- Piezometer installation: 1 month
- Pilot test implementation: 8 months
- Data collection and analysis: 2 months

The schedule for additional permeation grouting will be developed after completion of the pilot test and subsequent data analysis.

7.3 Monitored Natural Attenuation

Strictly speaking, the MNA process is currently being implemented at the Site, although a formalized process to evaluate and document the process has not been established. MNA will be implemented by establishing the detailed MNA sampling, analysis, and evaluation plan in 90 days as part of the corrective action groundwater monitoring program. Implementation of the MNA program is anticipated to include the following:

- Install one additional no-exceedance and remedial effectiveness monitoring well (estimated to take 1 week)
- Coordinate MNA sampling with the first semiannual compliance sampling event after new well installation
- Collect and analyze baseline data: 1 year post closure
- Remedy complete: depending on area, 2 to 25 years after Site closure is complete

8 References

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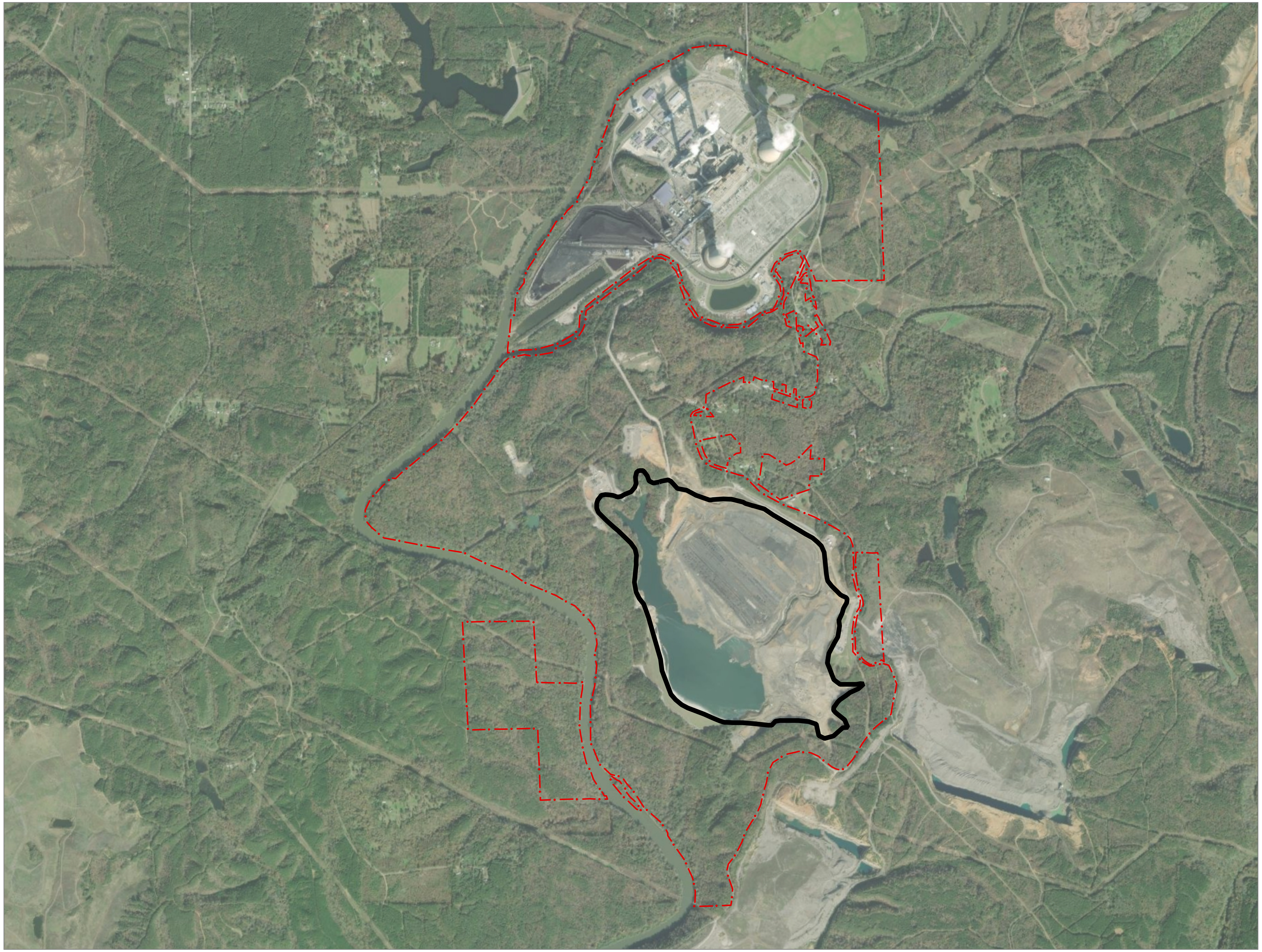
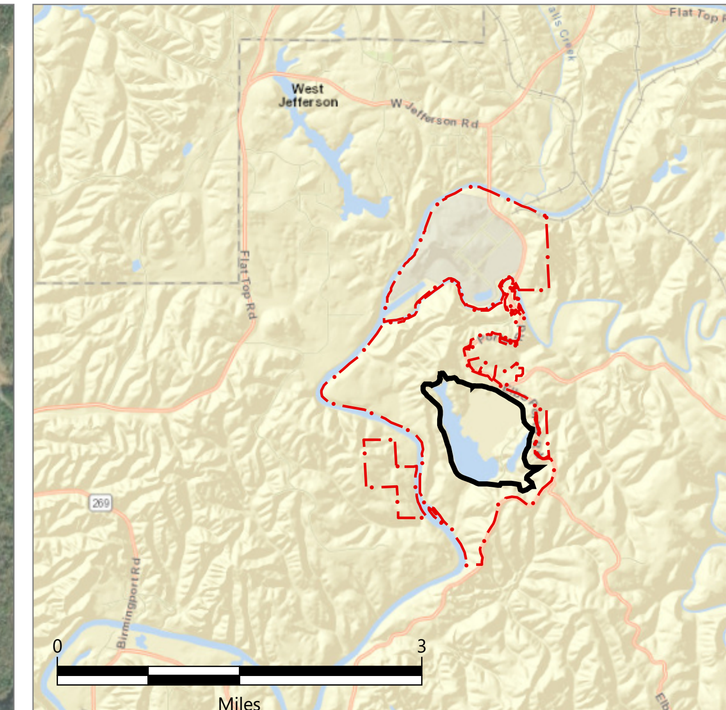
USGS, 2018b. Sylvan Springs Alabama Quadrangle, 7.5 Minute Series Topographic Map.

Figures





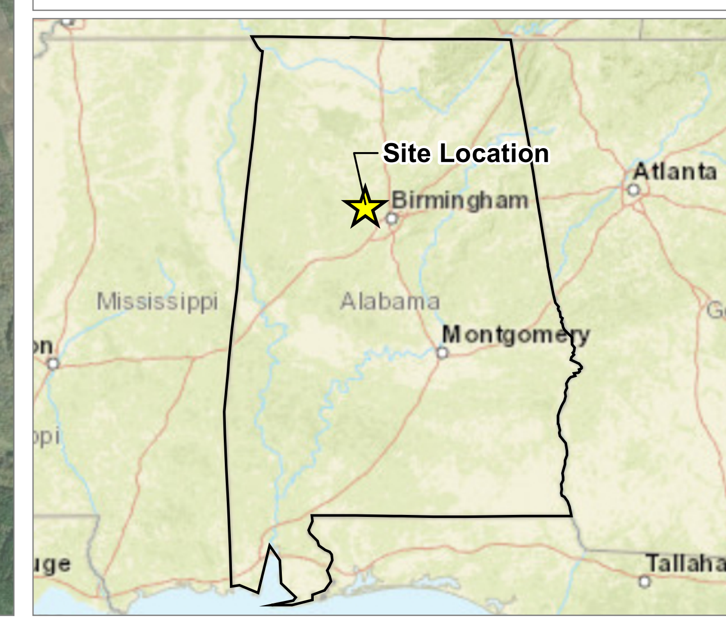
LEGEND:

Ash Pond Boundary

Miller Plant Property Boundary

0 3,000

Feet



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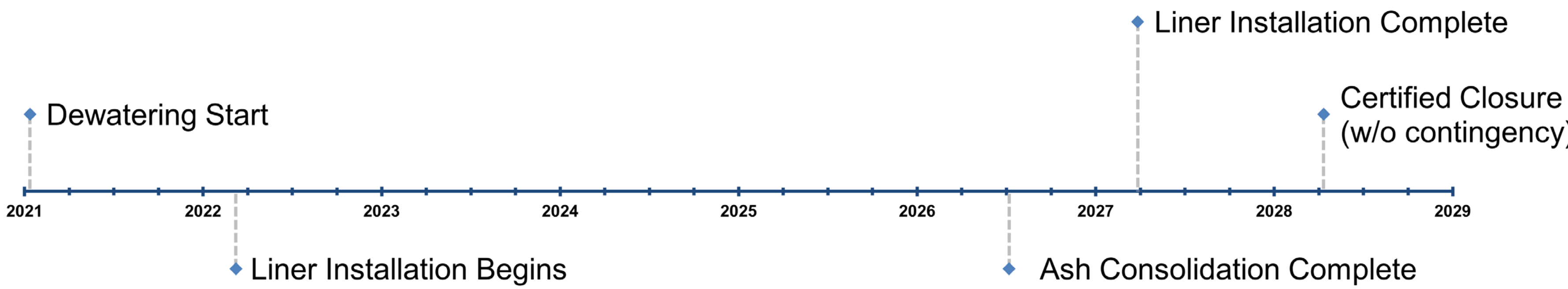
ANCHOR QEA

Figure 1
Site Location Map

Groundwater Remedy Selection Report
Plant Miller



Note:
Liner is part of final cover system (cap).

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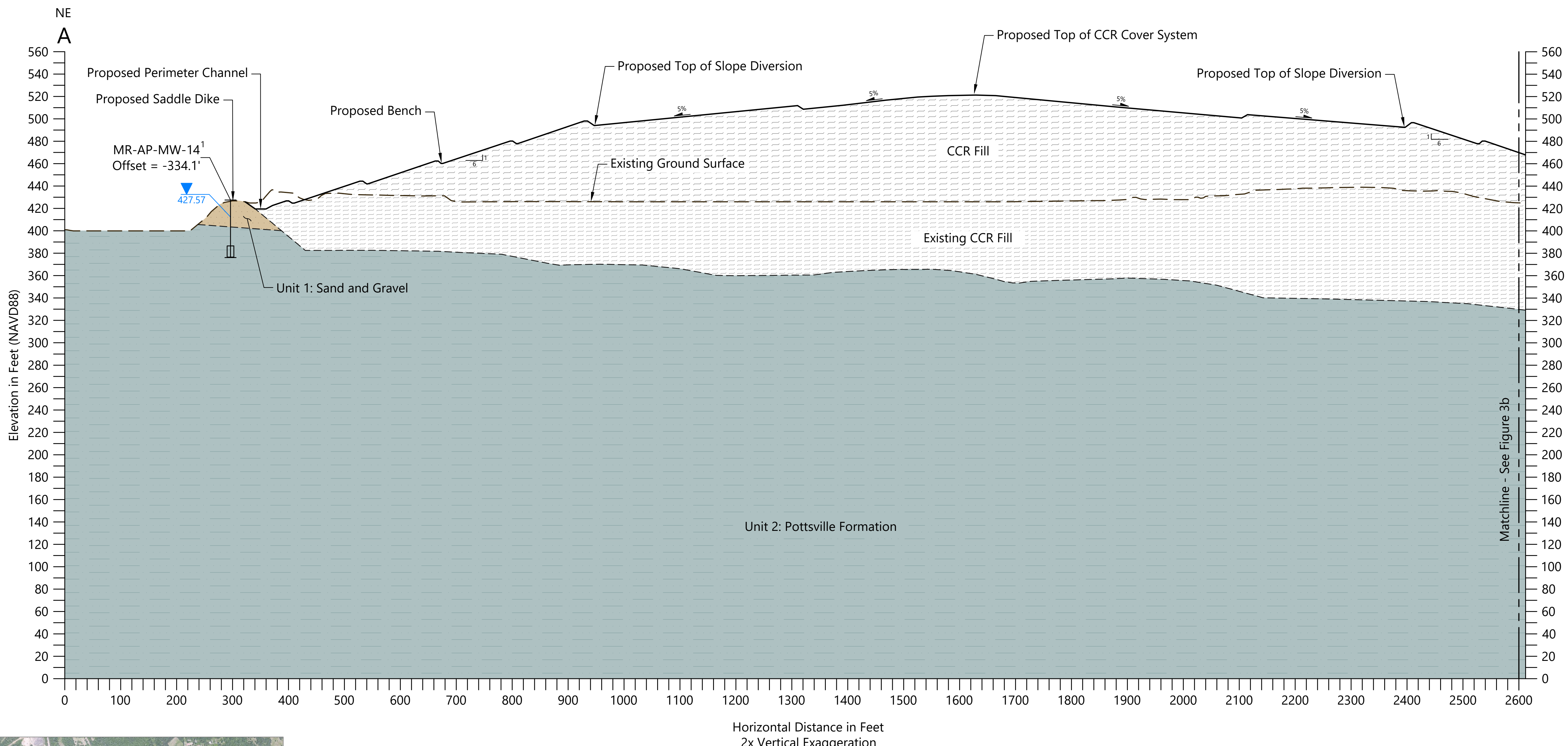
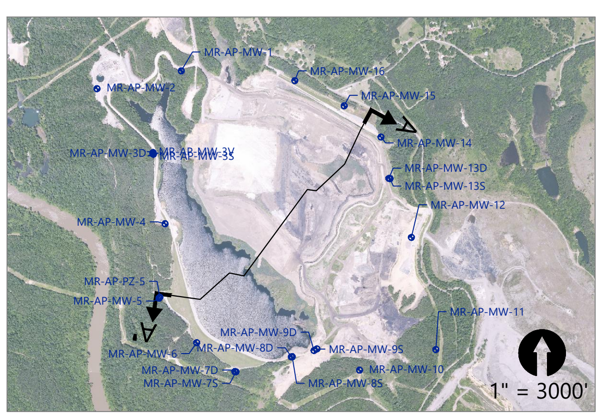
ANCHOR QEA

Figure 2
Closure Timeline
Groundwater Remedy Selection Report
Plant Miller





0 200
Feet

LEGEND:

- Existing Ground Surface
- Proposed Ground Surface
- Geologic Contact
- Existing Monitoring Well
- Water Elevation (Collected October 2020)
- Screened Interval

NOTES:

1. Water elevation for MW-14 is from the March 2020 groundwater monitoring event. All other water elevations are from the October 2020 groundwater monitoring event.
2. Proposed features are based on Plant Miller CCR Pond Closure, Jefferson County, Alabama, Golder, February 2019.
3. CCR: Coal Combustion Residuals

HORIZONTAL DATUM: Alabama State Plane West Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: NAVD88

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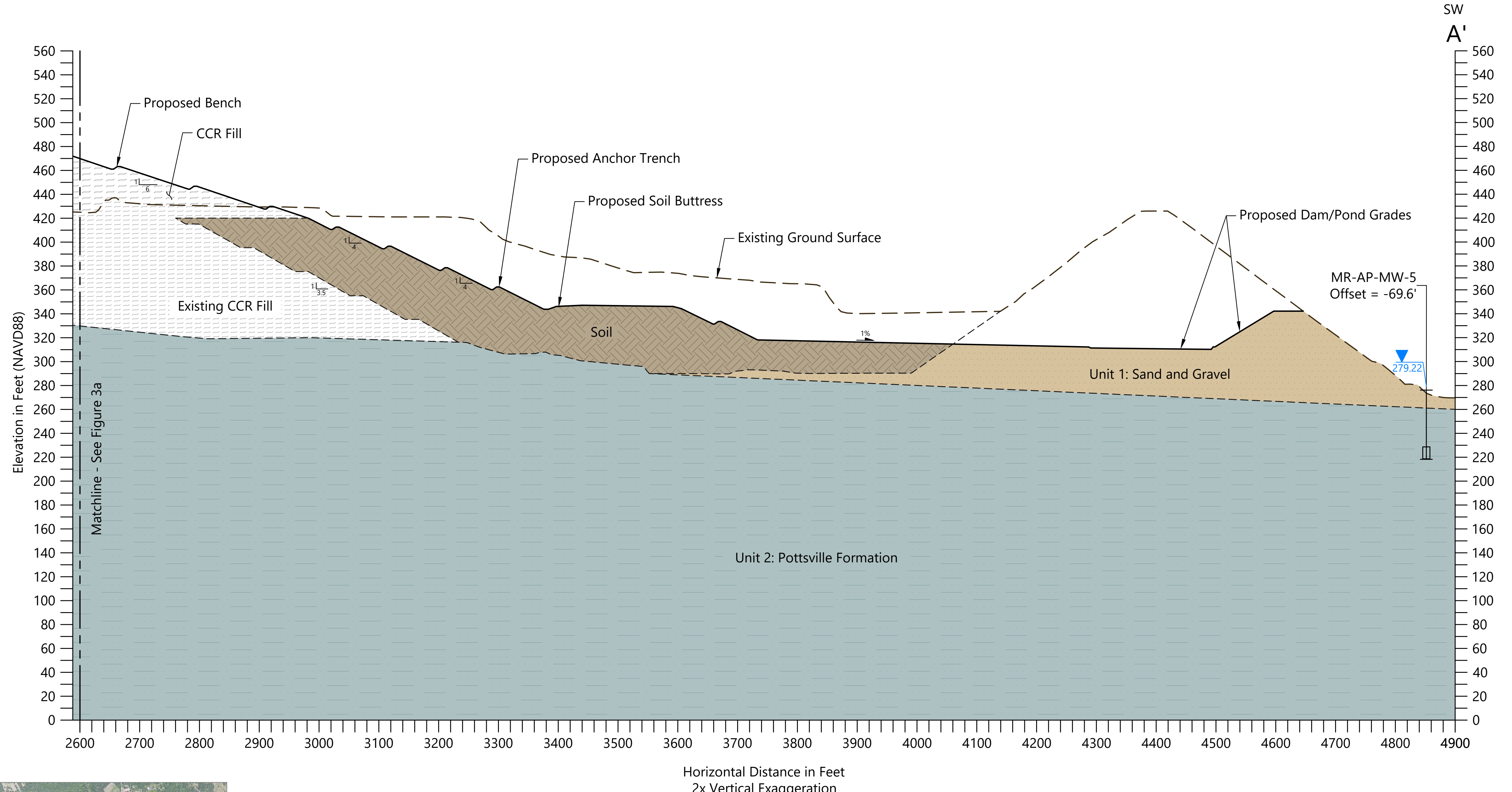
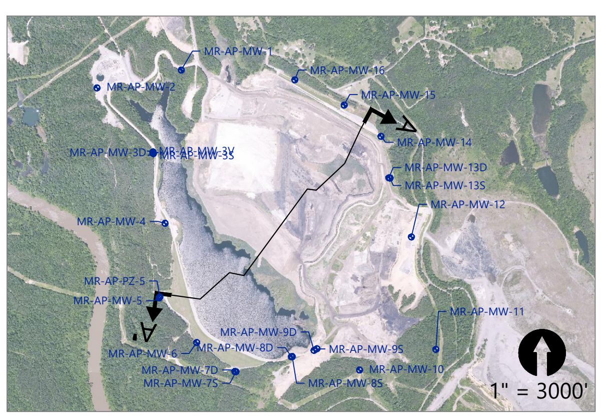
Filepath: K:\Projects\1114-Southern Company\Miller\Groundwater Remedy Selection Report\1114-RP-001 (Miller Sections).dwg Figure 3a

ANCHOR QEA

Figure 3a
Conceptual Cross Section A-A'

Groundwater Remedy Selection Report
Plant Miller





LEGEND:

Existing Ground Surface

Proposed Ground Surface

Geologic Contact

Existing Monitoring Well

Water Elevation (Collected October 2020)

Screened Interval

NOTES:

1. Water elevations were measured in October 2020.
2. Proposed features are based on Plant Miller CCR Pond Closure, Jefferson County, Alabama, Golder, February 2019.
3. CCR: Coal Combustion Residuals

HORIZONTAL DATUM: Alabama State Plane West Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: NAVD88

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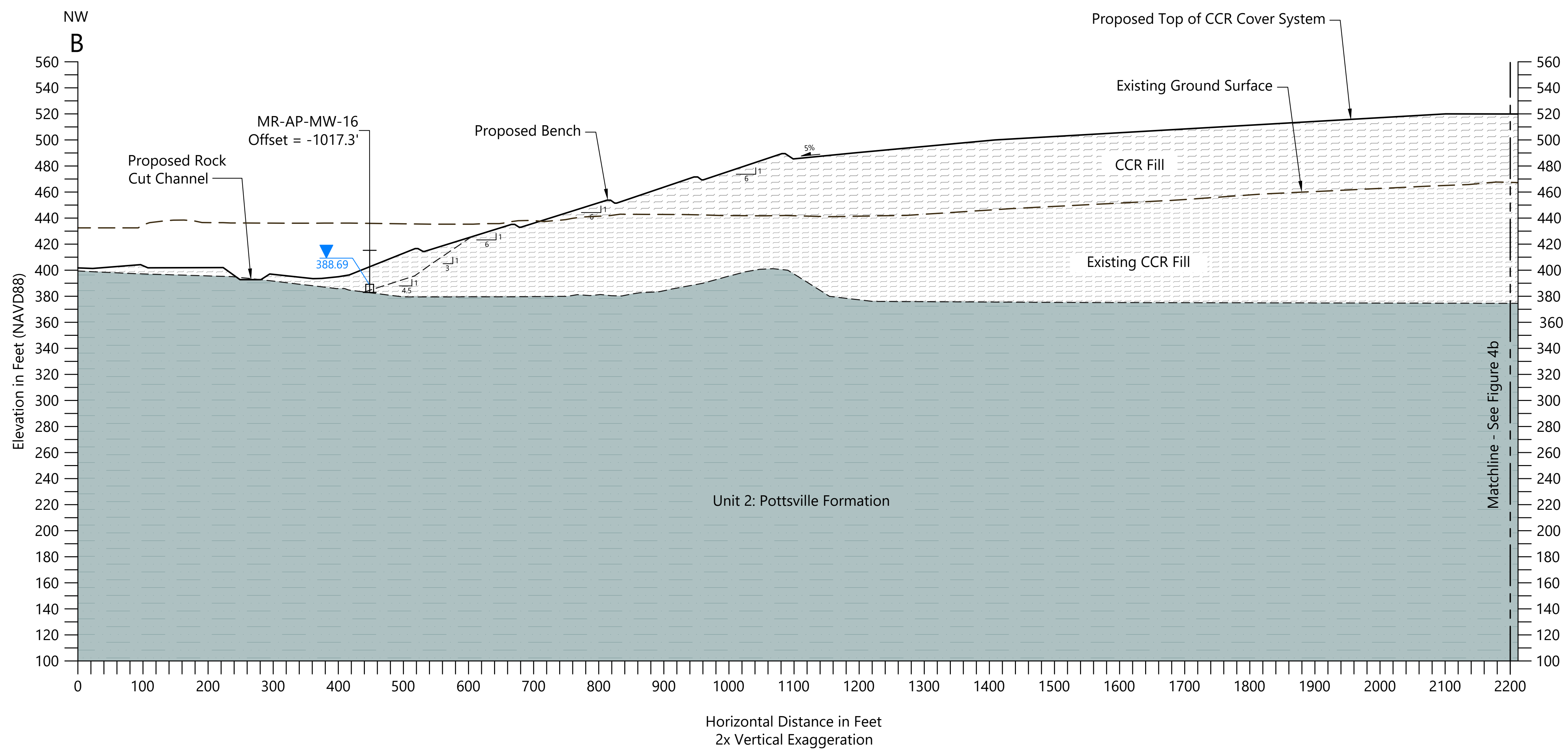
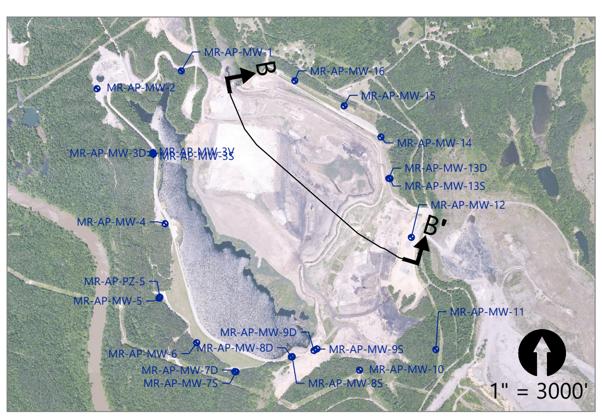
Filepath: K:\Projects\1114-Southern Company\Miller\Groundwater Remedy Selection Report\1114-RP-001 (Miller Sections).dwg Figure 3b

ANCHOR QEA

Figure 3b
Conceptual Cross Section A-A'
Groundwater Remedy Selection Report
Plant Miller





0 200
Feet

LEGEND:

- Existing Ground Surface
- Proposed Ground Surface
- Geologic Contact
- Existing Monitoring Well
- Water Elevation (Collected October 2020)
- Screened Interval

NOTES:
1. Water elevations were measured in October 2020.
2. Proposed features are based on Plant Miller CCR Pond Closure, Jefferson County, Alabama, Golder, February 2019.
3. CCR: Coal Combustion Residuals

HORIZONTAL DATUM: Alabama State Plane West Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: NAVD88

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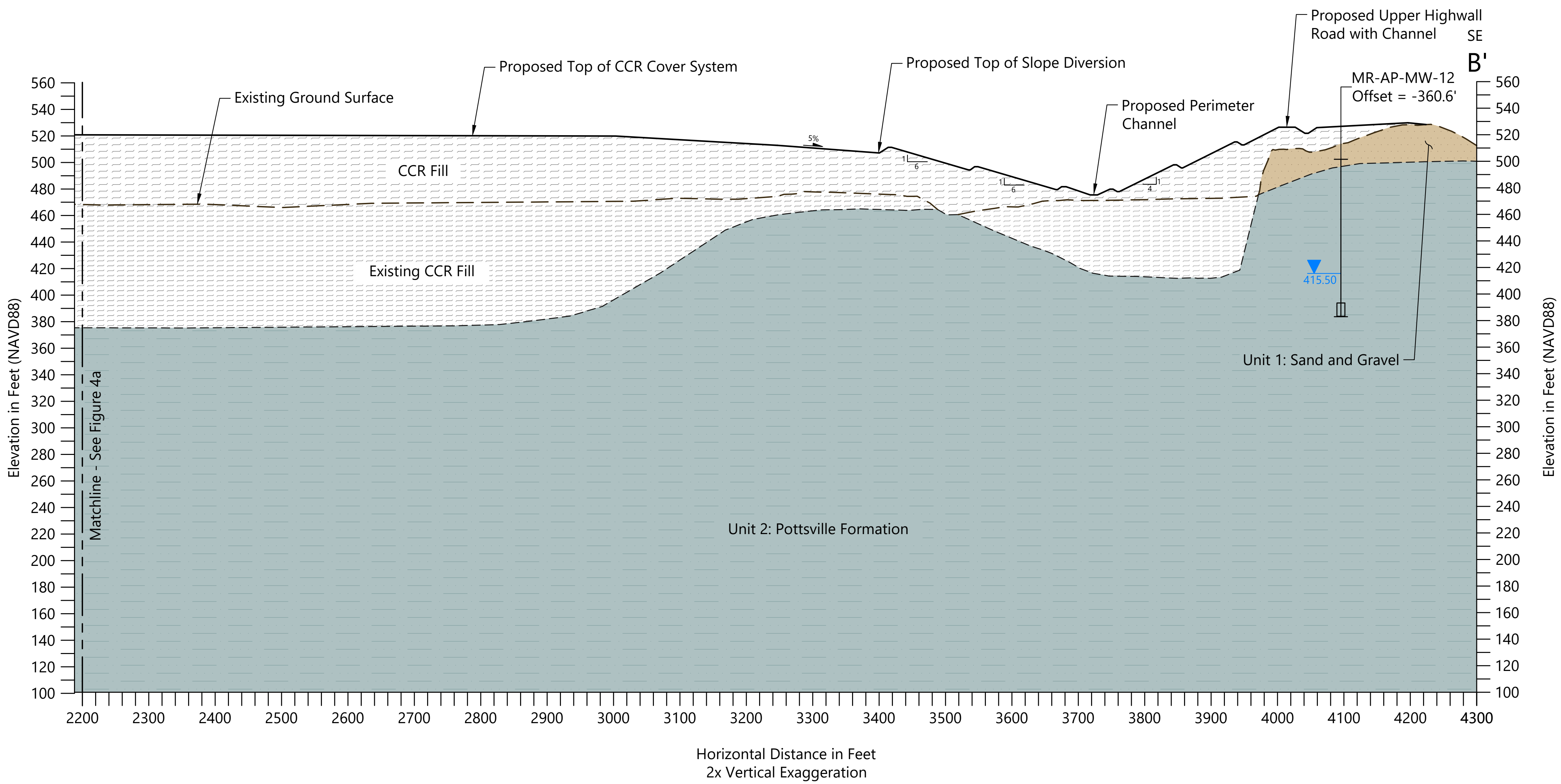
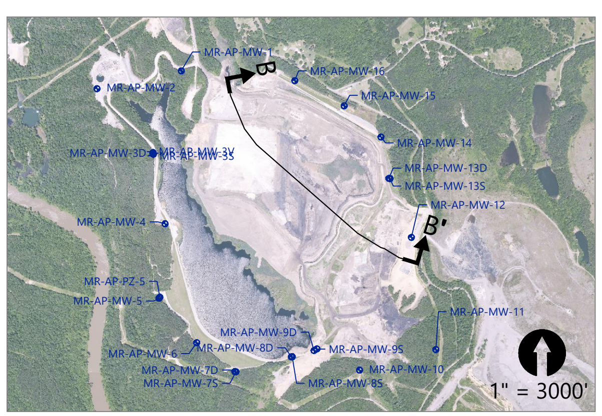
Filepath: K:\Projects\1114-Southern Company\Miller\Groundwater Remedy Selection Report\1114-RP-001 (Miller Sections).dwg Figure 4a

ANCHOR QEA

Figure 4a
Conceptual Cross Section B-B'

Groundwater Remedy Selection Report
Plant Miller





0 200 Feet

LEGEND:

- Existing Ground Surface
- Proposed Ground Surface
- Geologic Contact
- Existing Monitoring Well
- Water Elevation (Collected October 2020)
- Screened Interval

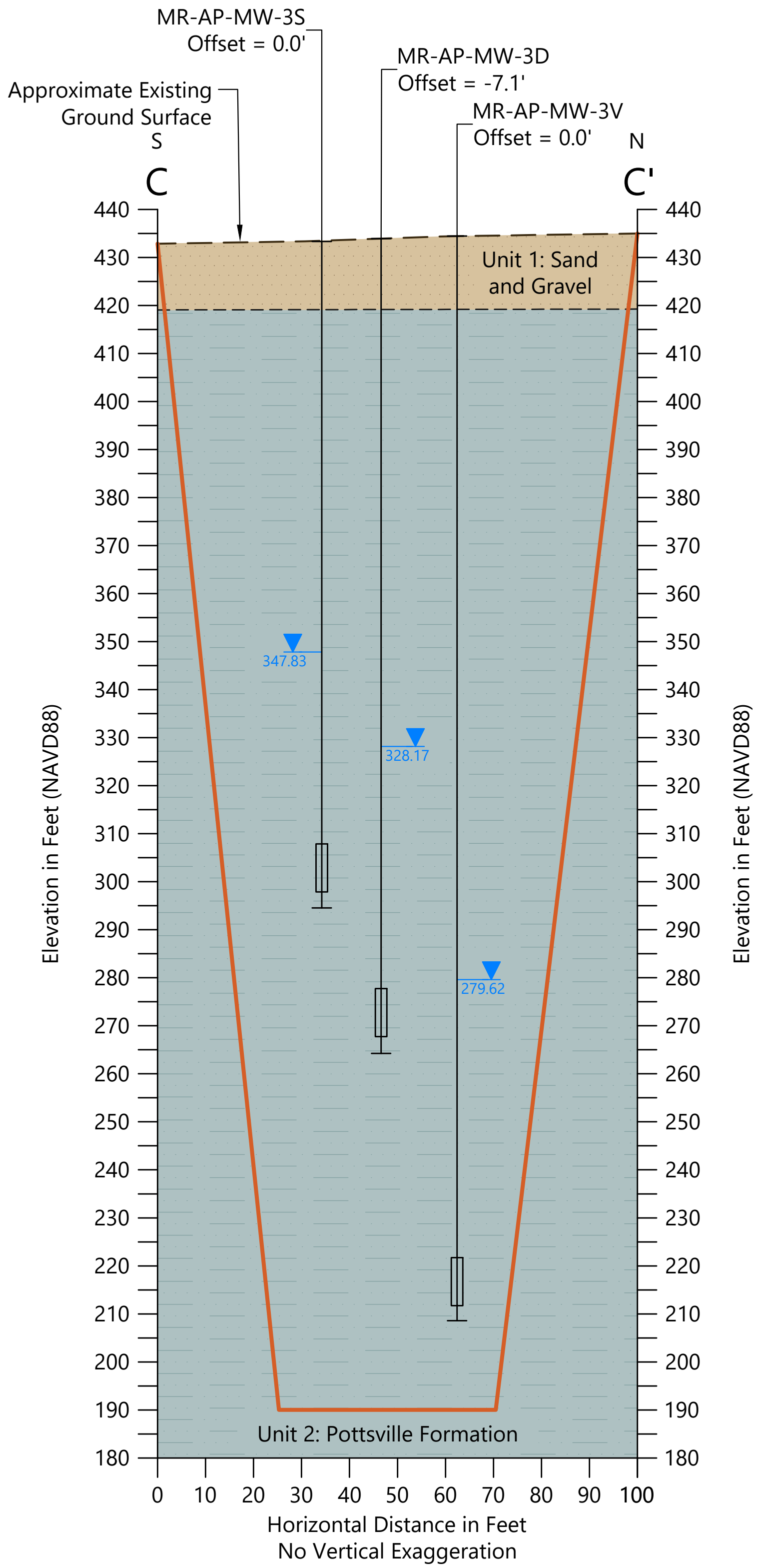
NOTES:

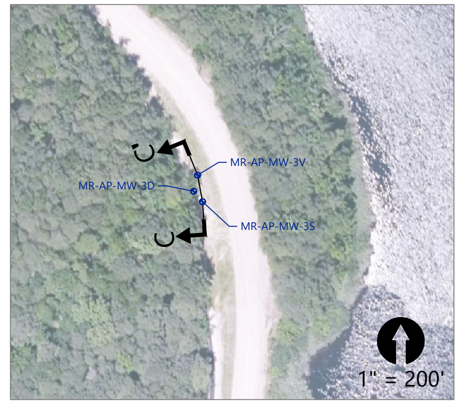
1. Water elevations were measured in October 2020.
2. Proposed features are based on Plant Miller CCR Pond Closure, Jefferson County, Alabama, Golder, February 2019.
3. CCR: Coal Combustion Residuals

HORIZONTAL DATUM: Alabama State Plane West Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: NAVD88

Figure 4b
Conceptual Cross Section B-B'

Groundwater Remedy Selection Report
Plant Miller





LEGEND:

Existing Ground Surface

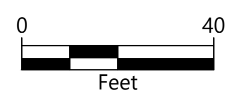
Geologic Contact

Approximate Permeation Grouting Pilot Area

Existing Monitoring Well

Water Elevation (Collected October 2020)

Screened Interval

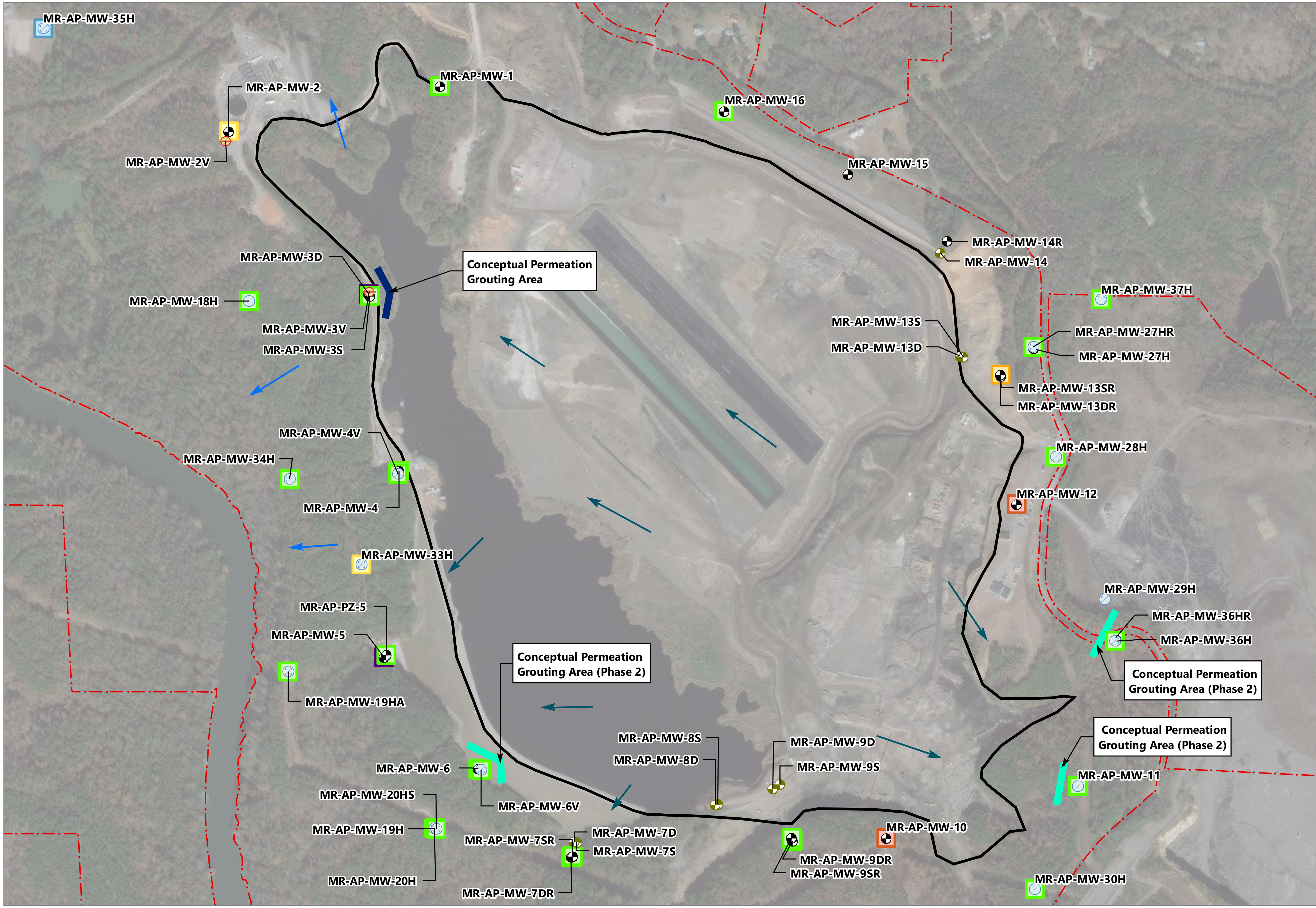


NOTE: Water elevations were measured in October 2020.
HORIZONTAL DATUM: Alabama State Plane West Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: NAVD88

ANCHOR QEA

Figure 5
Conceptual Permeation Grouting Cross Section C-C'

Groundwater Remedy Selection Report
Plant Miller



LEGEND:

- Property Boundary
- Plant Miller Ash Pond Boundary
- Approximate Groundwater Flow Direction (Gillespy-Curry and Pratt Aquifers)
- Approximate Groundwater Flow Direction (Mary Lee Aquifer)
- Abandoned and Replaced Monitoring Well
- Existing Compliance Monitoring Well
- Existing Delineation Monitoring Well
- Existing Piezometer
- Permeation Grouting Phase 1 (Pilot Test) Area
- Potential Area for Phase 2 Permeation Grouting
- Arsenic GWPS Exceedance
- Lithium GWPS
- Arsenic and Lithium GWPS Exceedances
- Lithium and Molybdenum GWPS Exceedances
- Cobalt GWPS
- Cobalt and Lithium GWPS Exceedances

NOTES:
1. GWPS exceedances are from the September 2021 sampling event.

CCR: coal combustion residuals
GWPS: groundwater protection standard

0 1,000
Feet

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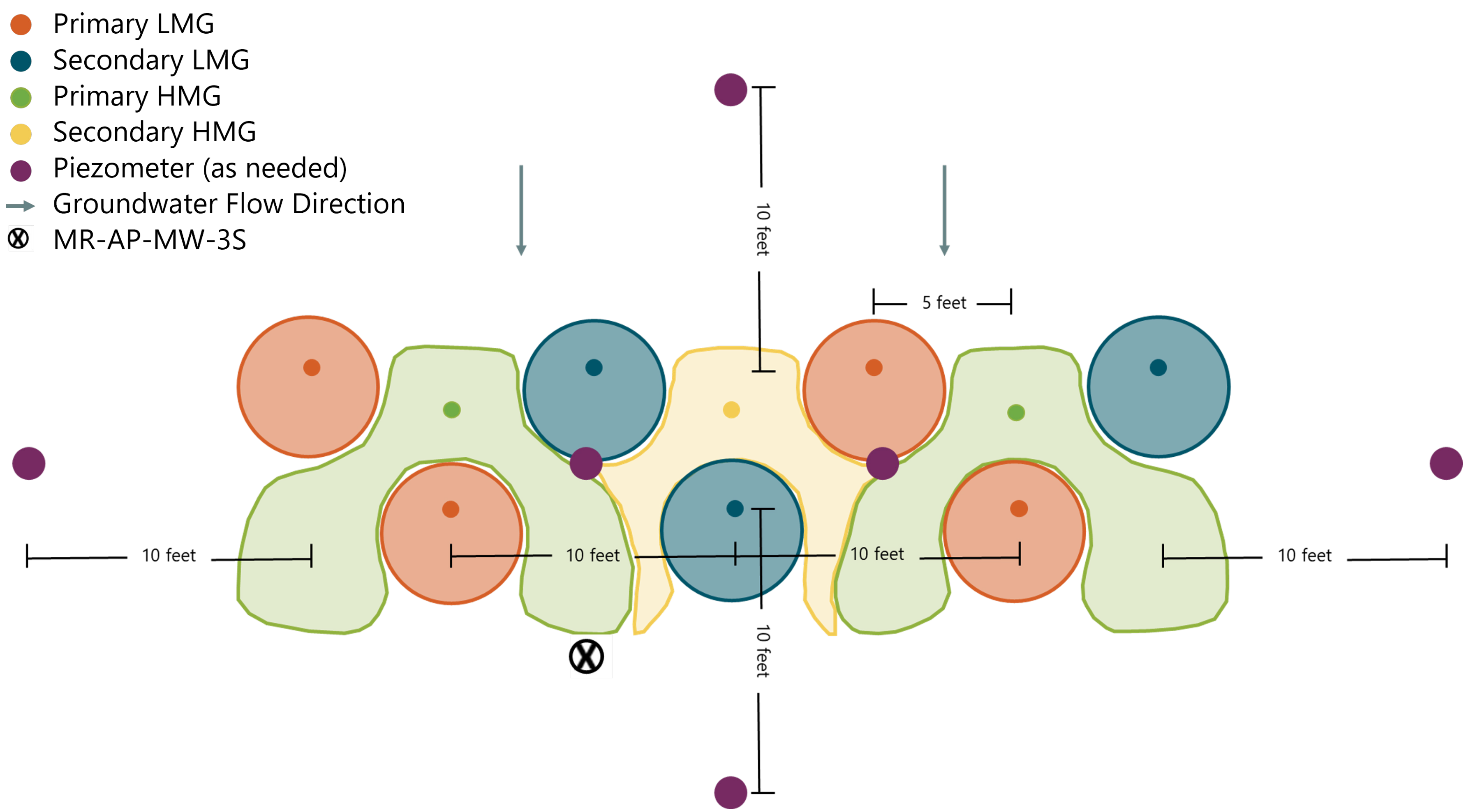
ANCHOR QEA

Figure 6
Site Layout Map
Groundwater Remedy Selection Report
Plant Miller



Notes:

HMG: high-mobility grout

LMG: low-mobility grout

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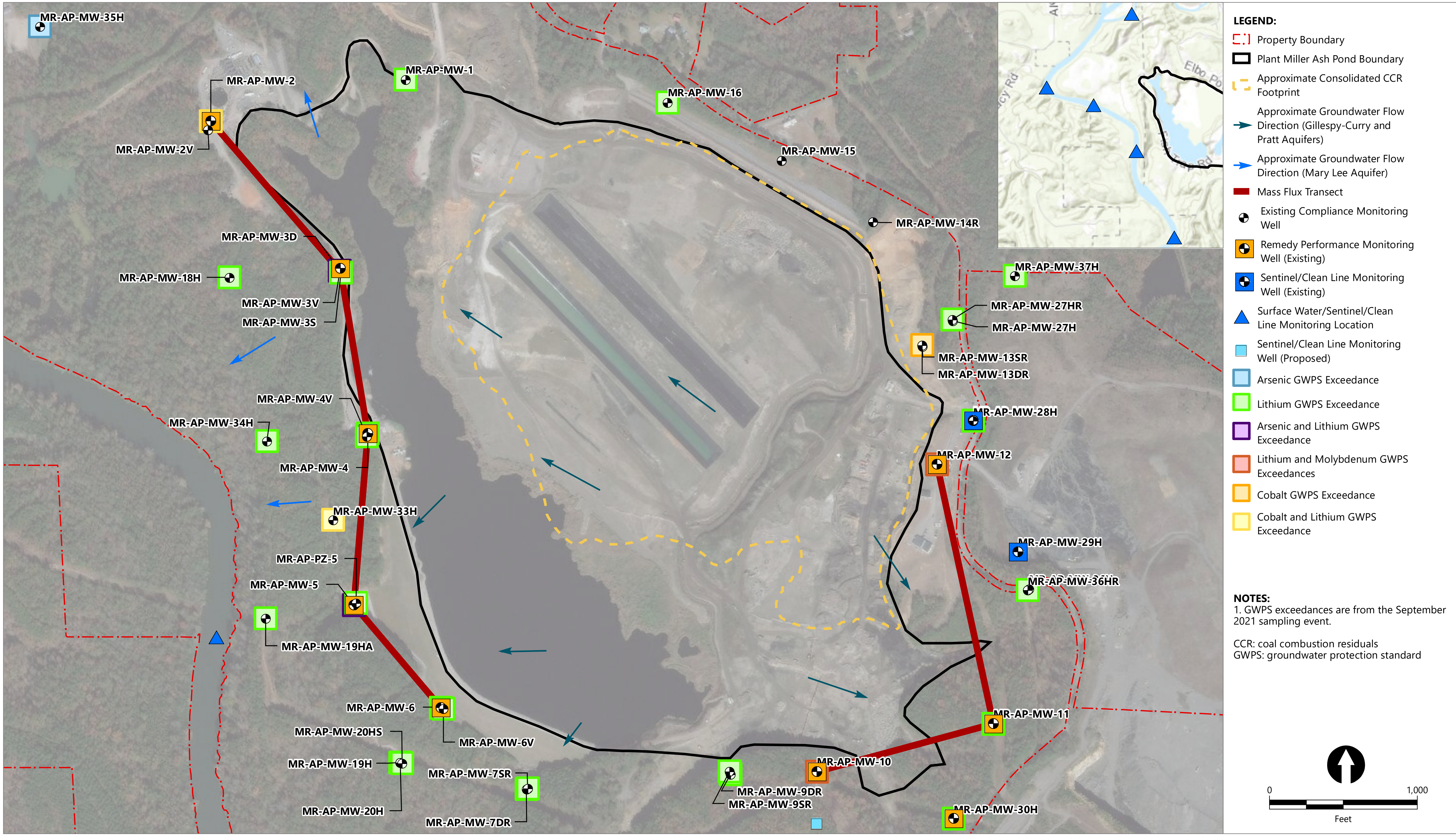
ANCHOR QEA

Figure 7
Typical Cell Layout, Pilot Grouting Program
Groundwater Remedy Selection Report
Plant Miller



Publish Date: 2021/11/24, 2:54 PM | User: jquinley
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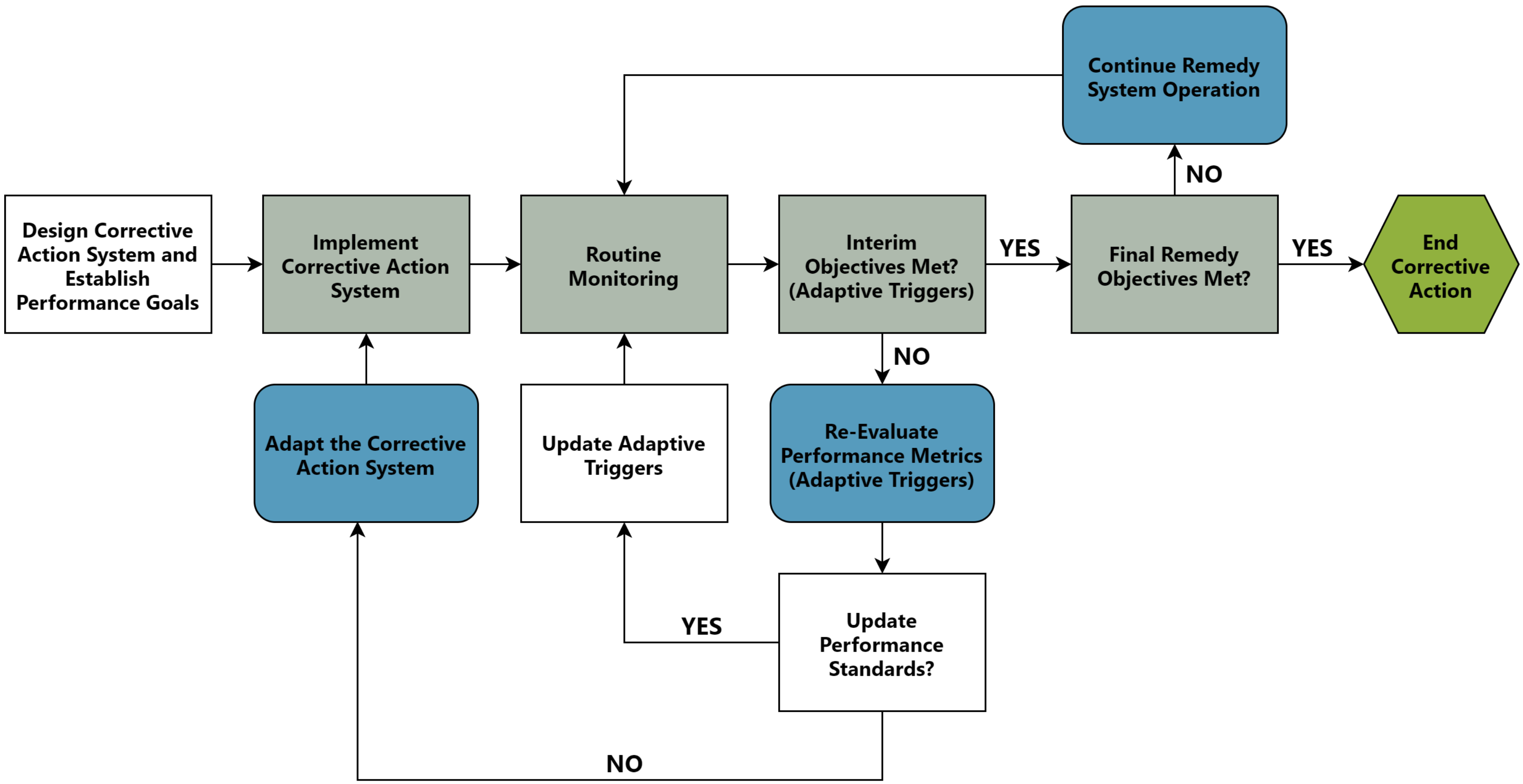
ANCHOR QEA

Figure 8
Conceptual Corrective Action Monitoring Plan
Groundwater Remedy Selection Report
Plant Miller



ANCHOR QEA

Figure 9
Adaptive Site Management Framework
Groundwater Remedy Selection Report
Plant Miller

Appendix A
Certificate of Authorization

State of Alabama

Board of Licensure for Professional Engineers and Land Surveyors

This is to certify that

ANCHOR QEA LLC

Having given satisfactory evidence of the necessary qualifications required by law has been duly certificated and is hereby issued Certificate of Authorization

CA- 5073 -E

authorizing the firm to provide or offer to provide

Engineering

services in the State of Alabama through individual licensed professional licensees as agents, employees, officers or partners.

This certificate requires the firm to operate in the State of Alabama as

ANCHOR QEA LLC

This certificate will lapse January 31, 2022 unless renewed.

In Testimony whereof, witness the signature of the Executive Director under seal of the Board on November 02, 2020

William R. Huett

Executive Director

RECEIPT NO.
20201102000023800

Appendix B
Potentiometric Surface Maps

Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Piezometer	213.67
MR-AP-MW-3S	Downgradient	350.33
MR-AP-MW-3D	Downgradient	327.69
MR-AP-MW-3V	Piezometer	282.30
MR-AP-MW-4	Downgradient	381.42
MR-AP-MW-5	Downgradient	279.22
MR-AP-MW-17H	Horizontal Delineation	257.49
MR-AP-MW-18H	Horizontal Delineation	286.03
MR-AP-MW-19H	Piezometer	144.04
MR-AP-MW-20HS	Horizontal Delineation	346.33
MR-AP-MW-30H	Horizontal Delineation	364.53
MR-AP-MW-27H	Piezometer	174.02
MR-AP-MW-29H	Piezometer	353.07
MR-AP-MW-31H	Piezometer	321.78
MR-AP-MW-33H	Horizontal Delineation	310.15
MR-AP-MW-35H	Horizontal Delineation	296.01

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 6A through 6E.

Legend

- Downgradient Monitoring Well
- Horizontal Delineation Well
- Ash Pond Boundary
- Conceptual Potentiometric Surface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction

MR-AP-MW-1 Well ID
280.36 Groundwater Elevation

N

0 500 1,000 2,000 Feet

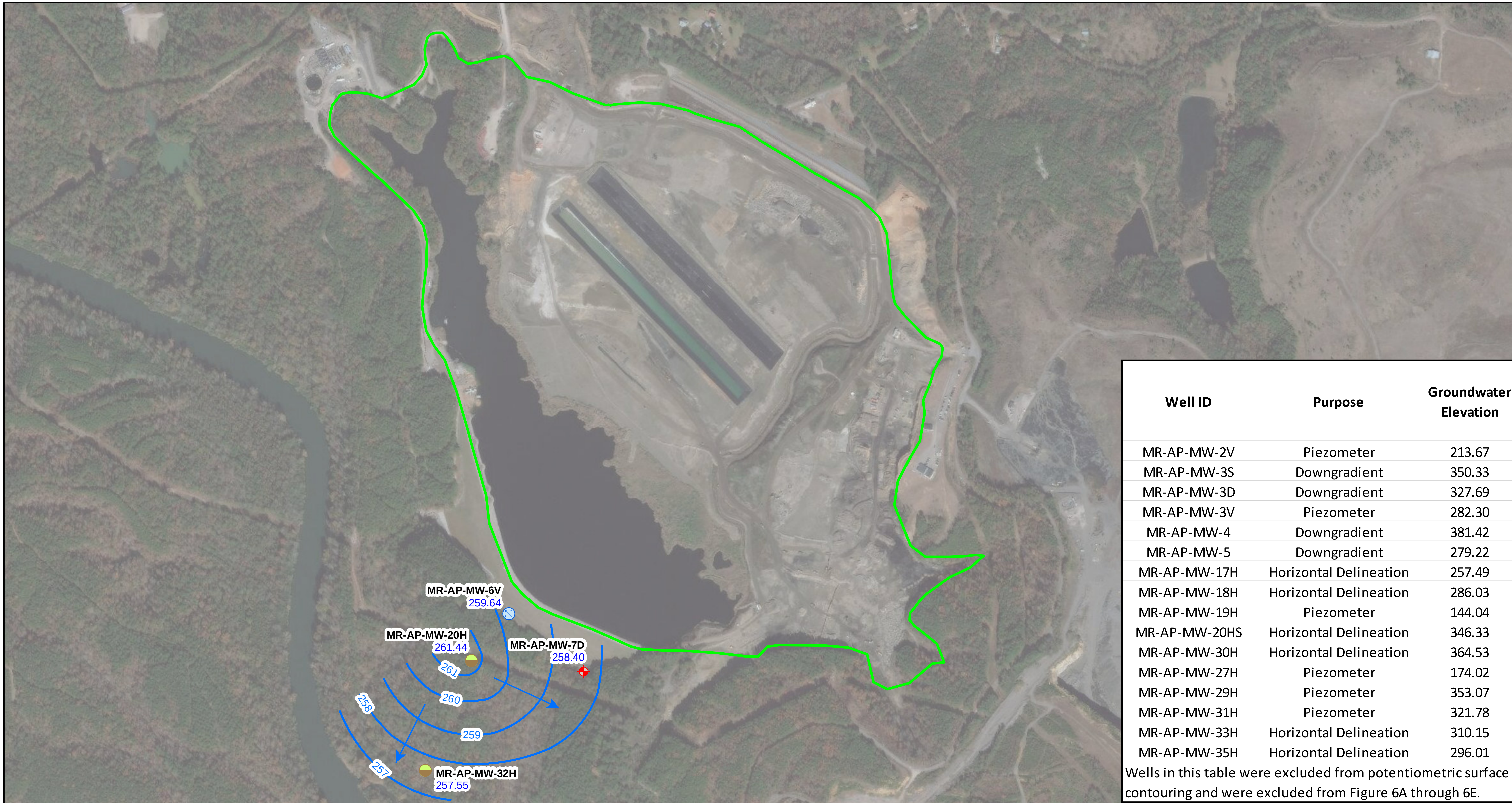
NOTES:
1. ft NAVD88 indicates feet above the North American Vertical Datum of 1988.
2. NM indicates not measured.
3. Wells MW-1, MW-2, MW-19HA, MW-34H, PZ-5 are the only locations screened across the Mary Lee Coal aquifer unit.

SCALE	1:9000
DATE	7/28/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
MARCH 2, 2020
MARY LEE AQUIFER
PLANT MILLER ASH POND

FIGURE NO
FIGURE 6A

Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Piezometer	213.67
MR-AP-MW-3S	Downgradient	350.33
MR-AP-MW-3D	Downgradient	327.69
MR-AP-MW-3V	Piezometer	282.30
MR-AP-MW-4	Downgradient	381.42
MR-AP-MW-5	Downgradient	279.22
MR-AP-MW-17H	Horizontal Delineation	257.49
MR-AP-MW-18H	Horizontal Delineation	286.03
MR-AP-MW-19H	Piezometer	144.04
MR-AP-MW-20HS	Horizontal Delineation	346.33
MR-AP-MW-30H	Horizontal Delineation	364.53
MR-AP-MW-27H	Piezometer	174.02
MR-AP-MW-29H	Piezometer	353.07
MR-AP-MW-31H	Piezometer	321.78
MR-AP-MW-33H	Horizontal Delineation	310.15
MR-AP-MW-35H	Horizontal Delineation	296.01

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 6A through 6E.

Legend

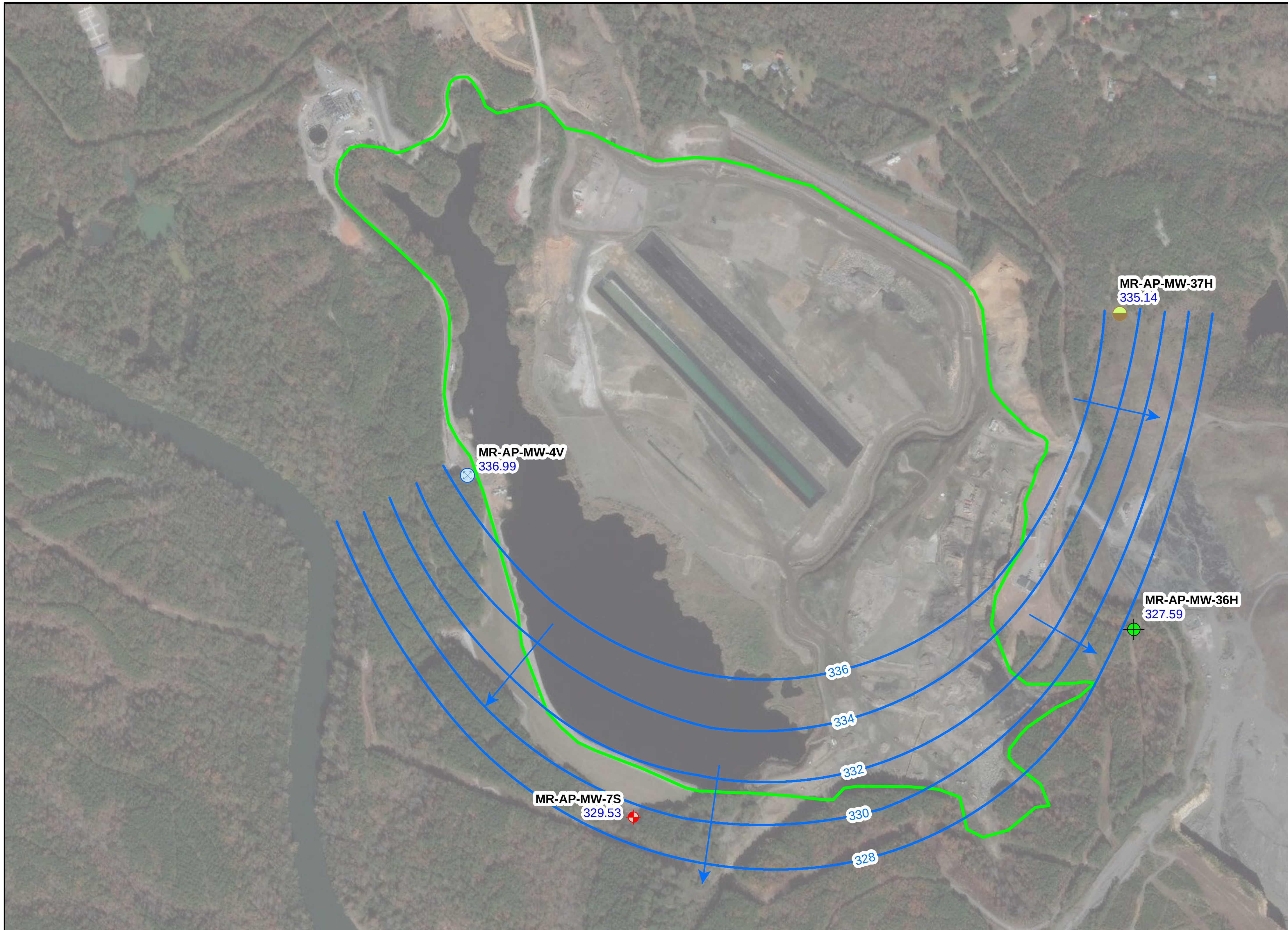
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary
- Downgradient Monitoring Well (Gillespy Aquifer)
- Horizontal Delineation Well
- Vertical Delineation Well
- **MR-AP-MW-6V** Well ID
- 259.64 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Potentiometric contour lines were generalized for depiction and ease of reader.
3. Wells MW-6V, MW-20H, MW-7D, and MW-32H monitor parallel-to-bedding-plane fractures within Gillespy Coal Group sandstones.

SCALE	1:9000	DRAWING TITLE	POTENTIOMETRIC SURFACE CONTOUR MAP MARCH 2, 2020 GILLESPY LOWER SANDSTONE UNIT(S) PLANT MILLER ASH POND
DATE	7/28/2020		
DRAWN BY	KAR	FIGURE NO	**FIGURE 6B**
CHECKED BY	GBD		Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Piezometer	213.67
MR-AP-MW-3S	Downgradient	350.33
MR-AP-MW-3D	Downgradient	327.69
MR-AP-MW-3V	Piezometer	282.30
MR-AP-MW-4	Downgradient	381.42
MR-AP-MW-5	Downgradient	279.22
MR-AP-MW-17H	Horizontal Delineation	257.49
MR-AP-MW-18H	Horizontal Delineation	286.03
MR-AP-MW-19H	Piezometer	144.04
MR-AP-MW-20HS	Horizontal Delineation	346.33
MR-AP-MW-30H	Horizontal Delineation	364.53
MR-AP-MW-27H	Piezometer	174.02
MR-AP-MW-29H	Piezometer	353.07
MR-AP-MW-31H	Piezometer	321.78
MR-AP-MW-33H	Horizontal Delineation	310.15
MR-AP-MW-35H	Horizontal Delineation	296.01

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 6A through 6E.

Legend

- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary
- Downgradient Monitoring Well (Gillespy Aquifer)
- Horizontal Delineation Well
- Vertical Delineation Well
- Piezometer

MR-AP-MW-7S Well ID
329.53 Groundwater Elevation

N

0 500 1,000 2,000 Feet

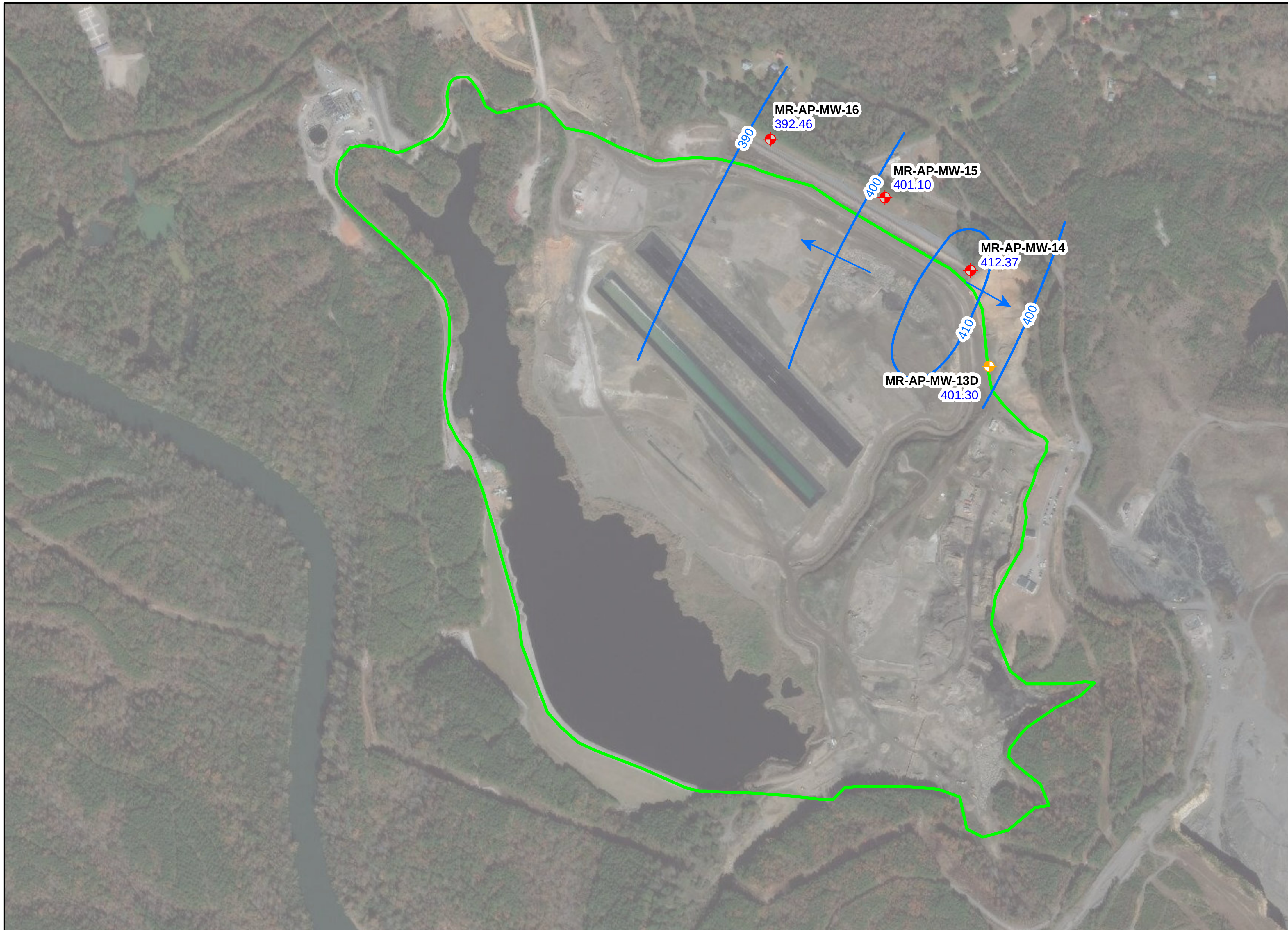
NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Potentiometric contour lines were generalized for depiction and ease of reader.
3. Wells MW-4V, MW-7S, MW-36H, and MW-37H are the only wells screened within the upper Gillespy Coal Group sandstones.

SCALE	1:9000
DATE	7/28/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
MARCH 2, 2020
GILLESPY UPPER SANDSTONE UNIT(S)
PLANT MILLER ASH POND

FIGURE NO
FIGURE 6C

Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Piezometer	213.67
MR-AP-MW-3S	Downgradient	350.33
MR-AP-MW-3D	Downgradient	327.69
MR-AP-MW-3V	Piezometer	282.30
MR-AP-MW-4	Downgradient	381.42
MR-AP-MW-5	Downgradient	279.22
MR-AP-MW-17H	Horizontal Delineation	257.49
MR-AP-MW-18H	Horizontal Delineation	286.03
MR-AP-MW-19H	Piezometer	144.04
MR-AP-MW-20HS	Horizontal Delineation	346.33
MR-AP-MW-30H	Horizontal Delineation	364.53
MR-AP-MW-27H	Piezometer	174.02
MR-AP-MW-29H	Piezometer	353.07
MR-AP-MW-31H	Piezometer	321.78
MR-AP-MW-33H	Horizontal Delineation	310.15
MR-AP-MW-35H	Horizontal Delineation	296.01

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 6A through 6E.

Legend

- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary
- Downgradient Monitoring Well (Gillespy Aquifer)
- Downgradient Monitoring Well (Pratt Aquifer)
- MR-AP-MW-13D Well ID
- 401.30 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Potentiometric contour lines were generalized for depiction and ease of reader.
3. Wells MW-13D, MW-14, MW-15, and MW-16 are the only wells screened within the transition zone between the Gillespy Coal and Pratt Coal Groups.

SCALE	1:9000
DATE	7/28/2020
DRAWN BY	KAR
CHECKED BY	GBD

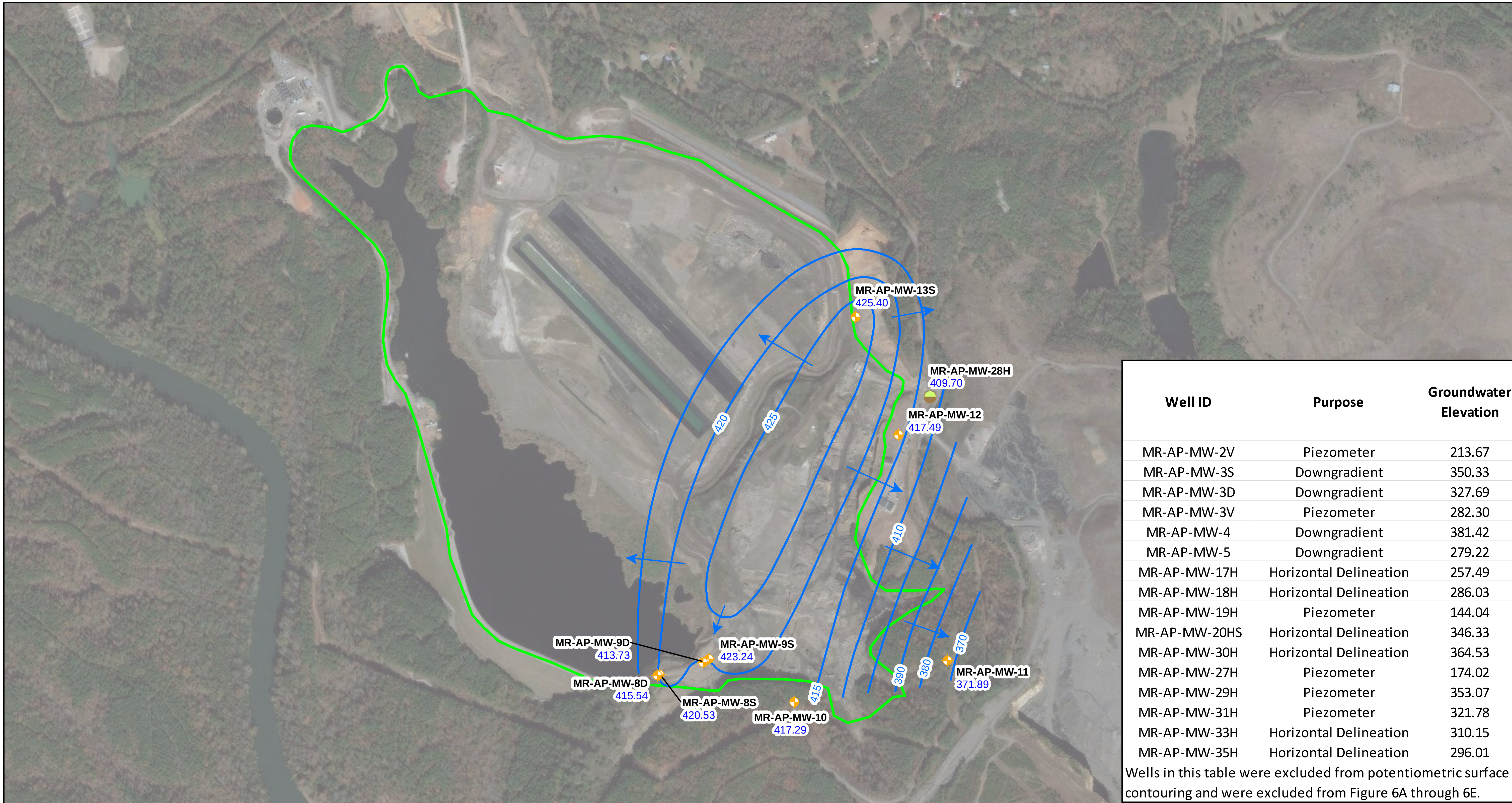
DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP
MARCH 2, 2020
GILLESPY COAL - PRATT TRANSITION ZONE
PLANT MILLER ASH POND

FIGURE NO

FIGURE 6D

Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Piezometer	213.67
MR-AP-MW-3S	Downgradient	350.33
MR-AP-MW-3D	Downgradient	327.69
MR-AP-MW-3V	Piezometer	282.30
MR-AP-MW-4	Downgradient	381.42
MR-AP-MW-5	Downgradient	279.22
MR-AP-MW-17H	Horizontal Delineation	257.49
MR-AP-MW-18H	Horizontal Delineation	286.03
MR-AP-MW-19H	Piezometer	144.04
MR-AP-MW-20HS	Horizontal Delineation	346.33
MR-AP-MW-30H	Horizontal Delineation	364.53
MR-AP-MW-27H	Piezometer	174.02
MR-AP-MW-29H	Piezometer	353.07
MR-AP-MW-31H	Piezometer	321.78
MR-AP-MW-33H	Horizontal Delineation	310.15
MR-AP-MW-35H	Horizontal Delineation	296.01

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 6A through 6E.

Legend

- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary
- Downgradient Monitoring Well (Pratt Aquifer)
- Horizontal Delineation Well

MR-AP-MW-8D Well ID
415.54 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Groundwater elevations vary across different hydrostatic intervals of the Pratt as evidenced by shallow/deep well pairs indicating confining or semi-confining conditions. However, groundwater flow paths generally follow a similar overal pattern.

SCALE	1:9000
DATE	7/28/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP
MARCH 2, 2020
PRATT COAL GROUP (GENERALIZED)
PLANT MILLER ASH POND

FIGURE NO

FIGURE 6E

Southern Company

Legend

- Upgradient Monitoring Well
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Property Boundary (Approximate)

MR-AP-MW-21 Well ID
353.14 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTE: ft NAVD88 indicates feet above North American Vertical Datum of 1988.

SCALE	1:12000
DATE	7/28/2020
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP
UPGRADIENT MONITORING WELLS
APRIL 9, 2020
PLANT MILLER ASH POND

FIGURE NO

FIGURE 6F

Southern Company

Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Vertical Delineation	215.42
MR-AP-MW-3D	Downgradient	328.17
MR-AP-MW-3S	Downgradient	347.83
MR-AP-MW-4V	Vertical Delineation	336.29
MR-AP-MW-17H	Horizontal Delineation	253.43
MR-AP-MW-20HS	Horizontal Delineation	334.89

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 7A through 7D.

Legend

- Downgradient Monitoring Well (Mary Lee Aquifer)
- Horizontal Delineation Well
- Piezometer
- Ash Pond Boundary

MR-AP-MW-1 Well ID
278.64 Groundwater Elevation

Conceptual Potentiometric Surface Contours (ft NAVD88)

- Mary Lee Aquifer
- Upper Mary Lee Group Contour
- Approximate Groundwater Flow Direction (Mary Lee Aquifer)
- Approximate Groundwater Flow Direction (Upper Mary Lee Group)

N

0 500 1,000 2,000 Feet

NOTES:
1. ft NAVD88 indicates feet above the North American Vertical Datum of 1988.
2. NM indicates not measured.
3. Wells MW-1, MW-2, MW-19HA, MW-34H, MW-35H, and PZ-5 are the only locations screened across the Mary Lee Coal aquifer unit.
4. Well MW-18H and piezometer MW-3V, labeled in italics, are screened in the Upper Mary Lee Group.

SCALE	1:10326
DATE	1/28/2021
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
OCTOBER 12, 2020
MARY LEE AQUIFER
PLANT MILLER ASH POND

FIGURE NO
FIGURE 7A

Southern Company

Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Vertical Delineation	215.42
MR-AP-MW-3D	Downgradient	328.17
MR-AP-MW-3S	Downgradient	347.83
MR-AP-MW-4V	Vertical Delineation	336.29
MR-AP-MW-17H	Horizontal Delineation	253.43
MR-AP-MW-20HS	Horizontal Delineation	334.89

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 7A through 7D.

Legend

- Downgradient Monitoring Well (Gillespy Aquifer)
- Horizontal Delineation Well
- Vertical Delineation Well
- Ash Pond Boundary
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- **MR-AP-MW-6V** Well ID
- 259.28 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Potentiometric contour lines were generalized for depiction and ease of reader.
3. Wells MW-6V, MW-20H, MW-7DR, and MW-32H monitor parallel-to-bedding-plane fractures within Gillespy Coal Group sandstones.

SCALE	1:9000
DATE	1/28/2021
DRAWN BY	KAR
CHECKED BY	GBD

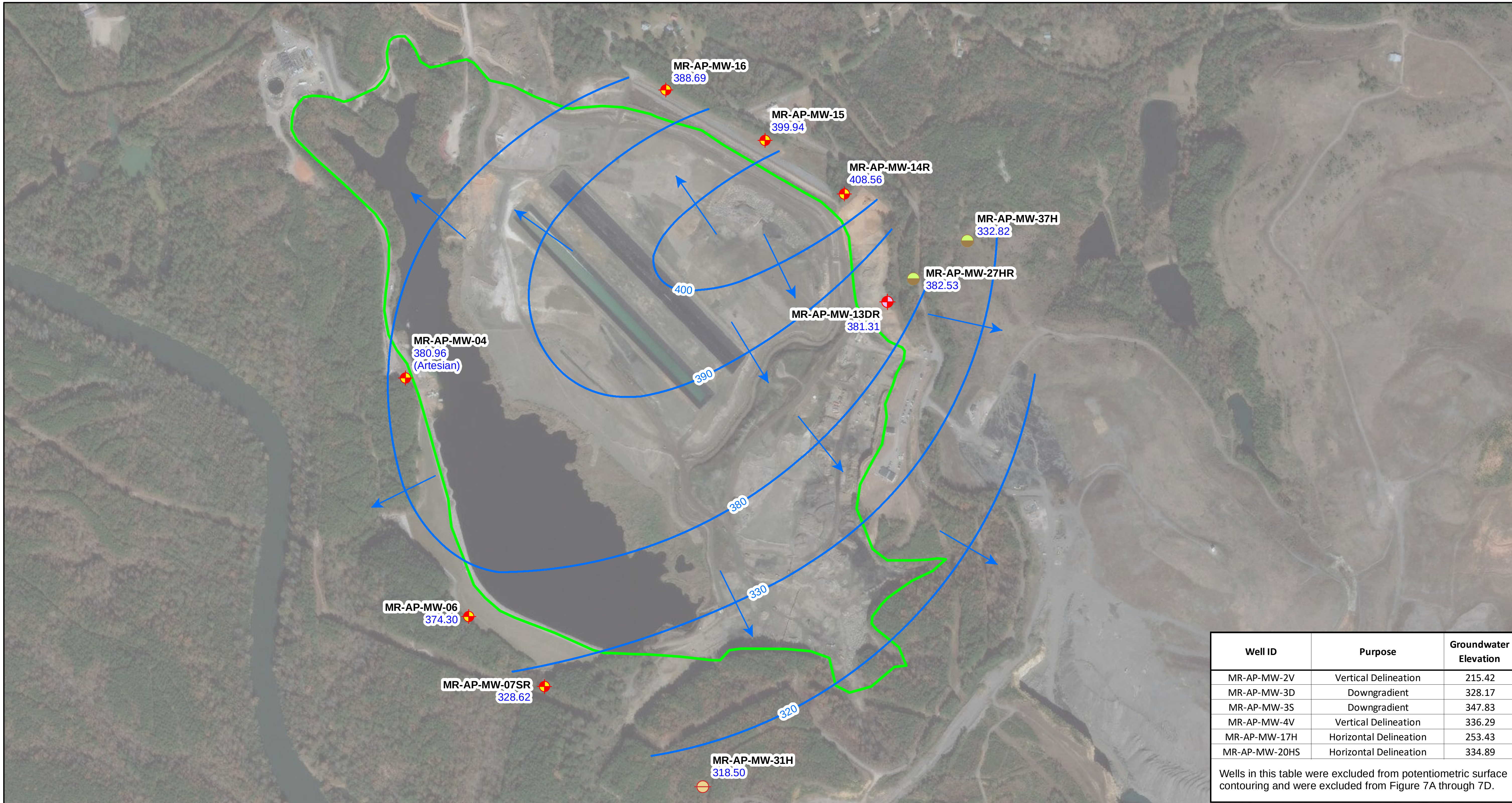
DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP
OCTOBER 12, 2020
GILLESPY LOWER SANDSTONE UNIT(S)
PLANT MILLER ASH POND

FIGURE NO

FIGURE 7B

Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Vertical Delineation	215.42
MR-AP-MW-3D	Downgradient	328.17
MR-AP-MW-3S	Downgradient	347.83
MR-AP-MW-4V	Vertical Delineation	336.29
MR-AP-MW-17H	Horizontal Delineation	253.43
MR-AP-MW-20HS	Horizontal Delineation	334.89

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 7A through 7D.

Legend

- Downgradient Monitoring Well (Gillespy Aquifer)
- Downgradient, Pratt Aquifer
- Horizontal Delineation Well
- Piezometer
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary

MR-AP-MW-7SR Well ID
328.62 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Potentiometric contour lines were generalized for depiction and ease of reader.
3. Wells MW-4V, MW-7SR, and MW-37H are the only wells screened within the upper Gillespy Coal Group sandstones.

SCALE 1:9000

DATE 1/28/2021

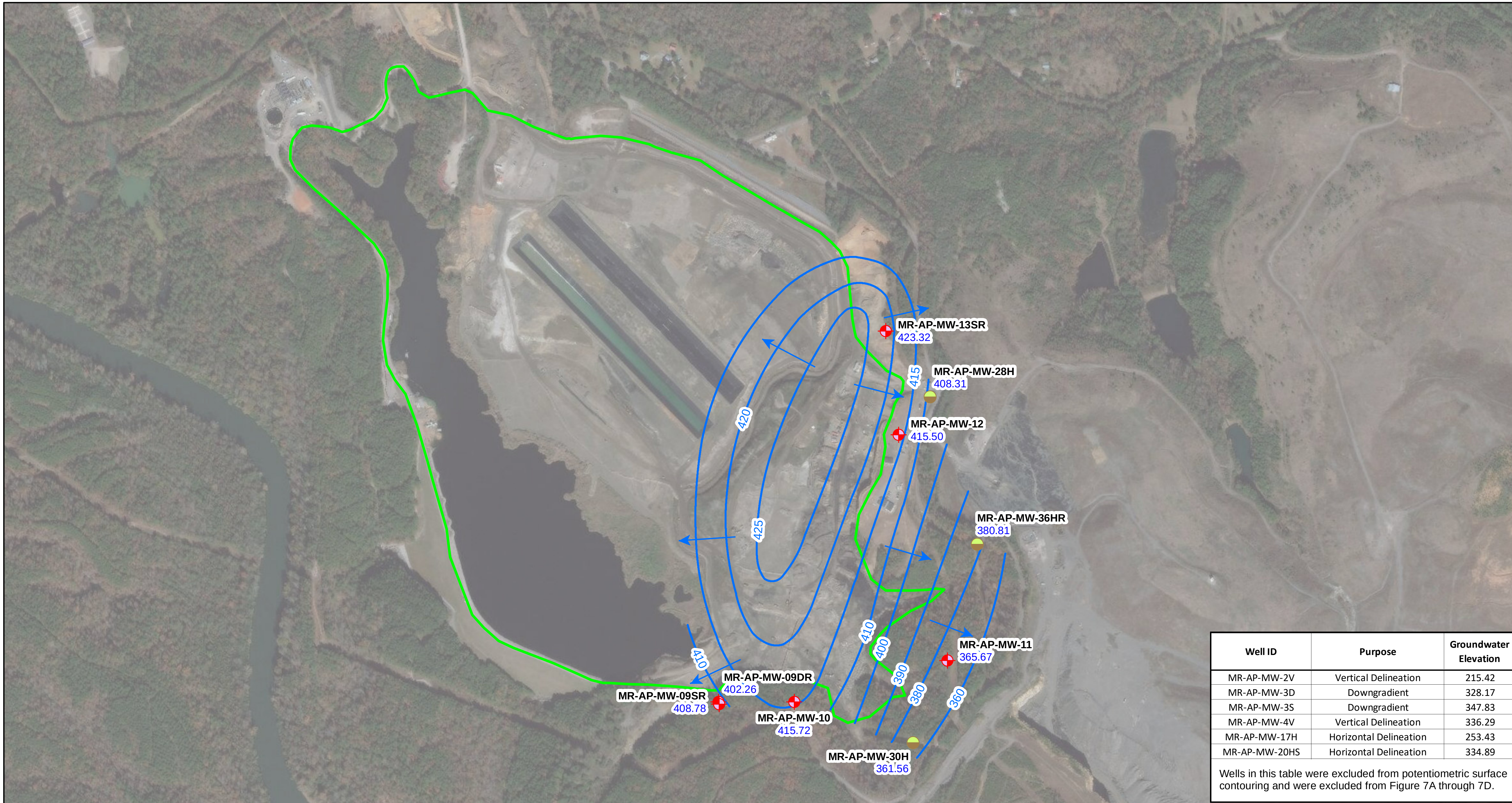
DRAWN BY KWR

CHECKED BY GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
OCTOBER 12, 2020
GILLESPY - PRATT TRANSITION ZONE
PLANT MILLER ASH POND

FIGURE NO
FIGURE 7C

Southern Company



Well ID	Purpose	Groundwater Elevation
MR-AP-MW-2V	Vertical Delineation	215.42
MR-AP-MW-3D	Downgradient	328.17
MR-AP-MW-3S	Downgradient	347.83
MR-AP-MW-4V	Vertical Delineation	336.29
MR-AP-MW-17H	Horizontal Delineation	253.43
MR-AP-MW-20HS	Horizontal Delineation	334.89

Wells in this table were excluded from potentiometric surface contouring and were excluded from Figure 7A through 7D.

Legend

- Downgradient Monitoring Well (Pratt Aquifer)
- Horizontal Delineation Well
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction
- Ash Pond Boundary

MR-AP-MW-10 Well ID
415.72 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTES: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.
2. Groundwater elevations vary across different hydrostatic intervals of the Pratt as evidenced by shallow/deep well pairs indicating confining or semi-confining conditions. However, groundwater flow paths generally follow a similar overal pattern.

SCALE 1:9000

DATE 1/28/2021

DRAWN BY KWR

CHECKED BY GBD

DRAWING TITLE

POTENTIOMETRIC SURFACE CONTOUR MAP
OCTOBER12, 2020
PRATT COAL GROUP (GENERALIZED)
PLANT MILLER ASH POND

FIGURE NO

FIGURE 7D

Southern Company

Legend

- Upgradient Monitoring Well
- Conceptual Potentiometric Suface Contour (ft NAVD88)
- Approximate Groundwater Flow Direction

MR-AP-MW-21 Well ID
347.20 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTE: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.

SCALE	1:12000
DATE	1/28/2021
DRAWN BY	KAR
CHECKED BY	GBD

DRAWING TITLE
POTENTIOMETRIC SURFACE CONTOUR MAP
DEEP UPGRADIENT MONITORING WELLS
OCTOBER 12, 2020
PLANT MILLER ASH POND

FIGURE NO
FIGURE 7E

Southern Company

Legend

Upgradient Monitoring Well

Conceptual Potentiometric Suface Contour (ft NAVD88)

Approximate Groundwater Flow Direction

MR-AP-MW-21 Well ID

347.20 Groundwater Elevation

N

0 500 1,000 2,000 Feet

NOTE: 1. ft NAVD88 indicates feet above North American Vertical Datum of 1988.

SCALE 1:12000	DRAWING TITLE POTENTIOMETRIC SURFACE CONTOUR MAP SHALLOW UPGRADIENT MONITORING WELLS OCTOBER 12, 2020 PLANT MILLER ASH POND		
DATE 1/28/2021			
DRAWN BY KAR	FIGURE NO **FIGURE 7F**	Southern Company	
CHECKED BY GBD			

Appendix C
Monitored Natural Attenuation Demonstration

November 2021
Plant Miller

Monitored Natural Attenuation Demonstration

Prepared for Alabama Power Company

November 2021
Plant Miller

Monitored Natural Attenuation Demonstration

Prepared for
Alabama Power Company
600 18th Street North
Birmingham, Alabama 35203

Prepared by
Anchor QEA, LLC
9797 Timber Circle, Suite B
Daphne, Alabama 36527

Project Number: 201114-01.05
\\Athena\Mobile\Projects\Southern Company\Alabama Power ACMs - PRIVILEGED & CONFIDENTIAL\MNA Demonstration Reports\Miller\Text\Miller MNA Demonstration Report.docx

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APPENDICES

ABBREVIATIONS

µg/L	microgram per liter
CCR	coal combustion residuals
CEC	cation exchange capacity
cm	centimeter
COI	constituent of interest
EGL	Anchor QEA Environmental Geochemistry Laboratory
GWPS	groundwater protection standard
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
PV	pore volume
SEM	scanning electron microscopy
Site	Plant Miller Ash Pond
SSE	selective sequential extraction
SSL	statistically significant level
USEPA	U.S. Environmental Protection Agency
XRD	X-ray diffraction
XRF	X-ray fluorescence

Executive Summary

Extensive geochemical and related studies demonstrate that monitored natural attenuation (MNA) is a viable corrective action for groundwater impacts associated with the Plant Miller Ash Pond (Site). The preponderance of evidence indicates that conditions at the Site meet the U.S. Environmental Protection Agency's evaluation criteria for the use of MNA, specifically: area of impacts stable or shrinking, identified mechanisms for attenuation, stability of the attenuating mechanisms, sufficient aquifer capacity for attenuation, and time to achieve groundwater protection standards (GWPSs) are reasonable compared to other corrective-action alternatives. However, MNA is one component of the Site's corrective-action remedy. The following corrective measures were selected for the Site: source control to include dewatering, consolidation, and capping of the Site; permeation grouting in areas of relatively high concentrations of arsenic, cobalt, and lithium (constituents of interest; COIs) to prevent COI movement beyond the facility boundary; and MNA over the entire Site.

Investigations performed to support the use of MNA at the Site included: preparation of concentration versus time and concentration versus distance graphs for COIs in groundwater; groundwater, well solids (precipitates), and soil sampling; laboratory analyses of well solids samples for bulk chemistry (X-ray fluorescence), mineralogy (X-ray diffraction and scanning electron microscopy), and cation exchange capacity; geochemical modeling; selective sequential extraction (SSE) to determine associations of COIs with attenuating solids; and column studies to assess the aquifer (soil) capacity for attenuation.

The trends observed in concentration versus time and concentration versus distance graphs provide evidence that natural attenuation is occurring at the Site. Concentration versus time graphs indicated that arsenic, cobalt, and lithium concentrations are generally stable or decreasing in several areas, even without source control. The concentration versus distance graphs along downgradient transects indicate that arsenic, cobalt, and lithium are decreasing with distance from the Site.

Based on the geochemical investigations, multiple lines of evidence support one or more attenuating mechanisms, depending upon the COI. The major attenuating mechanisms include: sorption on iron oxides (arsenic and cobalt), cation exchange on clays (cobalt and lithium), coprecipitation in iron oxides (cobalt), and precipitation in barium arsenate (arsenic). All COIs are subject to physical attenuating mechanisms such as dispersion and flushing, which will decrease concentrations with time and distance from the Site.

Column studies were performed to assess the ability of the residual aquifer media (soil) and overlying rock to remove arsenic, lithium, and cobalt from groundwater. Column tests using different combinations of Site soils and groundwaters showed that arsenic and lithium are strongly taken up by the aquifer media likely due to sorption and ion exchange reactions. While cobalt was not removed by the soils tested in the column studies, concentration versus time and concentration versus distance graphs, as well as other geochemical evidence, indicate that cobalt is being attenuated at the Site. Cobalt attenuation at the Site may be controlled by slower processes such as coprecipitation that might not be observed within the time frame of a column experiment and may be limited by local groundwater geochemical conditions. All of the COIs are also subject to physical attenuation processes (dispersion and flushing).

Arsenic was completely attenuated by aquifer media for at least 100 pore volumes, while lithium attenuation was more variable depending on the soil tested. This attenuation capacity was extrapolated to the entire mass of the aquifer downgradient of the consolidated ash pond but within the property boundary. The extrapolation showed that the aquifer has an attenuating capacity of many more times the mass of arsenic and lithium requiring attenuation.

SSE was performed on samples of well solids (precipitates) and soils used in the column studies to assess the stability of the attenuated COIs and their host minerals. SSE data for the COIs are somewhat limited due to the small sample size for the well solids and a relatively high number of samples measuring below the method detection limit for both datasets. Iron, which is commonly associated with arsenic and cobalt attenuation, is present in the exchangeable, reducible, and oxidizable fractions for well solids, but primarily in the oxidizable and residual fractions in the post-column soil samples. Arsenic is mostly in the exchangeable fraction in the post-column soils, with some in the oxidizable and residual fractions. In the post-column soils, cobalt occurs primarily in the exchangeable and reducible fractions, with some in the oxidizable and residual fractions. Manganese, which is associated with lithium attenuation, is distributed among all (except water-soluble) fractions, depending upon the sample. Due to almost no COIs in the water-soluble fraction and the sum of the mass of COIs in the more stable fractions (oxidizable, reducible, and residual), attenuated COIs are not expected to remobilize back into groundwater.

Reactive transport modeling was performed along a simulated fracture pathway in rock and demonstrated that the migration of arsenic and cobalt is significantly retarded (slower) as compared to a nonreactive constituent such as chloride. The arsenic and cobalt retardation is primarily due to sorption on iron oxide coatings on fracture walls and, to a lesser extent, diffusion into and attenuation within the rock matrix.

The slope of trend lines through recent data on concentration versus time graphs and results from reactive transport modeling were used to estimate time to achieve the applicable GWPS. Depending on the COI and well (area), the estimated time to achieve natural attenuation ranges from 2 to 25 years, not considering source control. This range is reasonable compared to durations of other corrective-action technologies and is compatible with the closure and post-closure period. Site closure (source control) and permeation grouting are expected to reduce the time to achieve GWPS as compared to MNA alone.

1 Introduction

The Plant Miller Ash Pond (Site), located in Jefferson County, Alabama, is owned and operated by Alabama Power Company. As of April 15, 2019, the Site ceased receiving all coal combustion residuals (CCR) and non-CCR waste streams.

Alabama Power Company has been monitoring groundwater at the Site in accordance with the U.S. Environmental Protection Agency (USEPA) CCR Rule 40 Code of Federal Regulations § 257.97 and the Alabama Department of Environmental Management's Administrative Code r. 335-13-15-.06 since 2016. Constituents of interest (COIs) for the Site include arsenic, cobalt, and lithium.

Though substantial evidence for natural attenuation exists for the Site, natural attenuation is expected to increase as source control measures are implemented (i.e., dewatering, consolidation, and capping).

USEPA defines monitored natural attenuation (MNA) as the "reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods" (USEPA 1999, 2015). An MNA evaluation consists of the following steps or tiers (USEPA 2015):

1. Demonstrate that the plume areas are stable or shrinking.
2. Determine the mechanisms and rates of attenuation.
3. Determine the capacity of the aquifer is sufficient to attenuate the mass of constituents in groundwater and the immobilized constituents are stable and will not remobilize.
4. Design a performance monitoring program based on the mechanisms of attenuation and establish contingency remedies (tailored to site-specific conditions) should MNA not perform as expected.

As shown in Table 1, the field and laboratory investigations completed for this evaluation support Tiers 1 through 3. Tier 4 is addressed in the accompanying *Groundwater Remedy Selection Report*. A detailed sitewide corrective-action monitoring plan will be submitted within 90 days of the *Groundwater Remedy Selection Report*.

2 Stability of Areas of Impacts

Existing groundwater data were used to generate concentration versus time and concentration versus distance graphs to assess natural attenuation occurrence and rates. COIs were plotted on the y-axis. For the concentration versus time plots, the time between sampling events (from 2016 through 2021) was plotted on the x-axis. For the concentration versus distance graphs, the distance between the pond boundary and monitoring well was plotted on the x-axis. Concentration versus distance graphs were made for COIs along the upgradient-downgradient flow paths. Specifically, concentration versus distance graphs were made for the following wells:

- MR-AP-MW-5 to MR-AP-MW-19HA (arsenic and lithium)
- MR-AP-MW-6 to MR-AP-MW-32H (cobalt and lithium)
- MR-AP-MW-3S to MR-AP-MW-18H (lithium)

The trends observed in recent spatial and temporal data provide evidence that natural attenuation is occurring at the Site. All transects showed COI concentrations decreasing with distance from the Site, indicating spatial attenuation (Figure 1). Arsenic concentrations in MR-AP-MW-5 (representing the only well with statistically significant levels [SSLs] of this COI) have remained stable since initial sampling in 2016. Cobalt concentrations are decreasing with time at all wells with SSLs. Lithium concentrations are decreasing or stable with time in approximately 75% of the wells with SSLs, and decreasing trends are expected in other wells after closure, as closure activities cut off the source of COIs to groundwater. A selection of concentration versus time graphs are included in Figure 2. All concentration versus time graphs are included in Appendix A.

3 Groundwater Sampling and Analysis

Groundwater sampling and analyses were conducted to perform geochemical modeling to help determine attenuating mechanisms. Groundwater samples were collected by RDH Environmental in February 2020 and submitted to the Alabama Power General Test Laboratory. Groundwater samples were collected from monitoring wells as listed in Table 2. The samples were analyzed for major cations and anions and geochemical parameters influencing the chemical behavior of the COI. The analyzed constituents and associated laboratory analytical methods are summarized in Table 3.

Groundwater samples were collected from monitoring wells included in Table 2 using the dedicated pump installed in each well. Wells were purged at a low flow rate to minimize drawdown and sampled using low-flow sampling techniques in accordance with USEPA CCR Rule 40 Code of Federal Regulations § 257.93(a) and Alabama Department of Environmental Management Administrative Code r. 335-13-15-.06(4)(a). Prior to sampling, each monitoring well was purged until field parameters (pH, temperature, specific conductance, dissolved oxygen, and oxidation-reduction potential) stabilized. Turbidity was measured during sampling but was not used as a stabilization criterion.

4 Geochemical Stability and Speciation Calculations

Geochemical equilibrium modeling was performed to determine mineral phases that may be controlling the dissolved concentrations, mobility, and attenuation of arsenic, cobalt, and lithium, as well as the behavior of other species (such as iron, manganese, and aluminum) that influence the behavior of the COIs.

The software The Geochemist's Workbench (Bethke and Yeakel 2013) was used to construct Pourbaix (Eh-pH) diagrams for iron, arsenic, cobalt, and manganese based on Site groundwater chemistry and to assess the geochemical stability of phases potentially controlling COI concentrations under Site conditions (Figures 3 through 6). Blue fields indicate dissolved/mobile species, and yellow fields indicate solid/attenuated species. Eh-pH data from the February 2020 groundwater sampling event are also plotted to determine the most stable species under Site conditions. The Pourbaix stability diagrams indicate the following associations and attenuating mechanisms:

- Site Eh-pH data fall along or near the thermodynamic stability boundaries between amorphous iron hydroxide [$Fe(OH)_3(a)$] and dissolved ferrous iron [Fe^{2+}] (Figure 3). Amorphous iron oxides are strong sorbents for many metals and metalloids, including arsenic and cobalt.
- Site Eh-pH data also plot within the stability field of a barium arsenate mineral phase [$Ba_3(AsO_4)_2$], which may control dissolved arsenic concentrations in areas where barium concentrations exceed those of arsenic (Figure 4).
- A cobalt-iron oxide phase [$CoFe_2O_4$] is also predicted to be stable under Site conditions (Figure 5). This phase has a similar structure to the iron oxide mineral magnetite [Fe_3O_4], suggesting incorporation/coprecipitation of cobalt in iron oxides as an attenuation mechanism under conditions in which such phases could form.
- Lithium is often associated with manganese oxides, and the mineral lithiophorite [$(Li,Al)Mn_2O_2(OH)_2$] is an example of a lithium-bearing manganese oxide. The thermodynamic properties of lithiophorite and other lithium-bearing manganese oxides are not well known, and its stability field shown in Figure 6 is approximate.

Geochemical speciation-solubility calculations were also performed using the U.S. Geological Survey computer program PHREEQC (Parkhurst and Appelo 2013) with the WATEQ4F thermodynamic database (augmented with data for lithiophorite [Parc et al. 1989] and cobalt species from the MINTEQv4 database) to calculate aqueous speciation and determine the saturation state of groundwater samples with respect to possible mineral phases. Saturation index calculations can be used to infer solid phases potentially present in the aquifer. The solubility of these phases may be controlling dissolved concentrations. If a groundwater solution is saturated or supersaturated with respect to a mineral phase, then that phase could be precipitating and attenuating COIs as it precipitates. Saturation indices for groundwater samples collected in February 2020 are presented in Table 4, and geochemical speciation modeling results indicate the following:

- Groundwater is slightly supersaturated and/or close to equilibrium with respect to amorphous iron hydroxide [$Fe(OH)_3(a)$] and supersaturated with respect to the more crystalline iron oxides (goethite, hematite, and magnetite).
- Groundwater with detectable arsenic is supersaturated with respect to a barium arsenate mineral phase.
- Groundwater with detectable cobalt is supersaturated with respect to a cobalt-iron oxide mineral phase.
- No lithium-bearing mineral phases are close to saturation. Groundwater is close to equilibrium with respect to rhodochrosite [$MnCO_3$], indicating that redox conditions are generally more reducing than required to stabilize manganese oxides with which lithium could be associated.

5 Solids Sampling and Analysis

Precipitation and coprecipitation reactions can be important mechanisms for natural attenuation of COIs. Soil and aquifer media can also sorb COIs, and their geochemistry can indicate if natural attenuation is occurring or has the potential to occur. If well solids (precipitates) are forming and incorporating COIs, then natural attenuation is occurring.

5.1 Sample Collection

To evaluate these mechanisms (precipitation and coprecipitation), solid particles (if present) were collected from the bottom of monitoring wells and analyzed (summarized in Table 2). The well solids (precipitates) may include precipitates forming in situ in the aquifer, as well as finer-grained particles of the aquifer matrix that have been transported through the well screen and deposited in the bottom of the well. Regardless, the recovered well solids provide insights into aquifer geochemistry and mineralogy, and attenuation mechanisms for COIs.

Well solids (precipitates) samples were collected as follows:

- Well solids were pumped from the bottom of the well via polyethylene tubing.
- Groundwater and well solids were pumped through an inline filter holder and stand (for example, those manufactured by Geotech Environmental Equipment, Inc.) with a 0.45-micron filter membrane until the filter clogged or the water ran clear. Up to five filters containing well solids were collected at each well (with the objective to collect as much solid material as possible from the bottom of each well).
- All filters from each well were placed in a single plastic petri dish, and the petri dish lid was secured with duct tape.
- Each sealed petri dish was placed in a Mylar bag with oxygen-absorbent packets to minimize oxidation of the well solids samples during transport.
- The Mylar bags were sealed with no headspace and placed in a secured iced cooler.
- Samples were stored on ice and shipped to the Anchor QEA, LLC, Environmental Geochemistry Laboratory (EGL) in Portland, Oregon, for analysis.

Aquifer solids (soil) samples and unconsolidated residual materials were selected from core boxes in a core storage area and analyzed to determine capacity, rates, and stability of MNA. Soil samples were collected from MR-AP-MW-2V, MR-AP-MW-3V, and MR-AP-MW-20H between April 5 and April 9, 2021, from the soil boring locations shown in Figure 7. When possible, both soil and rock samples were collected from areas with greater impacts. These samples were sealed in zip-top bags, labeled, packed in coolers, and shipped to EGL. Preservation of these samples was not required. Rock samples were analyzed to provide information on mineralogy and lithology to inform attenuation mechanisms in fractured rock and for use in modeling (Section 7). As described in Section 8, soil samples were also used in column studies to determine attenuation capacity and stability of the attenuated COIs and their host minerals in residual soils.

5.2 Sample Analysis

Upon arrival at EGL, well solids (precipitates) and soil samples were inspected and checked against the chain of custody. Samples were then stored under refrigeration until processing. Well solids were recovered from the filters in a glove box under a nitrogen atmosphere to prevent oxidation prior to analysis for geochemical characterization. Solids accumulated on the filters were scraped and collected in centrifuge tubes. The wet material was then centrifuged, and the solids were transferred into a pre-weighed glass jar. The solids were then dried under a nitrogen atmosphere at 38°C for 24 to 72 hours until dry.

The well solids (precipitates) and soil samples were analyzed by the following methods:

- X-ray fluorescence (XRF) to determine the chemical composition of the matrix (e.g., iron compounds) and presence of detectable COIs
- X-ray diffraction (XRD) to determine crystalline mineral phases
- Selective sequential extraction (SSE) to determine association of COIs with attenuating phases, determine relative strength of attenuation, and provide a sense of permanence
- Cation exchange capacity (CEC) to assess cation exchange as a mechanism for attenuation
- Scanning electron microscopy (SEM) to directly observe and determine the composition of attenuating phases in well solids (Soil was not examined by SEM.)

Additional detail (including the relevance of each analysis to the MNA evaluation) is included in Table 5.

All well solids (precipitates) samples with sufficient mass and all aquifer solids were analyzed by XRF to determine bulk chemical composition. After drying, processed samples were loaded and sealed in plastic sample containers for elemental analysis by XRF. XRF testing was performed by EGL staff using a Niton XL3t GOLDD+ XRF Analyzer. Individual samples were analyzed by XRF using the "Test All Geo" method under the "Mining" profile, which includes most elements heavier than sodium.

Powder XRD analysis was performed on selected well solids (precipitates) and aquifer soil samples to determine mineralogy. Samples were selected based on several factors, including well location; groundwater chemistry; bulk chemical composition data (XRF); and, for well solids samples, available sample mass.

Following XRF analysis, samples for SSE analysis were selected using the criteria above and results of the XRF analysis. SSE measures the distribution of COIs bound to the solid phase in different forms in order of decreasing solubility and mobility from F1 (soluble) to F5 (residual). Samples are extracted stepwise with chemical solutions of increasing aggressiveness into fractions, which are operationally defined as follows:

- F1: Water soluble
- F2: Exchangeable (e.g., bound to clay minerals)
- F3: Reducible (e.g., associated with amorphous or poorly crystalline oxides such as ferrihydrite, a hydrous iron oxide)
- F4: Strong acid/oxidizable (e.g., associated with crystalline oxides and/or sulfide minerals)
- F5: Residual (e.g., bound in insoluble silicate phases)

Each successive step represents stronger attenuation and greater permanence. The F3 (reducible), F4 (strong acid/oxidizable), and F5 (residual) fractions represent COIs associated with relatively stable (permanent) attenuating mechanisms, provided Site geochemical conditions do not change drastically in the future (which is not expected).

Cation exchange on clays can be an important attenuation mechanism for some COIs, such as cobalt and lithium. After XRF analysis, samples for CEC analysis were selected using the criteria above and the results of the XRF analysis. CEC was determined by leaching samples with ammonium acetate and analyzing the leachate for exchangeable cations, including lithium and cobalt (for aquifer solids only).

Select well solids (precipitates) samples, including point microanalysis and elemental mapping, were also submitted for examination by SEM to confirm the identity and chemical compositions of attenuating mineral phases and document the presence of amorphous iron and aluminum oxide coatings on mineral grains that can attenuate COIs.

5.3 Well Solids Results

The XRF chemical analysis of the well solids (precipitates; Table 6) showed relatively high concentrations (i.e., greater than 7,600 milligrams per kilogram [mg/kg]) of iron in samples from both wells. Arsenic was also detected in the sample with the highest iron concentration, suggesting an association of arsenic with iron.

XRD identified quartz as a major component of the well solids (precipitates) in both wells and minor feldspar in MR-AP-MW-3D. The bulk chemistry identified elements associated with potentially attenuating phases (iron and calcium), and the XRD analysis identified minor muscovite-illite and zeolite, as well as significant calcite, which are potentially attenuating minerals (Table 7).

SEM imaging and associated elemental mapping were performed on select samples to confirm mineral phases and attenuating mechanisms. SEM results indicate that the solids collected from MR-AP-MW-4 are a mix of quartz and calcite, with smaller aluminum- and iron-rich grains (Figure 8).

Some alteration with dissolution pitting and thin coatings of iron and aluminum-rich material was also observed. SEM results indicate that the solids collected from MR-AP-MW-3D are predominantly quartz interspersed with calcite, feldspar, and iron-rich grains. Very little alteration with dissolution pitting was observed in some grains, and thin coatings of aluminum, calcium, and iron-rich material was observed in others.

Based on the results from the XRF and XRD analyses and available sample volume, well solids (precipitates) samples were selected for SSE using the technique described in Section 5.2.

Figure 9 shows the results of SSE for three well solids (precipitates) samples from the Site. Interpretation by COI includes the following:

- Arsenic: A small amount of arsenic was detected in the F1 (soluble) fraction. Arsenic was not detected in fractions F2 to F5 due to small sample mass of some of the samples, which resulted in elevated detection limits. SSE, therefore, provided limited information for arsenic. However, iron (which is commonly associated with arsenic attenuation) is generally detected in highest concentrations in the F3 (reducible) and F4 (strong acid/oxidizable) fractions, consistent with the presence of poorly crystalline to crystalline iron oxide particles and coatings.
- Cobalt: Cobalt is variably distributed among the F2 (exchangeable), F3 (reducible), F4 (oxidizable), and F5 (residual) fractions. F2 is consistent with cobalt ion exchange on clays reported in the scientific literature, and F3 and F4 are consistent with cobalt associated with iron oxides as also suggested by iron SSE results and geochemical modeling (stability of cobalt-iron oxides).
- Lithium: Detected primarily in the F5 (residual) fraction, but detection limits are elevated due to limited sample mass available for SSE. SSE, therefore, provided limited information for lithium.

Two samples with suspected clay content were submitted for CEC testing. CEC was very high for these samples, specifically 1,910 and 6,200 milliequivalents per kilogram and mostly due to calcium (Table 8), which likely reflects clay mineralogy but may be biased high due to dissolution of calcite. Exchangeable lithium was detected in solids from one of the wells, supporting ion exchange on clays as an attenuating mechanism for lithium.

5.4 Aquifer Solids (Soil) Results

XRF analyses of soil samples show high total iron content in the range of 24,700 to 40,600 mg/kg, likely reflecting variable iron oxide content, which provides substantial attenuating capacity (Table 9). The XRF data suggest a weak positive relationship between arsenic and iron concentrations.

The mineralogy of the soil samples (as determined by XRD) consists predominantly of quartz with abundant muscovite-illite and clay minerals (mainly kaolinite and nacrite) and lesser amounts of feldspar (Table 10). Although muscovite was identified by XRD, it is likely a mixture of muscovite and illite, which is a clay mineral weathering product of muscovite that exhibits a similar XRD pattern.

CEC for the soil samples ranges from 4.6 to 36.1 milliequivalents per kilogram (Table 11) and reflects the nature and abundance of clay minerals in the aquifer soil samples. These values, while significantly lower than the CEC reported for the well solids (precipitates) samples, are more consistent with the expected CEC of the clay minerals identified and are, therefore, likely more representative of the cation exchange properties of the aquifer.

Extractable iron, manganese, and aluminum oxides in aquifer soil samples and simultaneously extractable arsenic, cobalt, and lithium are presented in Table 12. The data indicate that aquifer soils contain a mixture of mainly iron and aluminum oxides and, to a somewhat lesser degree, manganese oxides. These oxides are likely present as both discrete iron-rich grains, as well as iron. aluminum, and/or manganese coatings on mineral particles and rock fracture surfaces, as indicated by SEM. Groundwater geochemical modeling results (Eh-pH diagrams) indicate that iron oxides are stable at the Site. The aluminum oxides may also reflect the presence of clay minerals. Arsenic was detected in the oxide extracts of all aquifer soil samples, and cobalt was detected in all but one sample, indicating arsenic and cobalt are being attenuated by sorption and incorporation in iron oxides.

Analytical results are included in Appendix B.

6 Mechanisms for Natural Attenuation

To support MNA, the following geochemical modeling and laboratory analyses of groundwater, well solids (precipitates), and aquifer solids (soils) were conducted:

- Performed groundwater geochemical modeling using The Geochemist's Workbench and PHREEQC to assess the geochemical stability of phases potentially controlling COI concentrations under Site conditions, including saturation index calculations
- Analyzed samples by XRF, XRD, SEM, and CEC to identify attenuating mechanisms for COIs
- Performed SSE to determine the association of COIs with attenuating phases, and relative strength and stability of attenuation mechanisms

As discussed in Section 5, results from groundwater data analysis, geochemical modeling, well solids (precipitates), and aquifer solids (soil) analyses provide multiple lines of evidence for specific attenuation mechanisms for COIs (summarized in Table 13). The major attenuating mechanisms include sorption on iron oxides (arsenic and cobalt), cation exchange on clays (cobalt and lithium), coprecipitation in iron oxides (cobalt), and precipitation in barium arsenate (arsenic).

XRF detected at least one COI and elements associated with natural attenuation (iron, barium, calcium, manganese, and/or potassium). The XRF bulk chemical analysis for aquifer solids (soils) showed sufficient concentrations of iron for attenuation, ranging between 24,700 and 40,600 mg/kg. Aluminum concentrations from the XRF analysis suggest clay minerals are present.

XRD identified at least one of four potentially attenuating clay minerals: muscovite-illite, kaolinite, nacrite (a clay mineral very similar to kaolinite), and/or vermiculite in six aquifer solids (soil) samples. CEC, SSE, and SEM were performed on select samples to verify the results of the XRD work. The aquifer solids (soils) samples exhibit moderate but variable CEC, which ranges from 4.6 to 36.1 milliequivalents per kilogram. CEC results indicate that cobalt and lithium are involved in cation exchange on clay minerals.

SEM identified widespread occurrence of iron oxide coatings on aquifer solids, which supports the other lines of evidence that indicate that iron oxides are important attenuating phases for arsenic and cobalt (Figure 10).

As discussed in greater detail in Section 5.3, SSE indicated an association of COIs with attenuating solids and mechanisms as follows:

- Cobalt: Cobalt is variably distributed among the F2 (exchangeable), F3 (reducible), F4 (oxidizable), and F5 (residual) fractions. F2 is consistent with cobalt ion exchange on clays reported in the scientific literature, and F3 and F4 are consistent with cobalt associated with iron oxides as also suggested by iron SSE results and geochemical modeling (stability of cobalt-iron oxides).

- Iron: Distributed among the F2 (exchangeable), F3 (reducible), and F4 (strong acid/oxidizable) fractions, with more mass in the F4 (oxidizable) fraction. Attenuation of arsenic and cobalt by iron oxides is well documented in the scientific literature.
- SSE provided limited information for arsenic and lithium as a result of elevated detection limits due to small sample mass available for well solids samples.

As discussed in Section 8, SSE was also performed on aquifer solids (soils) after column tests to help determine attenuating mechanisms. Results for cobalt and lithium in the post-column soil SSE tests were below detection limits, so no interpretations can be made. Although results for arsenic were mostly below detection limits in SSE tests for well solids (precipitates), SSE of the post-column soils provided additional information for arsenic. For the post-column soil SSE tests, most of the arsenic is bound in the F2 (exchangeable) fraction, with some arsenic bound in the F4 (strong acid/oxidizable) and F5 (residual) fractions.

7 Reactive Transport Modeling

Reactive transport modeling was performed to assess the fate and transport of COIs (arsenic, cobalt, and lithium) along a representative groundwater flow path at the Site under existing conditions. The objective of the modeling was to understand the potential role of natural attenuation processes occurring in the fractured rock system based on site-specific hydrogeological and geochemical data supporting remedy selection and future remedial design.

A 2D transect oriented along a generalized groundwater flow path (i.e., perpendicular to the interpreted potentiometric contours) from the boundary of the Site westward to the predominant downgradient surface water feature, the Locust Fork River (Figure 7), was modeled using the U.S. Geological Survey (USGS) modular finite-difference flow model MODFLOW-2005 (Harbaugh 2005) and the multicomponent reactive transport model PHT3D (Prommer and Post 2010), which incorporates the 3D multispecies transport model MT3DMS (Zheng and Wang 1999) and geochemical modeling code PHREEQC (Parkhurst and Appelo 2013). The model includes a single idealized discrete bedrock fracture pathway with an aperture value consistent with site-specific and literature-based data[1]. The fracture is represented as a single model layer. The unfractured rock matrix adjacent to the fracture is included in the model domain and represented by multiple layers to explicitly simulate COI diffusive interaction between the fracture pathway and rock matrix. The model domain extends from the midpoint of the fracture outward to a distance representing half of the average fracture spacing based on site-specific data (SCS 2020). The upgradient and downgradient extents of the model domain are represented by constant head boundaries defined by measured hydraulic head at MR-AP-MW-3D and measured river stage at the Site, respectively. A graphic depicting the model grid is provided as Figure 11. Specific model domain and grid details are listed as follows:

- Model length in the direction of groundwater flow: 1,868 feet
  - Number of columns: 187
  - Column width: 10 feet
- Model height (i.e., half the average fracture spacing) perpendicular to the simulated fracture pathway: 2.5 feet
  - Number of layers: 13 or 41[2]
  - Layer thickness: variable, ranging from 0.00049 foot (150 microns, which is half the fracture aperture) for the layer representing the fracture pathway to a maximum

[1] Estimates for fracture aperture were developed from fracture spacing data obtained from the boring log for well MR-AP-MW-3D and Figures 6 and 7 of Snow (1968).

[2] There are two versions of the model, one with 13 layers and one with 41 layers. The 13-layer model is used for the 1- and 8-year simulations, while the 41-layer model was used for the 30-day simulation. The smaller number of layers was used for the 1- and 8-year simulations to speed model runtime.

thickness of 1.25 feet for the 13-layer model and 0.2 foot for the 41-layer model for the outermost model layer.[3]

- Number of rows: 1
- Row thickness: 0.2 to 1.25 feet, equal to the maximum layer thickness

As groundwater and solutes migrate downgradient through bedrock fractures, COI concentrations are attenuated by reactions with mineral coatings such as iron oxides and clay minerals on the fracture walls and by diffusion into and reaction with minerals in the rock matrix. Diffusive forces alone are known to provide substantial attenuation relative to the rate of groundwater flow. Lipson et al. (2005) demonstrated that the rate of attenuation increases with time and travel distance, eventually reaching an asymptotic level or a maximum retardation rate, β. Using Equation 1 (Lipson et al. 2005), β for this model is estimated at 251 (dimensionless), meaning that, following the advance of the plume to a sufficient distance, even a nonreactive solute near the leading edge of the plume would migrate at a rate 251 times slower than the rate of groundwater flow in the fractures.

Equation 1

$$\beta = R' \left(\frac{\varphi_m}{\varphi_f} \right)$$

where:

β	=	plume attenuation factor
R′	=	matrix retardation factor representing sorption of solute to grain surfaces within the matrix (For non-sorbing solutes such as chloride, R′ is assumed to equal 1.)
φ_m	=	matrix porosity
φ_f	=	fracture porosity, $\frac{e}{S}$
e	=	fracture aperture
S	=	fracture spacing

Reactions with mineral coatings on the fracture walls and in the rock matrix also attenuate solutes migrating through a bedrock fracture network (Lipson et al. 2005). Specific attenuating mechanisms for the three COIs simulated in the model include the following:

- Arsenic: Sorption to iron and aluminum oxide binding sites within the rock fractures and matrix

[3] The thickness of each layer increases by a factor less than 1.5 from one layer to the next.

- Cobalt: Sorption to binding sites on iron oxides and clay minerals within the rock fractures and matrix
- Lithium: Cation exchange on clay minerals within the rock fractures and matrix

Inclusion of these attenuation mechanisms in the transport model was based on analysis of trends in groundwater monitoring data, geochemical modeling, and laboratory analyses described previously, as well as thin-section petrography and SEM data on fractured rock samples collected in the vicinity of the model transect (Appendix B).

Sorption reactions of COIs and other species on iron oxides were modeled using the surface complexation model of Dzombak and Morel (1990). For sorption on clays, the aluminum oxide binding site model presented in Karamalidis and Dzombak (2010) was used. Transect-specific data, including groundwater chemistry, as well as estimated CEC and iron and aluminum oxide concentration data for the rock fractures and matrix, were used to define initial groundwater and matrix geochemistry.

Initial groundwater chemistry along the transect is based on data for samples collected in October 2020 for which complete chemical analyses (major and minor constituents, including COIs) were available. Initial chemistry is defined by background[4] groundwater chemistry data from a downgradient well, MR-AP-MW-18H, with none of the COIs at SSLs. The chemistry of groundwater entering the upgradient boundary is defined by data from upgradient well MR-AP-MW-3D with COI concentrations at SSLs. The groundwater chemistry data used in the model are presented in Table 14.

Average CEC and iron and aluminum oxide data estimated from petrographic and SEM analyses for rock samples collected at the Site were used to assign cation exchange and sorption capacity (concentrations of iron and aluminum binding sites) parameters in the model (Table 15). Parameter estimates are based on elemental and mineral analyses of the rock samples, which generally show a 2:1 ratio of iron to aluminum. Illite was assumed as the representative clay, which is a conservative assumption because illite has lower exchange/sorption capacity than other clays such as montmorillonite (Ugwu and Igbokwe 2019). For modeling purposes, for estimation of iron and aluminum oxide concentrations, it was assumed that the volume of mineral coatings within the fracture is similar to the fracture void volume.

Model simulations were run for several different simulation times, ranging from 30 days to 8 years, to assess the relative importance of the different natural attenuation processes (e.g., sorption on iron oxides along the fracture versus diffusion into the rock matrix and sorption) within the fracture and rock matrix on the migration of different COIs. The groundwater flow velocity in the representative fracture pathway is calculated at 639 feet per day based on estimates of bulk hydraulic conductivity,

[4] "Background" here refers to groundwater chemical composition.

fracture spacing, fracture aperture, and hydraulic gradient (Snow 1968). For the domain length of 1,868 feet, it would take 2.9 days for groundwater within the fracture pathway to reach the river at the end of the transect or, in other words, to achieve one fracture pathway pore-volume (PV) flush. Thus, 30 days (10 PV flushes) is a sufficient simulation time to assess attenuation within the fracture. However, a longer simulation time is required to evaluate attenuation associated with matrix diffusion since it occurs over a longer timescale; thus, the model was also run for a total time of 8 years. To keep model execution times reasonable for this longer simulation, the model domain length was reduced to 20 feet, with 8 columns at a 2.5-foot spacing. Both the 30-day and 8-year models had 41 layers, with a maximum thickness of 0.2 foot. A 1-year simulation was also run to further access migration through the fracture, which had only 13 layers to speed up model run time. Results from both the 13- and 41-layer models were similar, suggesting minimal numerical dispersion effects associated with range of simulated layer thickness.

Hydraulic and transport input parameters to the model including hydraulic conductivity, hydraulic gradient, porosity, molecular diffusion (effective diffusion coefficient), and dispersivity were defined based on site-specific data and the literature. Where applicable, specific data from wells MR-AP-MW-3D and MR-AP-MW-18H were applied. If unavailable, Site average data were applied. A summary of hydraulic and transport parameter inputs is provided in Table 16.

The reactive transport model results presented here demonstrate that attenuation of arsenic and cobalt occurs predominantly within the fracture but also to some extent within the rock matrix. Figure 12 shows normalized concentrations (i.e., final simulated concentrations divided by influent concentrations) along the transect for arsenic, cobalt, and chloride, respectively, at different times up to 365 days (arsenic and cobalt) and 30 days (chloride). Figure 12 shows it only takes a few days for chloride, which, for all practical purposes, is considered a conservative, nonreactive constituent, to reach the downgradient end of the modeled transect, whereas, at 365 days, arsenic has traveled less than 50 feet and has maximum concentration of less than 40% of the initial concentration, and cobalt has only traveled approximately 250 feet, with concentrations approaching 100% of the initial concentration only at the upgradient end of the model domain. These results demonstrate that migration of arsenic and cobalt along the fracture is significantly retarded and attenuated compared to that of chloride. Retardation factors for arsenic and cobalt, relative to chloride, assuming travel distances for the leading edge of the plume of 50 and 250 feet, respectively (Figures 12b and 12c), over 365 days and a chloride travel distance of 600 feet in 1 day (Figure 12a), are estimated at 4,380 and 876, respectively (i.e., migration of arsenic and cobalt along the fracture is 4,380 and 876 times slower, respectively, than chloride).

Diffusion into the rock matrix is also occurring and contributes to the attenuation of arsenic and cobalt, as well as lithium, at the Site. Figure 13 shows vertical profiles of arsenic, cobalt, lithium, and chloride within the first 10 feet of the model domain for different times up to 8 years. These figures demonstrate the effect of diffusion into the rock matrix on attenuation. As shown, after 8 years, chloride and lithium have both diffused more than 1 foot into the matrix, while arsenic and cobalt have diffused only inches into the rock matrix. The diffusion of chloride and lithium into the rock matrix demonstrates attenuation via diffusion is occurring. The differences in the concentration profiles between chloride and COIs over time demonstrates that COIs are attenuated within the matrix. The attenuation of arsenic and cobalt is dominated by geochemical reactions near the fracture, while attenuation of lithium is dominated by matrix diffusion and cation exchange on clay minerals in the rock matrix.

The modeling results indicate that both geochemical reactions and matrix diffusion contribute to natural attenuation of COIs at the Site.

8 Column Studies

8.1 Methodology (Setup)

Column tests were performed using unconsolidated Site aquifer media (residuum or soil) and impacted groundwater to evaluate effectiveness of removal of COIs under flow conditions and to provide a basis for estimating the natural attenuation capacity of the aquifer matrix (part of USEPA's Tier 3).

Two groundwater samples were collected on April 26 and April 28, 2021, from monitoring wells MR-AP-MW-6V and MR-AP-MW-2. Upon receipt at EGL, groundwater samples were submitted to ALS Environmental in Kelso, Washington, for chemical analysis prior to beginning the column testing. Analytical results are summarized in Table 17 and included in Appendix B. Six column tests were prepared with six Site soils (MR-AP-MW-20H 16'-17', MR-AP-MW-20H 18'-19', MR-AP-MW-20H 23'-24', MR-AP-MW-20H 25'-26', MR-AP-MW-3V 3'-5', and MR-AP-MW-3V 7'-10'). Two different Site groundwaters (from MR-AP-MW-6V and MR-AP-MW-2) were pumped through the columns (Table 18). The laboratory column setup is shown in Figure 14, and a detailed schematic is provided in Figure 15.

Column tests were carried out in 12.8-centimeter (cm)-long, 2.6-cm-diameter polypropylene columns. Because the Site soils are fine-grained, the dried Site soils were mixed with clean quartz sand (Accusand) in a 50:50 mass ratio to prevent development of preferential flow paths within the columns. The Site soil/sand mixtures were packed into the columns to achieve a total depth of 12.8 cm. Site groundwater was pumped in an upflow direction through the columns at a flow rate of approximately 0.4 milliliters per minute for approximately 14 days using a peristatic pump with a multichannel pump head. Flow rates were regularly checked and adjusted as needed to maintain a constant flow rate. Table 19 provides a summary of the column test operating conditions.

The initial arsenic concentration in MR-AP-MW-6V groundwater was lower than expected based on historical data (1.69 micrograms per liter [µg/L] versus historical concentrations of approximately 20 µg/L). For the column tests, MR-AP-MW-6V groundwater was, therefore, spiked with arsenic. An arsenic stock solution was prepared from sodium arsenate heptahydrate and added to the influent reservoir of MR-AP-MW-6V to produce an influent concentration of approximately 459 µg/L. The initial cobalt concentration in MR-AP-MW-2 was similar to historical data (57.0 µg/L versus historical concentrations of approximately 42 µg/L). To clearly observe soil attenuation capacity for cobalt, a cobalt stock solution prepared from cobalt(II) chloride hexahydrate was spiked to produce an influent cobalt concentration of approximately 166 µg/L. The initial lithium concentrations in MR-AP-MW-6V and MR-AP-MW-2 were similar to historical data (94.6 and 204 µg/L, respectively); therefore, a lithium spike was not added. The influent reservoirs were purged with nitrogen and kept in sealed Mylar bags with oxygen-absorbing packets during the column tests.

Column influents and effluents were sampled periodically over the duration of the test, filtered using 0.45-micron nylon membrane syringe filters and preserved with nitric acid. Influents and effluents were also tested for pH, and flow rates and cumulative flow volumes were also recorded for each column at the time of sampling to calculate the total number of PVs treated. The column influent and effluent samples were analyzed for dissolved COIs by USEPA method 200.8 (inductively coupled plasma mass spectrometry) at ALS Environmental.

The laboratory column tests were operated at a higher linear velocity (102 cm per day) than the groundwater flow conditions in the vicinity of the Site, which averages 53 cm per day (SCS 2021). As a result, the hydraulic residence time in the columns was shorter than the hydraulic residence time at the Site. The attenuation measured in the columns, therefore, provides a conservative estimate of the attenuation in the field because the shorter residence time in the column provides less time for attenuation and less mass of COI being attenuated as compared to field conditions.

8.2 Column Test Results

Column test results for arsenic, cobalt, and lithium are shown in Figures 16 through 20, respectively. Results are plotted as the concentration ratio of effluent to influent as a function of PVs of groundwater passed through each column, as well as cumulative COI mass uptake by soil versus COI mass loading. Analytical summary reports are included in Appendix B. Arsenic, cobalt, and lithium concentrations in the influent reservoirs were stable throughout the column testing.

Site soils from MR-AP-MW-20H effectively removed arsenic from MR-AP-MW-6V groundwater, indicating substantial attenuation capacity attributable to iron oxides. Arsenic removals greater than 95% were observed for more than 100 PVs for all soil depth intervals tested and for more than 200 PVs in the shallower soils (16-17 feet, 28-19 feet, and 23-24 feet). The arsenic uptake capacity of Site soils is estimated to be greater than 40 to 55 mg/kg (Figure 17).

Cobalt was not removed from MR-AP-MW-2 groundwater by Site soils from MR-AP-MW-3V (Figure 18). The soil from the 7-to-10-foot depth interval initially released cobalt, likely due to desorption as the soil equilibrated with the influent groundwater. The soil from the 3-to-5-foot depth interval also did not remove cobalt. The lack of cobalt attenuation by soils is likely due to the acidic (less than 4) pH of MR-AP-MW-2 groundwater. Cobalt adsorption on iron oxides and other minerals is strongly pH-dependent and decreases below pH 6 (Woodward et al. 2018).

Lithium was removed from MR-AP-MW-6V groundwater by soils from MR-AP-MW-20H (Figure 19a). Lithium removal by the 16-17-foot-interval soil was greater than 95% up to approximately 50 PVs and then gradually decreased to approximately 50% by 220 PVs. The 17-18-foot-interval soil removed more than 90% of influent lithium up to approximately 60 PVs, then decreased to approximately 50% removal by 110 PVs. The 23-34-foot- and 25-26-foot-interval soils initially removed more than 95% lithium but reached 50% removal by 70 PVs. Lithium attenuation capacity was higher in the soils from shallower intervals, compared to the deeper soil intervals, and ranged from greater than 9 mg/kg in the shallowest soil interval to approximately 2 mg/kg in the deeper soil (Figure 20a).

Soils from MR-AP-MW-3V also initially removed lithium from MR-AP-MW-2 groundwater but broke through relatively early with no significant removal after approximately 20 PVs (Figure 19b). Lithium uptake capacity was 0.2 to 0.3 mg/kg (Figure 20b).

9 Aquifer Capacity for Attenuation

Geospatial methods were used to calculate the estimated saturated volume of the residual aquifer (soil) overlying rock and estimated mass of COIs in the aquifer. ArcGIS software (Esri 2021a) was used to perform all geospatial operations. Saturated aquifer thickness data (interpreted from boring and well construction logs), groundwater chemistry data (collected from Site monitoring wells), and previously reported Site porosity values (SCS 2021) were used to create interpolated Thiessen polygons showing saturated aquifer thickness and COI concentration polygons for the entire Site (Esri 2021b).

Vector and raster geospatial data, in combination with results from the column tests, were used as inputs for calculations to estimate the aquifer capacity for attenuating COIs. Vector data consist of points, lines, and polygons and are used to spatially represent precise locations or discrete boundaries in real-world space. Raster data are matrices of cells organized into rows and columns (i.e., a grid) for which each cell carries a data value. Thiessen polygons delineate area around each input point such that any location within the polygon is closer to that point than any of the other input points, effectively allocating area to each point based on the way the points are distributed across a site. A value encoded in the point, such as aquifer thickness, is applied across the entire area of the Thiessen polygon surrounding the point.

The primary geospatial data sources used in this analysis are as follows:

- Aquifer extent (estimated maximum lateral extent of the aquifer available for attenuating COIs based on parcel boundaries in the downgradient flow direction)
- Isoconcentration boundaries (estimated extent of COIs at concentrations greater than the groundwater protection standard [GWPS])
- Sitewide estimates for saturated aquifer thickness and COI concentrations

A workflow was developed using the ArcGIS Model Builder application to calculate estimated saturated aquifer volumes and the mass of COIs in the aquifer. The workflow was divided into modular steps, with separate models created to execute one or more steps. A summary of each step in the workflow is as follows:

1. Interpolate Saturated Aquifer Thickness Using Thiessen Polygons: The saturated aquifer thickness across the Site was determined by interpolating saturated aquifer thickness values from boring and well construction logs. Thiessen polygons were generated from the aquifer thickness points. Because data within the Site footprint is limited, Thiessen polygons were used because they are an interpolation method that estimates data values across large distances between data points without reducing the magnitude of the values, allowing for the estimate of aquifer thickness in the interior portion of the Site where no data points were available.

2. Convert Saturated Aquifer Thickness Thiessen Polygons into Saturated Aquifer Thickness Raster: Saturated aquifer thickness Thiessen polygons were then converted into a saturated aquifer thickness raster surface with a grid cell resolution of 50 feet by 50 feet, where each cell is encoded with the interpolated saturated aquifer thickness at that location. A 50-foot by 50-foot grid captures adequate detail, given that the Site is hundreds of acres in size.
3. Create Saturated Aquifer Volume Raster: The saturated aquifer thickness raster was used to create a saturated aquifer volume raster by multiplying all thickness cells by their respective area (i.e., 50 feet by 50 feet equals 2,500 square feet). The saturated aquifer volume could then be estimated by taking the summation of all the grid cell values in the saturated aquifer volume raster.
4. Create Plume Volume Raster: For a given COI, a plume volume raster was created by taking the summation of all the grid cell values from the saturated aquifer volume raster within the isoconcentration boundary.
5. Interpolate COI Concentrations Using Thiessen Polygons: Thiessen polygons were created from the groundwater chemistry data for each COI following the same methods used to create the saturated aquifer thickness polygons by applying groundwater chemistry data, instead of aquifer thickness values, to the areas surrounding each point.
6. Convert COI Concentrations Thiessen Polygons into COI Concentrations Raster Surfaces: COI concentration Thiessen polygons were then converted into COI concentration raster surfaces using the same 50-foot by 50-foot cell size.
7. Estimate COI Mass Within Plumes: For each COI, mass within the plume was estimated using Equation 2.
8. Extrapolate Column Test Results to Entire Aquifer: Aquifer capacity for attenuation was determined by multiplying the mass of COIs attenuated in the column studies by the total volume of saturated aquifer calculated in Step 3.

To calculate to mass of COI attenuated during the column study, the influent minus effluent concentrations were plotted on the y-axis (in µg/L), and the volume of water used in the column study was plotted on the x-axis (in liters). The area under the curve was calculated to determine the mass of COI (in micrograms) that was attenuated by column soil. An example graph is included as Figure 21. The average mass of COI attenuated by the columns was used to estimate the attenuating capacity of the entire aquifer.

The aquifer has far more potential for attenuation than the mass of arsenic and lithium requiring attenuation. Specifically, the aquifer has an attenuating capacity of more than 400 times the mass of arsenic and 15 to 350 times the mass of lithium in groundwater. Aquifer capacity for attenuation results is summarized in Table 20. Column tests and subsequent attenuation capacity calculations for cobalt indicated that negligible attenuation capacity for cobalt is observed. While cobalt was not removed by the soils tested in the column studies, concentration versus time and concentration versus distance graphs, as well as other geochemical evidence, indicate cobalt is being attenuated at the Site. Cobalt attenuation at the Site is strongly dependent on groundwater pH (sorption to iron oxides is strongest at pH greater than 6.5) and may also be controlled by slower processes such as coprecipitation that might not be observed within the time frame of a column experiment.

Equation 2

$$M_C = \sum_{i=1}^{n}(V_i \times C_i) \times A \times B \times p$$

where:

M_c	=	estimated mass of COIs within the plume
n	=	number of grid cells in raster
V	=	volume of grid cell
C	=	COI concentration at grid cell
A	=	conversion factor for cubic feet to liters
B	=	conversion factor for either microgram or milligram to kilogram
p	=	porosity

10 Time to Achieve Groundwater Protection Standards (Rates) and Stability of Attenuated COIs

The slope of trend lines through recent monitoring data on concentration versus time graphs and results from reactive transport modeling were used to estimate time to achieve the applicable GWPS. Constituents already less than their applicable GWPSs were not included in this analysis. Depending on the COI and well (area), the estimated time to achieve natural attenuation ranges from 2 to 25 years, not considering source control. This range is reasonable compared to durations of other corrective-action technologies and is compatible with the closure and post-closure period. Site closure (source control) and permeation grouting are expected to reduce the time to achieve GWPSs as compared to MNA alone. Figure 1 shows typical concentration versus time graphs that served as the basis for the rate analysis, and Appendix A contains all time versus concentration graphs.

SSE performed on soils used in the column studies provides a measure of relative stability of the attenuated COIs and their hosts, such as iron oxides. The SSE fractions, from least stable to most stable, are as follows:

- Water soluble
- Exchangeable (e.g., clay minerals)
- Reducible (e.g., poorly crystalline metal oxides such as iron oxides)
- Strong acid/oxidizable (e.g., crystalline oxide and crystalline sulfide minerals)
- Residual (e.g., silicate phases)

SSE was performed on samples of well solids (precipitates) and soils used in the column studies to assess the stability of the attenuated COIs and their host minerals. SSE data for the COIs are somewhat limited due to the small sample size for the well solids and a relatively high number of samples measuring below the method detection limit for both datasets. Iron, which is commonly associated with arsenic and cobalt attenuation, is present in the exchangeable, reducible, and oxidizable fractions for well solids (Figure 9), but primarily in the oxidizable and residual fractions in the post-column soil samples (Figure 22). Arsenic is mostly in the exchangeable fraction in the post-column soils, with some in the oxidizable and residual fractions. In the post-column soils, cobalt occurs primarily in the exchangeable and reducible fractions, with some in the oxidizable and residual fractions. Manganese, which is associated with lithium attenuation, is distributed among all (except water-soluble) fractions, depending upon the sample. Due to almost no COIs in the water-soluble fraction and the sum of the mass of COIs in the more stable fractions (oxidizable, reducible, and residual), attenuated COIs are not expected to remobilize back into groundwater. SSE results are summarized in Table 21.

11 Conclusions and Interpretation

Extensive geochemical and related studies demonstrate that MNA is a viable corrective action for groundwater impacts associated with the Site. The preponderance of evidence indicates that Site conditions meet USEPA's evaluation criteria for the use of MNA, specifically: area of impacts stable or shrinking, identified mechanisms for attenuation, stability of the attenuating mechanisms, sufficient aquifer capacity for attenuation, and time to achieve GWPSs reasonable as compared to other corrective-action alternatives. However, MNA is one component of the Site's corrective-action remedy. As noted in the *Groundwater Remedy Selection Report*, the following corrective measures were selected for the Site: source control to include dewatering, consolidation and capping of the Site, permeation grouting in areas of relatively high concentrations of COIs, and MNA over the entire Site.

Investigations performed to support the use of MNA at the Site included the following:

- Preparation of concentration versus time and concentration versus distance graphs for COIs in groundwater
- Groundwater, well solids (precipitates), and soil sampling and analysis
- Laboratory analysis of well solids samples for bulk chemistry (XRF), mineralogy (XRD and SEM), and CEC
- Geochemical modeling
- SSE to determine associations of COIs with attenuating solids
- Column studies to assess the attenuation capacity of the aquifer and to determine the stability of the attenuating phases
- Calculation of the time to achieve natural attenuation

Graphs of concentration versus time for COIs at the Site indicate a reduction of arsenic, cobalt, and lithium in groundwater through time in several areas, even without source control. Specifically, COIs are either decreasing or generally stable at the following wells:

- Arsenic at monitoring well MR-AP-MW-5
- Cobalt at monitoring wells MR-AP-MW-2, MR-AP-MW-4, and MR-AP-MW-6
- Lithium at monitoring wells MR-AP-MW-1, MR-AP-MW-3D, MR-AP-MW-4, MR-AP-MW-5, MR-AP-MW-6, MR-AP-MW-10, MR-AP-MW-12, and MR-AP-PZ-5

Concentration versus distance graphs along multiple downgradient transects indicate that arsenic, cobalt, and lithium are decreasing or stable with distance from the Site. Transects with decreasing concentrations include the following:

- Arsenic: MR-AP-MW-5 to MR-AP-MW-19HA
- Cobalt: MR-AP-MW-6 to MR-AP-MW-32H

- Lithium: MR-AP-MW-5 to MR-AP-MW-19HA, MR-AP-MW-6 to MR-AP-MW-32H, and MR-AP-MW-3S to MR-AP-MW-18H

Results from existing groundwater data analysis, geochemical modeling, and well solids (precipitates) analyses provide multiple lines of evidence for attenuation mechanisms for COIs operating at the Site. The major attenuation mechanisms operating at the Site include the following:

- Sorption on iron oxides (arsenic and cobalt)
- Cation exchange on clays (cobalt and lithium)
- Coprecipitation in iron oxides (cobalt)
- Precipitation in barium arsenate (arsenic)

All COIs are also subject to physical attenuation mechanisms such as dispersion and flushing, which will contribute to decreased concentrations with time and distance from the Site.

Column studies were performed to assess the ability and capacity of the aquifer media (soil) to take up COIs. Laboratory results were then extrapolated to the entire saturated mass of aquifer (downgradient of the consolidated pond footprint) using quantitative GIS-based techniques. Based on the column studies and saturated volume of the downgradient aquifer, the aquifer has much higher capacity to attenuate (sorb) arsenic and lithium than the mass of the COIs currently in groundwater. Specifically, the aquifer has an attenuating capacity of more than 400 times the mass of arsenic and 15 to 350 times for lithium in groundwater.

SSE was performed on samples of well solids (precipitates) and soils used in the column studies to assess the stability of the attenuated COIs and their host minerals. Due to almost no COIs in the water-soluble fraction and the sum of the mass of COIs in the more stable fractions (oxidizable, reducible, and residual), attenuated COIs are not expected to remobilize back into groundwater.

Trend lines through recent groundwater data and results from reactive transport modeling were used to estimate time to achieve the applicable GWPS. Depending on the COI and well (area), the estimated time to achieve natural attenuation ranges from 2 to 25 years, not considering source control. These time frames are reasonable to achieve GWPSs by MNA and are compatible with the closure and post-closure periods. Site closure and permeation grouting are expected to accelerate time to achieve GWPSs.

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Tables

Table 1
Monitored Natural Attenuation Demonstration Status

Tier	Approach	Status of MNA Demonstration
Tier 1: Area of Impacts Stable or Shrinking	Concentration versus time and/or distance graphs; statistics; isoconcentrations in plan and/or section view; Ricker Method (part of ongoing monitoring)	Satisfied
Tier 2a: Determine Mechanisms of Attenuation	Analysis of well solids: XRF, XRD, SEM, CEC, and SSE; complete analysis of groundwater (major cations and anions); geochemical modeling	Satisfied
Tier 2b: Determine Rates of Attenuation	Derived from concentration versus time graphs; batch and column tests; geochemical modeling	Satisfied
Tier 3a: Determine System (Aquifer) Capacity for Attenuation	Batch and column tests; geochemical modeling	Satisfied
Tier 3b: Determine Stability of the Attenuating Mechanisms (Solids) and COIs	SSE on tested materials from batch and column tests; geochemical modeling; inference from mechanisms	Satisfied
Tier 4a: Design a Performance Monitoring Program	Additional wells; repeat well solids and/or complete groundwater analysis; adaptive triggers	Satisfied
Tier 4b: Identify Alternative Remedies Should MNA Not Perform as Expected	Completed as part of the ACM; some technologies may need further testing and/or development (bench and pilot)	Satisfied

Notes:

ACM: *Assessment of Corrective Measures*

CEC: cation exchange capacity

COI: constituent of interest

MNA: monitored natural attenuation

SEM: scanning electron microscopy

SSE: selective sequential extraction

XRD: X-ray diffraction

XRF: X-ray fluorescence

Table 2
Sampling Locations

Groundwater Sampling Locations			
MR-AP-MW-3D	MR-AP-MW-4	MR-AP-MW-5	MR-AP-MW-6
Well Solids Sampling Locations			
MR-AP-MW-3D	MR-AP-MW-4	MR-AP-MW-5	MR-AP-MW-6

Table 3
Analyzed Constituents and Laboratory Analytical Methods

Constituent	Analytical Method	Constituent	Analytical Method
Alkalinity (total as $CaCO_3$)	SM 2320 B	Lead (dissolved)	EPA 200.8
Aluminum (dissolved)	EPA 200.8	Iron (total)	EPA 200.7
Aluminum (total)	EPA 200.8	Lead (total)	EPA 200.8
Antimony (dissolved)	EPA 200.8	Lithium (total)	EPA 200.7
Antimony (total)	EPA 200.8	Magnesium (total)	EPA 200.7
Arsenic (dissolved)	EPA 200.8	Manganese (dissolved)	EPA 200.8
Arsenic (total)	EPA 200.8	Manganese (total)	EPA 200.8
Barium (total)	EPA 200.8	Molybdenum (dissolved)	EPA 200.8
Beryllium (dissolved)	EPA 200.8	Molybdenum (total)	EPA 200.8
Beryllium (total)	EPA 200.8	Nitrogen nitrate (calculated)	EPA 353.2
Bicarbonate Alkalinity (calculated)	SM 4500CO2 D	Nitrogen nitrate/nitrite	EPA 353.2
Boron (total)	EPA 200.7	Nitrogen nitrite	EPA 353.2
Cadmium (dissolved)	EPA 200.8	Ortho phosphate	SM 4500PF-OP
Cadmium (total)	EPA 200.8	Potassium (total)	EPA 200.8
Calcium (total)	EPA 200.7	Selenium (dissolved)	EPA 200.8
Carbonate alkalinity (calculated)	SM 4500CO2 D	Selenium (total)	EPA 200.8
Chloride	SM4500Cl E	Silica (total; calculated)	EPA 200.7
Chromium (dissolved)	EPA 200.8	Silicon (total)	EPA 200.7
Chromium (total)	EPA 200.8	Sodium (total)	EPA 200.7
Cobalt (dissolved)	EPA 200.8	Sulfate	SM 4500SO4 E 2011
Cobalt (total)	EPA 200.8	Thallium (dissolved)	EPA 200.8
Fluoride	SM 4500F G 2017	Thallium (total)	EPA 200.8
Iron (dissolved)	EPA 200.7	Total organic carbon	SM 5310 B

Notes:

$CaCO_3$: calcium carbonate

EPA: U.S. Environmental Protection Agency (method)

SM: Standard Method

Table 4
Saturation Indices for Groundwater Samples

Sample ID	Well Designation	Gibbsite	$Fe(OH)_3$(a)	Goethite	Hematite	Magnetite	Siderite	$CoFe_2O_4$	$Ba_3(AsO_4)_2$	Pyrolusite	Bixbyite	Birnessite	Hausmannite	Manganite	Pyrochroite	Lithiophorite	Rhodochrosite
MR-AP-MW-3D	Downgradient	--	-0.04	**5.57**	**13.1**	**13.5**	-0.18	**18.1**	**3.16**	-15.2	-16.0	-16.2	-19.0	-7.48	-6.92	--	-0.12
MR-AP-MW-4	Downgradient	--	-1.45	**4.24**	**10.5**	**8.39**	-2.54	**14.8**	--	-13.6	-15.2	-14.9	-18.9	-7.29	-7.79	--	-0.83
MR-AP-MW-5	Downgradient	--	**1.14**	**6.72**	**15.4**	**15.3**	-0.59	--	**0.73**	-12.7	-14.1	-13.5	-17.8	-6.46	-7.56	--	-0.72
MR-AP-MW-6	Downgradient	--	**0.75**	**6.39**	**14.7**	**15.0**	-0.35	**19.1**	--	-13.8	-15.2	-14.9	-18.8	-7.17	-7.53	--	-0.75

Notes:

SI for James H. Miller, Jr., Electric Generating Plant groundwater samples collected in February 2020.

Bold indicates positive SI values (i.e., groundwater supersaturated with respect to mineral phase).

--: No SI calculated because one or more constituent(s) in phase was not detected in groundwater sample.

SI: saturation indices

Table 5
Geochemical Analysis of Monitoring Well and Aquifer Solids

Analysis	Description	Relevance to MNA Demonstration
CEC	Determines if cation exchange on clays is an attenuating mechanism.	Supports Tier 2 (mechanisms) and Tier 3 (stability) of cation exchange.
SEM	Allows direct visual observation of attenuating phases, such as framboidal pyrite and iron oxide coatings on sand grains.	Supports Tier 2 (mechanisms) and Tier 3 (stability) of attenuating phases.
SSE	Determines which attenuating solid phases are associated with constituents of interest.	Supports Tier 2 (mechanisms) and Tier 3 (stability) of attenuating phases.
XRD	Identifies and provides mineralogy of crystalline attenuating phases.	Supports Tier 2 (mechanisms) and Tier 3 (stability) of attenuation involving crystalline mineral phases.
XRF	Provides bulk chemistry and presence of constituents of interest. (Lithium is too light to be detected by XRF.)	Relationships are determined among elements in attenuating phases (e.g., iron and manganese) and constituents of interest. Supports Tier 2 (mechanisms) and Tier 3 (stability).

Notes:

CEC: cation exchange capacity

MNA: monitored natural attenuation

SEM: scanning electron microscopy

SSE: selective sequential extraction

XRD: X-ray diffraction

XRF: X-ray fluorescence

Table 6
Bulk Chemistry of Well Solids Samples by XRF

Well ID	Arsenic	Cobalt	Iron	Manganese	Aluminum	Calcium	Magnesium	Potassium	Silicon
MR-AP-MW-3D	ND	ND	7,610	ND	6,580	22,300	ND	4,260	199,000
MR-AP-MW-4	11	ND	17,000	ND	9,400	126,000	ND	7,370	117,000

Notes:

Direct analysis of lithium is not possible with portable XRF due to X-ray physics limitations.

Units are in milligrams per kilogram.

ND: below limit of detection

XRF: X-ray fluorescence

Table 7

Minerals Identified in Well Solids Samples by XRD[1]

Sample ID	Location ID	Carbonates	Mica	Feldspar	Quartz	Zeolite
		Calcite	Muscovite/Illite	Albite		
MR-AP-MW-3D	MW-3D	4.6	0.3	1.3	93.8	tr
MR-AP-MW-4	MW-4	59.6	3.9		36.1	0.3

Notes:

1: Estimated concentration (weight percent) reported where available.

tr: mineral idenitifed at trace level

XRD: X-ray diffraction

Table 8
Cation Exchange Capacity of Well Solids Samples

Well ID	Aluminum	Calcium	Lithium	Magnesium	Potassium	Sodium	Sum
MR-AP-MW-3D	<0.036	1,910	0.046 J	27	1.3	4.6	1,940
MR-AP-MW-4	1.78 J	6,100	<1.73	97	8.2 J	14 J	6,200

Notes:

Units are in milliequivalents per kilogram.

<: indicates the compound was analyzed for but not detected

J: detected but result is below the method reporting limit

Table 9
Bulk Chemistry of Aquifer Solids Samples by XRF

Sample ID	Depth Interval (ft bgs)	Units	Arsenic	Cobalt	Iron	Aluminum	Barium	Calcium	Manganese	Potassium	Silicon	Sulfur
MR-AP-MW-20H	16–17	ppm	13.25	<LOD	40,054	69,080	371.13	<LOD	123.17	15,300	251,691	288.79
MR-AP-MW-20H[1]	16–17	ppm	13.15	<LOD	40,002	71,254	381.07	<LOD	102.30	15,146	254,537	5.00
MR-AP-MW-3V	3–5	ppm	15.92	<LOD	40,557	78,966	438.14	492.92	153.15	22,502	252,028	172.22
MR-AP-MW-20H	25–26	ppm	9.36	<LOD	33,202	65,666	378.82	<LOD	523.46	17,128	274,741	<LOD
MR-AP-MW-20H	18–19	ppm	11.20	<LOD	26,509	60,263	377.69	<LOD	183.36	16,054	274,486	<LOD
MR-AP-MW-20H	23–24	ppm	9.93	<LOD	24,693	61,214	370.33	<LOD	446.55	15,862	258,006	182.70
MR-AP-MW-3V	7–10	ppm	10.59	<LOD	37,311	30,310	433.81	909.23	407.03	20,963	164,219	<LOD

Notes:

Samples were analyzed on June 2, 2021.

1. duplicate

<LOD: less than limit of detection

ft bgs: feet below ground surface

ppm: parts per million

XRF: X-ray fluorescence

Table 10

Minerals Identified in Aquifer Solids Samples by XRD[1]

Sample ID	Location ID	Depth Interval (feet bgs)	Clay Minerals			Mica	Feldspar	Quartz
			Kaolinite	Nacrite	Vermiculite	Muscovite/Illite	Albite	
MR-AP-MW-3V 3-5	MW-3V	3–5	17.6			39.2		43.2
MR-AP-MW-3V 7-10	MW-3V	7–10	3.2		0.4	26.1	10.8	59.5
MR-AP-MW-20H 16-17	MW-20H	16–17		16.2		17.6	1.5	64.7
MR-AP-MW-20H 18-19	MW-20H	18–19	13.0			19.5		67.5
MR-AP-MW-20H 23-24	MW-20H	23–24	17.2			23.5	0.1	59.2
MR-AP-MW-20H 25-26	MW-20H	25–26	13.9			25.9	0.4	59.8

Notes:

1. Estimated concentration (weight %) reported where available.

bgs: below ground surface

XRD: X-ray diffraction

Table 11
Cation Exchange Capacity of Aquifer Solids Samples

Sample ID	Depth Interval (ft bgs)	Exchangeable Cations (meq/kg soil)							CEC (meq/kg soil)
		Aluminum	Calcium	Cobalt	Magnesium	Potassium	Sodium	Lithium	
MR-AP-MW-20H	16–17	**0.146**	0.374 U	**0.000434 J**	**0.933**	**3.51**	**1.34**	0.009 U	**5.9**
MR-AP-MW-20H[1]	16–17	**0.177**	0.374 U	**0.000424 J**	**0.872**	**3.34**	**1.28**	0.009 U	**5.7**
MR-AP-MW-3V	3–5	**0.101 J**	**19.3**	**0.000771 J**	**9.65**	**2.13**	**4.89**	0.0101 U	**36.1**
MR-AP-MW-20H	25–26	**0.0772 J**	0.374 U	**0.0373**	**2.37**	**5.23**	**2.48**	0.009 U	**10.2**
MR-AP-MW-20H	18–19	0.0895 U	0.482 U	**0.00726**	**0.687**	**3.11**	**0.833**	0.0116 U	**4.6**
MR-AP-MW-20H	23–24	**0.0899 J**	0.374 U	**0.0237**	**1.57**	**2.89**	**1.04**	0.00899 U	**5.6**
MR-AP-MW-3V	7–10	0.0894 U	0.481 U	**0.0286**	**20.8**	**3.04**	**2.76**	0.0116 U	**27.5**

Notes:

Bold indicates detected values.

1. duplicate

CEC: cation exchange capacity

ft bgs: feet below ground surface

J: estimated value

meq/kg: milliequivalents per kilogram

U: compound analyzed for but not detected above detection limit

Table 12

Extractable Aluminum, Manganese, and Iron Oxides in Aquifer Soils

Sample ID	Depth Interval (feet bgs)	Extractable Oxides (mg/kg soil)			Simultaneously Extractable Metals (mg/kg)		
		Aluminum	Iron	Manganese	Arsenic	Cobalt	Lithium
MR-AP-MW-20H 16-17	16–17	**988**	**879**	**11.2**	**1.55**	0.182 U	0.909 U
MR-AP-MW-3V 3-5	3–5	**941**	**1850**	**50.8**	**2.96**	**0.824**	0.882 U
MR-AP-MW-20H 25-26	25–26	**830**	**991**	**788**	**1.15**	**12.2**	0.896 U
MR-AP-MW-20H 18-19	18–19	**598**	**485**	**137**	**0.77**	**2.42**	0.909 U
MR-AP-MW-20H 18-19[1]	18–19	**583**	**401**	**135**	**0.673**	**2.25**	0.909 U
MR-AP-MW-20H 23-24	23–24	**596**	**961**	**722**	**1.73**	**10.9**	0.896 U
MR-AP-MW-3V 7-10	7–10	**691**	**1620**	**364**	**2.88**	**13.7**	**0.958 J**

Notes:

1. Duplicate

Extractable oxides were determined by the acid ammonium oxalate method.

Bold indicates detected values.

J: estimated value

bgs: below ground surface

mg/kg: milligrams per kilogram

U: compound analyzed for but not detected above detection limit

Table 13
Geochemical Evidence for Attenuation Mechanisms

Mechanism	Geochemical Modeling	XRF	XRD	SSE	CEC	SEM
Sorption on iron oxides (arsenic and cobalt)	X	X				X
Precipitation of barium arsenate[1]	X					X
Coprecipitation in iron oxides (cobalt)	X			X		X
Cation exchange on clays (cobalt and lithium)			X	X	X	

Notes:

1. Barium observed in some SEM spectra; barium may be contained in residual minerals from the formation, rather than from forming in situ.

X: Indicates attenuation

CEC: cation exchange capacity

SEM: scanning electron microscopy

SSE: selective sequential extraction

XRD: X-ray diffraction

XRF: X-ray fluorescence

Table 14
Groundwater Chemistry Data Used in the 2D Reactive Transport Model

Sample Location ID:		MW-3D	MW-18H
Analyte	**Units**	**Upgradient**	**Downgradient**
Eh	V	0.145	0.155
pe	SUs	2.50	2.66
pH	SUs	6.90	7.23
Bicarbonate alkalinity	mg/L	179	247
Arsenic	mg/L	0.015	0.005 U
Barium	mg/L	0.029	0.038
Boron	mg/L	0.492	0.302
Calcium	mg/L	162	17.7
Chloride	mg/L	25.9	22.7
Cobalt	mg/L	0.006	0.005 U
Iron (dissolved)	mg/L	3.32	0.636
Lithium	mg/L	0.121[a]	0.215[b]
Magnesium (dissolved)	mg/L	36.2	7.56
Manganese (dissolved)	mg/L	1.79	0.074
Potassium	mg/L	6.80	2.23
Sodium	mg/L	81.9	257
Sulfate	mg/L	473	362

Notes:

a. Lithium concentration for MW-3S used instead (0.347 mg/L).

b. Average lithium concentration for March and October 2020 used instead (0.151 mg/L).

Groundwater chemistry data is from October 2020.

mg/L: milligrams per liter

SU: standard unit

U: compound analyzed for but not detected above detection limit

V: volts

Table 15
Cation Exchange and Sorption Capacity for the 2D Model Transect

Constituent	Units[1]	Fracture	Rock Matrix[2]
Cation exchange capacity (X)	mol/L	0.36	0.009
Iron oxides	mol/L	18	0.45
≡FeOH (weak)	mol/L	3.6	0.09
≡FeOH (strong)	mol/L	0.09	0.0023
Aluminum oxides	mol/L	9.0	0.225
≡AlOH	mol/L	0.30	0.0075

Notes:

1. Units are mol/L-water for the fracture (porosity = 100%) and mol/L-bulk for the rock matrix (porosity = 2.5%).

2. Cation exchange and sorption capacity for the rock matrix were calculated by multiplying the fracture values by the rock matrix porosity.

≡AlOH: surface binding site on $Al(OH)_3$

≡FeOH (strong): strong surface binding site on $Fe(OH)_3$

≡FeOH (weak): weak surface binding site on $Fe(OH)_3$

mol/L: moles per liter

X: ion exchange site

Table 16
Hydraulic and Transport Parameters

Parameter	Units	Range of Values	Base Case Parameters	Notes
Linear distance, D_L	feet	1,868	1,868	Represents the linear distance between wells MW-3D, 18H, and the river (Figure 7)
Upgradient head, H1	feet NAVD88	328	328	Groundwater elevation measured at MW-3D on October 12, 2020.
Downgradient head, H2	feet NAVD88	255	255	Average river stage elevation measured on October 12, 2020, at the James H. Miller, Jr., Electric Generating Plant Ash Pond.
Hydraulic gradient, i	feet/feet	0.039	0.039	Equals $(H_1 - H_2)/D_L$
Bulk hydraulic conductivity, K_b	feet/day	1.62	1.62	Estimated from low-flow sampling data using the steady-state Thiem equation
Matrix porosity, nm	Dimensionless	0.0158–0.0529	0.025	Total porosity reported by CoreLabs
Matrix hydraulic conductivity, Km	feet/day	7.48E-07–7.39E-05	9.98E-06	Reported by CoreLabs
Matrix tortuosity, τ_m	Dimensionless	0.1–0.4	0.20	Base case value from Lipson (2005)
Mean fracture spacing, S	feet	5–20	10	Estimated from the MW-3D boring log and data from Snow (1968)
Representative mean fracture aperture, e	microns	200–400	300	Calculated from K_b and S following the method developed by Snow (1968)
Mean fracture porosity, n_f	Dimensionless	6.26E-05–1.58E-04	9.9E-05	Calculated following the method by Snow (1968)
Mean fracture hydraulic conductivity, Kf	feet/day	10,000–26,000	16,250	Calculated from K_b, S, and e following the method developed by Snow (1968)
Molecular diffusion coefficient (entire model domain)	ft^2/day	5.0E-05–5.0E-04	1.8E-04	Equals the free-water diffusion coefficient of 1.0E-09 m^2/s X τ_m and converted to ft^2/day
Longitudinal dispersivity (entire model domain)	ft^2/day	--	1.87E-10	Assumed values
Ratio of transverse/longitudinal dispersion (entire model domain)	Dimensionless	--	0.10	Assumed values
Ratio of vertical/longitudinal dispersion (entire model domain)	Dimensionless	--	0.05	Assumed values

Notes:

Lipson, D.S., B.H. Kueper, and M.J. Gefell, 2005. "Matrix Diffusion-Derived Plume Attenuation in Fractured Bedrock." *Ground Water* 43(1):30–39.

Snow, D.T., 1968. "Rock Fracture Spacings, Openings, and Porosities." Journal of the Soil Mechanics and Foundations Division 94(1):73–91, 416–421, and 880–883.

--: not applicable

ft^2/day: square feet per day

m^2/s: square meters per second

NAVD88: North American Vertical Datum of 1988

Table 17
Initial Groundwater Characterization Results

Parameter	Result		Units
	MW-6V	MW-2	
Alkalinity	184	3 U	mg/L as $CaCO_3$
Ammonia as N	0.373	1.120	mg/L
Total organic carbon	1.40	0.90	mg/L
Chloride	21.1	3.98	mg/L
Fluoride	0.01 U	0.01 U	mg/L
Nitrate as N[1]	0.02 U	0.02 U	mg/L
Nitrite as N	0.006 U	0.006 U	mg/L
Orthophosphate	0.02 U	0.02 U	mg/L
Sulfate	329	1,520	mg/L
Aluminum, dissolved	1.7 J	1.9 J	µg/L
Aluminum, total	1.5 J	14.9	µg/L
Antimony, dissolved	0.02 U	0.02 U	µg/L
Arsenic, dissolved	1.69	0.21 J	µg/L
Barium, dissolved	29.3	21.1	µg/L
Beryllium	0.03 U	0.145	µg/L
Boron, dissolved	497	58.6	µg/L
Cadmium, dissolved	0.008 U	0.008 U	µg/L
Calcium, dissolved	102	221	mg/L
Chromium, dissolved	0.07 J	0.11 J	µg/L
Cobalt, dissolved	0.474	57	µg/L
Iron, dissolved	8.7	181	µg/L
Iron, total	770	188	µg/L
Lead, dissolved	0.006 U	0.006 U	µg/L
Lithium, dissolved	92.6	197	µg/L
Magnesium, dissolved	27.4	134	mg/L
Manganese, dissolved	590	3,660	µg/L
Manganese, total	594	3,510	µg/L
Molybdenum, dissolved	7.40	0.08 J	µg/L
Nickel, dissolved	0.53	49.3	µg/L
Potassium, dissolved	1.98	4.00	mg/L
Selenium, dissolved	1.0 U	0.2 U	µg/L
Silicon, dissolved	7.94	9,690	mg/L
Silver, dissolved	0.009 U	0.009 U	µg/L
Sodium, dissolved	57.9	103	mg/L
Thallium, dissolved	0.009 U	0.039	µg/L
Zinc, dissolved	2.2	188	µg/L
pH	7.48	3.37	--

Notes:

Samples were field filtered with a 0.45-micron filter at the time of collection and filtered again prior to analysis for dissolved constituents.

1. Calculated as: (nitrogen, nitrate + nitrite) – (nitrogen, nitrite)

--: not applicable

µg/L: micrograms per liter

$CaCO_3$: calcium carbonate

J: Indicates that the result is an estimated value.

mg/L: milligrams per liter

N: nitrogen

U: indicates that the compound was analyzed for but not detected

Table 18
Site Soils and Groundwater Used in Column Tests

Column Number	Soil ID	Groundwater ID	COIs in Groundwater
1	MR-AP-MW-20H 16'-17'	MW-6V	Arsenic and lithium
2	MR-AP-MW-20H 18'-19'	MW-6V	Arsenic and lithium
3	MR-AP-MW-20H 23'-24'	MW-6V	Arsenic and lithium
4	MR-AP-MW-20H 25'-26'	MW-6V	Arsenic and lithium
5	MR-AP-MW-3V 3'-5'	MW-2	Cobalt and lithium
6	MR-AP-MW-3V 7'-10'	MW-2	Cobalt and lithium

Note:
COI: constituent of interest

Table 19
Column Test Operating Conditions

Parameter	Value	Unit
Soil/sand mixture depth	12.8	cm
Column inside diameter	2.68	cm
Flow rate	0.4	mL per minute
Empty bed contact time	3.01	hours
Porosity	28–35	%
Dry mass of soil in column	47.5–60.0	grams
Mass of clean sand in column	47.5–60.0	grams
Hydraulic residence time	0.84–1.05	hours
Darcy flux	28.6–35.7	cm per day
Linear velocity	102	cm per day
Column test duration	14	days

Notes:
cm: centimeter
mL: milliliter

Table 20
Estimated Aquifer Capacity

COI[1]	Estimated Maximum Mass of COI in Aquifer (kg)	Estimated Maximum Attenuating Capacity of Aquifer (kg)	Estimated Excess Attenuating Capacity of Aquifer
Arsenic	2	>>800	>>400 times
Lithium	630	9,450 to 220,500	15 to 350 times

Notes:

1. Concentration versus time and concentration versus distance graphs, as well as other geochemical studies, indicate that cobalt is being attenuated at the Site. While cobalt was not removed by the soils tested in the column studies, its attenuation at the Site may be controlled by slower processes such as coprecipitation.

>>: significantly greater than

COI: constituent of interest

kg: kilograms

Site: Plant Miller Ash Pond

Table 21
Post-Column Test Soil SSE Results

Sample ID	Depth Interval (ft bgs)	Groundwater	Arsenic (mg/kg)					Cobalt (mg/kg)					Lithium (mg/kg)					Iron (mg/kg)					Manganese (mg/kg)				
			F1	F2	F3	F4	F5	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5
MR-AP-MW-20H	16–17	MW-6V	1.98 U	**31.5**	1.98 U	**3.17 J**	**4.7 J**	--	--	--	--	--	9.92 U	9.92 U	9.92 U	9.92 U	13.4 U	--	99.2 U	99.2 U	**528**	**7440**	--	**6.66**	**7.26**	1.98 U	**7.63**
MR-AP-MW-20H	18–19	MW-6V	2.02 U	**18.9**	2.02 U	2.02 U	**3.21 J**	--	--	--	--	--	10.1 U	10.1 U	10.1 U	10.1 U	13 U	--	101 U	101 U	**272**	**4450**	--	**8.06**	**40.9**	**4.45**	**4.33 J**
MR-AP-MW-20H	23–24	MW-6V	1.92 U	**26.5**	1.92 U	**1.95 J**	2.55 U	--	--	--	--	--	9.62 U	9.62 U	9.62 U	9.62 U	12.7 U	--	96.2 U	96.2 U	**399**	**3140**	--	**11.5**	**86.2**	**12.8**	**5.88**
MR-AP-MW-20H[1]	23–24	MW-6V	1.88 U	**26.8**	1.88 U	**1.99 J**	**4.39 J**	--	--	--	--	--	9.4 U	9.4 U	9.4 U	9.4 U	13.3 U	--	94 U	94 U	**478**	**5490**	--	**11.1**	**106**	**15.6**	**9.84**
MR-AP-MW-20H	25–26	MW-6V	1.89 U	**21.1**	1.89 U	1.89 U	**2.93 J**	--	--	--	--	--	9.47 U	9.47 U	9.47 U	9.47 U	13.3 U	--	94.7 U	94.7 U	**558**	**5140**	--	**14.6**	**105**	**23.9**	**13.6**
MR-AP-MW-3V	3–5	MW-2	--	--	--	--	--	1.94 U	1.94 U	1.94 U	1.94 U	2.75 U	9.69 U	9.69 U	9.69 U	9.69 U	13.8 U	--	96.9 U	**129 J**	**2850**	**9800**	--	1.94 U	**5.94**	**5.39**	**11.7**
MR-AP-MW-3V	7–10	MW-2	--	--	--	--	--	1.92 U	1.92 U	1.92 U	1.92 U	2.61 U	9.62 U	9.62 U	9.62 U	9.62 U	13 U	--	96.2 U	**159 J**	**2450**	**8700**	--	**2.02 J**	**9.92**	**8.77**	**29**

Notes:

Bold indicates detected values.

1. duplicate

--: not measured

F: fraction

F1: soluble

F2: exchangeable

F3: reducible (Iron/Manganese oxide bound)

F4: oxidizable (sulfide/organic/crystalline oxide bound)

F5: residual

ft bgs: feet below ground surface

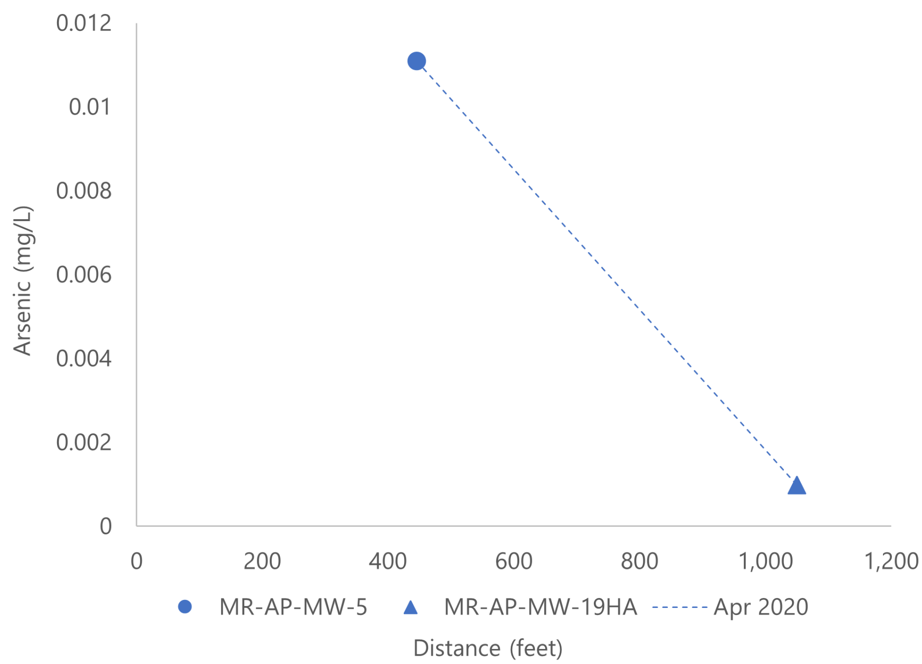
J: estimated value

mg/kg: milligrams per kilogram

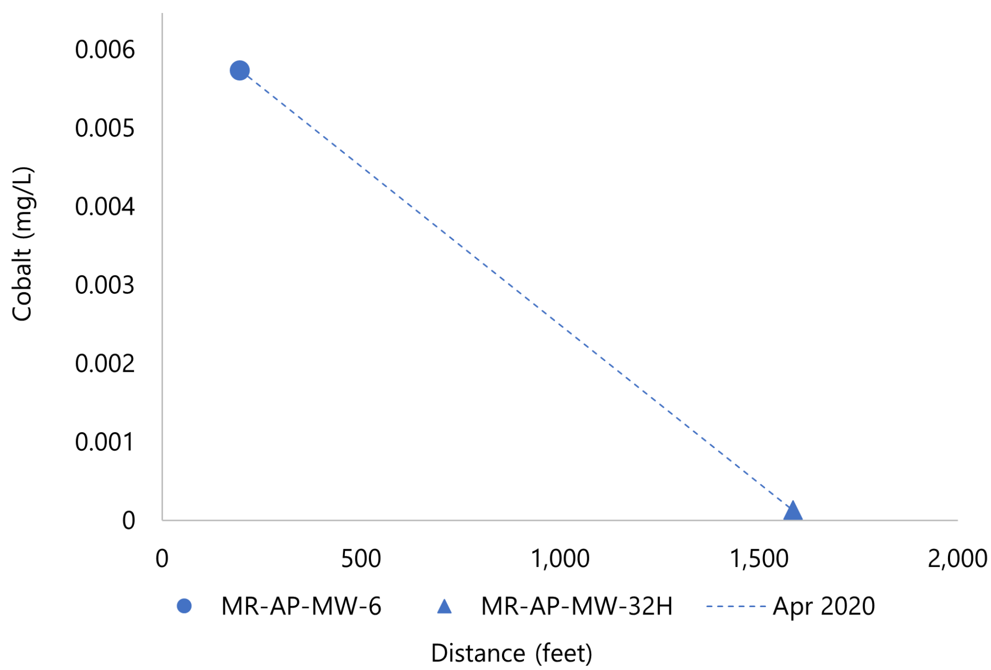
SSE: selective sequential extraction

U: compound analyzed for but not detected above detection limit

Figures



MR-AP-MW-5 to MR-AP-MW-19HA (Arsenic)



MR-AP-MW-6 to MR-AP-MW-32H (Cobalt)

Note:
mg/L: milligrams per liter

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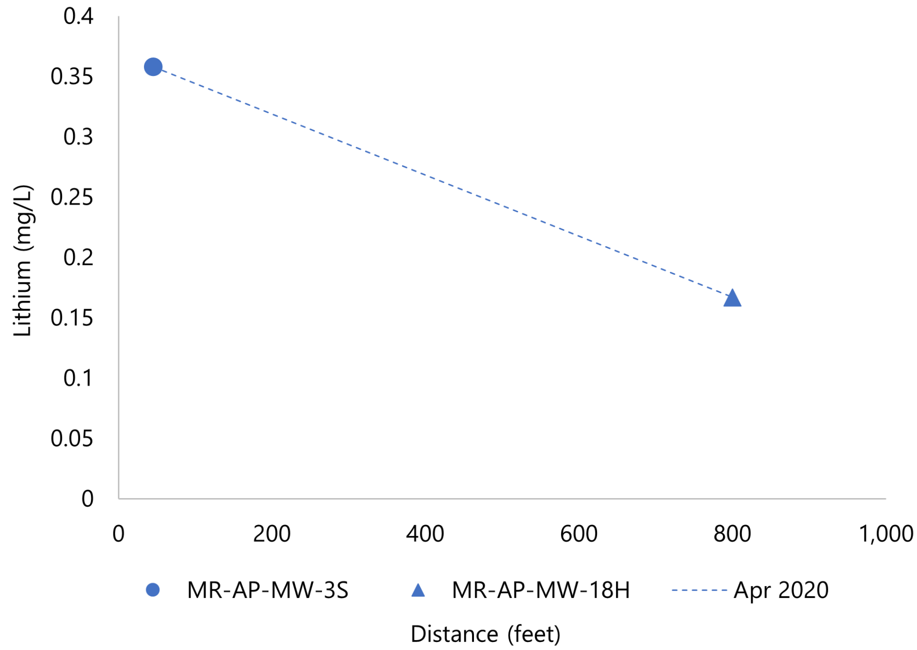
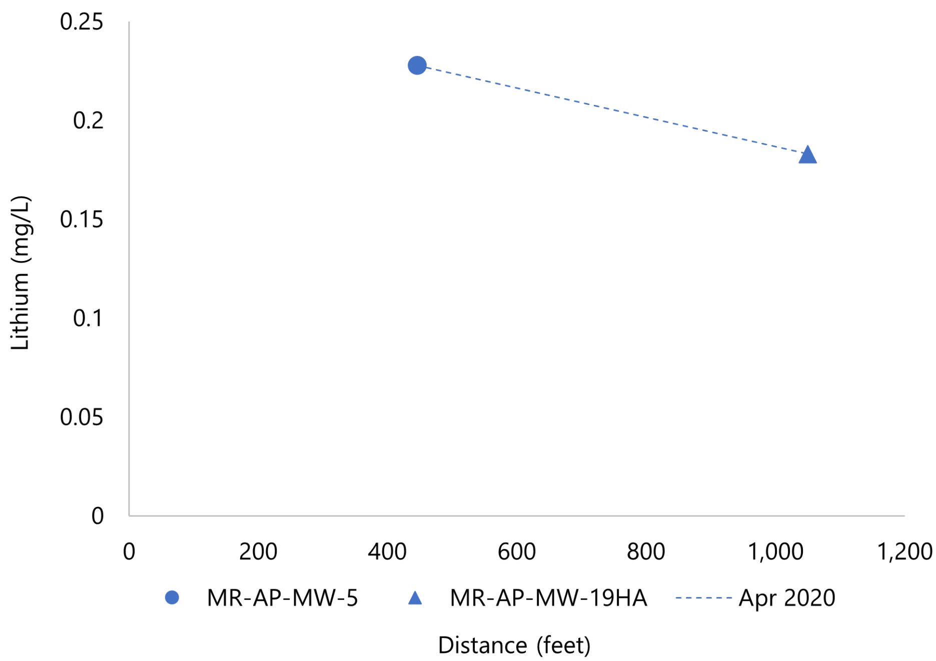
Figure 1a
Concentration Versus Distance Graphs
Monitored Natural Attenuation Demonstration
Plant Miller

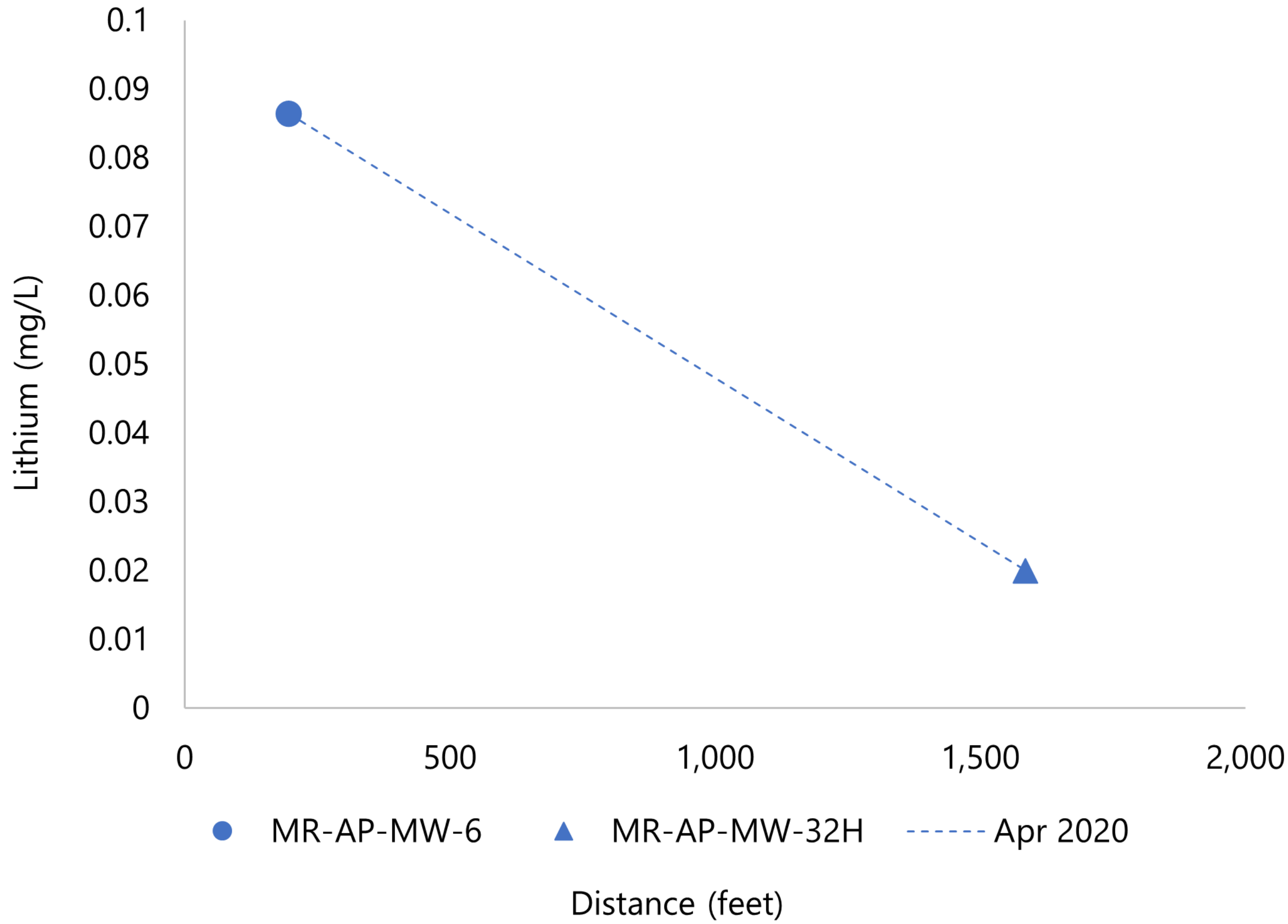


MR-AP-MW-3S to MR-AP-MW-18H (Lithium)



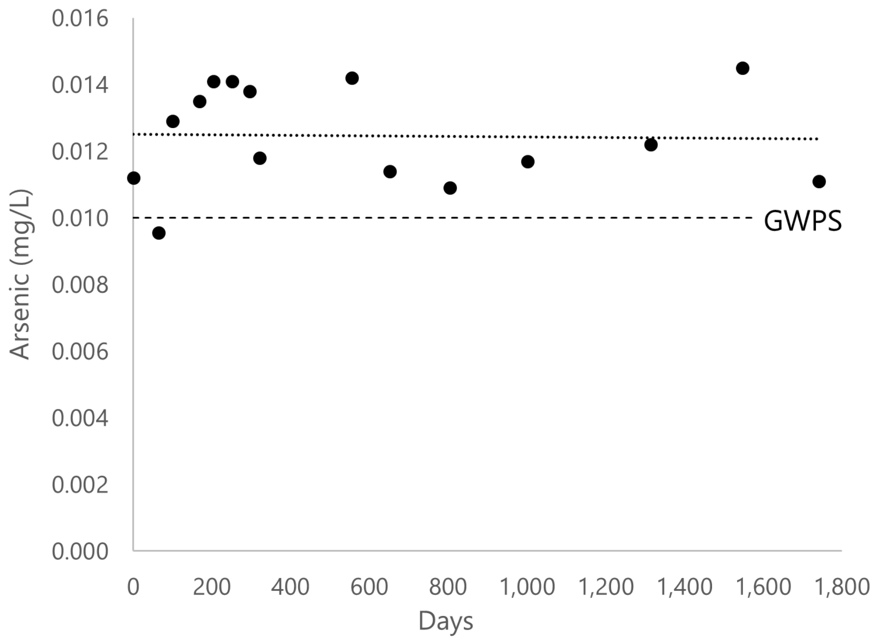
MR-AP-MW-5 to MR-AP-MW-19HA (Lithium)

Note:
mg/L: milligrams per liter

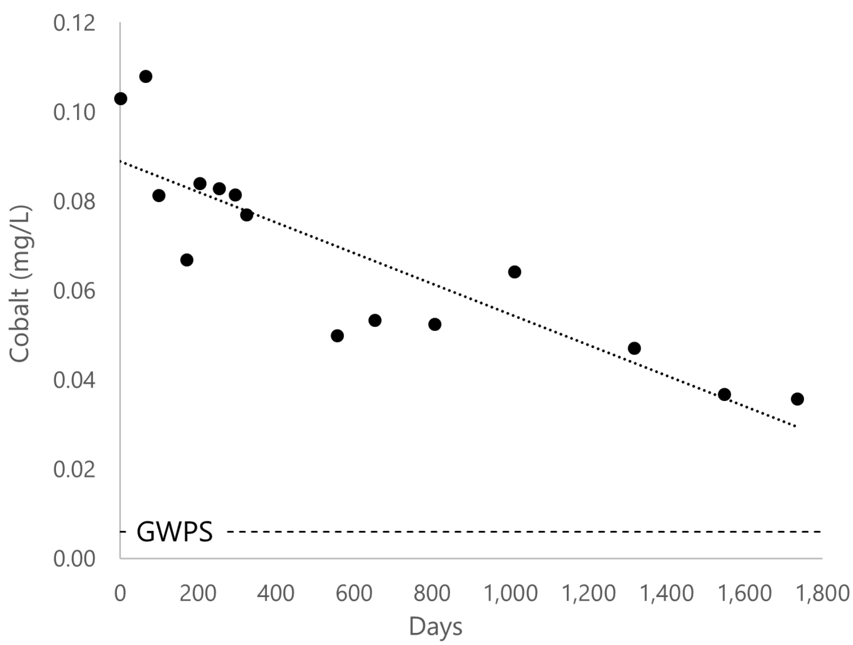


MR-AP-MW-6 to MR-AP-MW-32H (Lithium)

Note:
mg/L: milligrams per liter

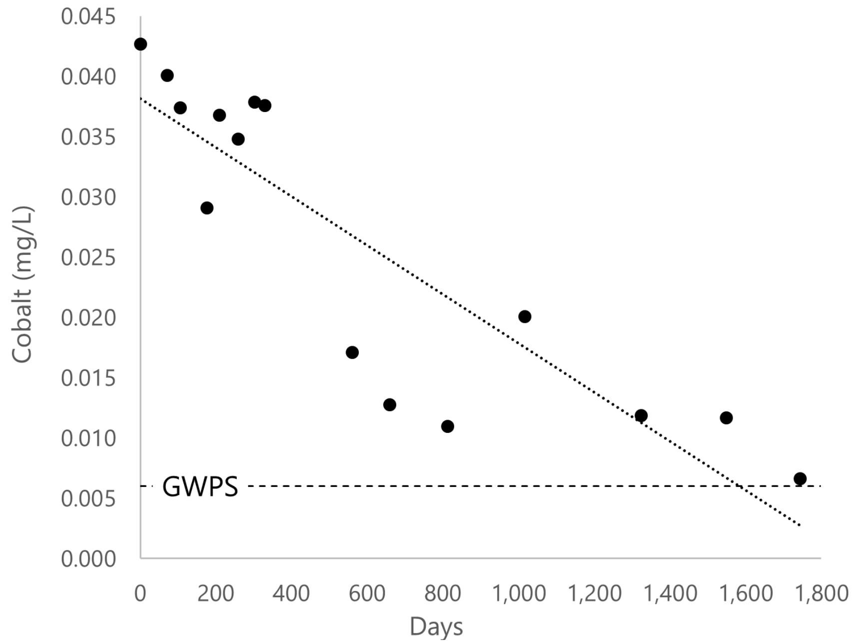


MR-AP-MW-5

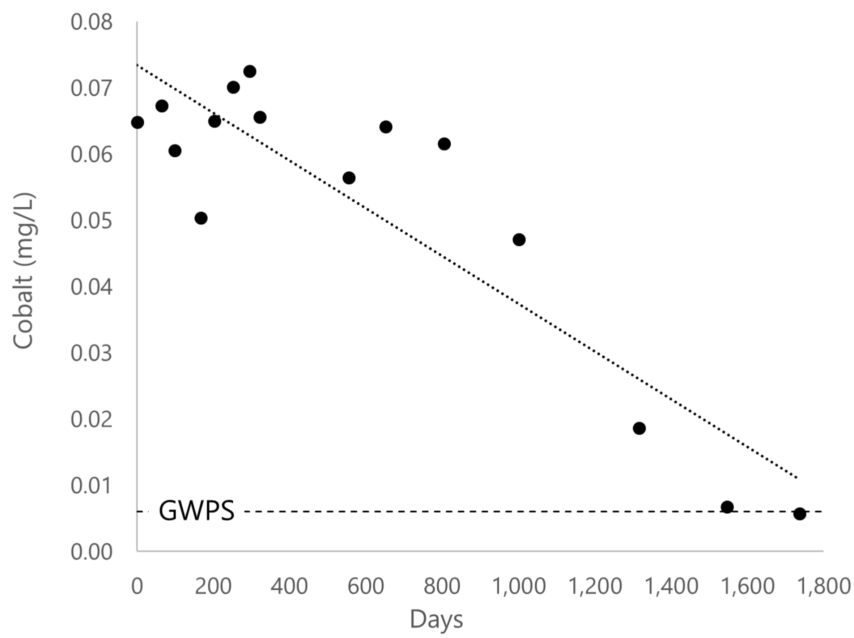


MR-AP-MW-2

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter

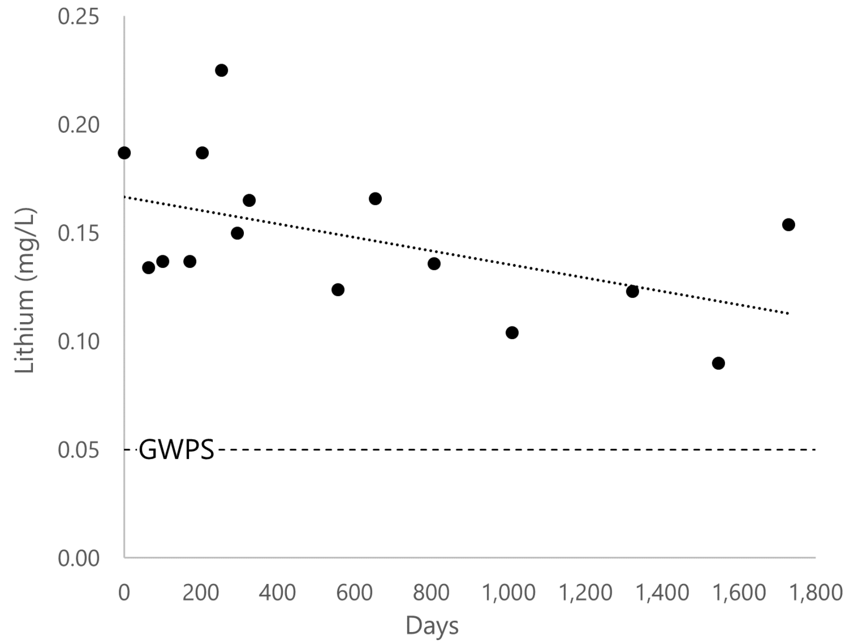


MR-AP-MW-4

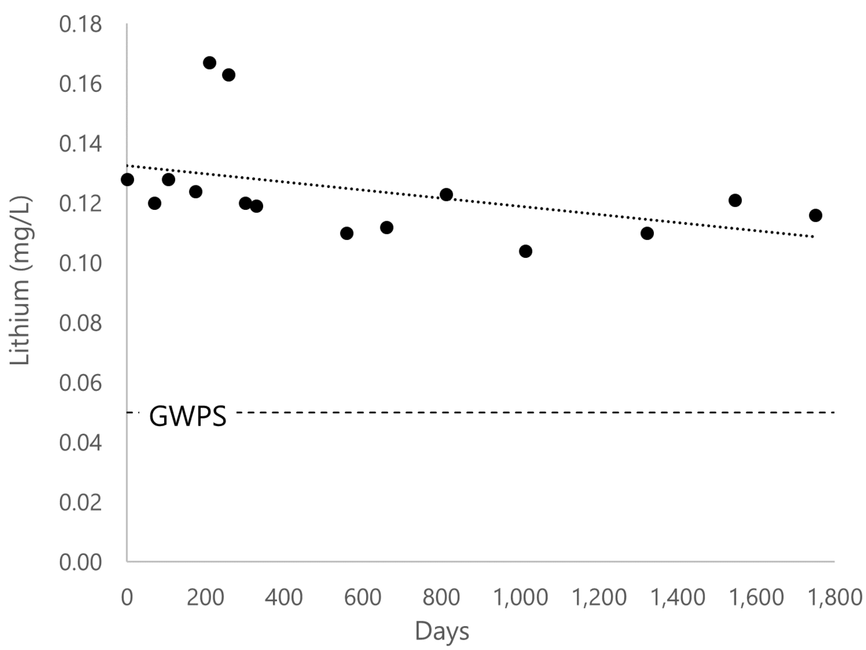


MR-AP-MW-6

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter

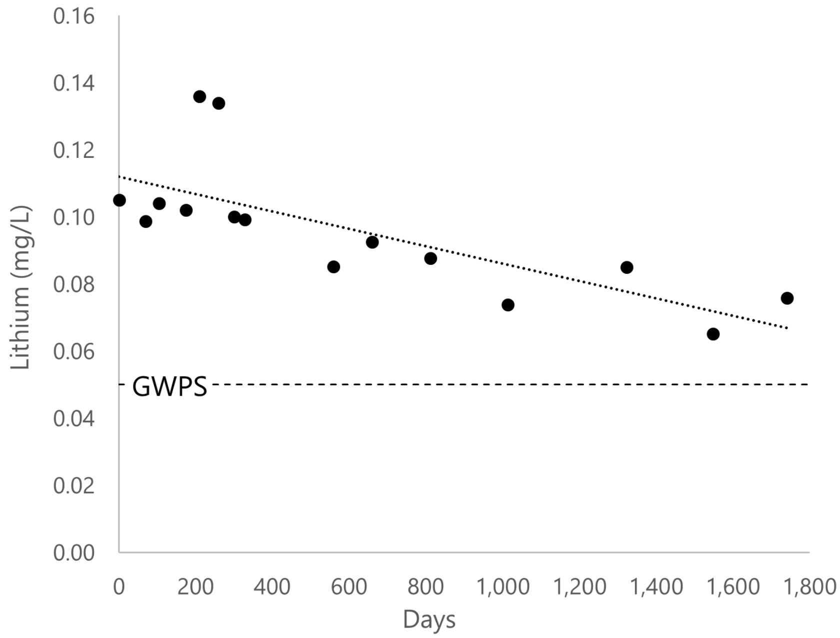


MR-AP-MW-1

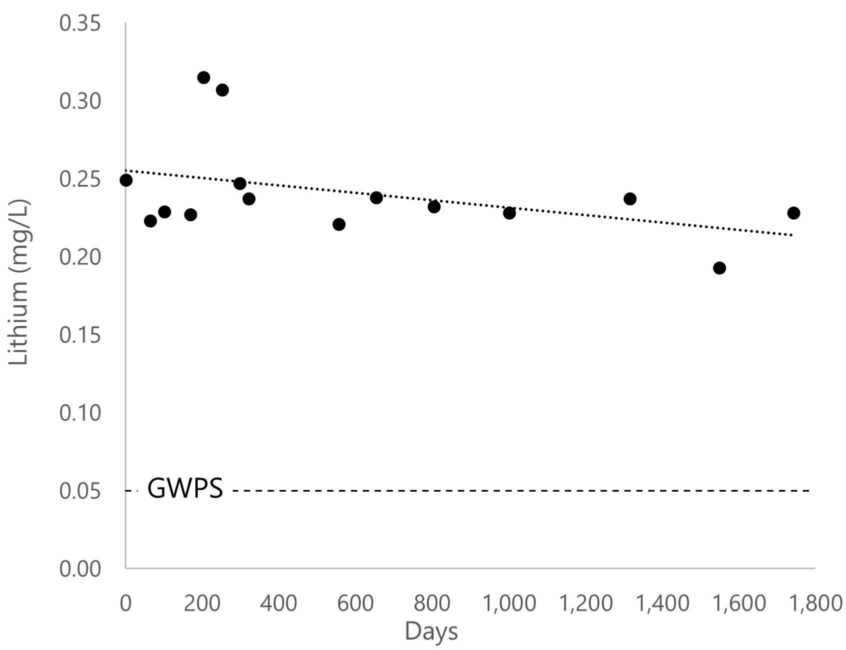


MR-AP-MW-3D

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter



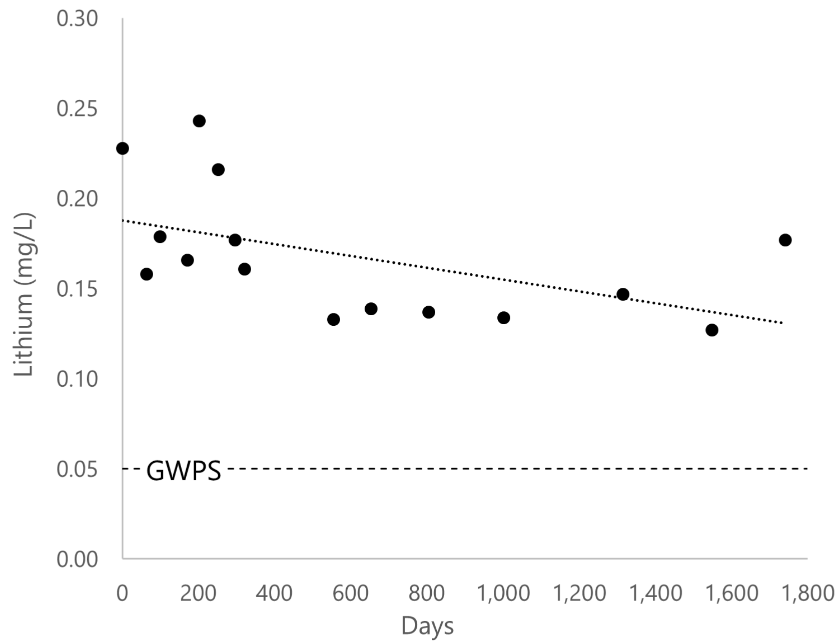
MR-AP-MW-4



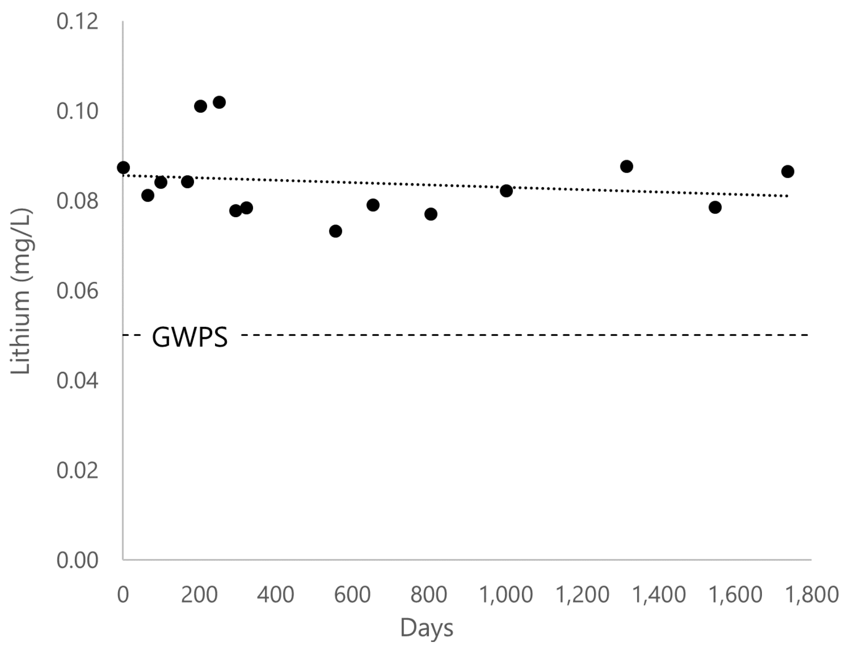
MR-AP-MW-5

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter

Figure 2d
Concentration Versus Time Graphs
Monitored Natural Attenuation Demonstration
Plant Miller

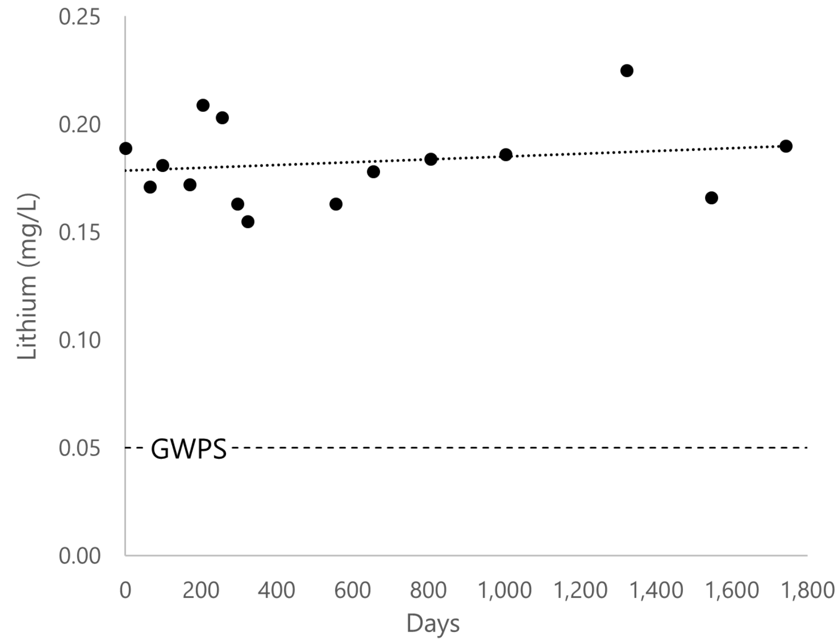


MR-AP-PZ-5

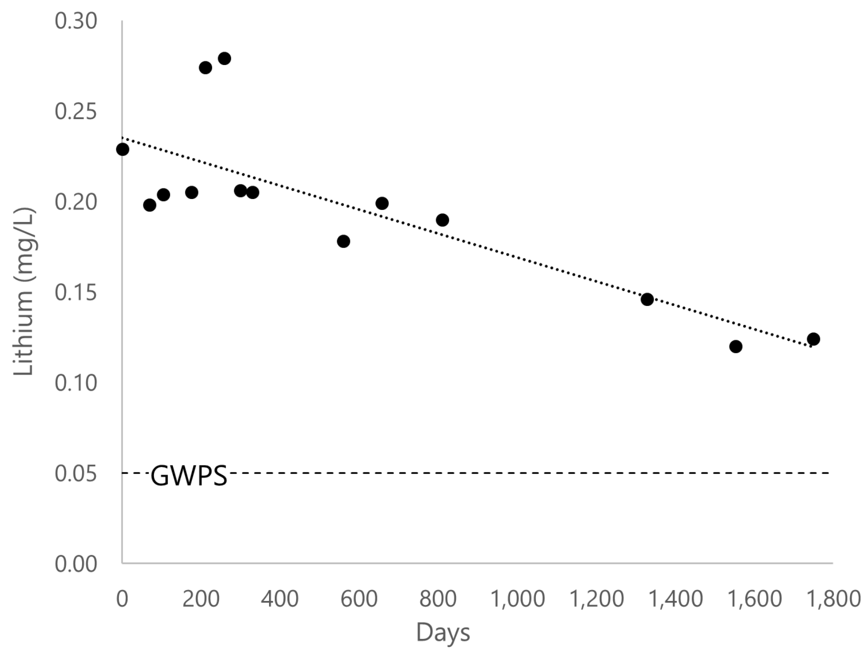


MR-AP-MW-6

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter



MR-AP-MW-10



MR-AP-MW-12

Notes:
GWPS: groundwater protection standard
mg/L: milligrams per liter

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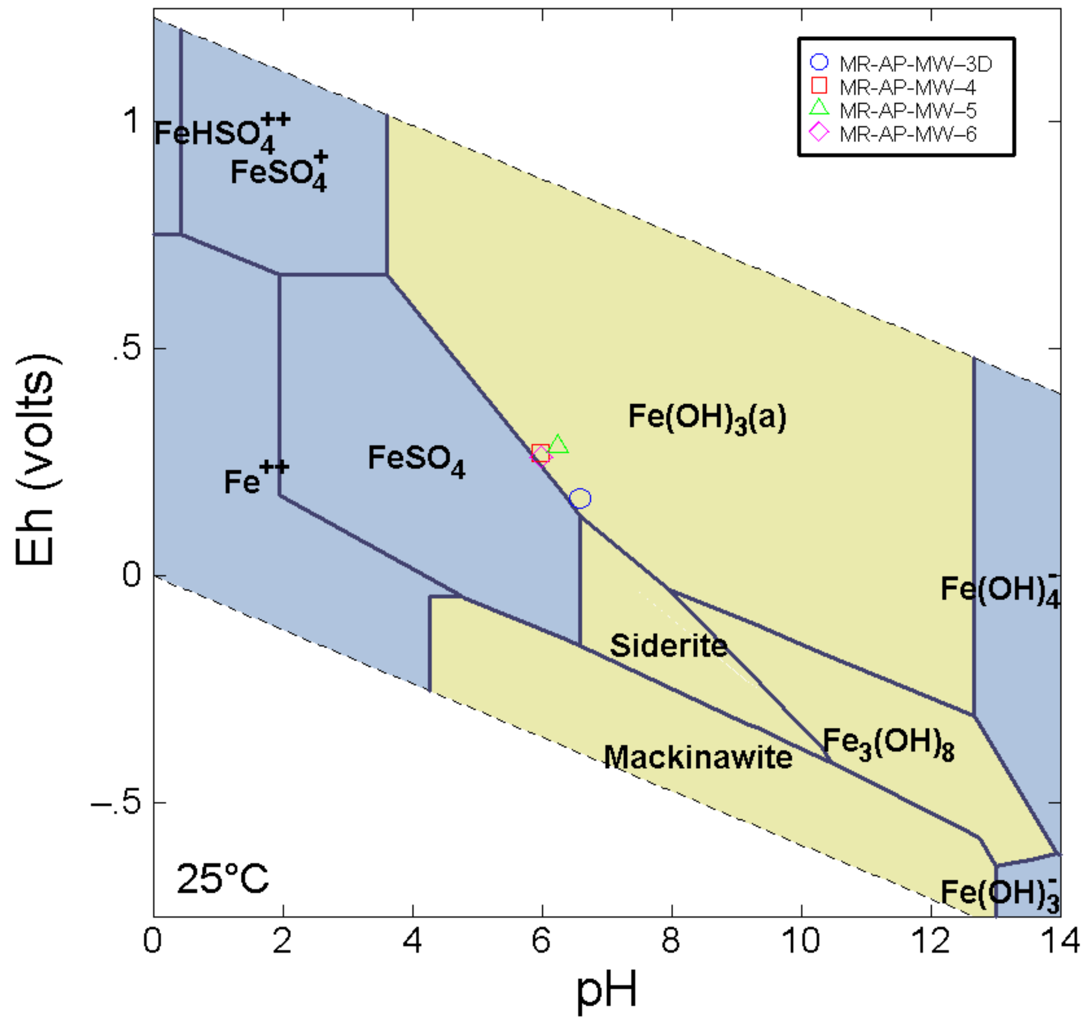
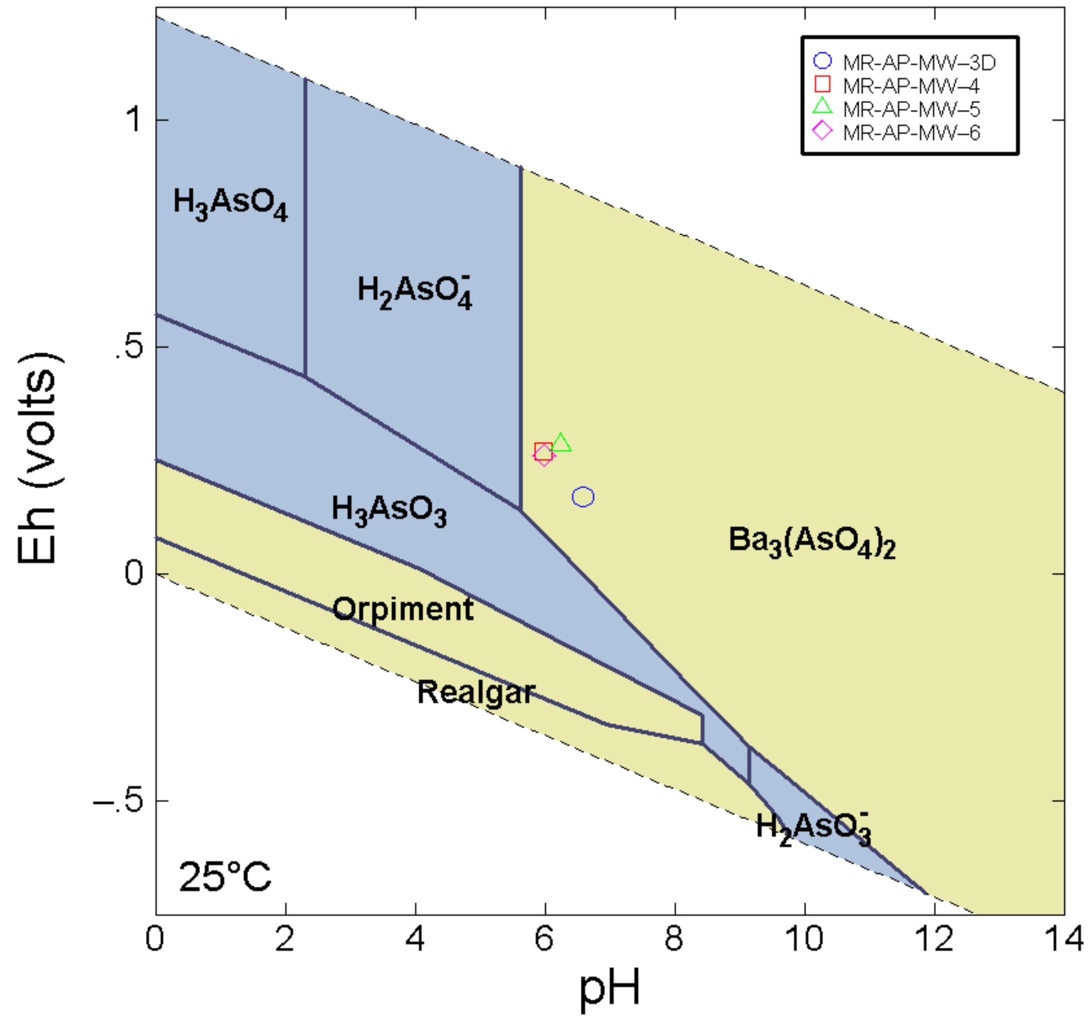
Figure 2f
Concentration Versus Time Graphs
Monitored Natural Attenuation Demonstration
Plant Miller



Note:
Blue fields indicate dissolved/mobile species. Yellow fields indicate solid/attenuated species.

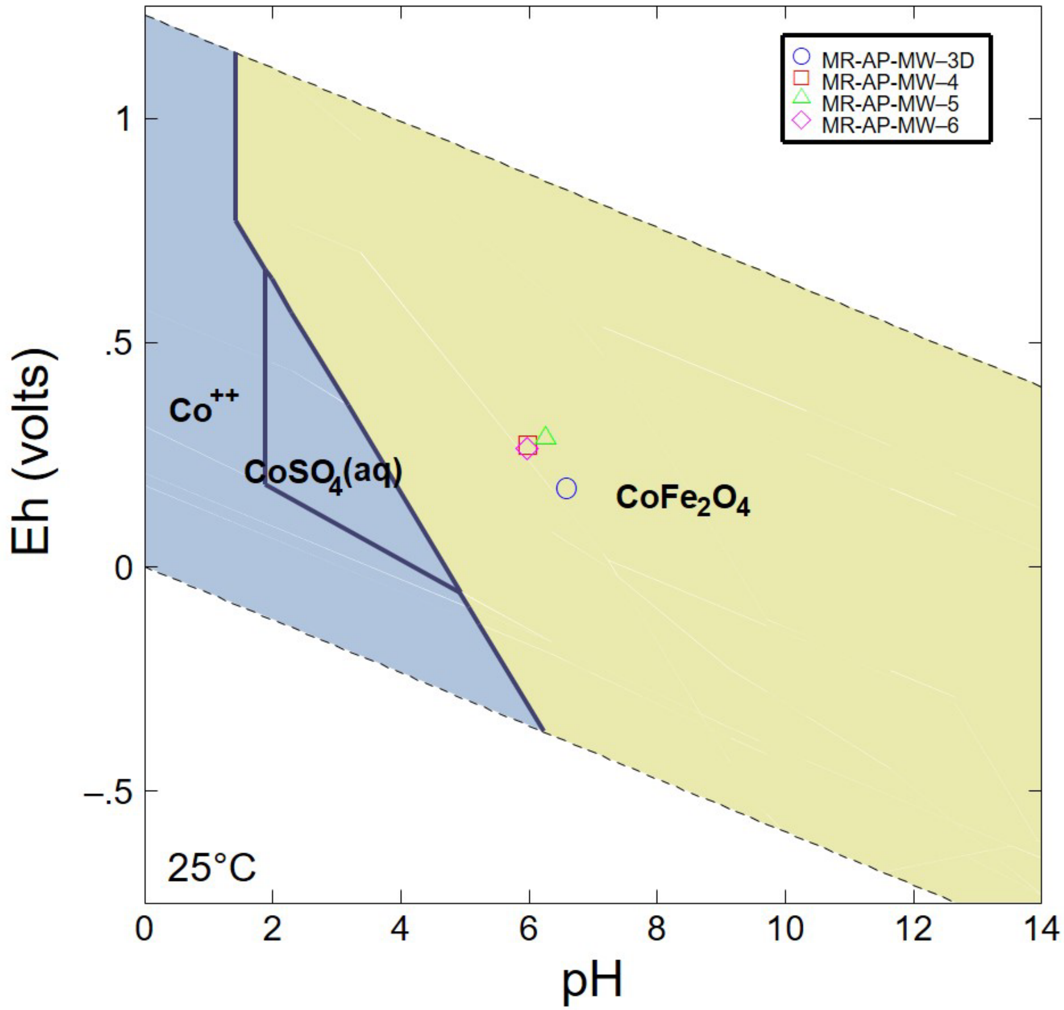
Figure 3
Eh-pH Stability Diagram for Dissolved and Solid Iron Phases
Monitored Natural Attenuation Demonstration
Plant Miller



Note:
Blue fields indicate dissolved/mobile species. Yellow fields indicate solid/attenuated species.

Figure 4
Eh-pH Stability Diagram for Dissolved and Solid Arsenic Phases

Monitored Natural Attenuation Demonstration
Plant Miller



Note:
Blue fields indicate dissolved/mobile species. Yellow fields indicate solid/attenuated species.

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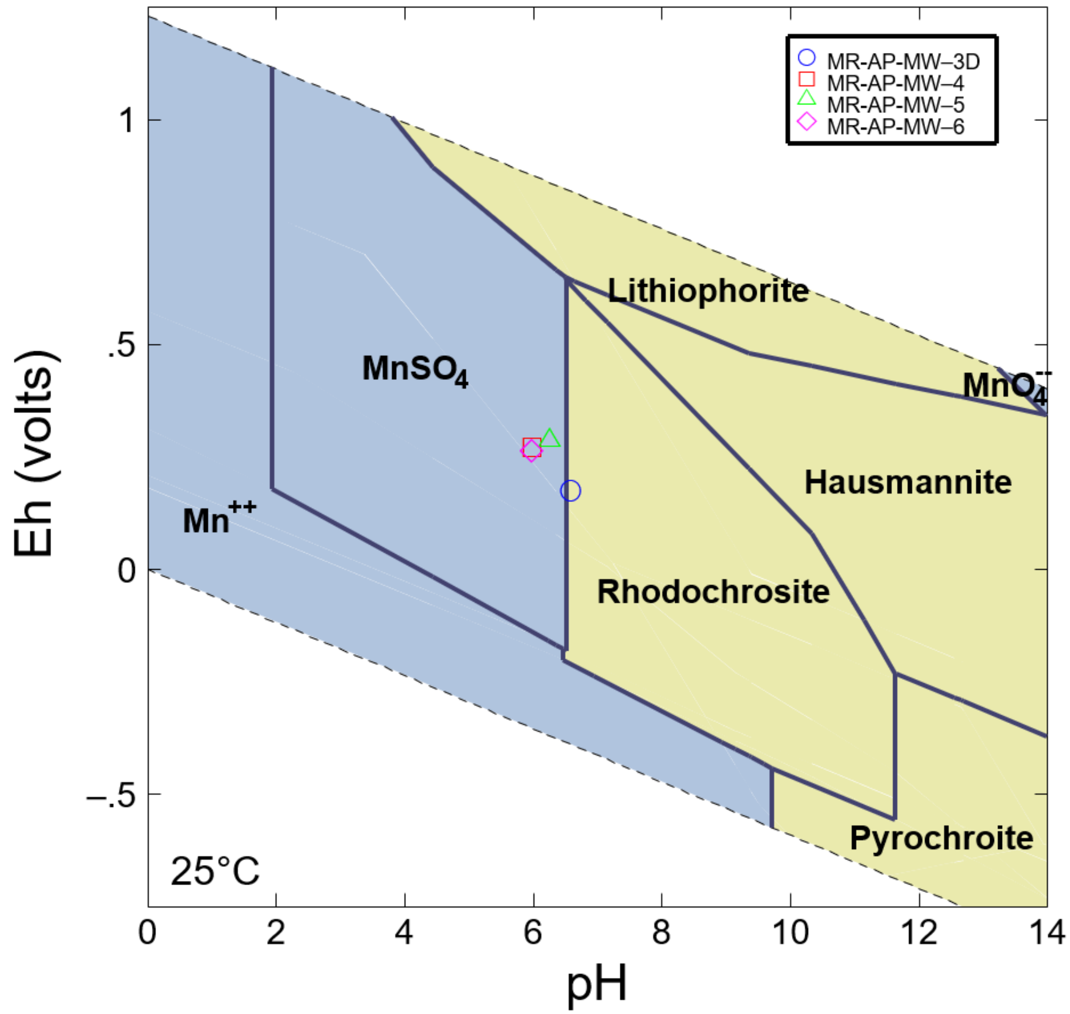
Figure 5
Eh-pH Stability Diagram for Dissolved and Solid Cobalt Phases
Monitored Natural Attenuation Demonstration
Plant Miller



Note:
Blue fields indicate dissolved/mobile species. Yellow fields indicate solid/attenuated species.

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Figure 7
Transport Model Transect Location
Monitored Natural Attenuation Demonstration
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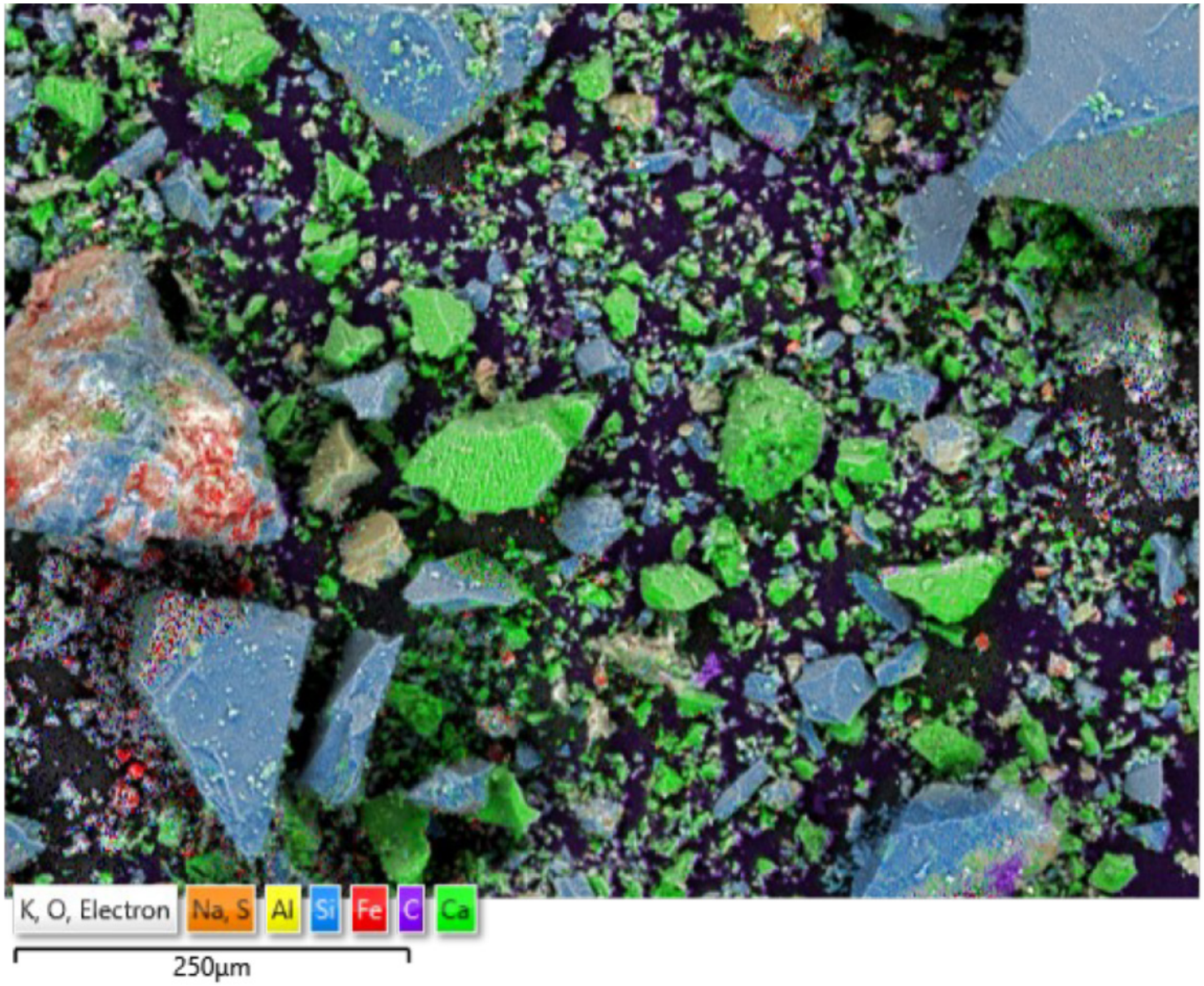
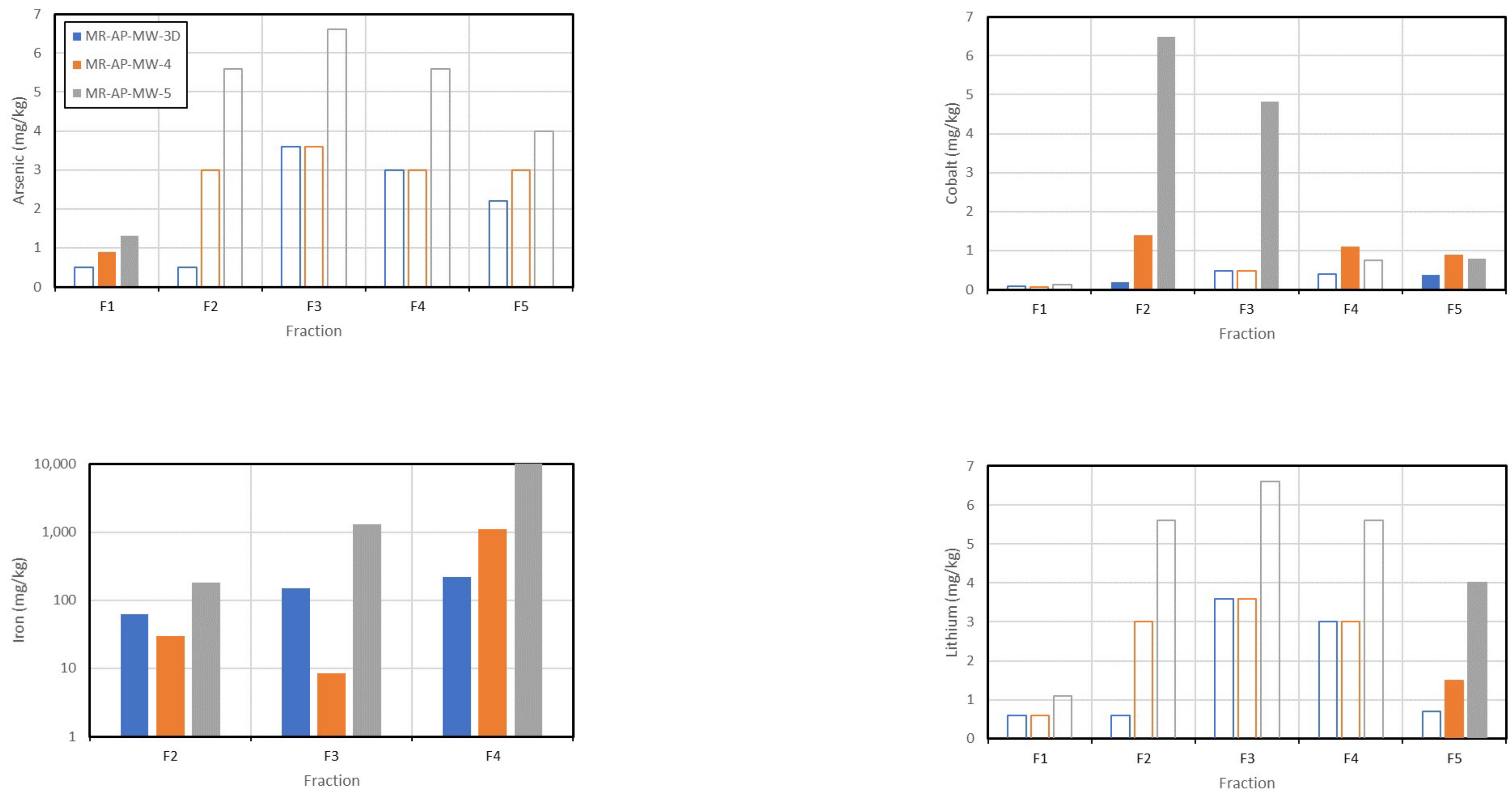
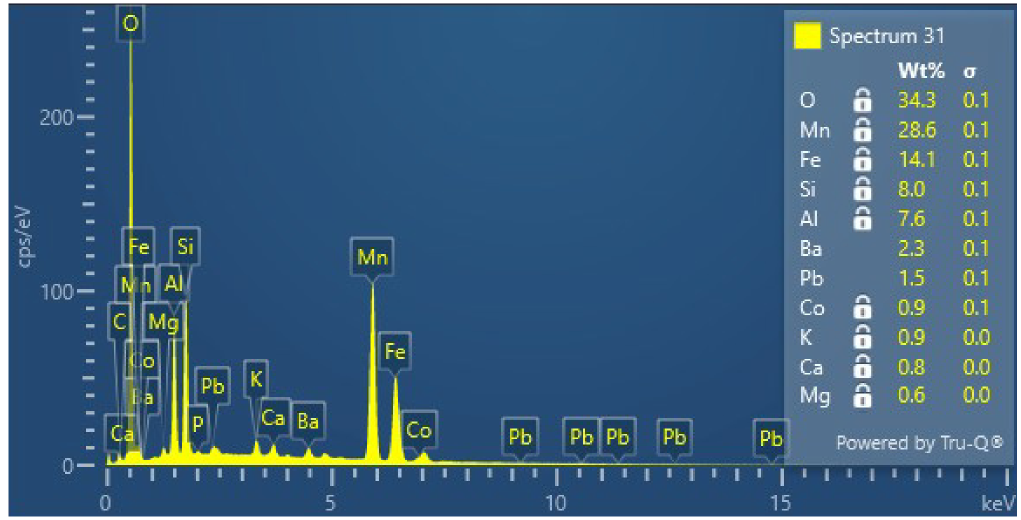


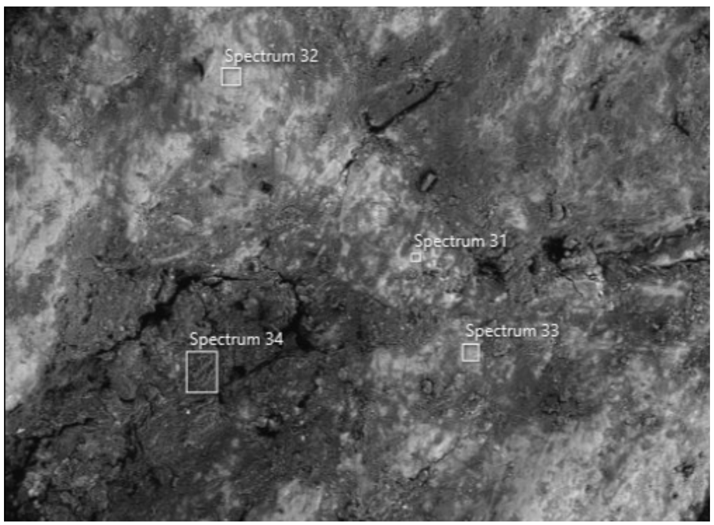
Notes:
µm: microns
SEM: scanning electron microscopy

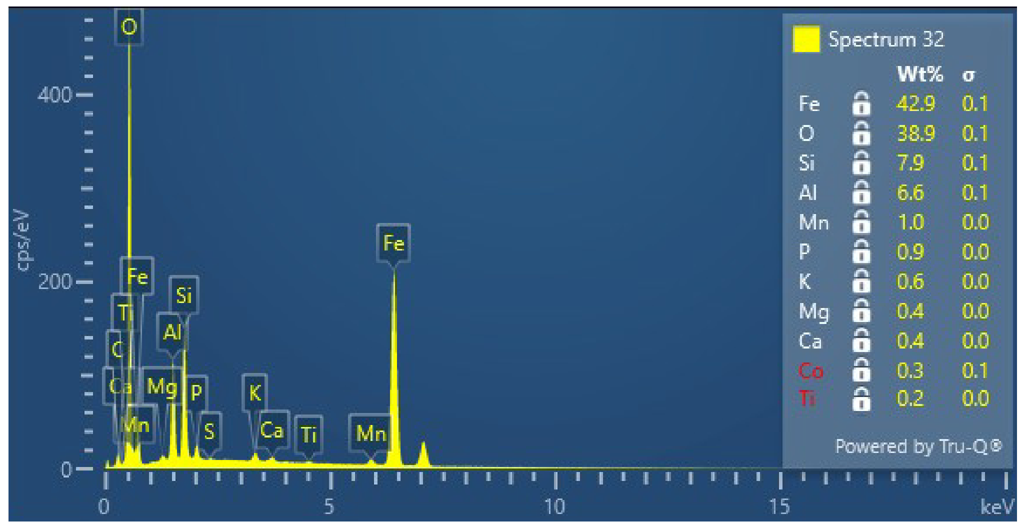


Notes:
Non-detect results are shown as unfilled bars plotted at the detection limit.
F1: water soluble
F2: exchangeable (e.g., clay minerals)
F3: reducible (e.g., poorly crystalline metal oxides such as iron oxides)
F4: oxidizable (e.g., crystalline oxide and crystalline sulfide minerals)
F5: residual (e.g., silicate phases)
mg/kg: milligrams per kilogram

Figure 9
SSE Results for Well Solids
Monitored Natural Attenuation Demonstration
Plant Miller



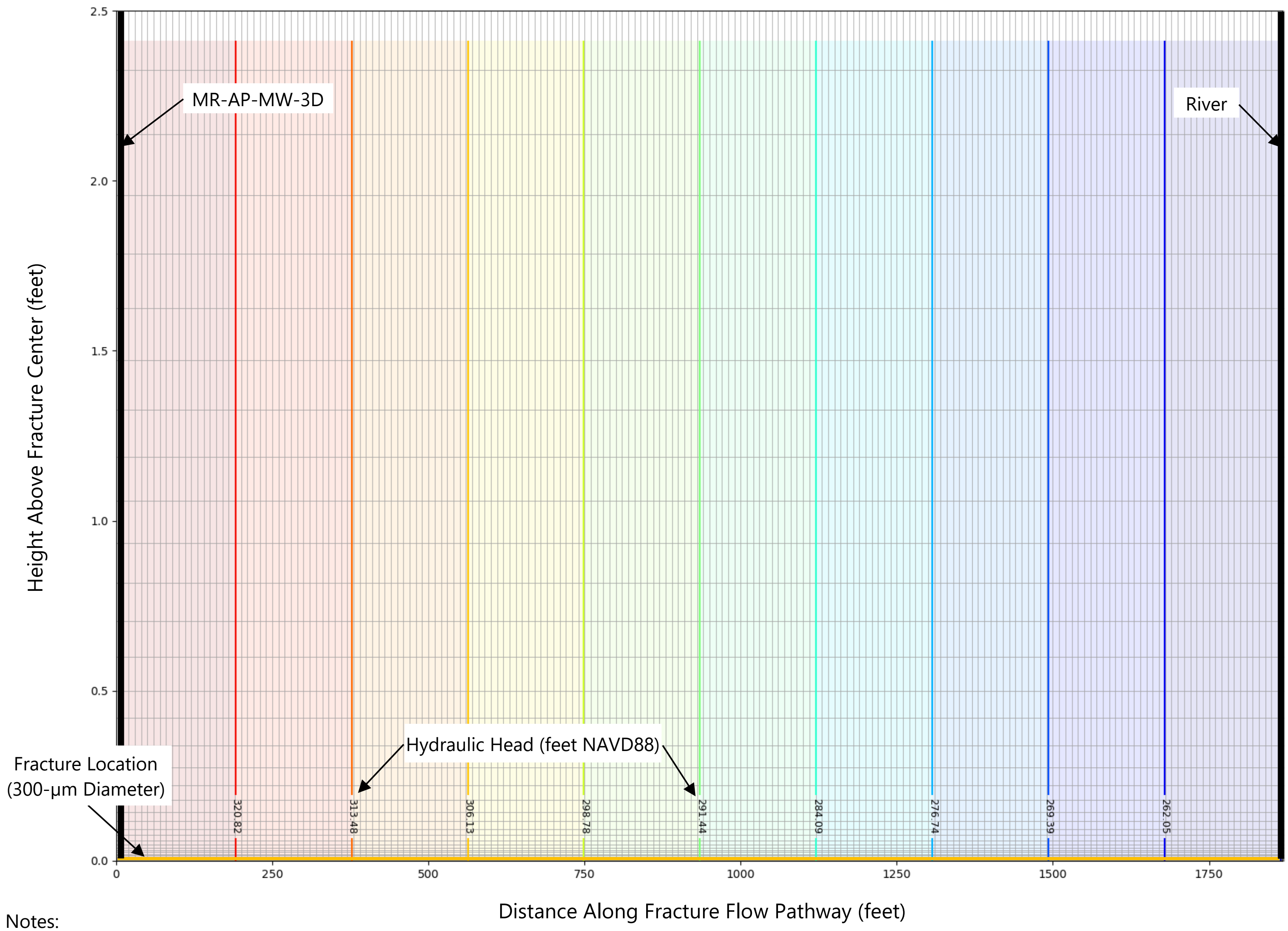




Filepath: \\Athena\Mobile\Projects\Southern Company\Alabama Power ACMs - PRIVILEGED & CONFIDENTIAL\MNA Demonstration Reports\Miller\Figures\Figure 10 - SEM Results for MR-AP-MW-2V (11-12).docx

ANCHOR QEA

Figure 10
SEM Results for MR-AP-MW-2V (11-12)
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
µm: micrometers
NAVD88: North American Vertical Datum of 1988

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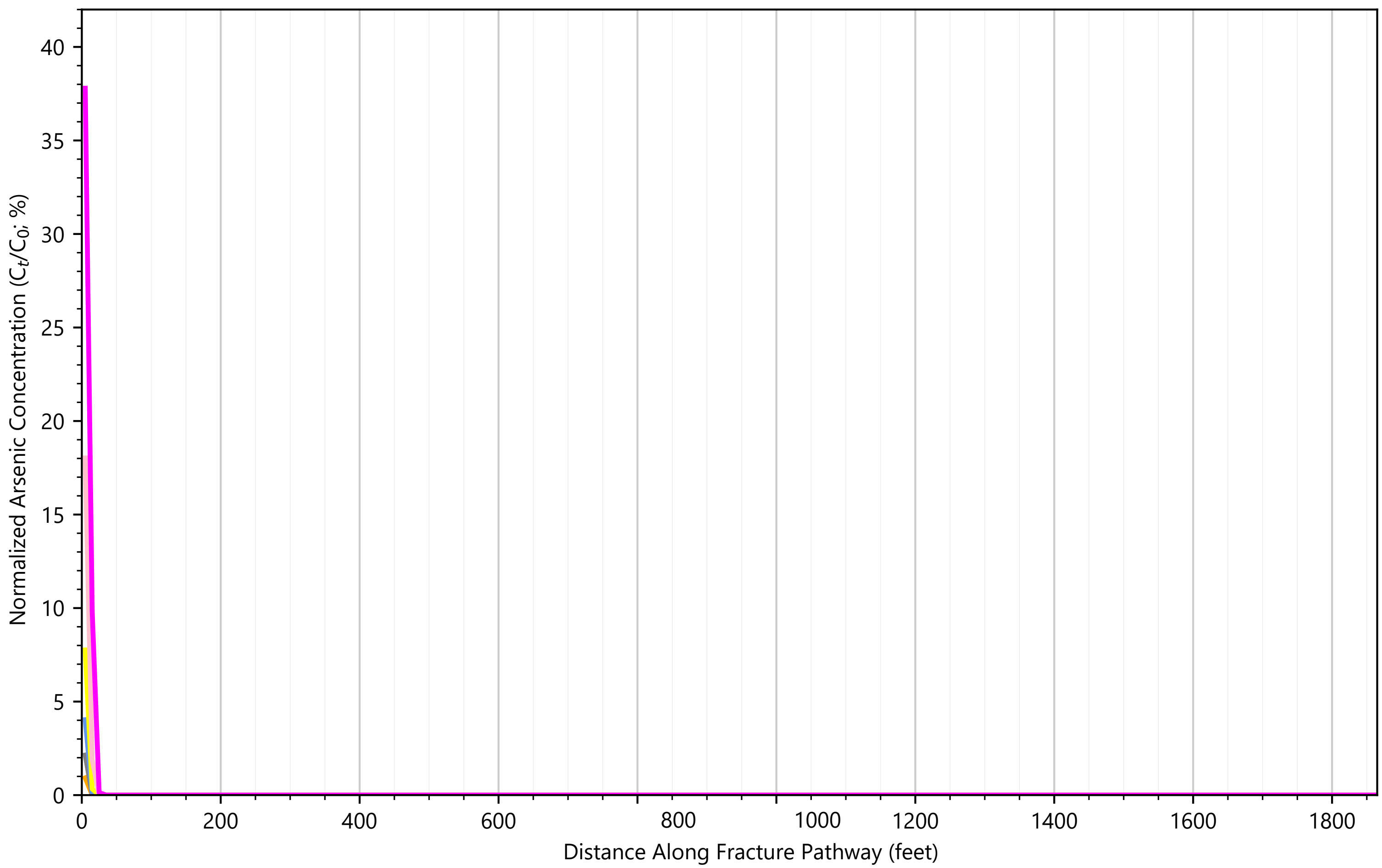
Figure 11
Model Grid (41-Layer Version)
Monitored Natural Attenuation Demonstration
Plant Miller



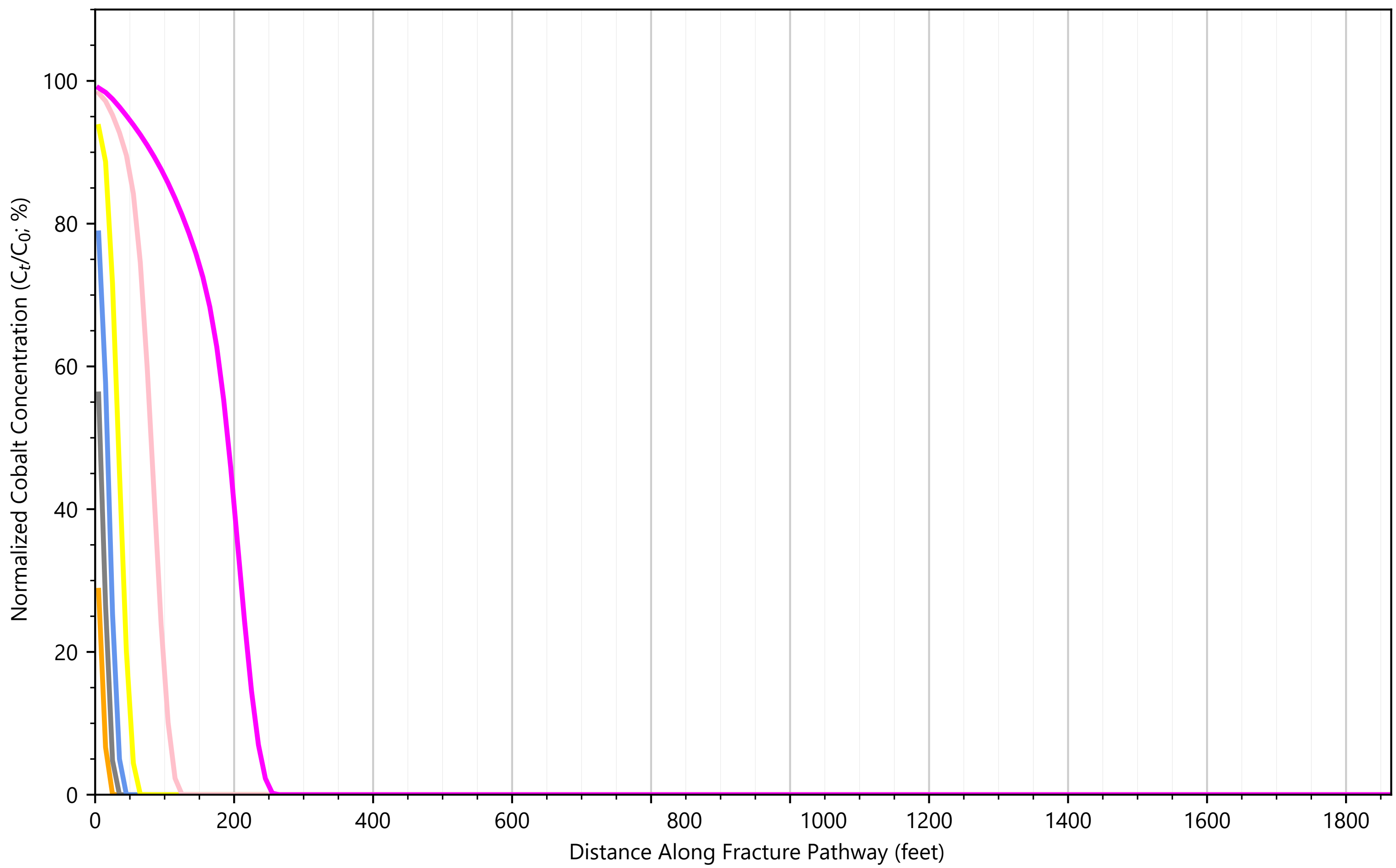
Notes:
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for arsenic is 8.5e-12 (As(+3)) and 2.002e-07 (As(+5)) moles per liter.

Legend:

5 days	60 days
15 days	150 days
30 days	365 days

ANCHOR QEA

Figure 12a
Normalized Arsenic Concentration Along Simulated Fracture Pathway
Monitored Natural Attenuation Demonstration
Plant Miller

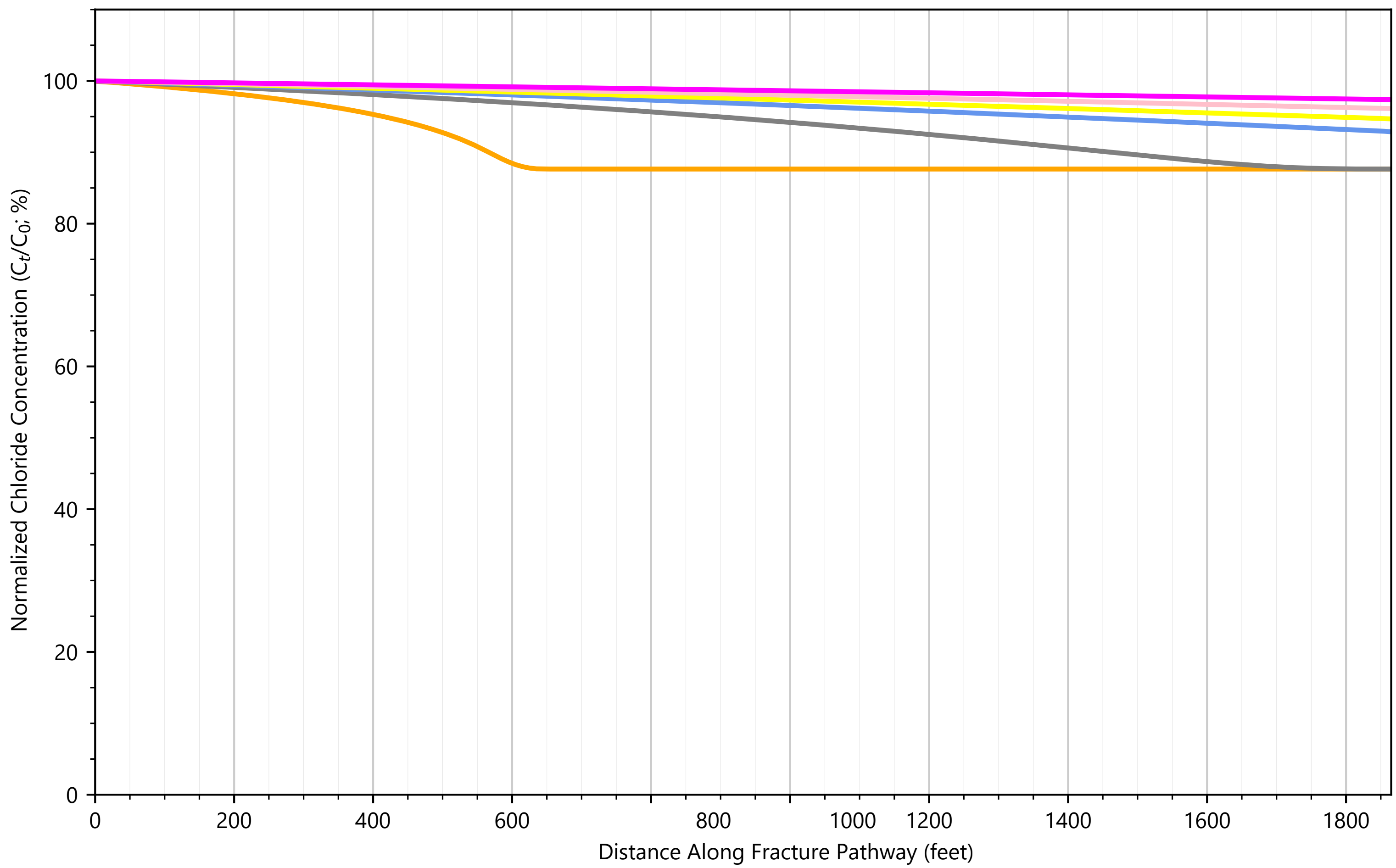


Notes:
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for cobalt is 6.8e-07 moles per liter.

Legend:
5 days
15 days
30 days
60 days
150 days
365 days

ANCHOR QEA

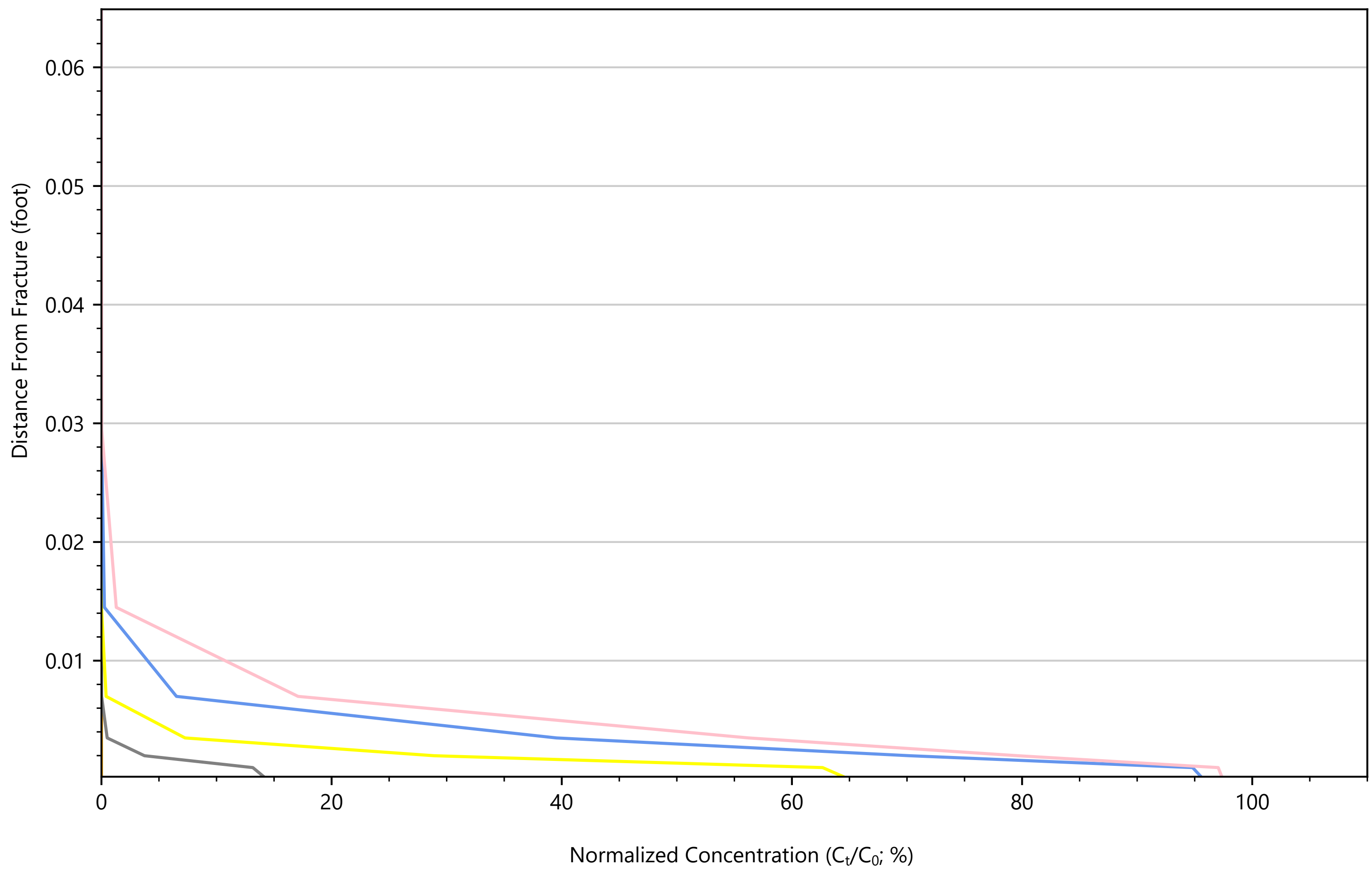
Figure 12b
Normalized Cobalt Concentration Along Simulated Fracture Pathway
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for chloride is 0.0007305 moles per liter.

ANCHOR QEA

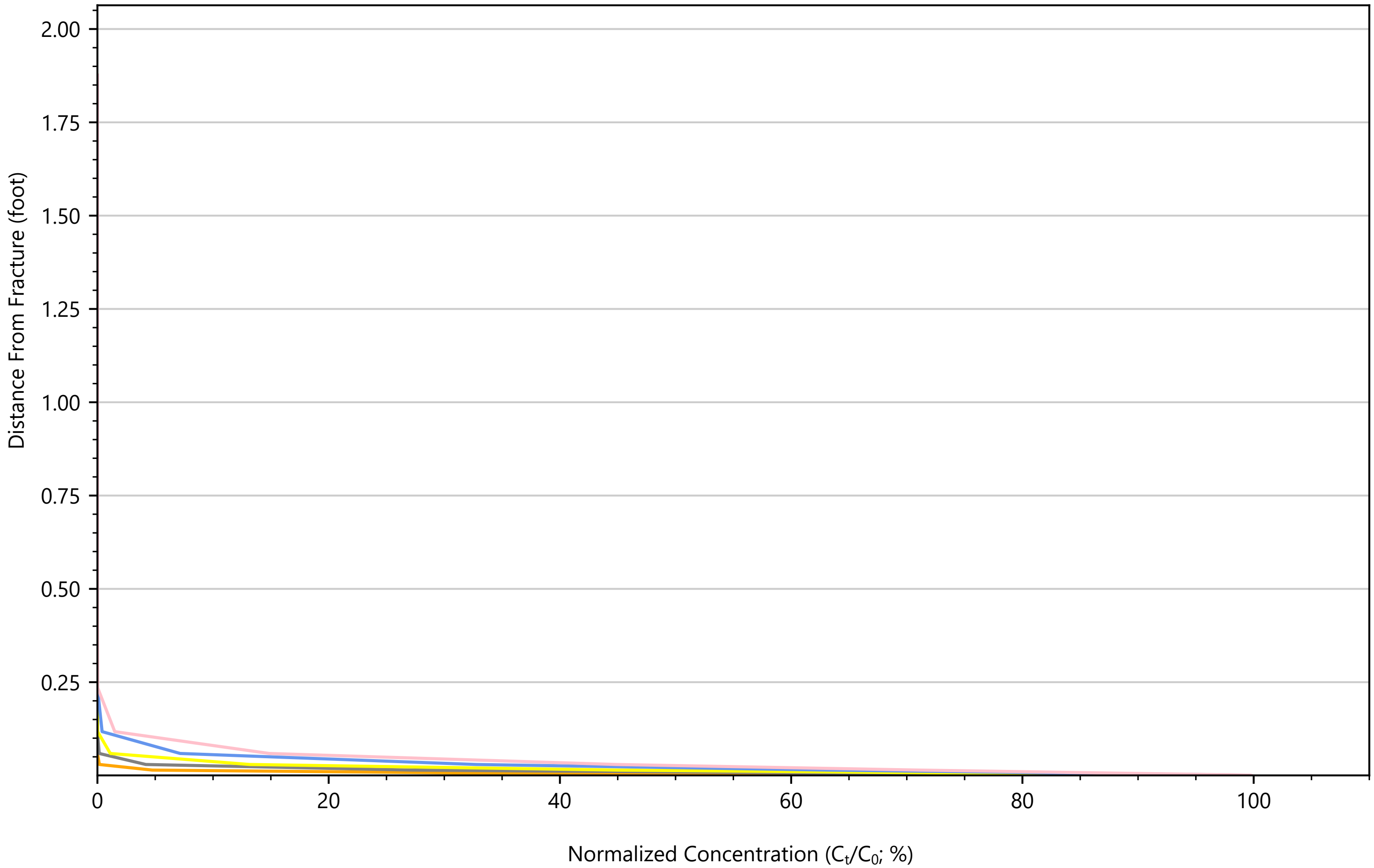
Figure 12c
Normalized Chloride Concentration Along Simulated Fracture Pathway
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
Concentrations are plotted at the midpoint of each layer.
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for arsenic is 8.5e-12 (As(+3)) and 2.002e-07 (As(+5)) moles per liter.

Legend:
- 100 days
- 1 year
- 2 years
- 5 years
- 8.5 years

Figure 13a
Normalized Arsenic Concentration for Vertical Profiles Along Transect
Monitored Natural Attenuation Demonstration
Plant Miller

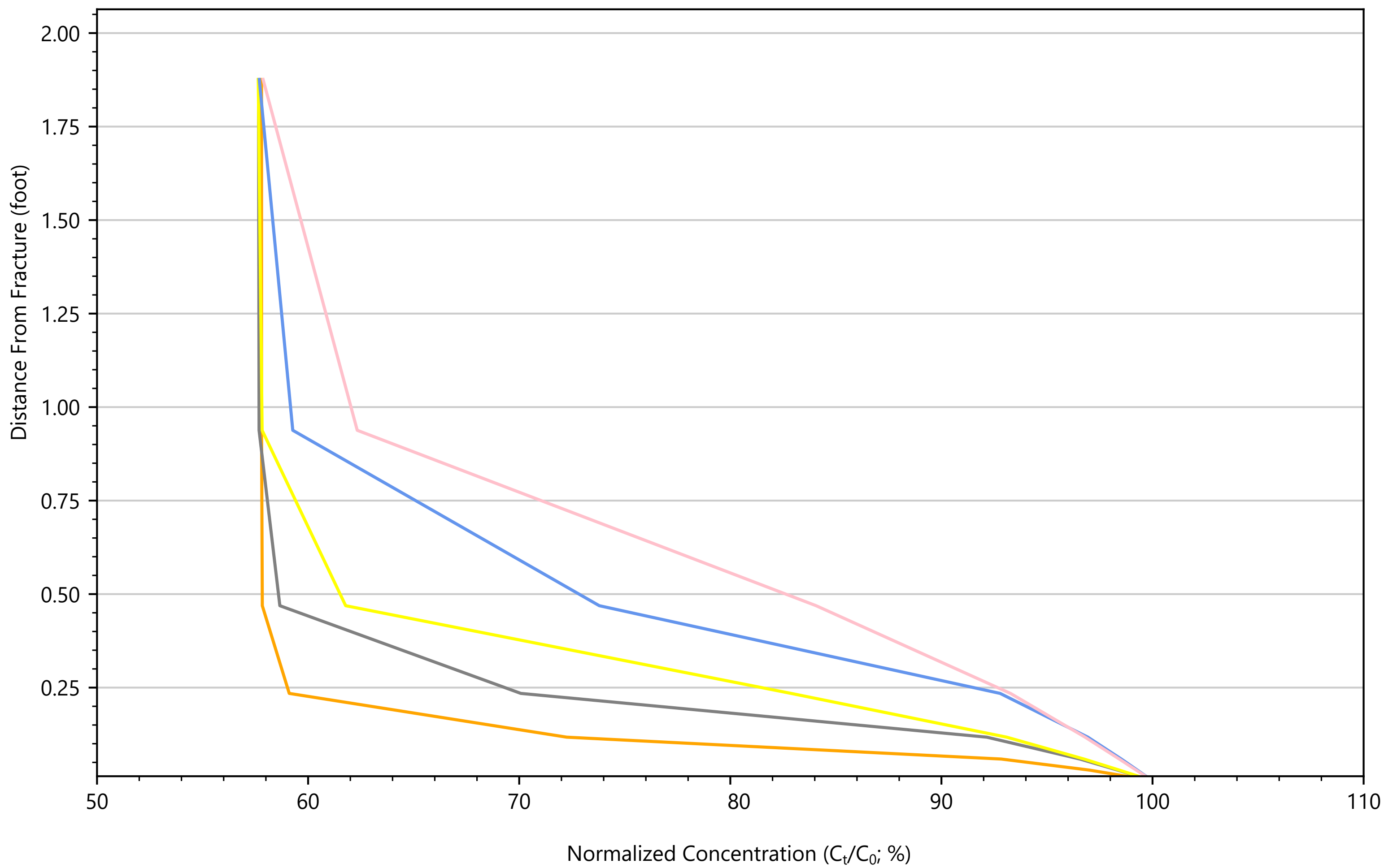


Notes:
Concentrations are plotted at the midpoint of each layer.
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for cobalt is 6.8e-07 moles per liter.

Legend:
100 days
1 year
2 years
5 years
8.5 years

ANCHOR QEA

Figure 13b
Normalized Cobalt Concentration for Vertical Profiles Along Transect
Monitored Natural Attenuation Demonstration
Plant Miller

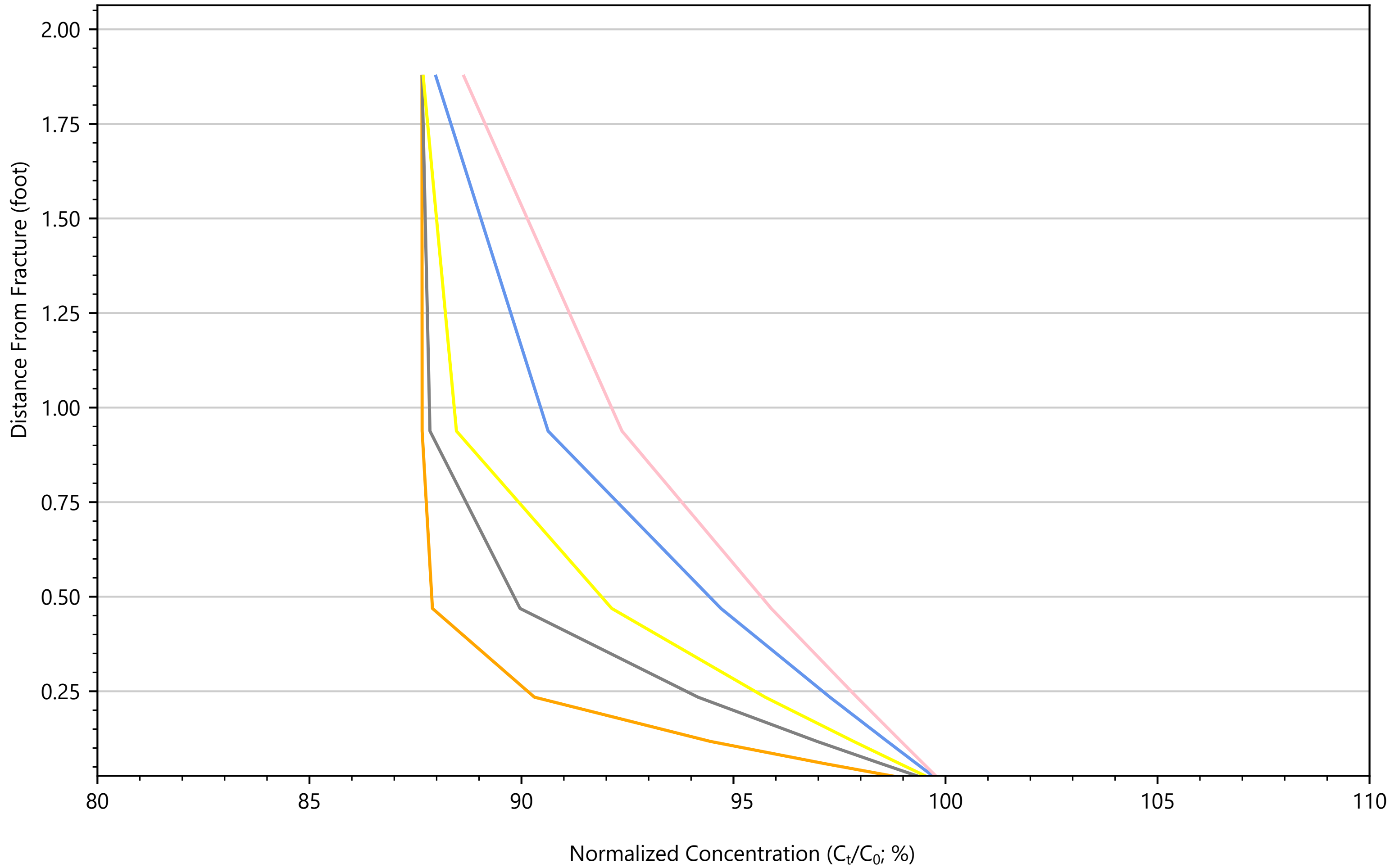


Notes:
Concentrations are plotted at the midpoint of each layer.
C_t/C_0 equals the simulated concentration, C_t, at any time, t, divided by the initial concentration, C_0.
The initial concentration for lithium is 5.001e-05 moles per liter.

Legend:
100 days
1 year
2 years
5 years
8.5 years

ANCHOR QEA

Figure 13c
Normalized Lithium Concentration for Vertical Profiles Along Transect
Monitored Natural Attenuation Demonstration
Plant Miller



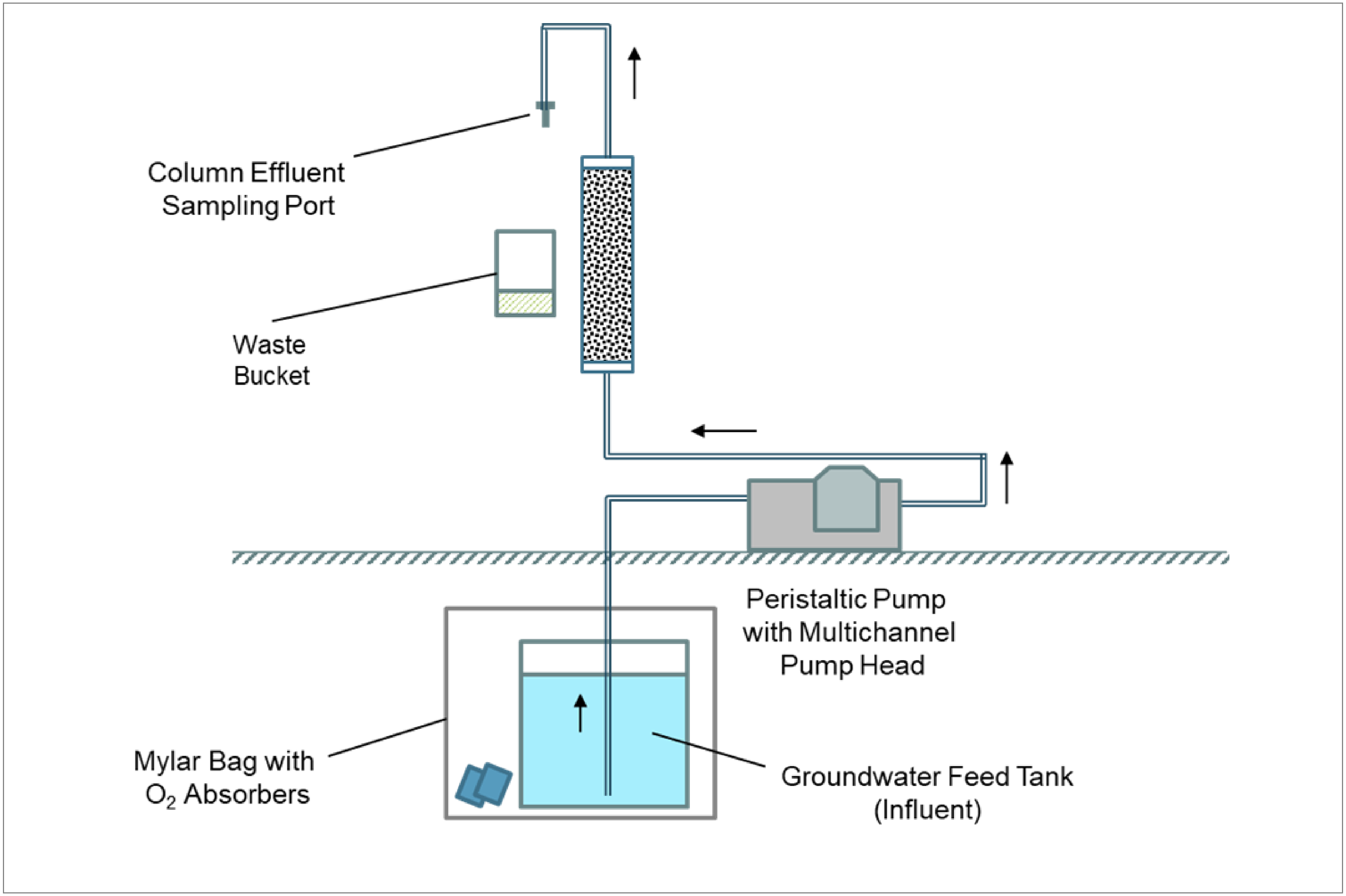
Notes:
Concentrations are plotted at the midpoint of each layer.
$Ct/C0$ equals the simulated concentration, Ct, at any time, t, divided by the initial concentration, $C0$.
The initial concentration for chloride is 0.0007305 moles per liter.

Legend:
100 days
1 year
2 years
5 years
8.5 years

ANCHOR QEA

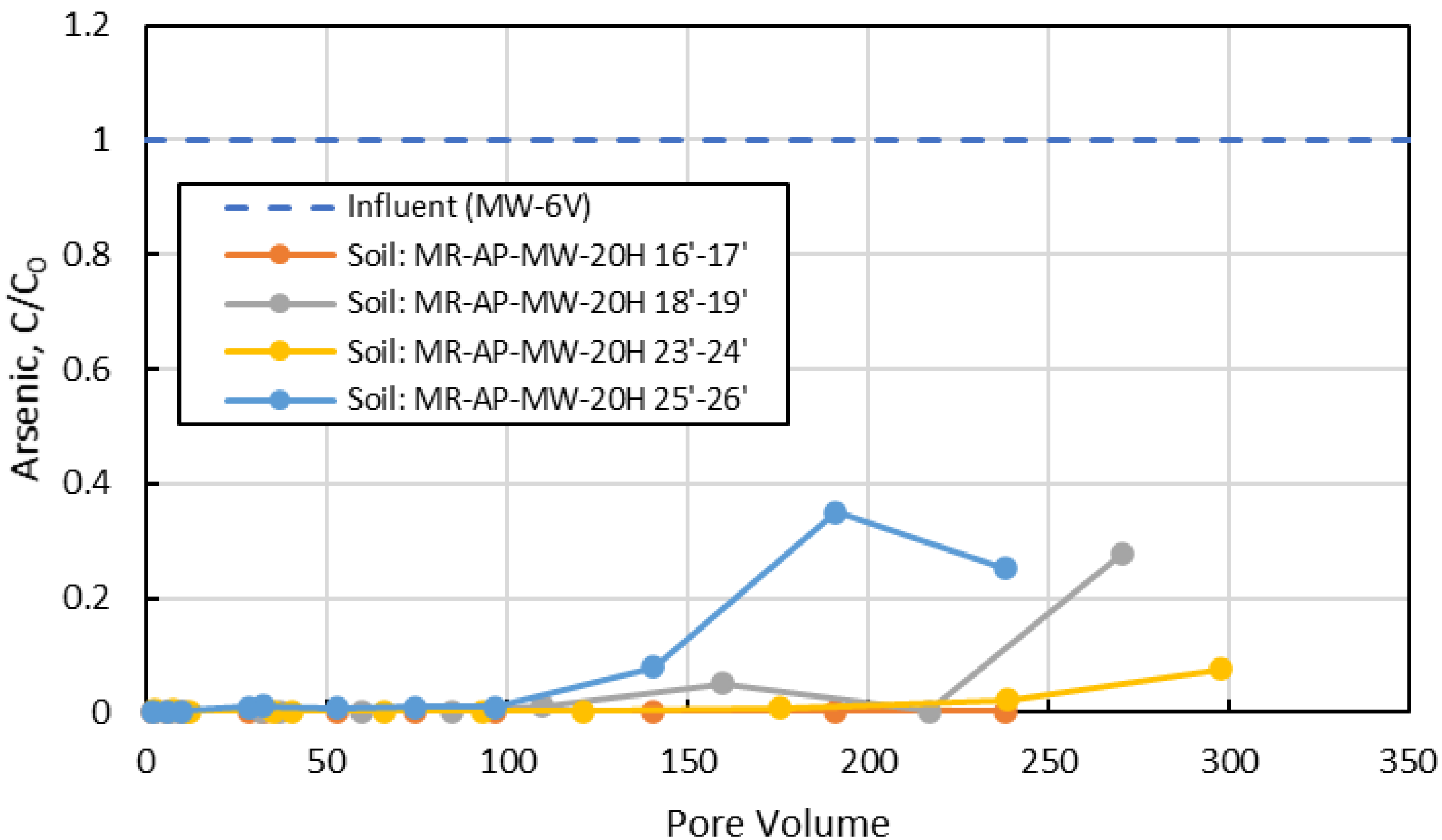
Figure 13d
Normalized Chloride Concentration for Vertical Profiles Along Transect
Monitored Natural Attenuation Demonstration
Plant Miller

Figure 14
Column Test Equipment Setup
Monitored Natural Attenuation Demonstration
Plant Miller



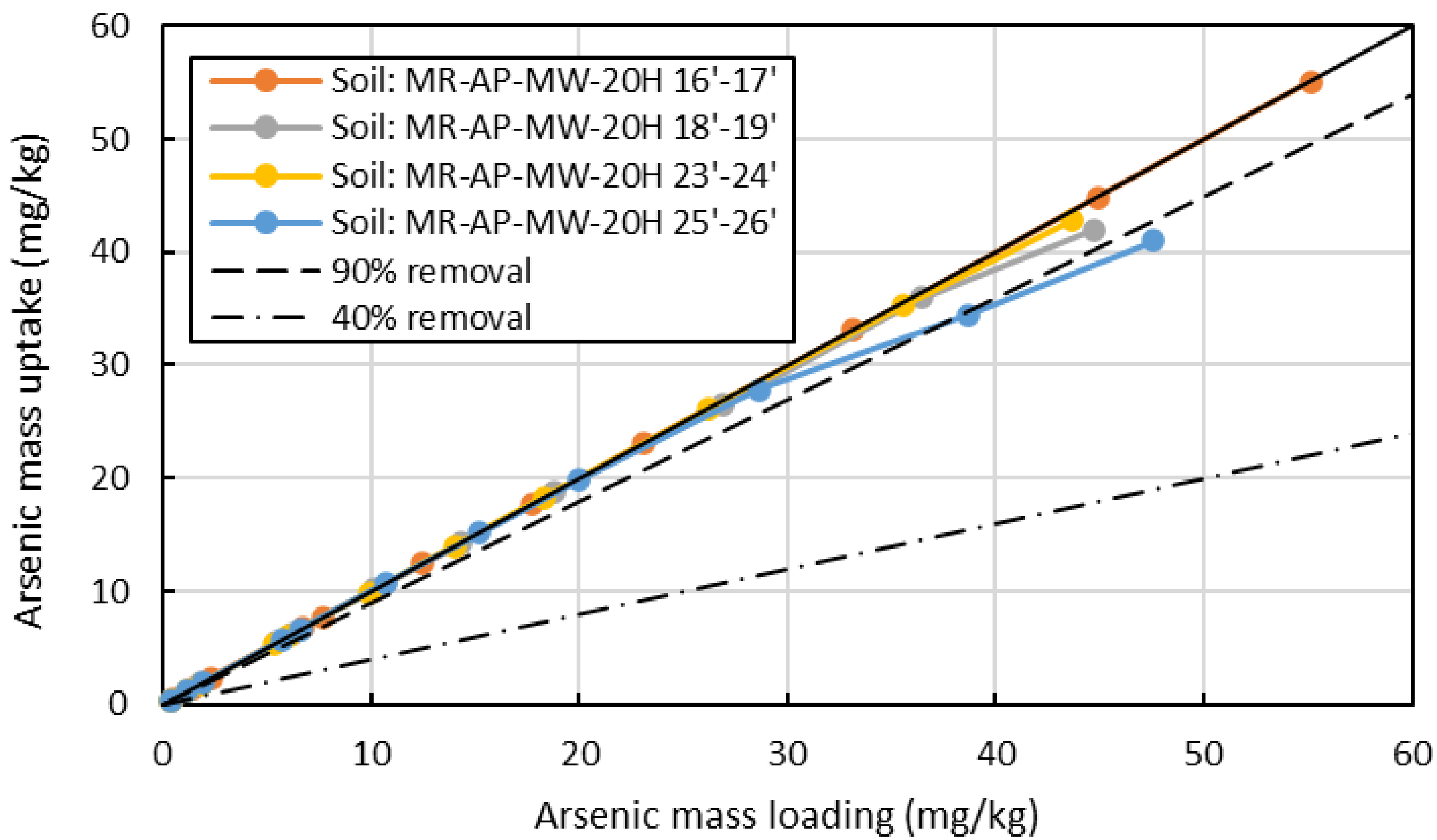
ANCHOR QEA

Figure 15
Schematic of Column Test Setup
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
Blue dashed line indicates that effluent concentrations equal influent concentrations (i.e., capacity for attenuation has been consumed).
C/C_0: ratio of concentration in column effluent to that in column influent solution

Figure 16
Dissolved Arsenic Breakthrough Curves: Columns 1 Through 4
Monitored Natural Attenuation Demonstration
Plant Miller



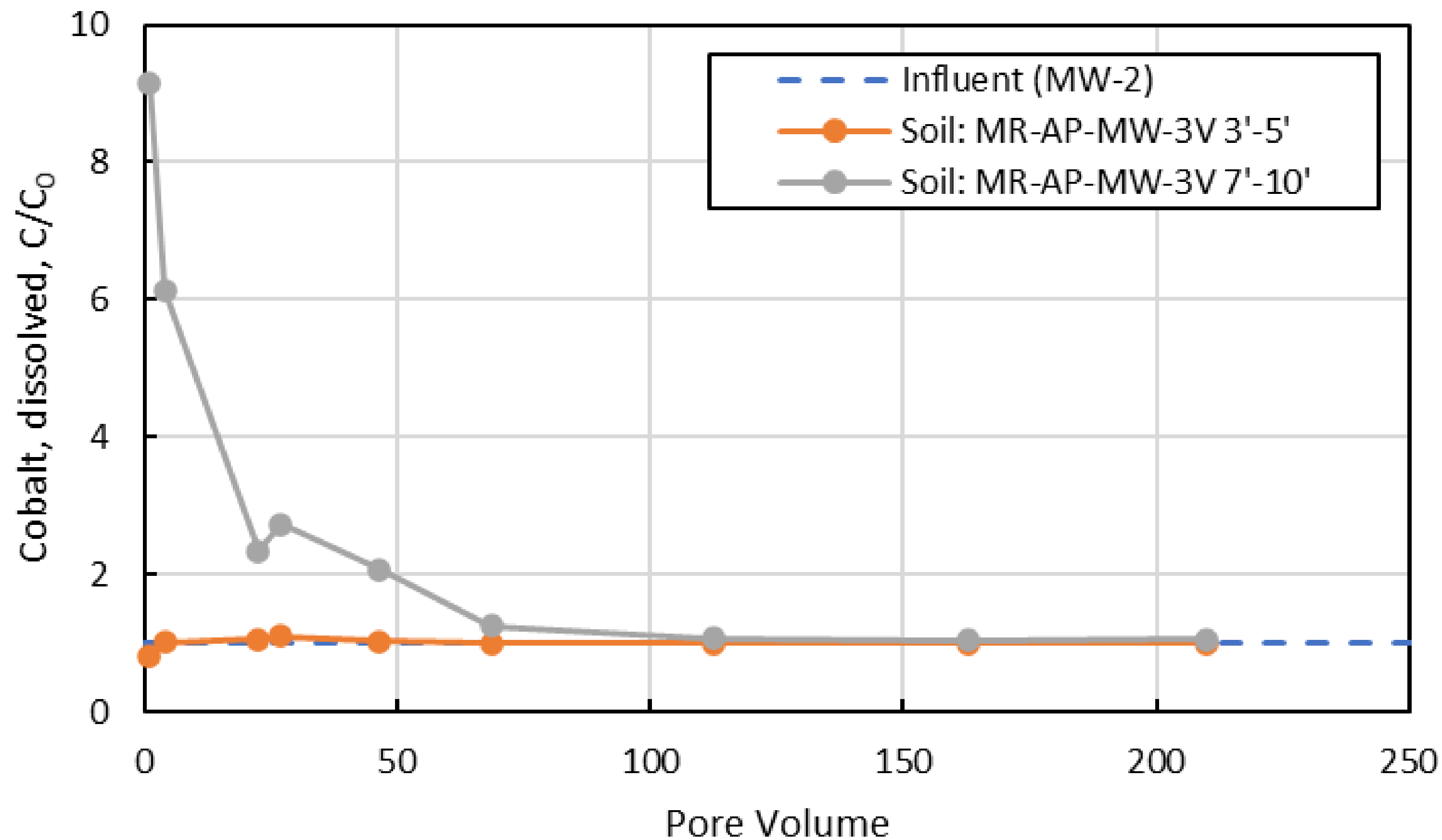
Note:
mg/kg: milligrams per kilogram

Filepath: \\Athena\Mobile\Projects\Southern Company\Alabama Power ACMs - PRIVILEGED & CONFIDENTIAL\MNA Demonstration Reports\Miller\Figures\Figure 17 - As Mass Uptake vs As Mass Loading.docx

ANCHOR QEA

Figure 17
Cumulative Arsenic Removal by Soil Columns as a Function of Loading: Columns 1 Through 4

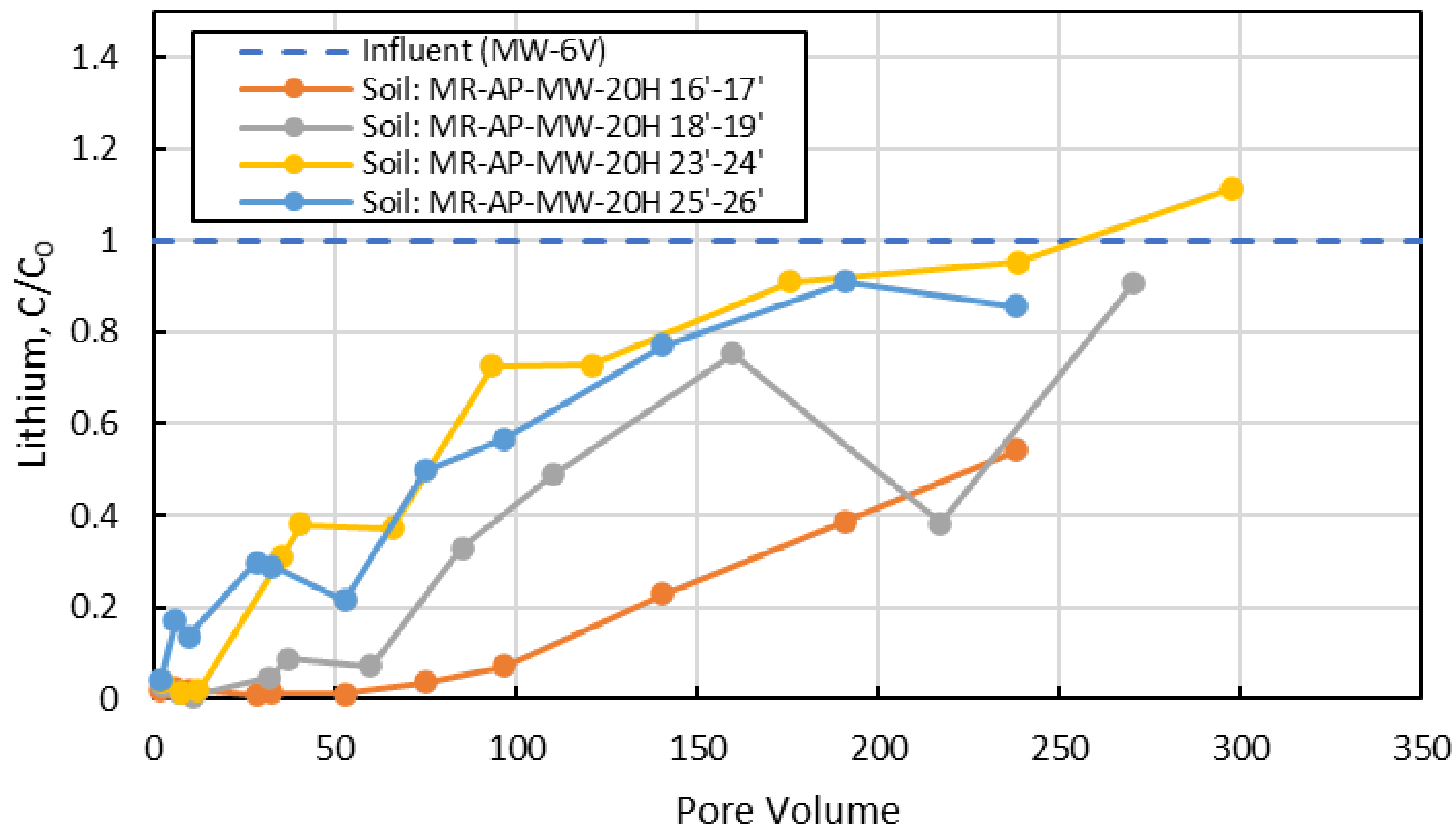
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
Blue dashed line indicates that effluent concentrations equal influent concentrations (i.e., capacity for attenuation has been consumed).
C/C_0: ratio of concentration in column effluent to that in column influent solution

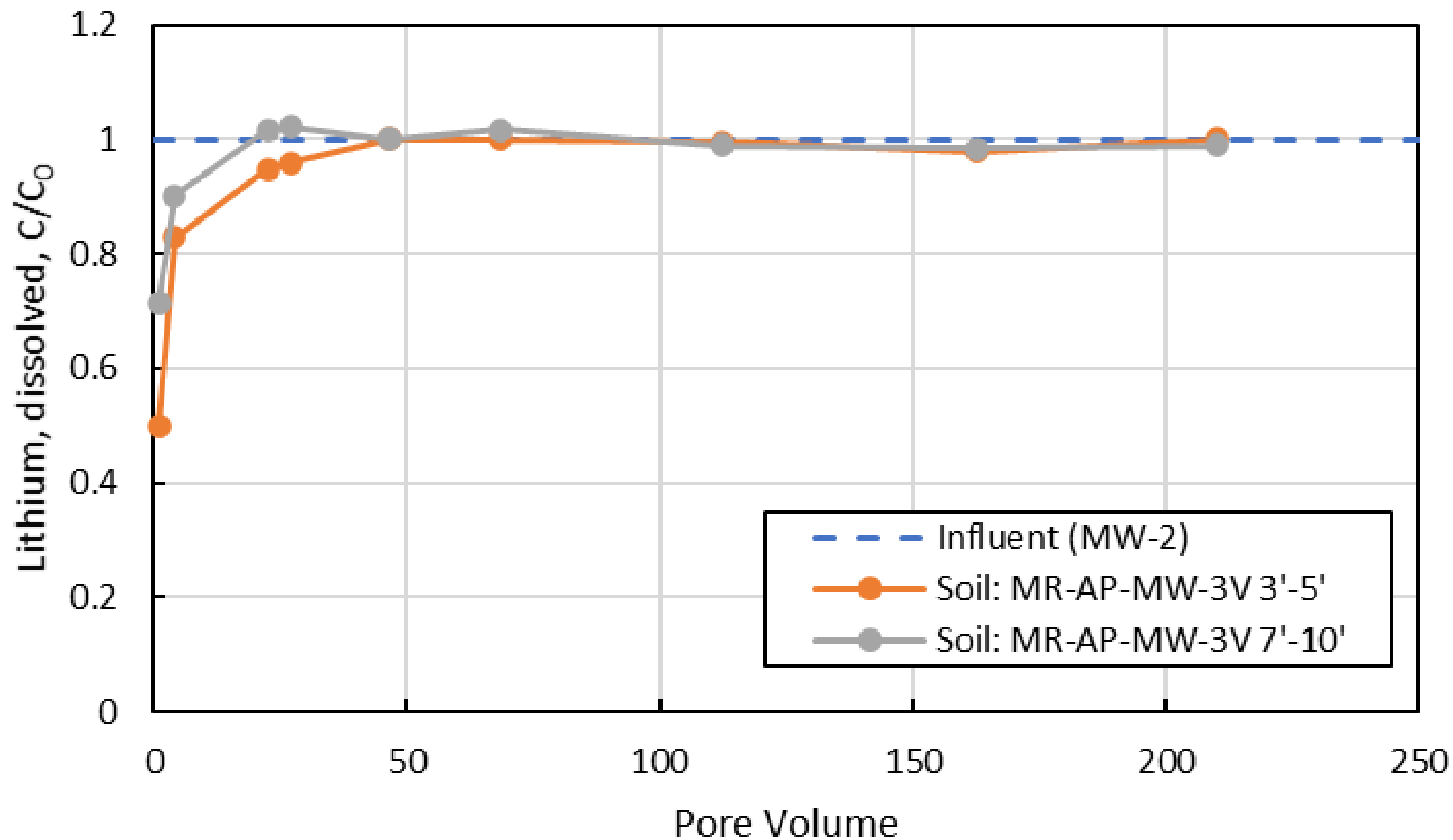
ANCHOR QEA

Figure 18
Dissolved Cobalt Breakthrough Curves: Columns 5 and 6
Monitored Natural Attenuation Demonstration
Plant Miller



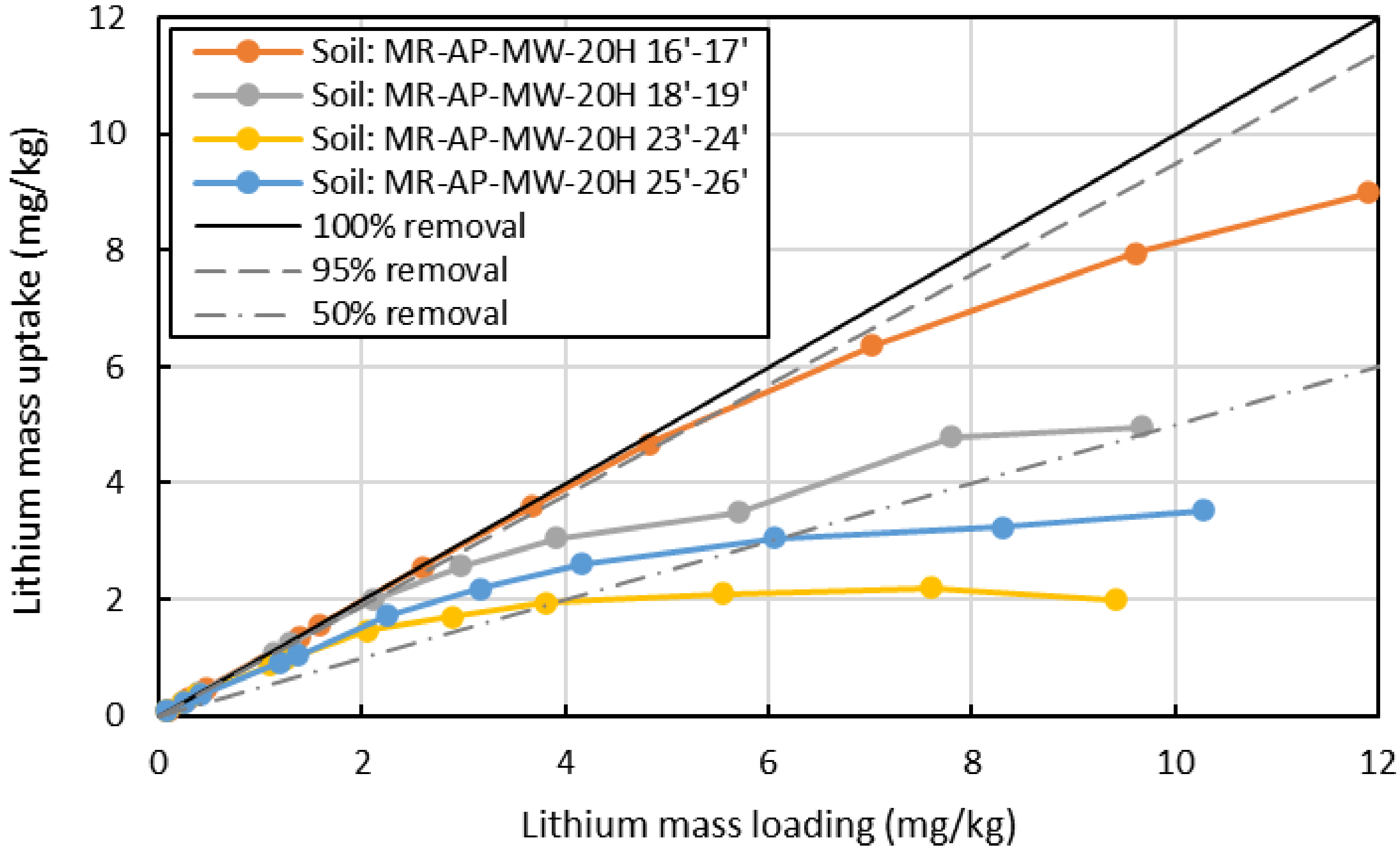
Notes:
Blue dashed line indicates that effluent concentrations equal influent concentrations (i.e., capacity for attenuation has been consumed).
C/C_0: ratio of concentration in column effluent to that in column influent solution

Figure 19a
Dissolved Lithium Breakthrough Curves: Columns 1 Through 4
Monitored Natural Attenuation Demonstration
Plant Miller



Notes:
Blue dashed line indicates that effluent concentrations equal influent concentrations (i.e., capacity for attenuation has been consumed).
C/C_0: ratio of concentration in column effluent to that in column influent solution

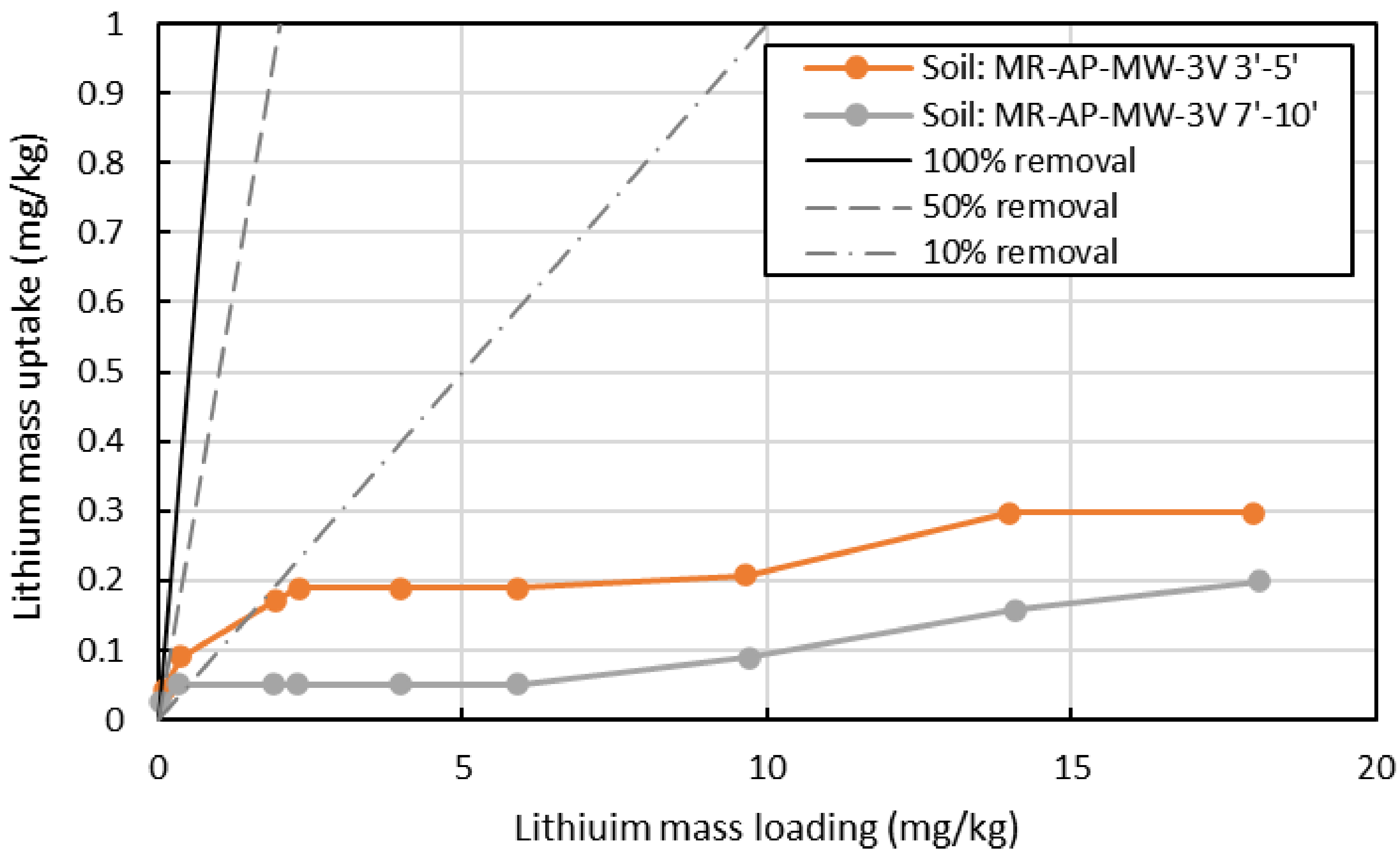
Figure 19b
Dissolved Lithium Breakthrough Curves: Columns 5 and 6
Monitored Natural Attenuation Demonstration
Plant Miller



Note:
mg/kg: milligrams per kilogram

ANCHOR QEA

Figure 20a
Cumulative Lithium Removal by Soil Columns as a Function of Loading with MR-AP-MW-6V Groundwater
Monitored Natural Attenuation Demonstration
Plant Miller

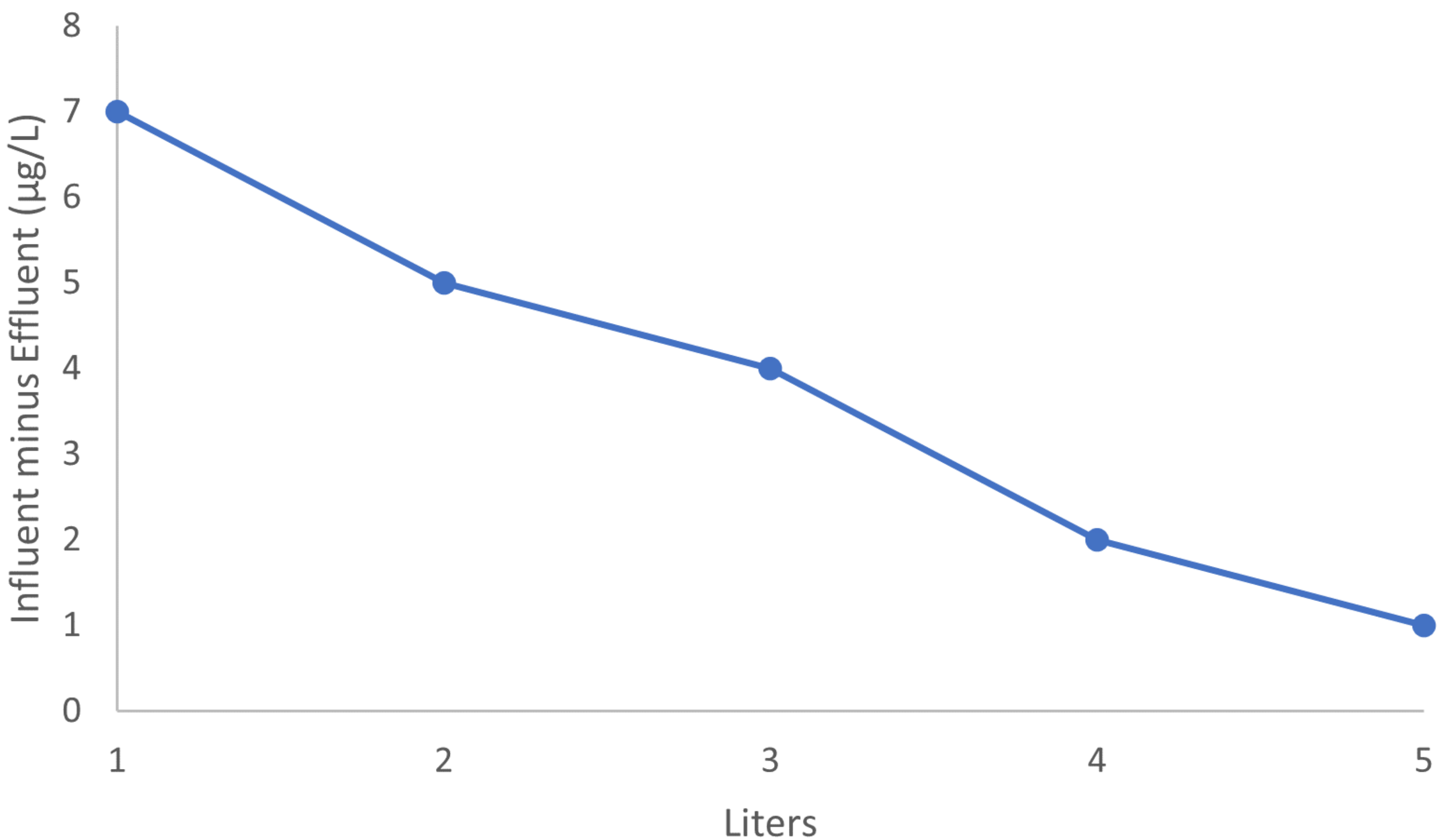


Note:
mg/kg: milligrams per kilogram

Filepath: \\Athena\Mobile\Projects\Southern Company\Alabama Power ACMs - PRIVILEGED & CONFIDENTIAL\MNA Demonstration Reports\Miller\Figures\Figure 20b - Li Mass Uptake vs Li Mass Loading 2.docx

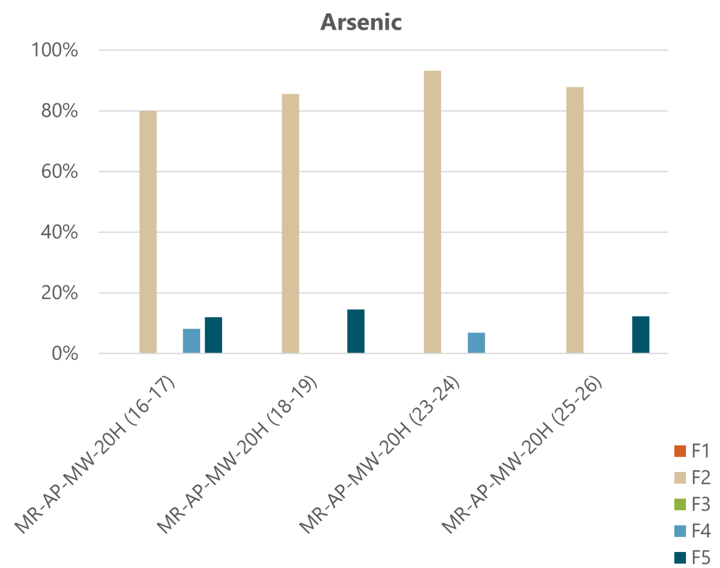
ANCHOR QEA

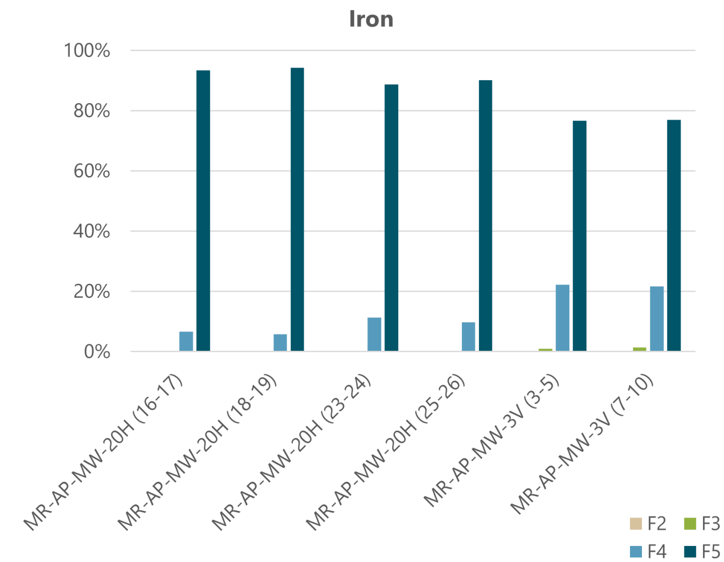
Figure 20b
Cumulative Lithium Removal by Soil Columns as a Function of Loading with MR-AP-MW-2 Groundwater
Monitored Natural Attenuation Demonstration
Plant Miller

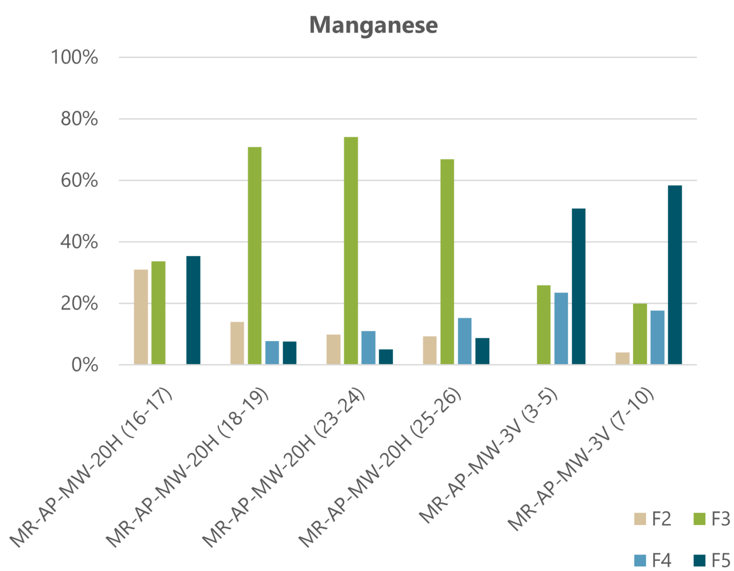


Note:
µg/L: micrograms per liter

Figure 21
Example Graph to Calculate Mass Attenuated by Columns
Monitored Natural Attenuation Demonstration
Plant Miller







Notes:
F1: water soluble
F2: exchangeable (e.g., clay minerals)
F3: reducible (e.g., poorly crystalline metal oxides such as iron oxides)
F4: oxidizable (e.g., crystalline oxide and crystalline sulfide minerals)
F5: residual (e.g., silicate phases)
SSE: selective sequential extraction

Figure 22
SSE Results for Aquifer Solids
Monitored Natural Attenuation Demonstration
Plant Miller

Appendix A
Concentration Versus Time Graphs

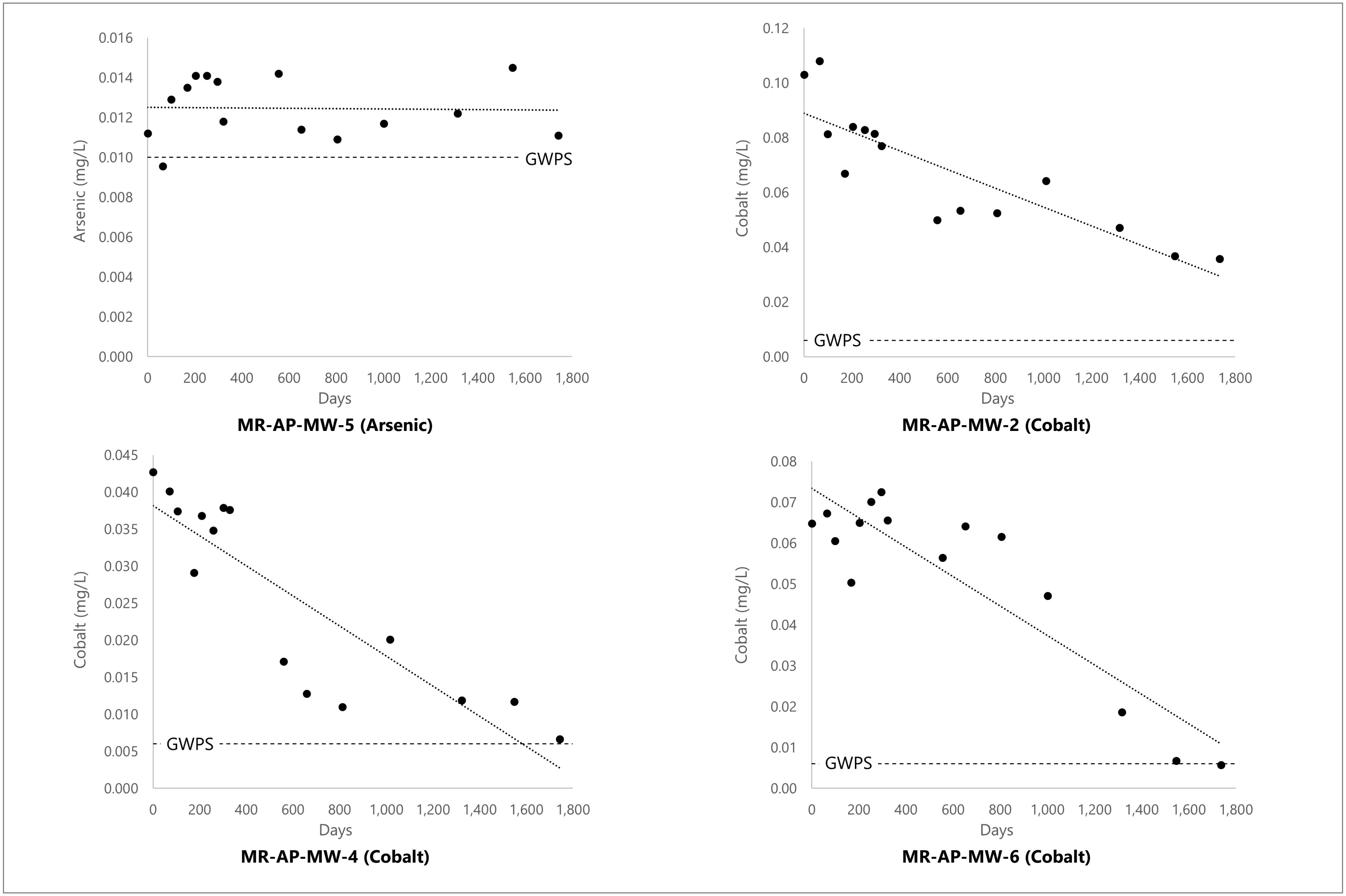


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Figure A-1a
Concentration Versus Time Graphs
Monitored Natural Attenuation Demonstration: Appendix A
Plant Miller

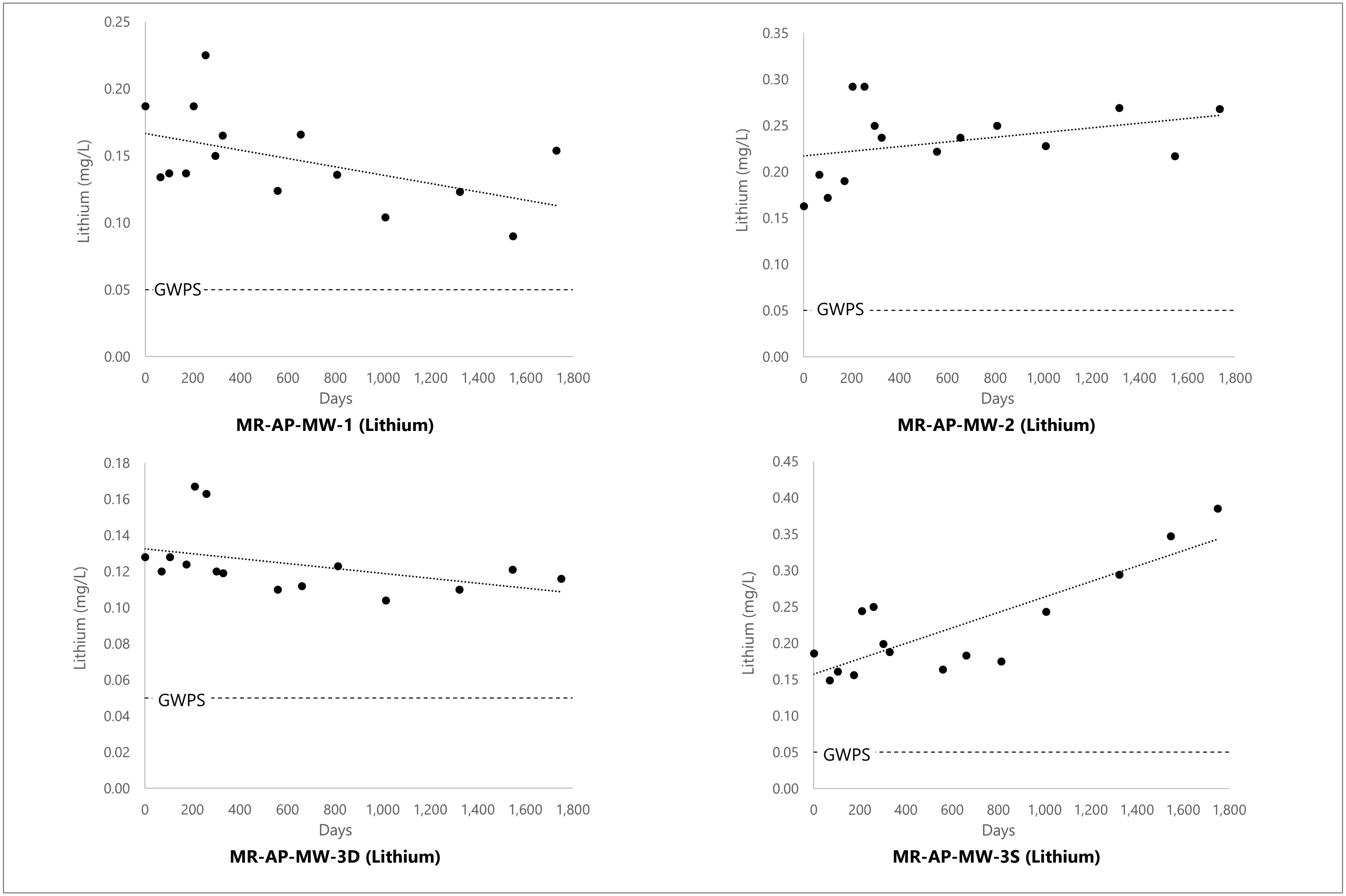

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Figure A-1b
Concentration Versus Time Graphs

Monitored Natural Attenuation Demonstration: Appendix A
Plant Miller

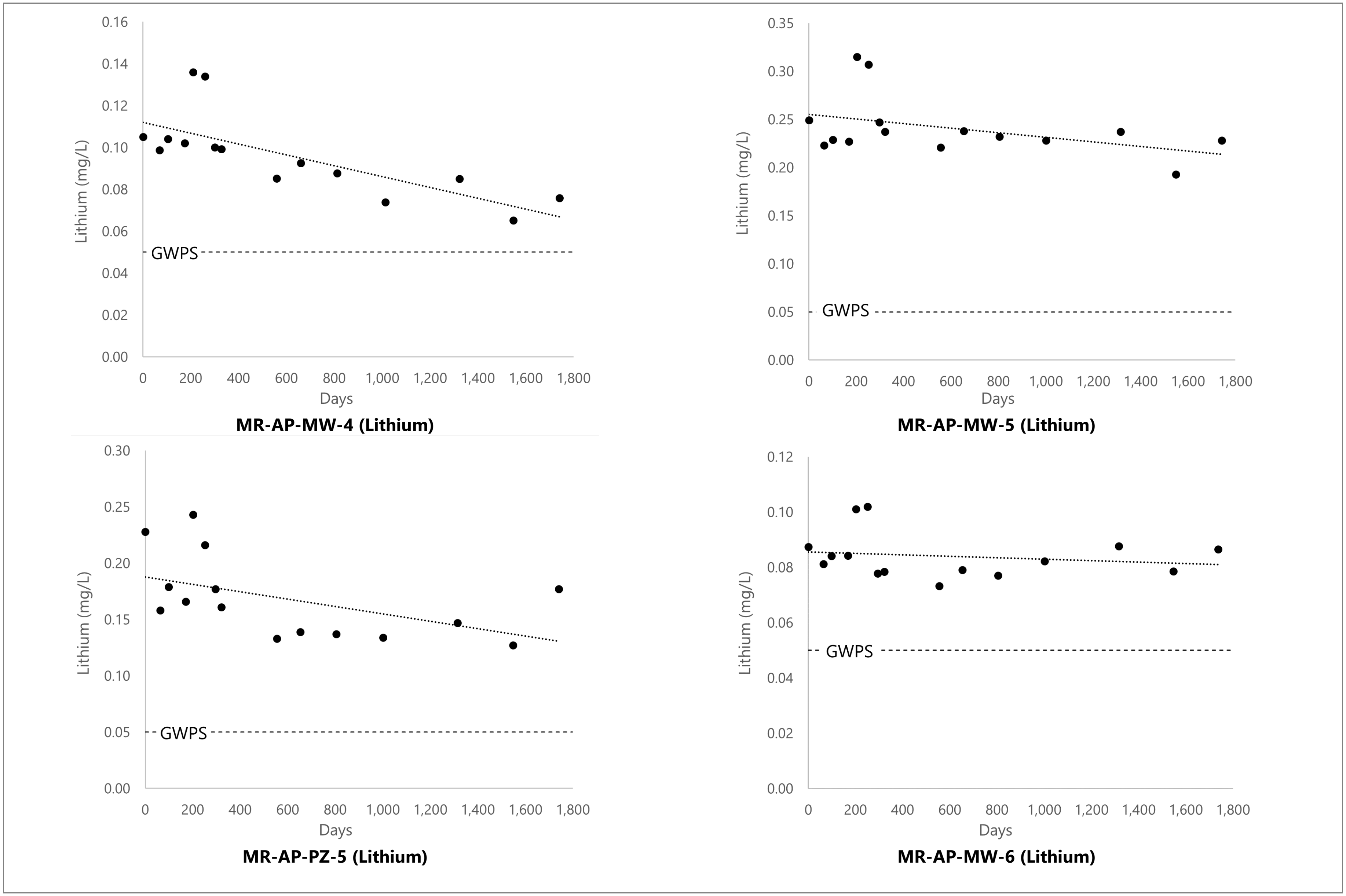

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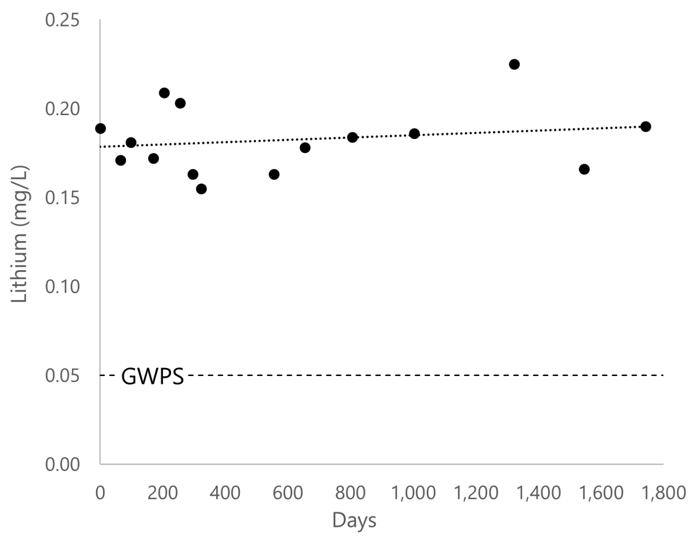
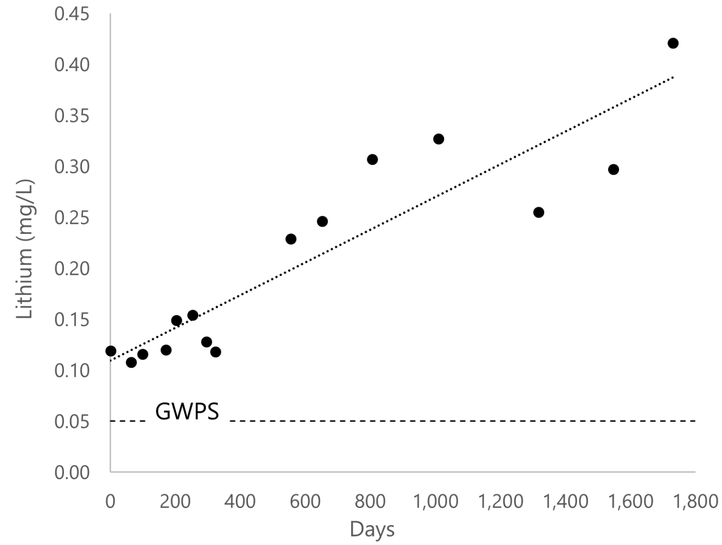
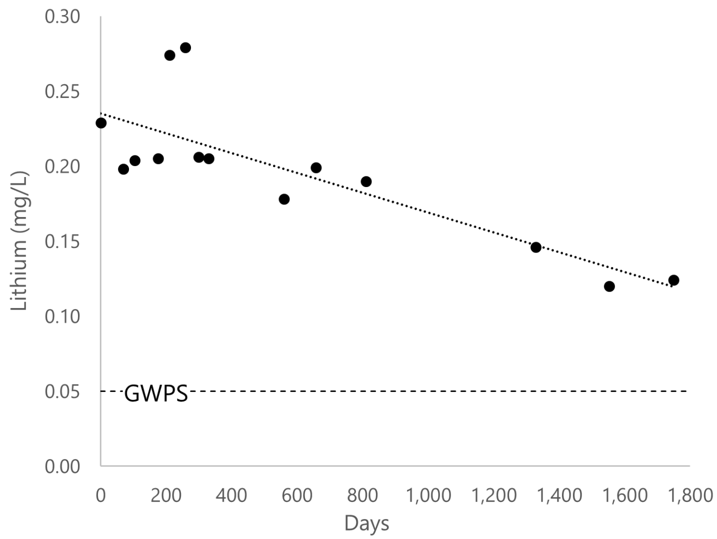
Figure A-1c
Concentration Versus Time Graphs
Monitored Natural Attenuation Demonstration: Appendix A
Plant Miller



MR-AP-MW-10 (Lithium)



MR-AP-MW-11 (Lithium)

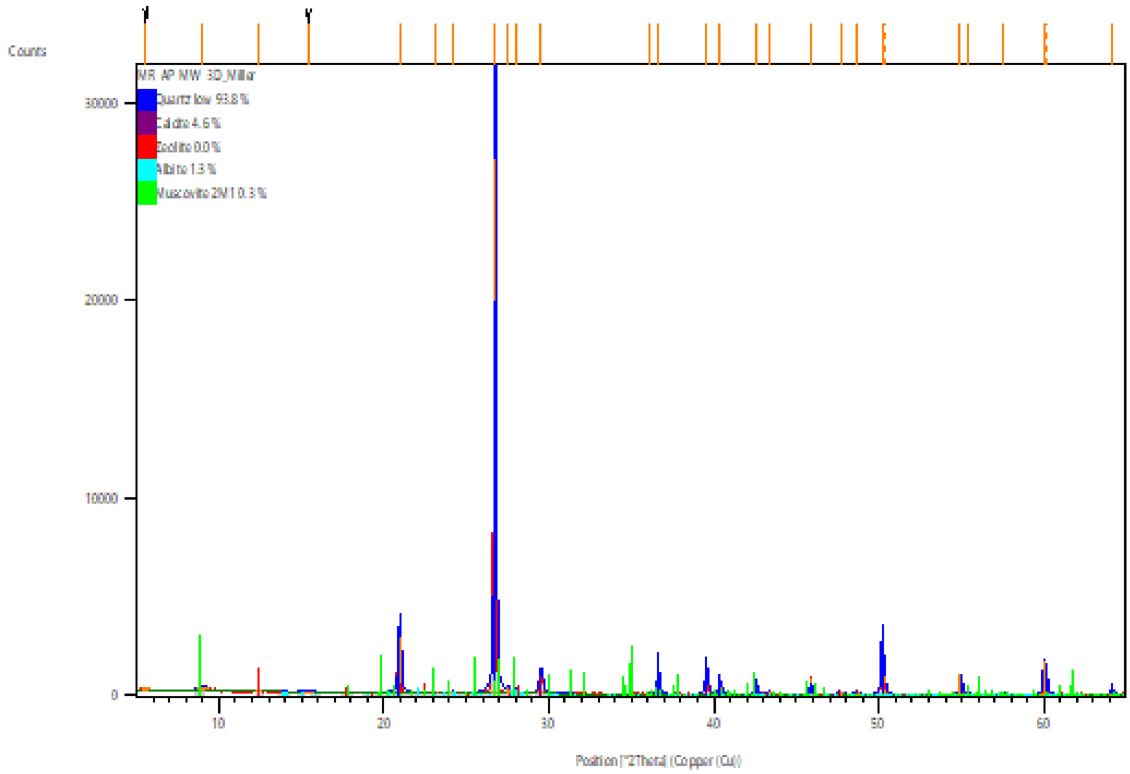


MR-AP-MW-12 (Lithium)

Notes:
GWPS: groundwater protection standard
mg/L: milligram per liter

Appendix B
Analytical Data

Graphics

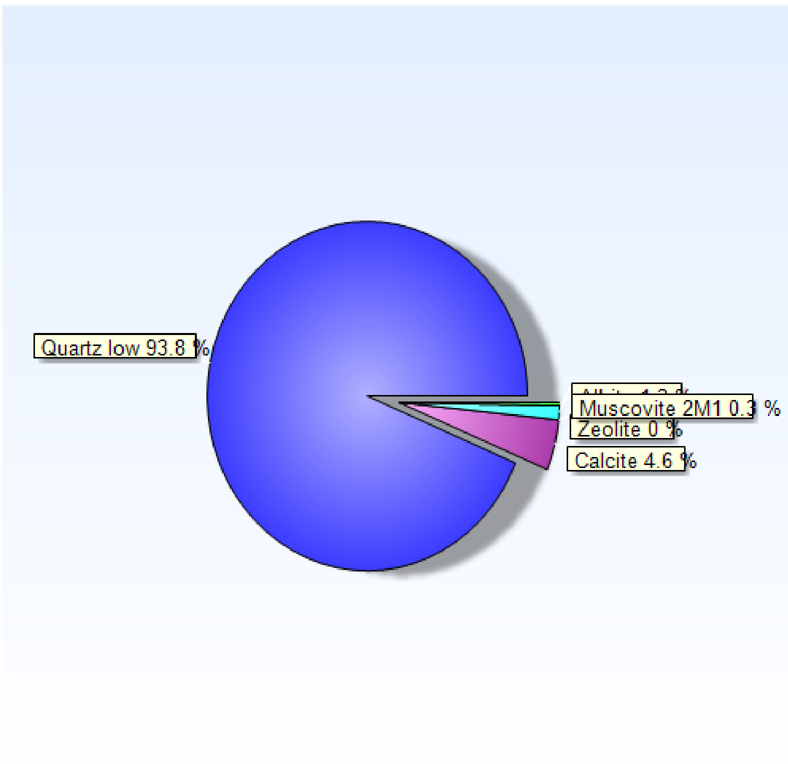


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
5.5661	15.87787	0.41	
9.0259	9.79780	0.64	98-009-0144;98..
12.3929	7.14240	0.12	98-017-0517
15.4233	5.74520	0.10	
20.9669	4.23705	10.57	98-009-3974;98..
23.1768	3.83781	0.09	98-003-7241;96..
24.1304	3.68826	0.30	96-900-1633
26.7366	3.33437	100.00	98-009-3974;96..
27.5651	3.23599	1.13	98-017-0517;96..
28.0467	3.18152	0.75	98-017-0517;96..
29.5229	3.02572	3.30	98-003-7241
36.1417	2.48535	0.37	98-003-7241;96..
36.6156	2.45426	3.60	98-009-3974;96..
39.5330	2.27961	4.34	98-009-3974;98..
40.3620	2.23469	2.13	98-009-3974;98..
42.5220	2.12604	2.50	98-009-3974;98..
43.3214	2.08864	0.38	98-003-7241;96..
45.8610	1.97872	3.18	98-009-3974;98..
47.6829	1.90728	0.28	98-003-7241;96..
48.6219	1.87262	0.41	98-003-7241;98..
50.1957	1.81603	10.23	98-009-3974;98..

54.9330	1.67010	3.65	98-009-3974;98..
55.3853	1.65752	0.75	98-009-3974;96..
57.4899	1.60175	0.15	98-009-3974;98..
60.0093	1.54038	6.33	98-009-3974;98..
64.0879	1.45183	0.82	98-009-3974;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	94
Phase Calcite:	Weight fraction/ %:	4.6
Phase Zeolite:	Weight fraction/ %:	0.0
Phase Albite:	Weight fraction/ %:	1.3
Phase Muscovite 2M1:	Weight fraction/ %:	0.3

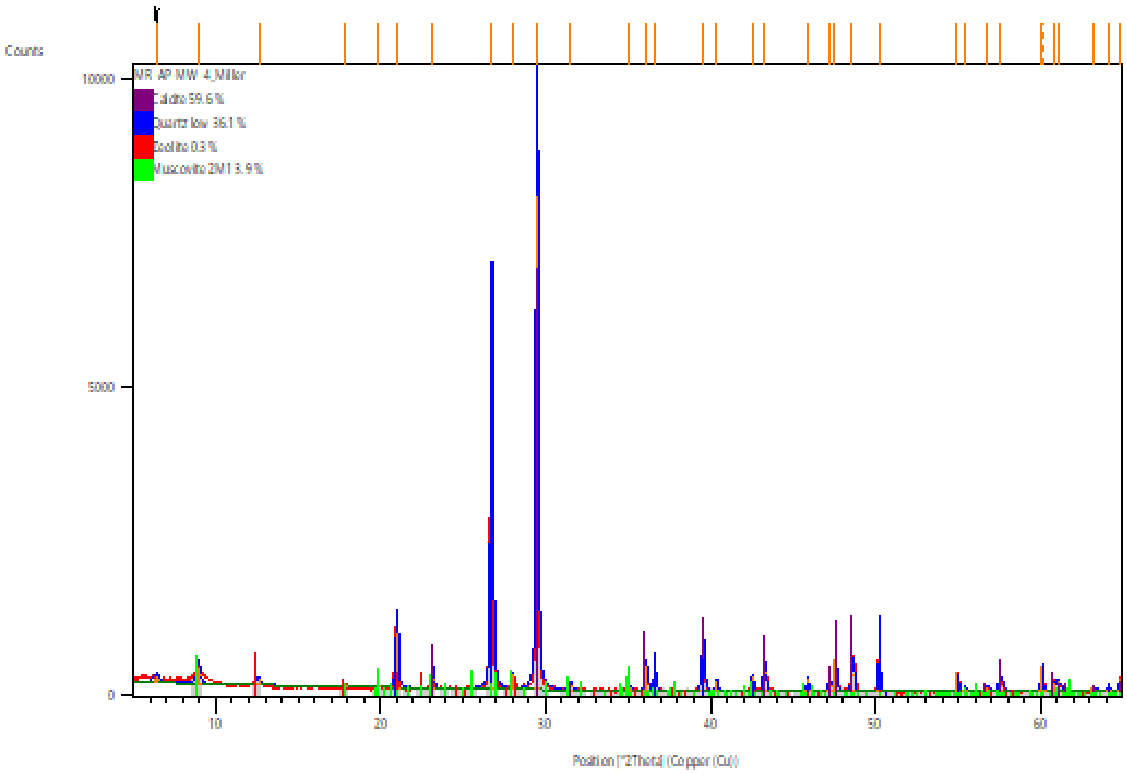
Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-009-3974	72	Quartz low	O2 Si1
98-003-7241	49	Calcite	C1 Ca1 O3
98-017-0517	9	Zeolite	O2 Si1
96-900-1633	6	Albite	Na2.00 Al2.00 Si6...
98-018-0082	0	Muscovite/Illite	H1.834 Al2.724 F0...

Anchor Scan Parameters

Dataset Name:	MR-AP-MW-3D_Miller
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2020_March\MR-AP-MW-3D_Miller.rd
Sample Identification:	MA-AP-MW-3D Miller
Comment:	Exported by X'Pert SW Generated by hugo in project AnchorQEA_2
Measurement Date / Time:	3/20/2020 1:02:00 PM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0150
End Position [°2Th.]:	64.9850
Step Size [°2Th.]:	0.0300
Scan Step Time [s]:	2.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Graphics



Peak List

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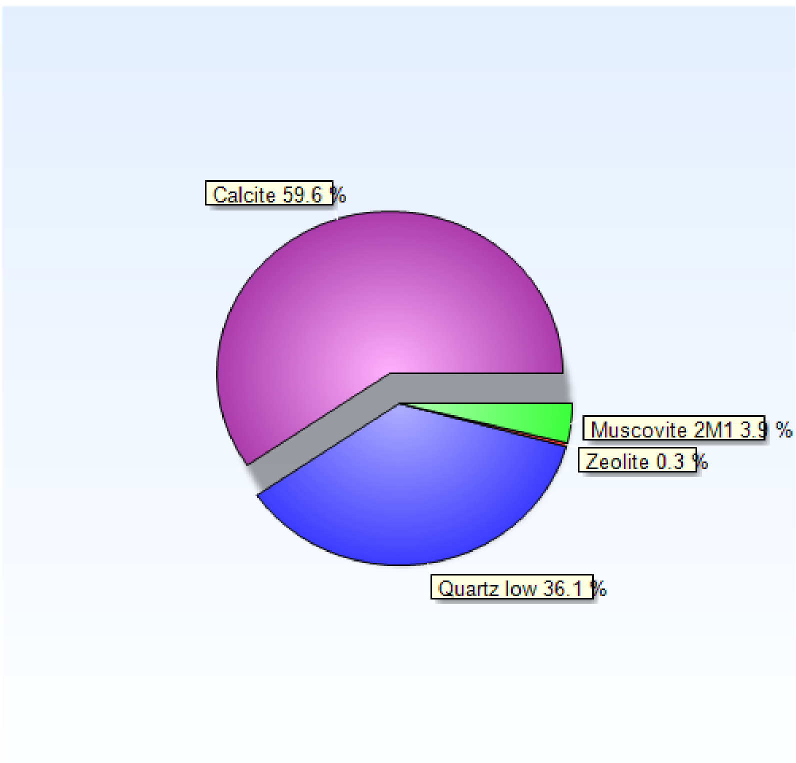
12.6134	7.01805	1.08	98-017-0517
17.8749	4.96239	0.22	98-018-0082
19.8878	4.46444	0.14	98-009-0144;98..
20.9897	4.23251	11.36	98-002-9210;98..
23.1892	3.83578	3.60	96-901-6707
26.7355	3.33450	67.70	98-002-9210;98..
27.9832	3.18859	2.92	98-018-0082
29.4722	3.03080	100.00	96-901-6707
31.4864	2.84136	1.32	96-901-6707;98..
35.0742	2.55850	0.90	98-009-0144;98..
36.0740	2.48986	5.12	96-901-6707;98..
36.6174	2.45414	3.99	98-002-9210;98..
39.5221	2.28022	10.38	96-901-6707;98..
40.3470	2.23548	2.36	98-002-9210;98..
42.5323	2.12555	3.27	98-002-9210;98..
43.2470	2.09206	7.55	96-901-6707;98..
45.8646	1.97857	3.02	98-002-9210;98..
47.1864	1.92619	2.46	96-901-6707
47.5363	1.91282	6.54	96-901-6707;98..

48.5732	1.87439	6.97	96-901-6707;98..
50.1977	1.81747	7.99	98-002-9210;98..
54.9240	1.67173	4.18	98-002-9210;98..
55.3851	1.65890	1.35	98-002-9210;98..
56.7206	1.62297	0.97	96-901-6707;98..
57.5485	1.60158	2.57	96-901-6707;98..
60.0210	1.54011	5.41	98-002-9210;98..
60.7885	1.52249	2.03	96-901-6707;98..
61.0610	1.51635	2.25	96-901-6707;98..
63.1495	1.47113	0.81	96-901-6707;98..
64.0908	1.45177	1.04	98-002-9210;98..
64.7919	1.43775	2.50	96-901-6707;98..

Quantitative Results



Phase Calcite:	Weight fraction/ %:	60
Phase Quartz low:	Weight fraction/ %:	36
Phase Zeolite:	Weight fraction/ %:	0.3
Phase Muscovite 2M1:	Weight fraction/ %:	3.9

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
96-901-6707	60	Calcite	Ca6.00 C6.00 O18.00
98-002-9210	58	Quartz low	O2 Si1
98-017-0517	8	Zeolite	O2 Si1
98-018-0082	17	Muscovite/Illite	H1.834 Al2.724 F0...

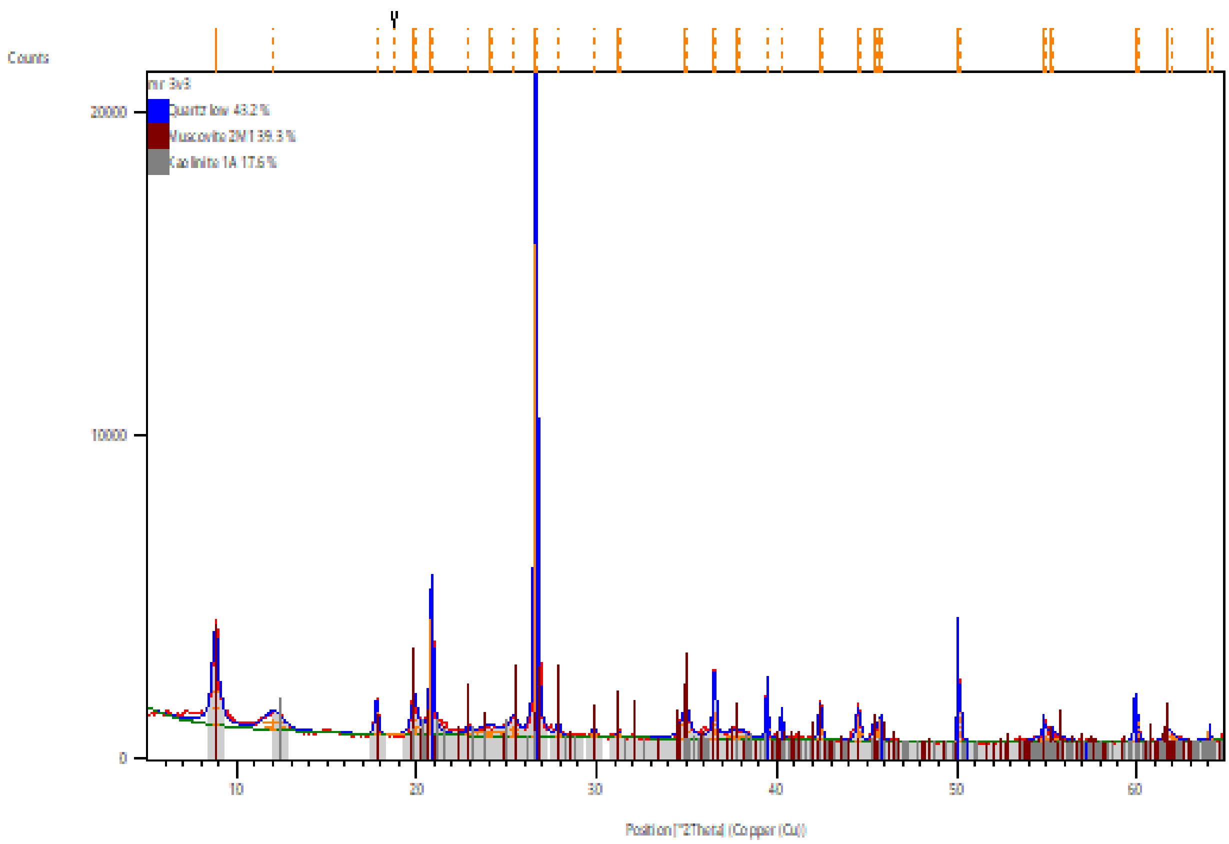
Anchor Scan Parameters

Dataset Name:	MR-AP-MW-4_Miller
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2020_March\MR-AP-MW-4_Miller.rd
Sample Identification:	MR-AP-MW-4 Miller
Comment:	Exported by X'Pert SW Generated by hugo in project AnchorQEA_2
Measurement Date / Time:	3/19/2020 11:15:00 AM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0125
End Position [°2Th.]:	64.9875
Step Size [°2Th.]:	0.0250
Scan Step Time [s]:	2.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-010-0341	71	Quartz low	O2 Si1
98-016-1221	48	Muscovite 2M1	H1.77 Al2.9 Ba0.01..
98-008-0082	29	Kaolinite 1A	H4 Al2 O9 Si2

Graphics

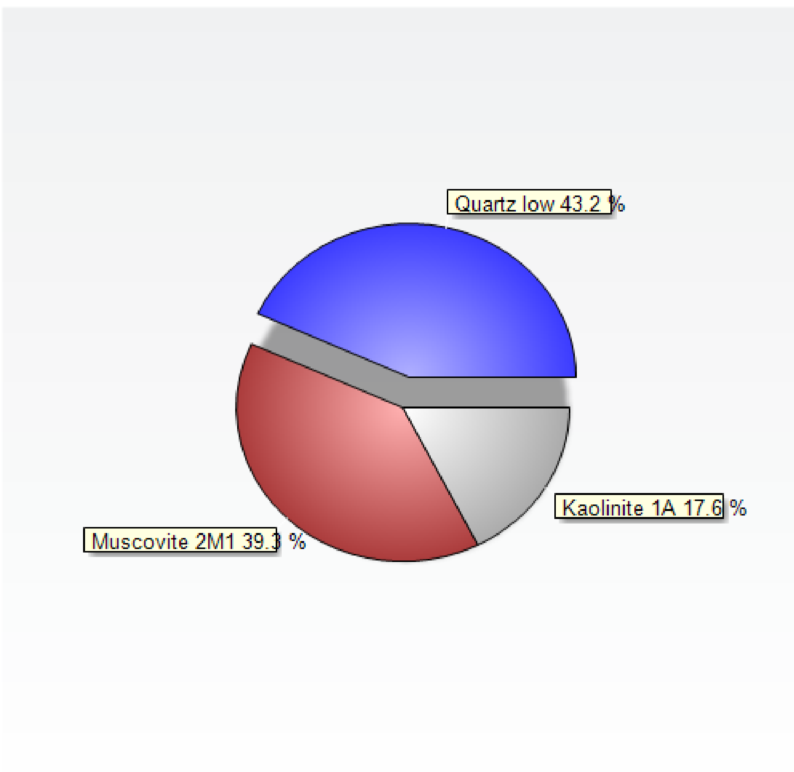


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
8.818(2)	10.01970	13.71	98-016-1221
12.05(1)	7.34058	2.54	98-008-0082
17.761(2)	4.98979	4.76	98-016-1221
19(1)	4.73285	0.02	
19.848(3)	4.46951	5.50	98-016-1221;98..
20.8168(9)	4.26373	23.50	98-010-0341;98..
22.830(6)	3.89212	1.64	98-016-1221;98..
24.06(4)	3.69514	1.39	98-016-1221;98..
25.37(1)	3.50775	2.31	98-016-1221;98..
26.6133(3)	3.34675	100.00	98-010-0341;98..
27.837(5)	3.20238	2.06	98-016-1221;98..

29.824(7)	2.99340	1.44	98-016-1221
31.190(9)	2.86530	1.12	98-016-1221;98..
34.916(4)	2.56762	5.17	98-016-1221;98..
36.517(2)	2.45863	10.68	98-010-0341;98..
37.78(2)	2.37932	1.42	98-016-1221;98..
39.430(2)	2.28344	7.57	98-010-0341;98..
40.245(3)	2.23905	3.82	98-010-0341;98..
42.401(2)	2.13007	6.33	98-010-0341;98..
44.504(3)	2.03415	5.34	98-016-1221
45.418(5)	1.99533	3.53	98-010-0341;98..
45.765(4)	1.98099	4.35	98-010-0341;98..
50.100(1)	1.81927	11.83	98-010-0341;98..
54.834(4)	1.67288	2.61	98-010-0341;98..
55.16(2)	1.66383	1.38	98-010-0341;98..
59.919(2)	1.54248	8.70	98-010-0341;98..
61.777(9)	1.50048	1.66	98-016-1221;98..
63.995(5)	1.45371	1.78	98-010-0341;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	43
Phase Muscovite 2M1:	Weight fraction/ %:	39
Phase Kaolinite 1A:	Weight fraction/ %:	18

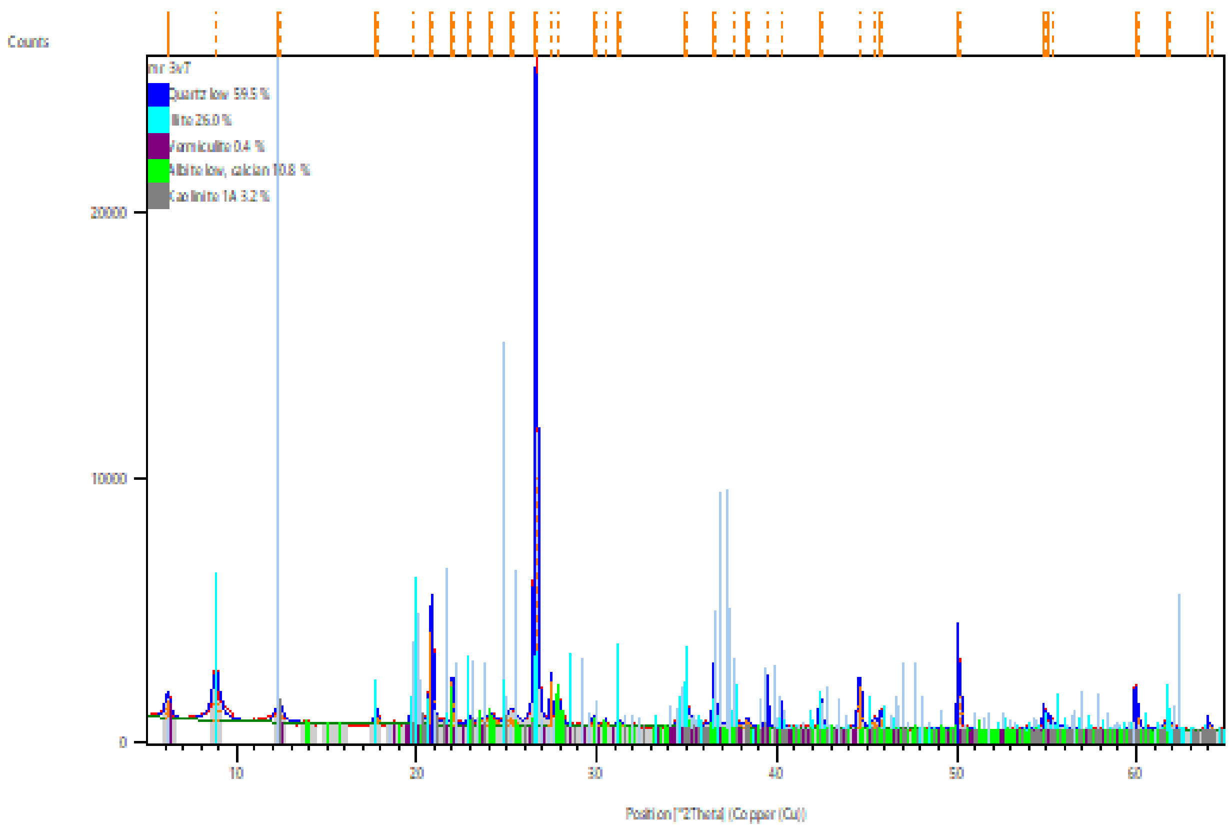
Anchor Scan Parameters

Dataset Name:	mr-3v3
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mr-3v3.rd
Sample Identification:	MR-AP-MW3V_3-5
Comment:	Exported by X'Pert SW Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/26/2021 9:59:00 AM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-009-0145	55	Quartz low	O2 Si1
98-016-6963	33	Illite	H2 Al2.59 Ca0.01 F..
96-900-0061	14	Vermiculite	Mg5.35 Fe0.96 Al2...
98-003-4917	37	Albite low, calcian	Al1.16 Ca0.16 Na0...
98-008-0082	29	Kaolinite 1A	H4 Al2 O9 Si2

Graphics

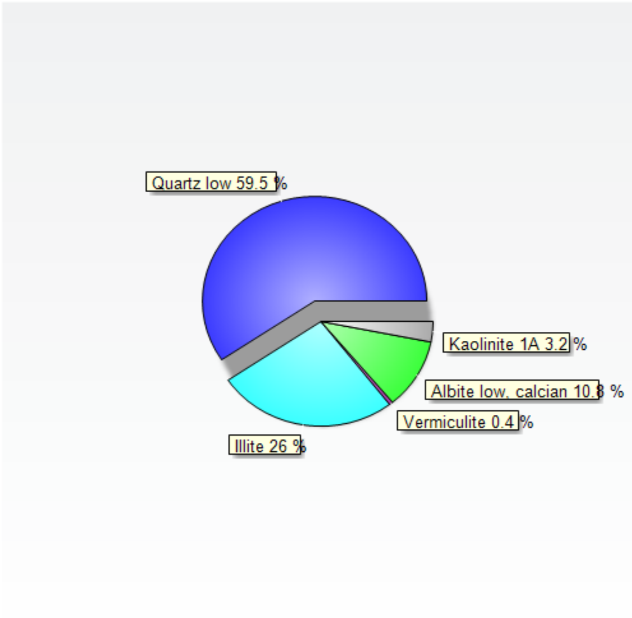


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
6.155(5)	14.34874	3.28	96-900-0061
8.842(3)	9.99320	6.99	98-016-6963
12.343(8)	7.16496	2.50	96-900-0061;98..
17.753(4)	4.99213	2.12	98-016-6963
19.811(3)	4.47789	3.29	98-016-6963;96..
20.8190(8)	4.26328	18.97	98-009-0145;98..
21.983(1)	4.04007	8.68	96-900-0061;98..
22.901(7)	3.88026	1.17	98-016-6963;96..
24.05(2)	3.69701	1.37	96-900-0061;98..

25.281(9)	3.51999	2.06	96-900-0061;98..
26.6145(3)	3.34661	100.00	98-009-0145;98..
27.448(1)	3.24689	9.05	96-900-0061;98..
27.868(4)	3.19882	3.78	96-900-0061;98..
29.850(7)	2.99085	1.37	96-900-0061;98..
30.465(7)	2.93180	1.14	98-003-4917
31.208(9)	2.86371	0.99	98-016-6963;96..
34.915(4)	2.56771	3.78	98-016-6963;96..
36.504(2)	2.45945	7.73	98-009-0145;98..
37.61(1)	2.38978	1.08	98-016-6963;96..
38.374(6)	2.34382	1.57	96-900-0061;98..
39.431(2)	2.28337	6.58	98-009-0145;96..
40.256(3)	2.23847	3.66	98-009-0145;98..
42.404(2)	2.12990	5.46	98-009-0145;98..
44.586(1)	2.03060	8.59	96-900-0061;98..
45.399(8)	1.99613	1.57	98-016-6963;96..
45.764(4)	1.98104	2.96	98-009-0145;98..
50.105(1)	1.81910	12.95	98-009-0145;96..
54.850(3)	1.67244	3.27	98-009-0145;98..
55.15(3)	1.66413	1.29	98-009-0145;98..
59.925(2)	1.54236	8.17	98-009-0145;98..
61.700(9)	1.50216	1.32	98-016-6963;98..
63.994(5)	1.45373	1.56	98-009-0145;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	60
Phase Illite:	Weight fraction/ %:	26
Phase Vermiculite:	Weight fraction/ %:	0.4
Phase Albite low, calcian:	Weight fraction/ %:	11
Phase Kaolinite 1A:	Weight fraction/ %:	3

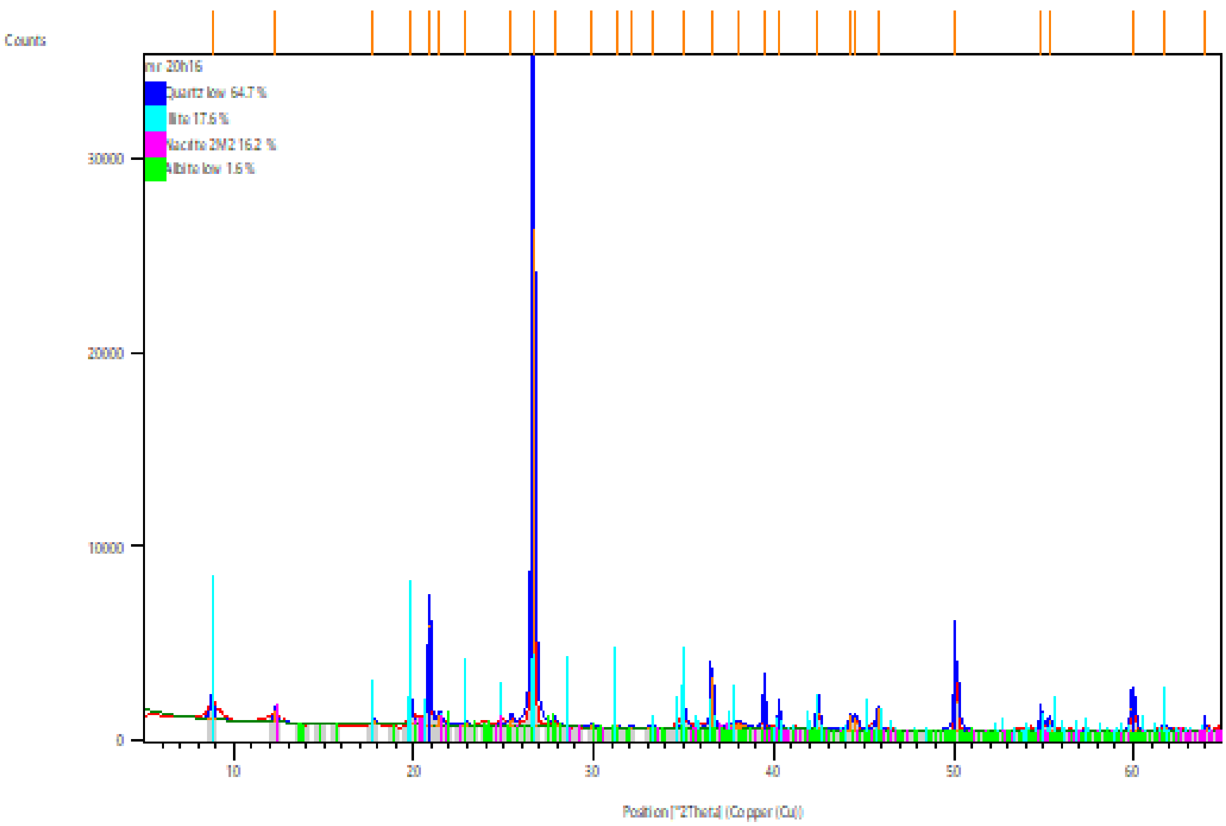
Anchor Scan Parameters

Dataset Name:	mr-3v7
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mr-3v7.rd
Sample Identification:	MR-AP-MW3V_7-10
Comment:	Exported by X'Pert SW Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/24/2021 2:18:00 PM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-009-0145	64	Quartz low	O2 Si1
98-016-6963	38	Illite	H2 Al2.59 Ca0.01 F..
98-000-9370	23	Nacrite 2M2	H4 Al2 O9 Si2
98-006-8913	13	Albite low	Al1 Na1 O8 Si3

Graphics

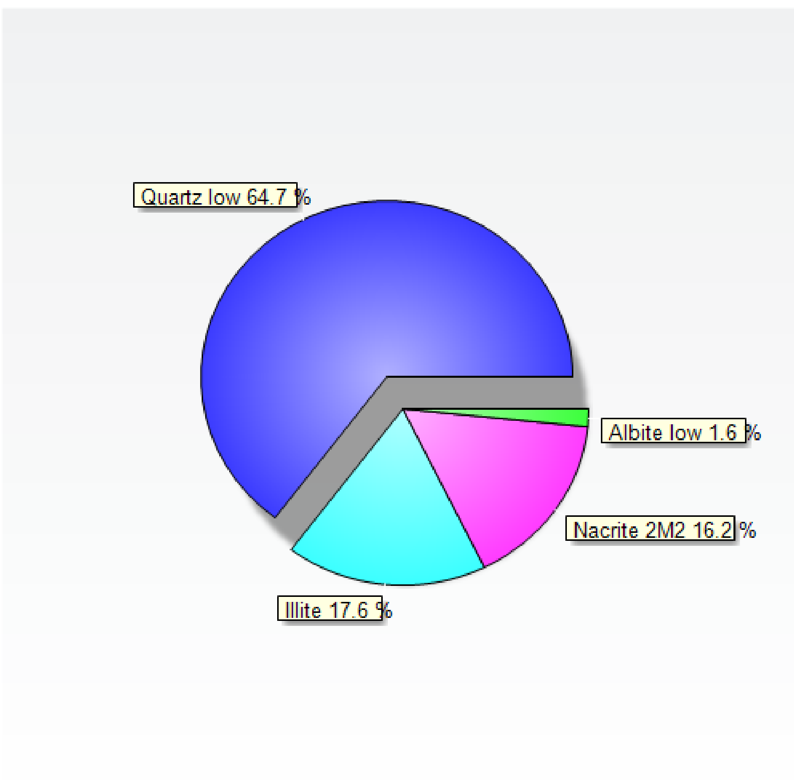


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
8.7870	10.06371	4.03	98-016-6963
12.3180	7.18569	2.42	98-000-9370
17.7491	4.99728	0.82	98-016-6963
19.8381	4.47551	4.00	98-016-6963;98..
20.8618	4.25815	20.09	98-009-0145;98..
21.4346	4.14563	1.94	98-016-6963;98..
22.8889	3.88542	0.84	98-016-6963;98..
25.4033	3.50626	1.48	98-006-8913
26.6363	3.34669	100.00	98-009-0145;98..
27.8403	3.20464	1.11	98-006-8913

29.8711	2.99124	0.64	98-006-8913
31.2467	2.86261	0.35	98-016-6963;98..
32.0406	2.79347	0.22	98-006-8913
33.2318	2.69601	0.19	98-016-6963;98..
35.0179	2.56249	2.98	98-016-6963;98..
36.5511	2.45844	10.27	98-009-0145;98..
37.9958	2.36823	1.01	98-016-6963;98..
39.4576	2.28380	6.25	98-009-0145;98..
40.2873	2.23866	3.69	98-009-0145;98..
42.4381	2.13005	6.25	98-009-0145;98..
44.2651	2.04628	3.02	98-016-6963;98..
44.5653	2.03319	2.75	98-000-9370;98..
45.7748	1.98225	4.17	98-009-0145;98..
50.1167	1.82022	11.53	98-009-0145;98..
54.8478	1.67388	3.91	98-009-0145;98..
55.3065	1.66107	2.18	98-009-0145;98..
59.9248	1.54363	8.16	98-009-0145;98..
61.6855	1.50373	0.93	98-016-6963;98..
63.9912	1.45500	1.21	98-009-0145;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	65
Phase Illite:	Weight fraction/ %:	18
Phase Nacrite 2M2:	Weight fraction/ %:	16
Phase Albite low:	Weight fraction/ %:	1.5

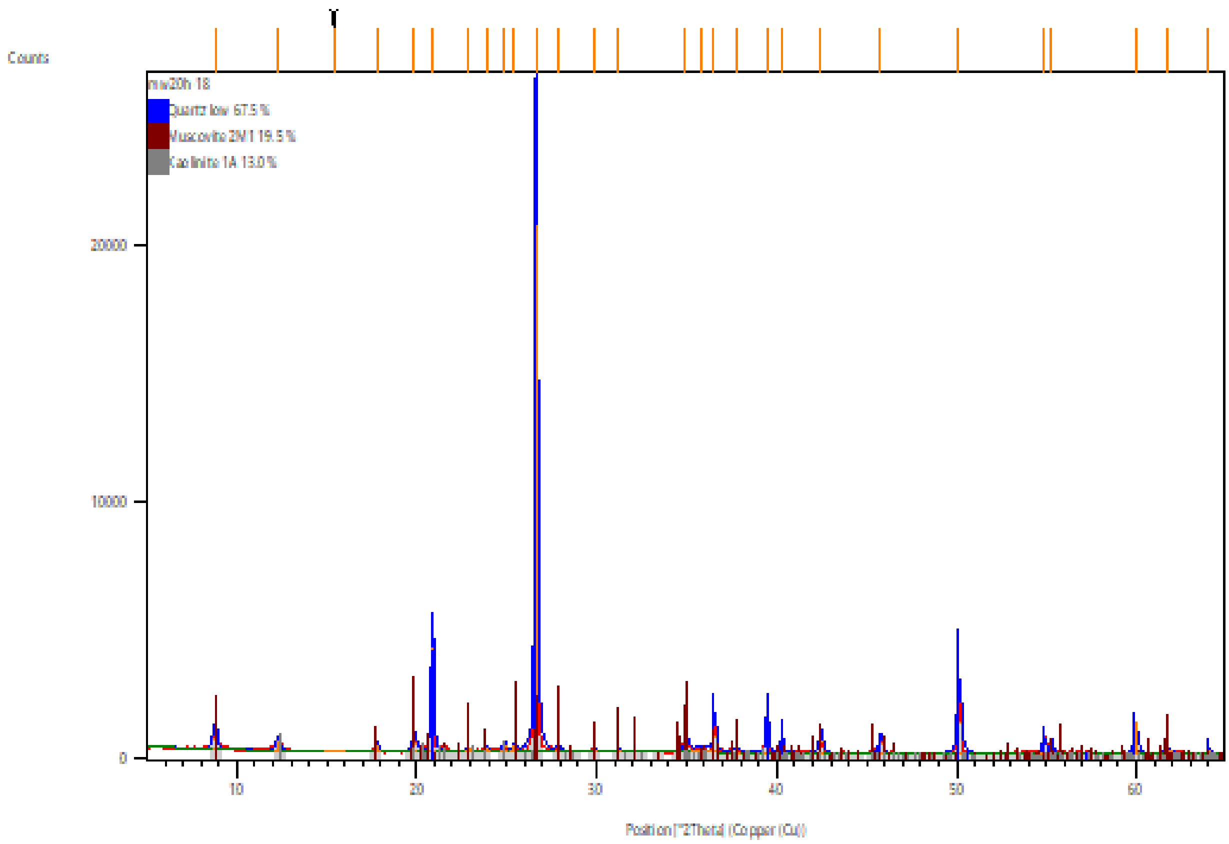
Anchor Scan Parameters

Dataset Name:	mr-20h16
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mr-20h16.rd
Sample Identification:	MR-AP-MW20H_16-20
Comment:	Exported by X'Pert SW
	Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/24/2021 12:24:00 PM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-006-2404	75	Quartz low	O2 Si1
98-020-2260	36	Muscovite 2M1	H2 Al2.9 K1 O12 Si..
98-006-8697	31	Kaolinite 1A	H4 Al2 O9 Si2

Graphics

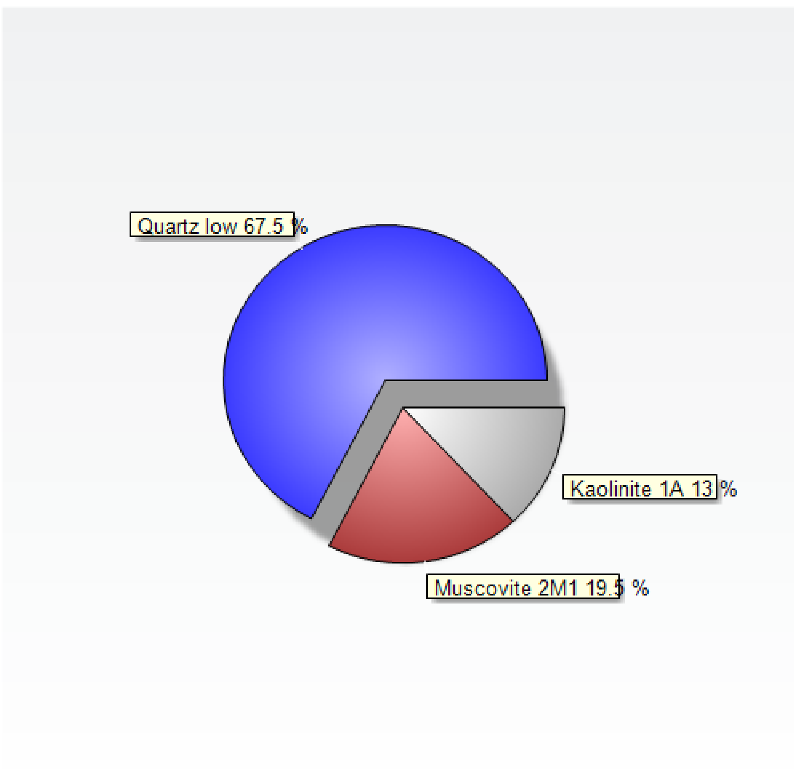


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
8.8085	10.03913	3.59	98-020-2260
12.3003	7.19596	1.92	98-006-8697
15.3857	5.75916	0.03	
17.7989	4.98340	1.26	98-020-2260
19.8616	4.47027	2.51	98-020-2260;98..
20.8634	4.25783	20.05	98-006-2404;98..
22.8657	3.88931	0.68	98-020-2260;98..
23.8658	3.72854	0.69	98-020-2260;98..
24.8742	3.57964	1.52	98-020-2260;98..
25.4118	3.50511	0.98	98-020-2260
26.6311	3.34733	100.00	98-006-2404;98..

27.8393	3.20475	0.91	98-020-2260
29.8805	2.99032	0.69	98-020-2260
31.2242	2.86463	0.41	98-020-2260
34.9538	2.56704	2.56	98-020-2260;98..
35.8161	2.50719	0.69	98-020-2260;98..
36.5356	2.45945	6.24	98-006-2404;98..
37.7440	2.38345	0.87	98-020-2260;98..
39.4623	2.28353	6.52	98-006-2404;98..
40.2782	2.23914	2.46	98-006-2404;98..
42.4342	2.13023	3.89	98-006-2404;98..
45.7673	1.98255	3.22	98-006-2404;98..
50.1132	1.82034	11.56	98-006-2404;98..
54.8333	1.67428	4.12	98-006-2404;98..
55.2866	1.66163	1.81	98-006-2404;98..
59.9154	1.54385	6.11	98-006-2404;98..
61.6581	1.50433	0.71	98-020-2260;98..
63.9888	1.45505	1.17	98-006-2404;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	67
Phase Muscovite 2M1:	Weight fraction/ %:	19
Phase Kaolinite 1A:	Weight fraction/ %:	13

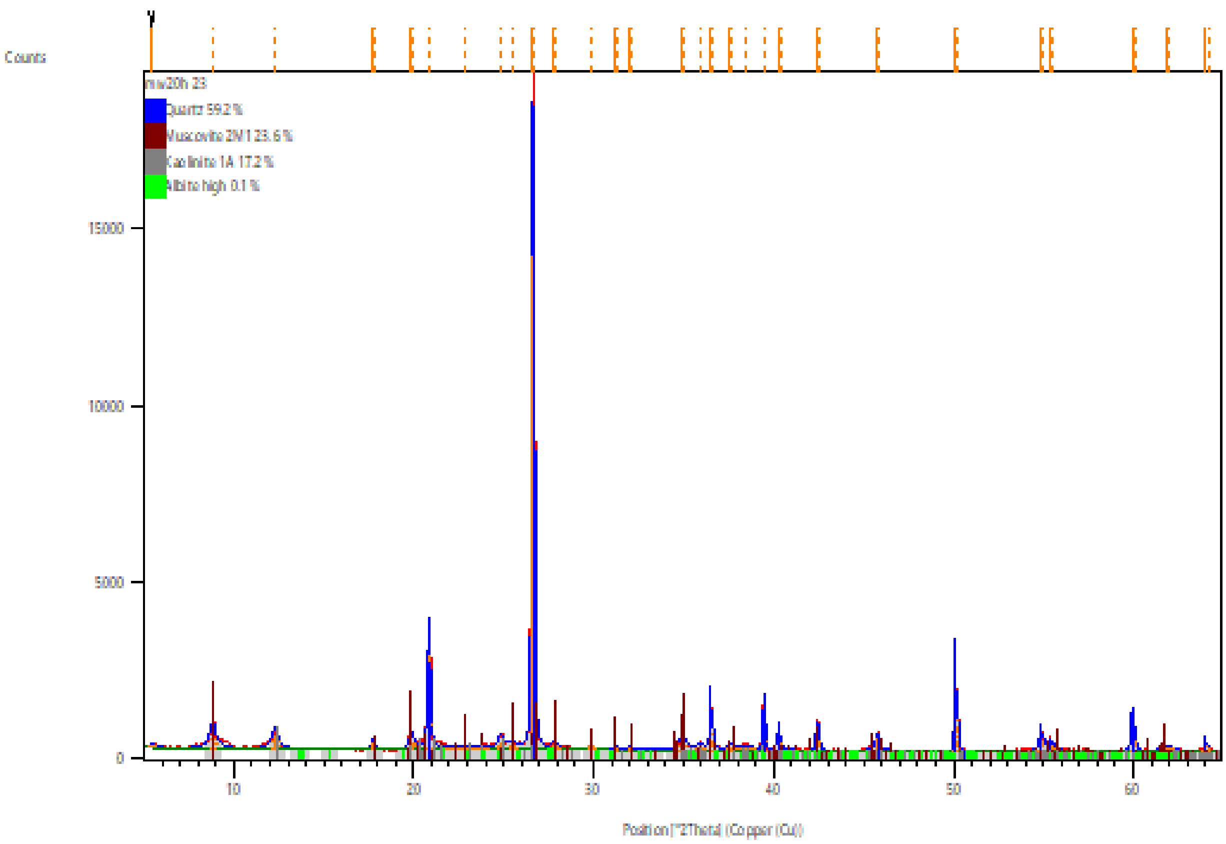
Anchor Scan Parameters

Dataset Name:	mw20h-18
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mw20h-18.rd
Sample Identification:	MR-AP-MW20H_18-19
Comment:	Exported by X'Pert SW Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/6/2021 9:32:00 AM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-015-4289	72	Quartz	O2 Si1
98-016-1221	41	Muscovite 2M1	H1.77 Al2.9 Ba0.01..
98-008-0082	32	Kaolinite 1A	H4 Al2 O9 Si2
98-000-9835	6	Albite high	Al1 Na1 O8 Si3

Graphics

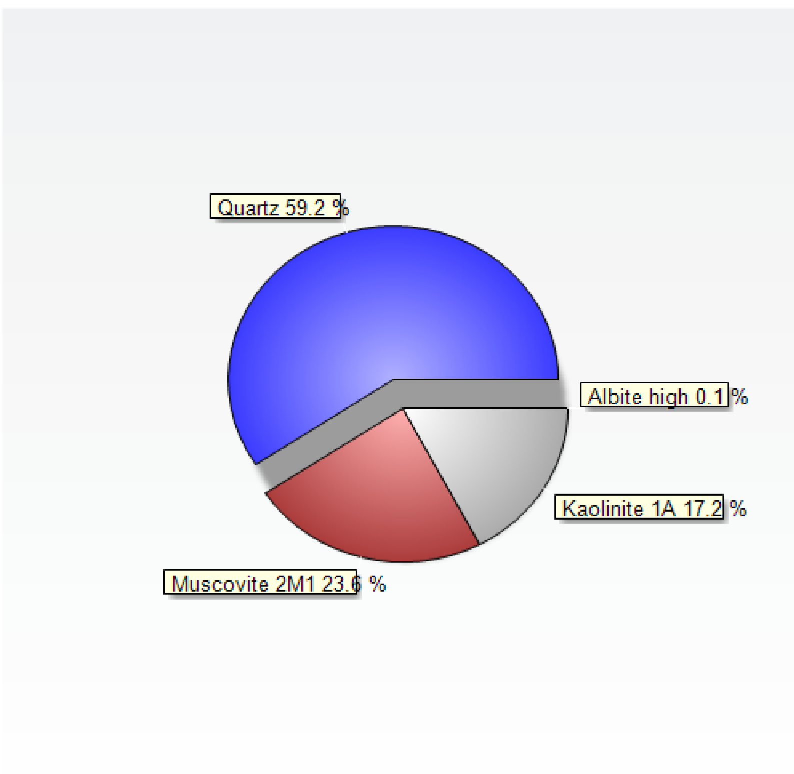


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
5.44(2)	16.22125	0.42	
8.844(3)	9.99088	3.75	98-016-1221
12.292(5)	7.19466	2.83	98-008-0082
17.750(5)	4.99281	1.45	98-016-1221
19.874(5)	4.46383	2.15	98-016-1221;98..
20.8404(9)	4.25895	19.29	98-015-4289;98..
22.84(5)	3.89039	0.61	98-016-1221;98..
24.829(7)	3.58302	1.80	98-016-1221;98..
25.45(1)	3.49738	0.91	98-016-1221;98..
26.6189(3)	3.34607	100.00	98-015-4289;98..

27.81(1)	3.20563	0.87	98-016-1221;98..
29.81(1)	2.99481	0.87	98-016-1221;98..
31.20(1)	2.86463	0.70	98-016-1221;98..
32.01(1)	2.79352	0.63	98-016-1221
34.914(6)	2.56775	2.24	98-016-1221;98..
35.89(2)	2.50024	0.76	98-016-1221;98..
36.517(2)	2.45864	6.55	98-015-4289;98..
37.57(5)	2.39180	0.55	98-016-1221;98..
38.41(3)	2.34145	0.72	98-016-1221;98..
39.444(2)	2.28267	6.79	98-015-4289;98..
40.266(3)	2.23795	3.29	98-015-4289;98..
42.415(2)	2.12939	4.76	98-015-4289;98..
45.742(4)	1.98195	2.61	98-015-4289;98..
50.108(1)	1.81902	12.15	98-015-4289;98..
54.838(3)	1.67276	3.55	98-015-4289;98..
55.31(1)	1.65957	1.52	98-015-4289;98..
59.927(2)	1.54230	7.89	98-015-4289;98..
61.85(2)	1.49895	0.66	98-016-1221;98..
64.012(5)	1.45338	1.73	98-015-4289;98..

Quantitative Results



Phase Quartz:	Weight fraction/ %:	60
Phase Muscovite 2M1:	Weight fraction/ %:	24
Phase Kaolinite 1A:	Weight fraction/ %:	17
Phase Albite high:	Weight fraction/ %:	0.1

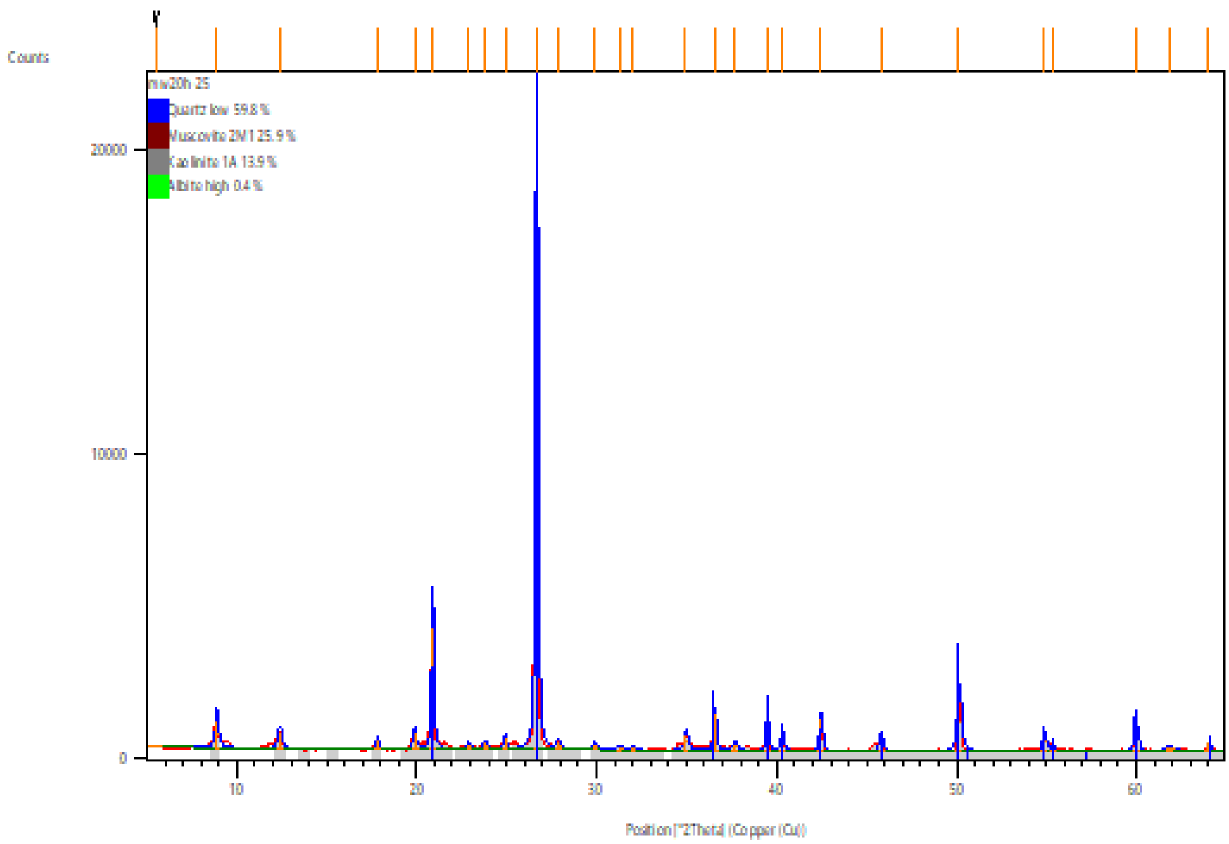
Anchor Scan Parameters

Dataset Name:	mw20h-23
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mw20h-23.rd
Sample Identification:	MR-AP-MW20H_23-24
Comment:	Exported by X'Pert SW
	Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/6/2021 11:26:00 AM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Pattern List

Ref.Code	Score	Compound Name	Chem. Formula
98-010-0341	77	Quartz low	O2 Si1
98-016-1221	36	Muscovite 2M1	H1.77 Al2.9 Ba0.01..
98-008-0082	30	Kaolinite 1A	H4 Al2 O9 Si2
98-000-9835	5	Albite high	Al1 Na1 O8 Si3

Graphics

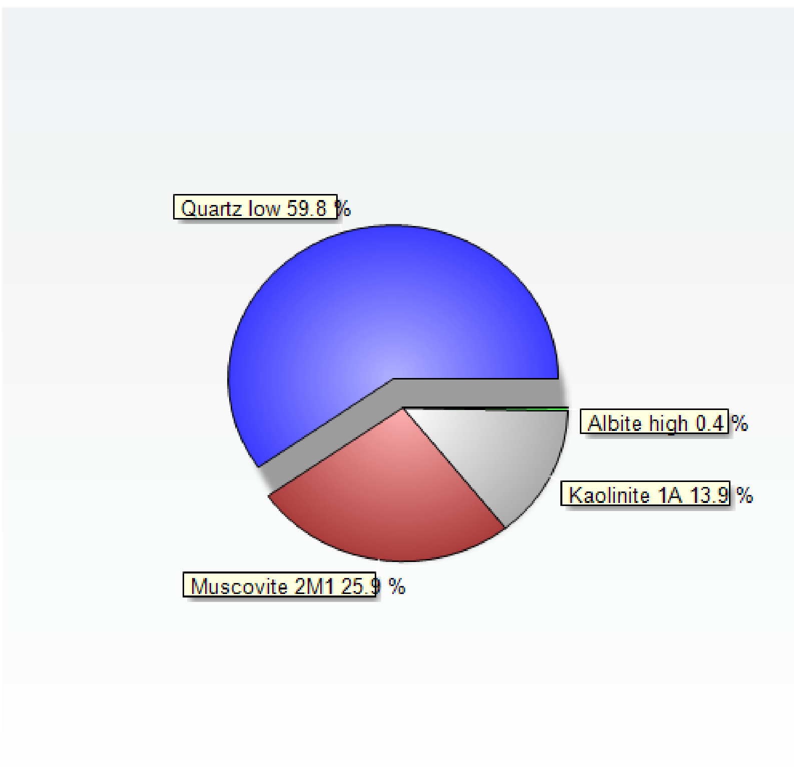


Peak List

Pos.[°2Th.]	d-spacing [Å]	Rel. Int. [%]	Matched by
5.5042	16.05628	0.20	
8.8939	9.94292	4.98	98-016-1221
12.4031	7.13656	2.80	98-008-0082
17.8219	4.97702	1.69	98-016-1221
19.8823	4.46567	2.93	98-016-1221;98..
20.8786	4.25476	22.50	98-010-0341;98..
22.8895	3.88532	0.91	98-016-1221;98..
23.8214	3.73539	1.04	98-016-1221;98..
24.8957	3.57659	2.20	98-016-1221;98..
26.6597	3.34381	100.00	98-010-0341;98..

27.8654	3.20181	1.29	98-016-1221;98..
29.8745	2.99090	1.17	98-016-1221
31.2451	2.86275	0.66	98-016-1221;98..
32.0084	2.79621	0.59	98-016-1221
34.9551	2.56695	2.91	98-016-1221;98..
36.5467	2.45873	6.85	98-010-0341;98..
37.6767	2.38755	1.11	98-016-1221;98..
39.4839	2.28234	5.70	98-010-0341;98..
40.3002	2.23797	3.64	98-010-0341;98..
42.4465	2.12964	6.23	98-010-0341;98..
45.7848	1.98183	2.93	98-010-0341;98..
50.1228	1.82001	10.25	98-010-0341;98..
54.8579	1.67359	3.66	98-010-0341;98..
55.3228	1.66062	1.64	98-010-0341;98..
59.9402	1.54327	6.74	98-010-0341;98..
61.8048	1.50111	0.77	98-016-1221;98..
64.0097	1.45462	1.58	98-010-0341;98..

Quantitative Results



Phase Quartz low:	Weight fraction/ %:	60
Phase Muscovite 2M1:	Weight fraction/ %:	26
Phase Kaolinite 1A:	Weight fraction/ %:	14
Phase Albite high:	Weight fraction/ %:	0.4

Anchor Scan Parameters

Dataset Name:	mw20h-25
File name:	C:\Users\Rick\Documents\RCIA_Win10\AnchorQEA\2021July26-XRD\mw20h-25.rd
Sample Identification:	MR-AP-MW20H_25-26
Comment:	Exported by X'Pert SW
	Generated by hugo in project AnchorQEA-2
Measurement Date / Time:	8/9/2021 10:10:00 AM
Raw Data Origin:	PHILIPS-binary (scan) (.RD)
Scan Axis:	Gonio
Start Position [°2Th.]:	5.0200
End Position [°2Th.]:	64.9400
Step Size [°2Th.]:	0.0400
Scan Step Time [s]:	4.5000
Scan Type:	Continuous
Offset [°2Th.]:	0.0000
Divergence Slit Type:	Fixed
Divergence Slit Size [°]:	0.5000
Specimen Length [mm]:	10.00
Receiving Slit Size [mm]:	0.1000
Measurement Temperature [°C]:	0.00
Anode Material:	Cu
K-Alpha1 [Å]:	1.54060
K-Alpha2 [Å]:	1.54443
K-Beta [Å]:	1.39225
K-A2 / K-A1 Ratio:	0.50000
Generator Settings:	30 mA, 40 kV
Diffractometer Type:	XPert MPD
Diffractometer Number:	1
Goniometer Radius [mm]:	200.00
Dist. Focus-Diverg. Slit [mm]:	91.00
Incident Beam Monochromator:	No
Spinning:	No

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Wednesday, July 28, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1G0664 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1G0664, which was received by the laboratory on 7/23/2021 at 12:05:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 2.2 degC

APEX LABORATORIES

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0664 - 07 28 21 1402

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MR-AP-CEC-1-20210722	A1G0664-01	Water	07/22/21 10:00	07/23/21 12:05
MR-AP-CEC-2-20210722	A1G0664-02	Water	07/22/21 10:05	07/23/21 12:05
MR-AP-CEC-3-20210722	A1G0664-03	Water	07/22/21 10:10	07/23/21 12:05
MR-AP-CEC-4-20210722	A1G0664-04	Water	07/22/21 10:15	07/23/21 12:05
MR-AP-CEC-5-20210722	A1G0664-05	Water	07/22/21 10:20	07/23/21 12:05
MR-AP-CEC-6-20210722	A1G0664-06	Water	07/22/21 10:25	07/23/21 12:05
MR-AP-CEC-7-20210722	A1G0664-07	Water	07/22/21 10:30	07/23/21 12:05
MR-AP-CEC-MB-20210722	A1G0664-08	Water	07/22/21 10:35	07/23/21 12:05

DRAFT REPORT

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APEX LABORATORIES

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	A1G0664 - 07 28 21 1402

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-1-20210722 (A1G0664-01)				Matrix: Water				
Batch: 1070784								
Aluminum	**263**	125	250	ug/L	5	07/26/21 19:58	EPA 6020B	
Arsenic	**5.99**	2.50	5.00	ug/L	5	07/26/21 19:58	EPA 6020B	
Calcium	**2980**	1500	3000	ug/L	5	07/26/21 19:58	EPA 6020B	**J, R-04, B**
Cobalt	**2.56**	2.50	5.00	ug/L	5	07/26/21 19:58	EPA 6020B	**J, R-04**
Magnesium	**2270**	375	750	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Potassium	**27500**	250	500	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Sodium	**6150**	250	500	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 19:58	EPA 6020B	R-04
MR-AP-CEC-2-20210722 (A1G0664-02)				Matrix: Water				
Batch: 1070784								
Aluminum	**318**	125	250	ug/L	5	07/26/21 20:03	EPA 6020B	
Arsenic	**5.31**	2.50	5.00	ug/L	5	07/26/21 20:03	EPA 6020B	
Calcium	**2560**	1500	3000	ug/L	5	07/26/21 20:03	EPA 6020B	**R-04, J, B**
Cobalt	**2.50**	2.50	5.00	ug/L	5	07/26/21 20:03	EPA 6020B	**R-04, J**
Magnesium	**2120**	375	750	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Potassium	**26100**	250	500	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Sodium	**5900**	250	500	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:03	EPA 6020B	R-04
MR-AP-CEC-3-20210722 (A1G0664-03)				Matrix: Water				
Batch: 1070784								
Aluminum	**182**	141	281	ug/L	5	07/26/21 20:08	EPA 6020B	**R-03, R-04, J**
Arsenic	**13.8**	2.81	5.62	ug/L	5	07/26/21 20:08	EPA 6020B	
Calcium	**77600**	1690	3380	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Cobalt	**4.55**	2.81	5.62	ug/L	5	07/26/21 20:08	EPA 6020B	**R-03, R-04, J**
Magnesium	**23500**	422	844	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Potassium	**16700**	281	562	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Sodium	**22500**	281	562	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Lithium	ND	14.1	28.1	ug/L	5	07/26/21 20:08	EPA 6020B	R-03, R-04
MR-AP-CEC-4-20210722 (A1G0664-04)				Matrix: Water				
Batch: 1070784								

DRAFT REPORT

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APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-4-20210722 (A1G0664-04)				Matrix: Water				
Aluminum	**139**	125	250	ug/L	5	07/26/21 20:29	EPA 6020B	**R-04, J**
Arsenic	**15.1**	2.50	5.00	ug/L	5	07/26/21 20:29	EPA 6020B	
Calcium	**2340**	1500	3000	ug/L	5	07/26/21 20:29	EPA 6020B	**R-04, J, B**
Cobalt	**220**	2.50	5.00	ug/L	5	07/26/21 20:29	EPA 6020B	
Magnesium	**5770**	375	750	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Potassium	**40900**	250	500	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Sodium	**11400**	250	500	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:29	EPA 6020B	R-04
MR-AP-CEC-5-20210722 (A1G0664-05)				Matrix: Water				
Batch: 1070784								
Aluminum	ND	161	321	ug/L	5	07/26/21 20:34	EPA 6020B	R-03, R-04
Arsenic	**6.41**	3.21	6.43	ug/L	5	07/26/21 20:34	EPA 6020B	**Q-42, R-03, R-04, J**
Calcium	ND	1930	3860	ug/L	5	07/26/21 20:34	EPA 6020B	Q-42, R-03, R-04
Cobalt	**42.8**	3.21	6.43	ug/L	5	07/26/21 20:34	EPA 6020B	
Magnesium	**1670**	482	964	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Potassium	**24300**	321	643	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Sodium	**3830**	321	643	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Lithium	ND	16.1	32.1	ug/L	5	07/26/21 20:34	EPA 6020B	R-03, R-04
MR-AP-CEC-6-20210722 (A1G0664-06)				Matrix: Water				
Batch: 1070784								
Aluminum	**162**	125	250	ug/L	5	07/26/21 20:45	EPA 6020B	**R-04, J**
Arsenic	**20.0**	2.50	5.00	ug/L	5	07/26/21 20:45	EPA 6020B	
Calcium	ND	1500	3000	ug/L	5	07/26/21 20:45	EPA 6020B	R-04
Cobalt	**140**	2.50	5.00	ug/L	5	07/26/21 20:45	EPA 6020B	
Magnesium	**3810**	375	750	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Potassium	**22600**	250	500	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Sodium	**4810**	250	500	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:45	EPA 6020B	R-04
MR-AP-CEC-7-20210722 (A1G0664-07)				Matrix: Water				
Batch: 1070784								

DRAFT REPORT

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APEX LABORATORIES

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-7-20210722 (A1G0664-07)				**Matrix: Water**				
Aluminum	ND	161	321	ug/L	5	07/26/21 20:50	EPA 6020B	R-03, R-04
Arsenic	**29.2**	3.21	6.43	ug/L	5	07/26/21 20:50	EPA 6020B	
Calcium	**3390**	1930	3860	ug/L	5	07/26/21 20:50	EPA 6020B	**R-03, R-04, J, B**
Cobalt	**169**	3.21	6.43	ug/L	5	07/26/21 20:50	EPA 6020B	
Magnesium	**50700**	482	964	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Potassium	**23800**	321	643	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Sodium	**12700**	321	643	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Lithium	ND	16.1	32.1	ug/L	5	07/26/21 20:50	EPA 6020B	R-03, R-04
MR-AP-CEC-MB-20210722 (A1G0664-08)				**Matrix: Water**				
Batch: 1070784								
Aluminum	ND	125	250	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Arsenic	ND	2.50	5.00	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Calcium	ND	1500	3000	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Cobalt	ND	2.50	5.00	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Magnesium	ND	375	750	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Potassium	ND	250	500	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Sodium	ND	250	500	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 21:01	EPA 6020B	R-04

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	A1G0664 - 07 28 21 1402

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070784 - EPA 3015A							Water					
Blank (1070784-BLK1)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 19:27								
EPA 6020B												
Aluminum	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Calcium	ND	300	600	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Magnesium	ND	75.0	150	ug/L	1	---	---	---	---	---	---	
Potassium	ND	50.0	100	ug/L	1	---	---	---	---	---	---	
Sodium	ND	50.0	100	ug/L	1	---	---	---	---	---	---	
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
Blank (1070784-BLK2)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 19:32								
EPA 6020B												
Aluminum	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	A-01
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	A-01
Calcium	**773**	300	600	ug/L	1	---	---	---	---	---	---	A-01
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	A-01
Magnesium	**203**	75.0	150	ug/L	1	---	---	---	---	---	---	A-01
Potassium	**145**	50.0	100	ug/L	1	---	---	---	---	---	---	A-01
Sodium	**849**	50.0	100	ug/L	1	---	---	---	---	---	---	A-01
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	A-01
LCS (1070784-BS1)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 19:37								
EPA 6020B												
Aluminum	2720	25.0	50.0	ug/L	1	2780	---	98	80-120%	---	---	
Arsenic	54.8	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
Calcium	2750	300	600	ug/L	1	2780	---	99	80-120%	---	---	B
Cobalt	55.1	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
Magnesium	2760	75.0	150	ug/L	1	2780	---	99	80-120%	---	---	B
Potassium	2860	50.0	100	ug/L	1	2780	---	103	80-120%	---	---	B
Sodium	2880	50.0	100	ug/L	1	2780	---	104	80-120%	---	---	B
LCS (1070784-BS2)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 19:42								
EPA 6020B												
Lithium	41.2	2.50	5.00	ug/L	1	44.4	---	93	80-120%	---	---	

DRAFT REPORT

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
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503-718-2323
ORELAP ID: OR100062

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070784 - EPA 3015A							**Water**					
Duplicate (1070784-DUP1)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:24								
QC Source Sample: MR-AP-CEC-3-20210722 (A1G0664-03)												
EPA 6020B												
Aluminum	**188**	141	281	ug/L	5	---	182	---	---	3	20%	R-03, R-04, J
Arsenic	**15.0**	2.81	5.62	ug/L	5	---	13.8	---	---	8	20%	
Calcium	**76700**	1690	3380	ug/L	5	---	77600	---	---	1	20%	EST, B
Cobalt	**4.59**	2.81	5.62	ug/L	5	---	4.55	---	---	0.8	20%	R-03, R-04, J
Magnesium	**23900**	422	844	ug/L	5	---	23500	---	---	2	20%	EST, B
Potassium	**17000**	281	562	ug/L	5	---	16700	---	---	1	20%	EST, B
Sodium	**22900**	281	562	ug/L	5	---	22500	---	---	2	20%	EST, B
Lithium	ND	14.1	28.1	ug/L	5	---	ND	---	---	---	20%	R-03, R-04
Matrix Spike (1070784-MS1)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:40								
QC Source Sample: MR-AP-CEC-5-20210722 (A1G0664-05)												
EPA 6020B												
Aluminum	3900	161	321	ug/L	5	3570	ND	109	75-125%	---	---	
Arsenic	116	3.21	6.43	ug/L	5	71.4	6.41	**154**	**75-125%**	---	---	Q-11
Calcium	5010	1930	3860	ug/L	5	3570	ND	**140**	**75-125%**	---	---	Q-11, B
Cobalt	116	3.21	6.43	ug/L	5	71.4	42.8	103	75-125%	---	---	
Magnesium	5450	482	964	ug/L	5	3570	1670	106	75-125%	---	---	B
Potassium	28100	321	643	ug/L	5	3570	24300	107	75-125%	---	---	B
Sodium	7660	321	643	ug/L	5	3570	3830	107	75-125%	---	---	B
Matrix Spike (1070784-MS2)			Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:55								
QC Source Sample: MR-AP-CEC-7-20210722 (A1G0664-07)												
EPA 6020B												
Lithium	58.5	16.1	32.1	ug/L	5	57.1	ND	102	75-125%	---	---	

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SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1070784							
A1G0664-01	Water	EPA 6020B	07/22/21 10:00	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-02	Water	EPA 6020B	07/22/21 10:05	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-03	Water	EPA 6020B	07/22/21 10:10	07/23/21 14:33	40mL/50mL	45mL/50mL	1.13
A1G0664-04	Water	EPA 6020B	07/22/21 10:15	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-05	Water	EPA 6020B	07/22/21 10:20	07/23/21 14:33	35mL/50mL	45mL/50mL	1.29
A1G0664-06	Water	EPA 6020B	07/22/21 10:25	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-07	Water	EPA 6020B	07/22/21 10:30	07/23/21 14:33	35mL/50mL	45mL/50mL	1.29
A1G0664-08	Water	EPA 6020B	07/22/21 10:35	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00

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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.
B	Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
EST	Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of Ca, K, Mg and Na th
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-11	Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
Q-42	Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
R-03	Elevated Reporting Limits due to limited sample volume.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

DRAFT REPORT

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ANALYTICAL REPORT

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

‘B’ and ‘B-02’ qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

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A1G0664

Chain of Custody Record & Laboratory Analysis Request

Company: Anchor QEA
Date: 7/22/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Paloma Spina

ANCHOR QEA

3day TAT

Line	Field Sample ID	Collection Date/Time		Matrix	No. of Containers	As, Co, Li, Ca,Mg, K, Na, Al,	Comments/Preservation
1	MR-AP-CEC-1-20210722	7/22/2021	10:00	Water	1	x	1 Molar (M) ammonium acetate, pH 7
2	MR-AP-CEC-2-20210722	7/22/2021	10:05	Water	1	x	1 Molar (M) ammonium acetate, pH 7
3	MR-AP-CEC-3-20210722	7/22/2021	10:10	Water	1	x	1 Molar (M) ammonium acetate, pH 7
4	MR-AP-CEC-4-20210722	7/22/2021	10:15	Water	1	x	1 Molar (M) ammonium acetate, pH 7
5	MR-AP-CEC-5-20210722	7/22/2021	10:20	Water	1	x	1 Molar (M) ammonium acetate, pH 7
6	MR-AP-CEC-6-20210722	7/22/2021	10:25	Water	1	x	1 Molar (M) ammonium acetate, pH 7
7	MR-AP-CEC-7-20210722	7/22/2021	10:30	Water	1	x	1 Molar (M) ammonium acetate, pH 7
8	MR-AP-CEC-MB-20210722	7/22/2021	10:35	Water	1	x	1 Molar (M) ammonium acetate, pH 7
9							
10							
11							
12							
13							
14							
15							
16							

Test Parameters

Comments: samples are filtered but not preserved.

Relinquished By: Anthony Dalton-Atha	Company: Anchor QEA	Received By: Eli Juner	Company: APEX LABS
Signature/Printed Name	Date/Time 7/23/21 1205	Signature/Printed Name	Date/Time 7/23/21 1205
Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

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WO# A1G0664

COC/Container Discrepancies

COC Reads		Container Reads/Comments
(MR-AP-CEC-1-20210722)	10:00	11:15
(MR-AP-CEC-2-20210722)	10:05	11:20
(MR-AP-CEC-~~2~~ 3-20210722) HAS 7/23/21	10:10	11:25
		~~11:30~~
(MR-AP-CEC-4-20210722)	10:15	HAS 7/23/21 ~~11:35~~ 11:30
(MR-AP-CEC-5-20210722)	10:20	~~11:40~~ 11:35
(MR-AP-CEC-6-20210722)	10:25	~~11:45~~ 11:40
(MR-AP-CEC-7-20210722)	10:30	~~11:50~~ 11:45
(MR-AP-CEC-MB-20210722)	10:35	11:50

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
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APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 G0664

Project/Project #: Alabama Power - Miller / 201114-01.03

Delivery Info:

Date/time received: 7/23/21 @ 1205 By: EJ

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 7/23/21 @ 1205 By: EJ

Chain of Custody included? Yes X No ___ Custody seals? Yes X No ___

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	2.2						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	N						
Ice type: (Gel/Real/Other)	real						
Condition:	good						

Cooler out of temp? (Y/N) N Possible reason why: ___

Green dots applied to out of temperature samples? Yes/No No

Out of temperature samples form initiated? Yes/No No

Sample Inspection: Date/time inspected: 7/23/21 @ 1330 By: HAS

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes ___ No X Comments: all times incorrect on containers. See form.

COC/container discrepancies form initiated? Yes X No ___

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments ___

Water samples: pH checked: Yes ___ No ___ NA X pH appropriate? Yes ___ No ___ NA X

Comments: ___

Additional information: ___

Labeled by: HAS

Witness:

Cooler Inspected by: HAS

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-BLK2	Aluminum	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-BLK2	Aluminum	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-DUP1	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-05	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-DUP1	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-06	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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A1G0664-08	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

APEX LABORATORIES

ANALYTICAL REPORT

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ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-MS1	Arsenic	Exceeds upper control limit

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-BLK2	Arsenic	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-BLK2	Arsenic	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-MS1	Arsenic	Q-11: Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	Q-42: Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	R-03: Elevated Reporting Limits due to limited sample volume.

DRAFT REPORT

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Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Arsenic	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-MS1	Calcium	Exceeds upper control limit

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-DUP1	Calcium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Calcium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

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Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-MS1	Calcium	Q-11: Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-05	Calcium	Q-42: Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-05	Calcium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Calcium	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-01	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-06	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

Project: **Alabama Power-Miller**
Project Number: **201114-01.03**
Project Manager: **Anthony Dalton-Atha**

Report ID:
A1G0664 - 07 28 21 1402

REPORT EXCEPTIONS PAGE

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A1G0664-08	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-BLK2	Cobalt	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-BLK2	Cobalt	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-DUP1	Cobalt	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Cobalt	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-DUP1	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-01	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE
ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	>= MRL

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-DUP1	Potassium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Potassium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

A1G0664-08	Potassium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-BLK2	Lithium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-BLK2	Lithium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-DUP1	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-05	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-DUP1	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-01	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

A1G0664-06	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-DUP1	Magnesium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Magnesium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

A1G0664-08	Magnesium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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ANALYTICAL REPORT

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-DUP1	Sodium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Sodium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

A1G0664-08	Sodium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

Apex Laboratories, LLC

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ANALYTICAL REPORT

Wednesday, July 28, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1G0664 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1G0664, which was received by the laboratory on 7/23/2021 at 12:05:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	2.2 degC

Apex Laboratories, LLC
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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
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Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MR-AP-CEC-1-20210722	A1G0664-01	Water	07/22/21 10:00	07/23/21 12:05
MR-AP-CEC-2-20210722	A1G0664-02	Water	07/22/21 10:05	07/23/21 12:05
MR-AP-CEC-3-20210722	A1G0664-03	Water	07/22/21 10:10	07/23/21 12:05
MR-AP-CEC-4-20210722	A1G0664-04	Water	07/22/21 10:15	07/23/21 12:05
MR-AP-CEC-5-20210722	A1G0664-05	Water	07/22/21 10:20	07/23/21 12:05
MR-AP-CEC-6-20210722	A1G0664-06	Water	07/22/21 10:25	07/23/21 12:05
MR-AP-CEC-7-20210722	A1G0664-07	Water	07/22/21 10:30	07/23/21 12:05
MR-AP-CEC-MB-20210722	A1G0664-08	Water	07/22/21 10:35	07/23/21 12:05

DRAFT REPORT

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APEX LABORATORIES

ANALYTICAL REPORT

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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-1-20210722 (A1G0664-01)				Matrix: Water				
Batch: 1070784								
Aluminum	**263**	125	250	ug/L	5	07/26/21 19:58	EPA 6020B	
Arsenic	**5.99**	2.50	5.00	ug/L	5	07/26/21 19:58	EPA 6020B	
Calcium	**2980**	1500	3000	ug/L	5	07/26/21 19:58	EPA 6020B	**J, R-04, B**
Cobalt	**2.56**	2.50	5.00	ug/L	5	07/26/21 19:58	EPA 6020B	**J, R-04**
Magnesium	**2270**	375	750	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Potassium	**27500**	250	500	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Sodium	**6150**	250	500	ug/L	5	07/26/21 19:58	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 19:58	EPA 6020B	R-04
MR-AP-CEC-2-20210722 (A1G0664-02)				Matrix: Water				
Batch: 1070784								
Aluminum	**318**	125	250	ug/L	5	07/26/21 20:03	EPA 6020B	
Arsenic	**5.31**	2.50	5.00	ug/L	5	07/26/21 20:03	EPA 6020B	
Calcium	**2560**	1500	3000	ug/L	5	07/26/21 20:03	EPA 6020B	**R-04, J, B**
Cobalt	**2.50**	2.50	5.00	ug/L	5	07/26/21 20:03	EPA 6020B	**R-04, J**
Magnesium	**2120**	375	750	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Potassium	**26100**	250	500	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Sodium	**5900**	250	500	ug/L	5	07/26/21 20:03	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:03	EPA 6020B	R-04
MR-AP-CEC-3-20210722 (A1G0664-03)				Matrix: Water				
Batch: 1070784								
Aluminum	**182**	141	281	ug/L	5	07/26/21 20:08	EPA 6020B	**R-03, R-04, J**
Arsenic	**13.8**	2.81	5.62	ug/L	5	07/26/21 20:08	EPA 6020B	
Calcium	**77600**	1690	3380	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Cobalt	**4.55**	2.81	5.62	ug/L	5	07/26/21 20:08	EPA 6020B	**R-03, R-04, J**
Magnesium	**23500**	422	844	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Potassium	**16700**	281	562	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Sodium	**22500**	281	562	ug/L	5	07/26/21 20:08	EPA 6020B	**EST, B**
Lithium	ND	14.1	28.1	ug/L	5	07/26/21 20:08	EPA 6020B	R-03, R-04
MR-AP-CEC-4-20210722 (A1G0664-04)				Matrix: Water				
Batch: 1070784								

DRAFT REPORT

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ORELAP ID: OR100062

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-4-20210722 (A1G0664-04)				Matrix: Water				
Aluminum	**139**	125	250	ug/L	5	07/26/21 20:29	EPA 6020B	**R-04, J**
Arsenic	**15.1**	2.50	5.00	ug/L	5	07/26/21 20:29	EPA 6020B	
Calcium	**2340**	1500	3000	ug/L	5	07/26/21 20:29	EPA 6020B	**R-04, J, B**
Cobalt	**220**	2.50	5.00	ug/L	5	07/26/21 20:29	EPA 6020B	
Magnesium	**5770**	375	750	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Potassium	**40900**	250	500	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Sodium	**11400**	250	500	ug/L	5	07/26/21 20:29	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:29	EPA 6020B	R-04
MR-AP-CEC-5-20210722 (A1G0664-05)				Matrix: Water				
Batch: 1070784								
Aluminum	ND	161	321	ug/L	5	07/26/21 20:34	EPA 6020B	R-03, R-04
Arsenic	**6.41**	3.21	6.43	ug/L	5	07/26/21 20:34	EPA 6020B	**Q-42, R-03, R-04, J**
Calcium	ND	1930	3860	ug/L	5	07/26/21 20:34	EPA 6020B	Q-42, R-03, R-04
Cobalt	**42.8**	3.21	6.43	ug/L	5	07/26/21 20:34	EPA 6020B	
Magnesium	**1670**	482	964	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Potassium	**24300**	321	643	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Sodium	**3830**	321	643	ug/L	5	07/26/21 20:34	EPA 6020B	**B**
Lithium	ND	16.1	32.1	ug/L	5	07/26/21 20:34	EPA 6020B	R-03, R-04
MR-AP-CEC-6-20210722 (A1G0664-06)				Matrix: Water				
Batch: 1070784								
Aluminum	**162**	125	250	ug/L	5	07/26/21 20:45	EPA 6020B	**R-04, J**
Arsenic	**20.0**	2.50	5.00	ug/L	5	07/26/21 20:45	EPA 6020B	
Calcium	ND	1500	3000	ug/L	5	07/26/21 20:45	EPA 6020B	R-04
Cobalt	**140**	2.50	5.00	ug/L	5	07/26/21 20:45	EPA 6020B	
Magnesium	**3810**	375	750	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Potassium	**22600**	250	500	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Sodium	**4810**	250	500	ug/L	5	07/26/21 20:45	EPA 6020B	**B**
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 20:45	EPA 6020B	R-04
MR-AP-CEC-7-20210722 (A1G0664-07)				Matrix: Water				
Batch: 1070784								

DRAFT REPORT

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APEX LABORATORIES

ANALYTICAL REPORT

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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-CEC-7-20210722 (A1G0664-07)				**Matrix: Water**				
Aluminum	ND	161	321	ug/L	5	07/26/21 20:50	EPA 6020B	R-03, R-04
Arsenic	**29.2**	3.21	6.43	ug/L	5	07/26/21 20:50	EPA 6020B	
Calcium	**3390**	1930	3860	ug/L	5	07/26/21 20:50	EPA 6020B	**R-03, R-04, J, B**
Cobalt	**169**	3.21	6.43	ug/L	5	07/26/21 20:50	EPA 6020B	
Magnesium	**50700**	482	964	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Potassium	**23800**	321	643	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Sodium	**12700**	321	643	ug/L	5	07/26/21 20:50	EPA 6020B	**B**
Lithium	ND	16.1	32.1	ug/L	5	07/26/21 20:50	EPA 6020B	R-03, R-04
MR-AP-CEC-MB-20210722 (A1G0664-08)				**Matrix: Water**				
Batch: 1070784								
Aluminum	ND	125	250	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Arsenic	ND	2.50	5.00	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Calcium	ND	1500	3000	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Cobalt	ND	2.50	5.00	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Magnesium	ND	375	750	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Potassium	ND	250	500	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Sodium	ND	250	500	ug/L	5	07/26/21 21:01	EPA 6020B	R-04
Lithium	ND	12.5	25.0	ug/L	5	07/26/21 21:01	EPA 6020B	R-04

Apex Laboratories, LLC

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ANALYTICAL REPORT

Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

Project: **Alabama Power-Miller**
Project Number: **201114-01.03**
Project Manager: **Anthony Dalton-Atha**

Report ID:
A1G0664 - 07 28 21 1402

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070784 - EPA 3015A							Water					
Blank (1070784-BLK1)			Prepared: 07/23/21 14:33 Analyzed: 07/26/21 19:27									
EPA 6020B												
Aluminum	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Calcium	ND	300	600	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Magnesium	ND	75.0	150	ug/L	1	---	---	---	---	---	---	
Potassium	ND	50.0	100	ug/L	1	---	---	---	---	---	---	
Sodium	ND	50.0	100	ug/L	1	---	---	---	---	---	---	
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
Blank (1070784-BLK2)			Prepared: 07/23/21 14:33 Analyzed: 07/26/21 19:32									
EPA 6020B												
Aluminum	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	A-01
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	A-01
Calcium	**773**	300	600	ug/L	1	---	---	---	---	---	---	A-01
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	A-01
Magnesium	**203**	75.0	150	ug/L	1	---	---	---	---	---	---	A-01
Potassium	**145**	50.0	100	ug/L	1	---	---	---	---	---	---	A-01
Sodium	**849**	50.0	100	ug/L	1	---	---	---	---	---	---	A-01
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	A-01
LCS (1070784-BS1)			Prepared: 07/23/21 14:33 Analyzed: 07/26/21 19:37									
EPA 6020B												
Aluminum	2720	25.0	50.0	ug/L	1	2780	---	98	80-120%	---	---	
Arsenic	54.8	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
Calcium	2750	300	600	ug/L	1	2780	---	99	80-120%	---	---	B
Cobalt	55.1	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
Magnesium	2760	75.0	150	ug/L	1	2780	---	99	80-120%	---	---	B
Potassium	2860	50.0	100	ug/L	1	2780	---	103	80-120%	---	---	B
Sodium	2880	50.0	100	ug/L	1	2780	---	104	80-120%	---	---	B
LCS (1070784-BS2)			Prepared: 07/23/21 14:33 Analyzed: 07/26/21 19:42									
EPA 6020B												
Lithium	41.2	2.50	5.00	ug/L	1	44.4	---	93	80-120%	---	---	

DRAFT REPORT

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070784 - EPA 3015A							**Water**					
Duplicate (1070784-DUP1)				Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:24							
QC Source Sample: MR-AP-CEC-3-20210722 (A1G0664-03)												
EPA 6020B												
Aluminum	**188**	141	281	ug/L	5	---	182	---	---	3	20%	R-03, R-04, J
Arsenic	**15.0**	2.81	5.62	ug/L	5	---	13.8	---	---	8	20%	
Calcium	**76700**	1690	3380	ug/L	5	---	77600	---	---	1	20%	EST, B
Cobalt	**4.59**	2.81	5.62	ug/L	5	---	4.55	---	---	0.8	20%	R-03, R-04, J
Magnesium	**23900**	422	844	ug/L	5	---	23500	---	---	2	20%	EST, B
Potassium	**17000**	281	562	ug/L	5	---	16700	---	---	1	20%	EST, B
Sodium	**22900**	281	562	ug/L	5	---	22500	---	---	2	20%	EST, B
Lithium	ND	14.1	28.1	ug/L	5	---	ND	---	---	---	20%	R-03, R-04
Matrix Spike (1070784-MS1)				Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:40							
QC Source Sample: MR-AP-CEC-5-20210722 (A1G0664-05)												
EPA 6020B												
Aluminum	3900	161	321	ug/L	5	3570	ND	109	75-125%	---	---	
Arsenic	116	3.21	6.43	ug/L	5	71.4	6.41	**154**	**75-125%**	---	---	Q-11
Calcium	5010	1930	3860	ug/L	5	3570	ND	**140**	**75-125%**	---	---	Q-11, B
Cobalt	116	3.21	6.43	ug/L	5	71.4	42.8	103	75-125%	---	---	
Magnesium	5450	482	964	ug/L	5	3570	1670	106	75-125%	---	---	B
Potassium	28100	321	643	ug/L	5	3570	24300	107	75-125%	---	---	B
Sodium	7660	321	643	ug/L	5	3570	3830	107	75-125%	---	---	B
Matrix Spike (1070784-MS2)				Prepared: 07/23/21 14:33	Analyzed: 07/26/21 20:55							
QC Source Sample: MR-AP-CEC-7-20210722 (A1G0664-07)												
EPA 6020B												
Lithium	58.5	16.1	32.1	ug/L	5	57.1	ND	102	75-125%	---	---	

DRAFT REPORT

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Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1070784							
A1G0664-01	Water	EPA 6020B	07/22/21 10:00	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-02	Water	EPA 6020B	07/22/21 10:05	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-03	Water	EPA 6020B	07/22/21 10:10	07/23/21 14:33	40mL/50mL	45mL/50mL	1.13
A1G0664-04	Water	EPA 6020B	07/22/21 10:15	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-05	Water	EPA 6020B	07/22/21 10:20	07/23/21 14:33	35mL/50mL	45mL/50mL	1.29
A1G0664-06	Water	EPA 6020B	07/22/21 10:25	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00
A1G0664-07	Water	EPA 6020B	07/22/21 10:30	07/23/21 14:33	35mL/50mL	45mL/50mL	1.29
A1G0664-08	Water	EPA 6020B	07/22/21 10:35	07/23/21 14:33	45mL/50mL	45mL/50mL	1.00

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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.
B	Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
EST	Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of Ca, K, Mg and Na th
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-11	Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
Q-42	Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
R-03	Elevated Reporting Limits due to limited sample volume.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

DRAFT REPORT

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A1G0664

ANCHOR QEA

3day TAT

Chain of Custody Record & Laboratory Analysis Request

Company: Anchor QEA
Date: 7/22/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Paloma Spina

Test Parameters

Line	Field Sample ID	Collection Date/Time		Matrix	No. of Containers	As, Co, Li, Ca, Mg, K, Na, Al	Comments/Preservation
1	MR-AP-CEC-1-20210722	7/22/2021	10:00	Water	1	x	1 Molar (M) ammonium acetate, pH 7
2	MR-AP-CEC-2-20210722	7/22/2021	10:05	Water	1	x	1 Molar (M) ammonium acetate, pH 7
3	MR-AP-CEC-3-20210722	7/22/2021	10:10	Water	1	x	1 Molar (M) ammonium acetate, pH 7
4	MR-AP-CEC-4-20210722	7/22/2021	10:15	Water	1	x	1 Molar (M) ammonium acetate, pH 7
5	MR-AP-CEC-5-20210722	7/22/2021	10:20	Water	1	x	1 Molar (M) ammonium acetate, pH 7
6	MR-AP-CEC-6-20210722	7/22/2021	10:25	Water	1	x	1 Molar (M) ammonium acetate, pH 7
7	MR-AP-CEC-7-20210722	7/22/2021	10:30	Water	1	x	1 Molar (M) ammonium acetate, pH 7
8	MR-AP-CEC-MB-20210722	7/22/2021	10:35	Water	1	x	1 Molar (M) ammonium acetate, pH 7
9							
10							
11							
12							
13							
14							
15							
16							

Comments: samples are filtered but not preserved.

Relinquished By: Anthony Dalton-Atha	Company: Anchor QEA	Received By: Eli Jones	Company: Apex Labs
Signature/Printed Name: [signature]	Date/Time 7/23/21 1205	Signature/Printed Name: [signature]	Date/Time 7/23/21 1205
Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Page 1 of 1

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WO# A1G0664

COC/Container Discrepancies

COC Reads		Container Reads/Comments
(MR-AP-CEC-1-20210722)	10:00	11:15
(MR-AP-CEC-2-20210722)	10:05	11:20
(MR-AP-CEC-~~2~~ 3-20210722) HAS 7/23/21	10:10	11:25
(MR-AP-CEC-4-20210722)	10:15	HAS 7/23/21 ~~11:30~~ ~~11:35~~ 11:30
(MR-AP-CEC-5-20210722)	10:20	~~11:40~~ 11:35
(MR-AP-CEC-6-20210722)	10:25	~~11:45~~ 11:40
(MR-AP-CEC-7-20210722)	10:30	~~11:50~~ 11:45
(MR-AP-CEC-MB-20210722)	10:35	11:50

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ORELAP ID: **OR100062**

APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 G0664

Project/Project #: Alabama Power - Miller / 201114-01.03

Delivery Info:

Date/time received: 7/23/21 @ 1205 By: EJ

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 7/23/21 @ 1205 By: EJ

Chain of Custody included? Yes X No ___ Custody seals? Yes X No ___

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	2.2						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	N						
Ice type: (Gel/Real/Other)	real						
Condition:	good						

Cooler out of temp? (Y/N) N Possible reason why: ___

Green dots applied to out of temperature samples? Yes/No No

Out of temperature samples form initiated? Yes/No No

Sample Inspection: Date/time inspected: 7/23/21 @ 1330 By: HAS

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes ___ No X Comments: all times incorrect on containers. See form.

COC/container discrepancies form initiated? Yes X No ___

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments ___

Water samples: pH checked: Yes ___ No ___ NA X pH appropriate? Yes ___ No ___ NA X

Comments: ___

Additional information: ___

Labeled by: HAS Witness: Cooler Inspected by: HAS

REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

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REPORT EXCEPTIONS PAGE

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-BLK2	Aluminum	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-BLK2	Aluminum	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-DUP1	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-05	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Aluminum	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Al (Aluminum) - 6020B - Total

1070784-DUP1	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-06	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

A1G0664-08	Aluminum	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-MS1	Arsenic	Exceeds upper control limit

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-BLK2	Arsenic	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-BLK2	Arsenic	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

1070784-MS1	Arsenic	Q-11: Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	Q-42: Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	R-03: Elevated Reporting Limits due to limited sample volume.

DRAFT REPORT

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Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

As (Arsenic) - 6020B - Total

A1G0664-05	Arsenic	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Arsenic	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0664 - 07 28 21 1402**

REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-MS1	Calcium	Exceeds upper control limit

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-BLK2	Calcium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-DUP1	Calcium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Calcium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

DRAFT REPORT

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

1070784-MS1	Calcium	Q-11: Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-05	Calcium	Q-42: Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-05	Calcium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Calcium	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Ca (Calcium) - 6020B - Total

A1G0664-01	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-06	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

A1G0664-08	Calcium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-BLK2	Cobalt	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-BLK2	Cobalt	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-DUP1	Cobalt	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Cobalt	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Co (Cobalt) - 6020B - Total

1070784-DUP1	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-01	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Cobalt	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	>= MRL

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-BLK2	Potassium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

1070784-DUP1	Potassium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Potassium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

K (Potassium) - 6020B - Total

A1G0664-08	Potassium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-BLK2	Lithium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-BLK2	Lithium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-DUP1	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-03	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-05	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.
A1G0664-07	Lithium	R-03: Elevated Reporting Limits due to limited sample volume.

Sample and QC Qualification / Duplicate Analytes

Li (Lithium) - 6020B - Total

1070784-DUP1	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-01	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-02	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-03	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-04	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-05	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

A1G0664-06	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-07	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
A1G0664-08	Lithium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE
ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-BLK2	Magnesium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

1070784-DUP1	Magnesium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Magnesium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

Mg (Magnesium) - 6020B - Total

A1G0664-08	Magnesium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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REPORT EXCEPTIONS PAGE

ITEMS FOR REVIEW

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	>= MRL

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	A-01: This is a Blank prepared with Citranox to mirror the Citrinox contamination to sample A1G0664-03 and 1070784-DUP1.

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-BLK2	Sodium	B-Excl: Blank excluded from MDL(b) calculations due to known source of contamination

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

1070784-DUP1	Sodium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of
A1G0664-03	Sodium	EST: Result reported as an Estimated Value. This sample had a small amount of Cirtranox introduced during preparation without sufficient volume to reprepare the sample. A blank prepared to check for Ciitranox contamination showed levels of

Sample and QC Qualification / Duplicate Analytes

Na (Sodium) - 6020B - Total

A1G0664-08	Sodium	R-04: Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

Apex Laboratories, LLC

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ANALYTICAL REPORT

Tuesday, August 17, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1H0217 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1H0217, which was received by the laboratory on 8/6/2021 at 3:30:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	3.0 degC

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1H0217 - 08 17 21 1356

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MR-AP-AAO-1-20210804	A1H0217-01	Water	08/04/21 11:15	08/06/21 15:30
MR-AP-AAO-2-20210804	A1H0217-02	Water	08/04/21 11:20	08/06/21 15:30
MR-AP-AAO-3-20210804	A1H0217-03	Water	08/04/21 11:25	08/06/21 15:30
MR-AP-AAO-4-20210804	A1H0217-04	Water	08/04/21 11:30	08/06/21 15:30
MR-AP-AAO-5-20210804	A1H0217-05	Water	08/04/21 11:35	08/06/21 15:30
MR-AP-AAO-6-20210804	A1H0217-06	Water	08/04/21 11:40	08/06/21 15:30
MR-AP-AAO-7-20210804	A1H0217-07	Water	08/04/21 11:45	08/06/21 15:30
MR-AP-AAO-MB-20210804	A1H0217-08	Water	08/04/21 11:50	08/06/21 15:30

APEX LABORATORIES

ANALYTICAL REPORT

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Anchor QEA, LLC	Project: Alabama Power-Miller	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	Report ID:
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1H0217 - 08 17 21 1356

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-AAO-1-20210804 (A1H0217-01)				Matrix: Water				
Batch: 1080275								
Aluminum	**16300**	150	300	ug/L	5	08/11/21 02:39	EPA 6020B	
Arsenic	**25.6**	3.00	6.00	ug/L	5	08/11/21 02:39	EPA 6020B	
Cobalt	ND	3.00	6.00	ug/L	5	08/11/21 02:39	EPA 6020B	R-04
Iron	**14500**	150	300	ug/L	5	08/11/21 02:39	EPA 6020B	
Manganese	**185**	3.00	6.00	ug/L	5	08/11/21 02:39	EPA 6020B	
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 02:39	EPA 6020B	R-04
MR-AP-AAO-2-20210804 (A1H0217-02)				Matrix: Water				
Batch: 1080275								
Aluminum	**16000**	150	300	ug/L	5	08/11/21 02:44	EPA 6020B	
Arsenic	**50.3**	3.00	6.00	ug/L	5	08/11/21 02:44	EPA 6020B	
Cobalt	**14.0**	3.00	6.00	ug/L	5	08/11/21 02:44	EPA 6020B	
Iron	**31400**	150	300	ug/L	5	08/11/21 02:44	EPA 6020B	
Manganese	**863**	3.00	6.00	ug/L	5	08/11/21 02:44	EPA 6020B	
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 02:44	EPA 6020B	R-04
MR-AP-AAO-3-20210804 (A1H0217-03)				Matrix: Water				
Batch: 1080275								
Aluminum	**13900**	150	300	ug/L	5	08/11/21 02:59	EPA 6020B	
Arsenic	**19.2**	3.00	6.00	ug/L	5	08/11/21 02:59	EPA 6020B	**B-02**
Cobalt	**204**	3.00	6.00	ug/L	5	08/11/21 02:59	EPA 6020B	
Iron	**19000**	150	300	ug/L	5	08/11/21 02:59	EPA 6020B	
Manganese	**8420**	3.00	6.00	ug/L	5	08/11/21 02:59	EPA 6020B	**E**
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 02:59	EPA 6020B	R-04
MR-AP-AAO-4-20210804 (A1H0217-04)				Matrix: Water				
Batch: 1080275								
Aluminum	**9870**	150	300	ug/L	5	08/11/21 03:03	EPA 6020B	
Arsenic	**12.7**	3.00	6.00	ug/L	5	08/11/21 03:03	EPA 6020B	**B-02**
Cobalt	**40.0**	3.00	6.00	ug/L	5	08/11/21 03:03	EPA 6020B	
Iron	**8000**	150	300	ug/L	5	08/11/21 03:03	EPA 6020B	
Manganese	**2260**	3.00	6.00	ug/L	5	08/11/21 03:03	EPA 6020B	
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 03:03	EPA 6020B	R-04

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ANALYTICAL REPORT

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ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1H0217 - 08 17 21 1356**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MR-AP-AAO-5-20210804 (A1H0217-05)				**Matrix: Water**				
Batch: 1080275								
Aluminum	**9620**	150	300	ug/L	5	08/11/21 03:08	EPA 6020B	
Arsenic	**11.1**	3.00	6.00	ug/L	5	08/11/21 03:08	EPA 6020B	**B-02**
Cobalt	**37.1**	3.00	6.00	ug/L	5	08/11/21 03:08	EPA 6020B	
Iron	**6610**	150	300	ug/L	5	08/11/21 03:08	EPA 6020B	
Manganese	**2230**	3.00	6.00	ug/L	5	08/11/21 03:08	EPA 6020B	
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 03:08	EPA 6020B	R-04
MR-AP-AAO-6-20210804 (A1H0217-06)				**Matrix: Water**				
Batch: 1080275								
Aluminum	**9990**	150	300	ug/L	5	08/11/21 03:13	EPA 6020B	
Arsenic	**28.9**	3.00	6.00	ug/L	5	08/11/21 03:13	EPA 6020B	**B-02**
Cobalt	**182**	3.00	6.00	ug/L	5	08/11/21 03:13	EPA 6020B	
Iron	**14400**	150	300	ug/L	5	08/11/21 03:13	EPA 6020B	
Manganese	**7320**	3.00	6.00	ug/L	5	08/11/21 03:13	EPA 6020B	**E**
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 03:13	EPA 6020B	R-04
MR-AP-AAO-7-20210804 (A1H0217-07)				**Matrix: Water**				
Batch: 1080275								
Aluminum	**11400**	150	300	ug/L	5	08/11/21 03:18	EPA 6020B	
Arsenic	**47.5**	3.00	6.00	ug/L	5	08/11/21 03:18	EPA 6020B	
Cobalt	**226**	3.00	6.00	ug/L	5	08/11/21 03:18	EPA 6020B	
Iron	**26800**	150	300	ug/L	5	08/11/21 03:18	EPA 6020B	
Manganese	**6010**	3.00	6.00	ug/L	5	08/11/21 03:18	EPA 6020B	
Lithium	**15.8**	15.0	30.0	ug/L	5	08/11/21 03:18	EPA 6020B	**J, R-04**
MR-AP-AAO-MB-20210804 (A1H0217-08)				**Matrix: Water**				
Batch: 1080275								
Aluminum	ND	150	300	ug/L	5	08/11/21 03:23	EPA 6020B	R-04
Arsenic	ND	3.00	6.00	ug/L	5	08/11/21 03:23	EPA 6020B	R-04
Cobalt	ND	3.00	6.00	ug/L	5	08/11/21 03:23	EPA 6020B	
Iron	**151**	150	300	ug/L	5	08/11/21 03:23	EPA 6020B	**J, R-04**
Manganese	**4.48**	3.00	6.00	ug/L	5	08/11/21 03:23	EPA 6020B	**J, R-04**
Lithium	ND	15.0	30.0	ug/L	5	08/11/21 03:23	EPA 6020B	R-04

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ANALYTICAL REPORT

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503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: Alabama Power-Miller	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	Report ID:
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1H0217 - 08 17 21 1356

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1080275 - EPA 3015A							**Water**					
Blank (1080275-BLK1)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 03:26									
EPA 6020B												
Aluminum	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Iron	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Blank (1080275-BLK2)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 02:29									
EPA 6020B												
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
LCS (1080275-BS1)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 03:31									
EPA 6020B												
Aluminum	2770	25.0	50.0	ug/L	1	2780	---	100	80-120%	---	---	
Arsenic	56.7	0.500	1.00	ug/L	1	55.6	---	102	80-120%	---	---	
Cobalt	58.1	0.500	1.00	ug/L	1	55.6	---	105	80-120%	---	---	
Iron	2780	25.0	50.0	ug/L	1	2780	---	100	80-120%	---	---	
Manganese	56.2	0.500	1.00	ug/L	1	55.6	---	101	80-120%	---	---	
LCS (1080275-BS2)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 02:34									
EPA 6020B												
Lithium	44.0	2.50	5.00	ug/L	1	44.4	---	99	80-120%	---	---	
Duplicate (1080275-DUP1)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 03:41									
QC Source Sample: Non-SDG (A1H0231-01)												
Aluminum	ND	25.0	50.0	ug/L	1	---	ND	---	---	---	20%	
Arsenic	**1.32**	0.500	1.00	ug/L	1	---	1.32	---	---	0.08	20%	
Cobalt	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	
Iron	**126**	25.0	50.0	ug/L	1	---	121	---	---	4	20%	
Manganese	**9.23**	0.500	1.00	ug/L	1	---	9.07	---	---	2	20%	
Duplicate (1080275-DUP2)			Prepared: 08/10/21 08:50 Analyzed: 08/11/21 03:33									
QC Source Sample: Non-SDG (A1H0231-01)												

DRAFT REPORT

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1H0217 - 08 17 21 1356**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1080275 - EPA 3015A							**Water**					
Duplicate (1080275-DUP2)			Prepared: 08/10/21 08:50	Analyzed: 08/11/21 03:33								
QC Source Sample: Non-SDG (A1H0231-01)												
Lithium	ND	25.0	50.0	ug/L	10	---	ND	---	---	---	20%	R-04
Matrix Spike (1080275-MS1)			Prepared: 08/10/21 08:50	Analyzed: 08/11/21 03:46								
QC Source Sample: Non-SDG (A1H0231-01)												
EPA 6020B												
Aluminum	2810	25.0	50.0	ug/L	1	2780	ND	101	75-125%	---	---	
Arsenic	59.7	0.500	1.00	ug/L	1	55.6	1.32	105	75-125%	---	---	
Cobalt	57.8	0.500	1.00	ug/L	1	55.6	ND	104	75-125%	---	---	
Iron	2950	25.0	50.0	ug/L	1	2780	121	102	75-125%	---	---	
Manganese	64.9	0.500	1.00	ug/L	1	55.6	9.07	100	75-125%	---	---	
Matrix Spike (1080275-MS2)			Prepared: 08/10/21 08:50	Analyzed: 08/11/21 03:38								
QC Source Sample: Non-SDG (A1H0231-01)												
EPA 6020B												
Lithium	44.0	25.0	50.0	ug/L	10	44.4	ND	99	75-125%	---	---	J, R-04

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Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1H0217 - 08 17 21 1356**

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1080275							
A1H0217-01	Water	EPA 6020B	08/04/21 11:15	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-02	Water	EPA 6020B	08/04/21 11:20	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-03	Water	EPA 6020B	08/04/21 11:25	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-04	Water	EPA 6020B	08/04/21 11:30	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-05	Water	EPA 6020B	08/04/21 11:35	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-06	Water	EPA 6020B	08/04/21 11:40	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-07	Water	EPA 6020B	08/04/21 11:45	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20
A1H0217-08	Water	EPA 6020B	08/04/21 11:50	08/10/21 08:50	37.5mL/50mL	45mL/50mL	1.20

DRAFT REPORT

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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

B-02	Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
E	Estimated Value. The result is above the calibration range of the instrument.
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories, LLC
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Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1H0217 - 08 17 21 1356**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

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A1H0217

Chain of Custody Record & Laboratory Analysis Request

Company: Anchor QEA
Date: 8/4/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Modi Raduma

ANCHOR QEA

3 day TAT

Test Parameters

Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	As, Co, Li, Fe, Al, Mn	Comments/Preservation
1	MR-AP-AAO-1-20210804	8/4/21 11:15	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
2	MR-AP-AAO-2-20210804	8/4/21 11:20	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
3	MR-AP-AAO-3-20210804	8/4/21 11:25	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
4	MR-AP-AAO-4-20210804	8/4/21 11:30	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
5	MR-AP-AAO-5-20210804	8/4/21 11:35	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
6	MR-AP-AAO-6-20210804	8/4/21 11:40	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
7	MR-AP-AAO-7-20210804	8/4/21 11:45	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
8	MR-AP-AAO-MB-20210804	8/4/21 11:50	Water	1	x	0.2 M ammonium oxalate in 0.1 M oxalic acid
9						
10						
11						
12						
13						
14						
15						
16						

Comments: samples are filtered and preserved with nitric acid.

Relinquished By: [signature] Company: AQEA
Signature/Printed Name: Anthony Dalton-Atha Date/Time: 8/6/21 1300

Received By: [signature] Company: Apex
Signature/Printed Name: [signature] Date/Time: 8/6/21 1300 1030 SD 8/6/21

Relinquished By: Company:
Signature/Printed Name Date/Time

Received By: Company:
Signature/Printed Name Date/Time

Page 1 of 1

Apex Laboratories, LLC
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Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1H0217 - 08 17 21 1356**

APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 H0217

Project/Project #: Alabama Power - Miller / 201114-01.03

Delivery Info:

Date/time received: 8/6/21 @ 1530 By: 80

Delivered by: Apex___ Client X ESS___ FedEx___ UPS___ Swift___ Senvoy___ SDS___ Other___

Cooler Inspection Date/time inspected: 8/6/21 @ 1535 By: 80

Chain of Custody included? Yes X No___ Custody seals? Yes___ No X

Signed/dated by client? Yes X No___

Signed/dated by Apex? Yes X No___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	3.0						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	real						
Condition:	good						

Cooler out of temp? (Y/N) Possible reason why:

Green dots applied to out of temperature samples? Yes/No

Out of temperature samples form initiated? Yes/No

Sample Inspection: Date/time inspected: 8/9/21 @ 1100 By: 80

All samples intact? Yes X No___ Comments:

Bottle labels/COCs agree? Yes X No___ Comments:

COC/container discrepancies form initiated? Yes___ No X

Containers/volumes received appropriate for analysis? Yes X No___ Comments:

Do VOA vials have visible headspace? Yes___ No___ NA X

Comments

Water samples: pH checked: Yes___No___NA X pH appropriate? Yes___No___NA X

Comments:

Additional information:

Labeled by: 80 Witness: W Cooler Inspected by: 80

Apex Laboratories, LLC
6700 S.W. Sandburg Street
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ORELAP ID: **OR100062**

ANALYTICAL REPORT

Monday, August 30, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1G0352 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1G0352, which was received by the laboratory on 7/13/2021 at 2:08:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 5.7 degC

APEX LABORATORIES

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	A1G0352 - 08 30 21 1304

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
AP-SSE-F1-M1	A1G0352-01	Water	07/07/21 10:00	07/13/21 14:08
AP-SSE-F1-M2	A1G0352-02	Water	07/07/21 10:05	07/13/21 14:08
AP-SSE-F1-M3	A1G0352-03	Water	07/07/21 10:10	07/13/21 14:08
AP-SSE-F1-M4	A1G0352-04	Water	07/07/21 10:15	07/13/21 14:08
AP-SSE-F1-M5	A1G0352-05	Water	07/07/21 10:20	07/13/21 14:08
AP-SSE-F1-M6	A1G0352-06	Water	07/07/21 10:25	07/13/21 14:08
AP-SSE-F1-M7	A1G0352-07	Water	07/07/21 10:30	07/13/21 14:08
MB-SSE-F1-M8	A1G0352-08	Water	07/07/21 10:35	07/13/21 14:08
AP-SSE-F2-M1	A1G0352-09	Water	07/08/21 10:00	07/13/21 14:08
AP-SSE-F2-M2	A1G0352-10	Water	07/08/21 10:05	07/13/21 14:08
AP-SSE-F2-M3	A1G0352-11	Water	07/08/21 10:10	07/13/21 14:08
AP-SSE-F2-M4	A1G0352-12	Water	07/08/21 10:15	07/13/21 14:08
AP-SSE-F2-M5	A1G0352-13	Water	07/08/21 10:20	07/13/21 14:08
AP-SSE-F2-M6	A1G0352-14	Water	07/08/21 10:25	07/13/21 14:08
AP-SSE-F2-M7	A1G0352-15	Water	07/08/21 10:30	07/13/21 14:08
MB-SSE-F2-M8	A1G0352-16	Water	07/08/21 10:35	07/13/21 14:08

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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F1-M1 (A1G0352-01)				**Matrix: Water**				
Batch: 1070420								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 02:33	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:04	EPA 6020B	R-04
AP-SSE-F1-M2 (A1G0352-02)				**Matrix: Water**				
Batch: 1070420								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 02:38	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:10	EPA 6020B	R-04
AP-SSE-F1-M3 (A1G0352-03)				**Matrix: Water**				
Batch: 1070420								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 02:43	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:16	EPA 6020B	R-04
AP-SSE-F1-M4 (A1G0352-04)				**Matrix: Water**				
Batch: 1070420								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 02:48	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:22	EPA 6020B	R-04
AP-SSE-F1-M5 (A1G0352-05)				**Matrix: Water**				
Batch: 1070420								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 02:52	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:27	EPA 6020B	R-04
AP-SSE-F1-M6 (A1G0352-06)				**Matrix: Water**				
Batch: 1070420								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 02:57	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:33	EPA 6020B	R-04
AP-SSE-F1-M7 (A1G0352-07)				**Matrix: Water**				
Batch: 1070420								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 03:02	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:39	EPA 6020B	R-04
MB-SSE-F1-M8 (A1G0352-08)				**Matrix: Water**				
Batch: 1070420								

DRAFT REPORT

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MB-SSE-F1-M8 (A1G0352-08)				Matrix: Water				
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 03:16	EPA 6020B	R-04
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 03:16	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 15:44	EPA 6020B	R-04
AP-SSE-F2-M1 (A1G0352-09)				Matrix: Water				
Batch: 1070420								
Arsenic	**397**	25.0	50.0	ug/L	50	07/16/21 03:21	EPA 6020B	
Iron	ND	1250	2500	ug/L	50	07/16/21 03:21	EPA 6020B	R-04
Manganese	**83.9**	25.0	50.0	ug/L	50	07/16/21 03:21	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 16:01	EPA 6020B	R-04
AP-SSE-F2-M2 (A1G0352-10)				Matrix: Water				
Batch: 1070420								
Arsenic	**234**	25.0	50.0	ug/L	50	07/16/21 03:26	EPA 6020B	
Iron	ND	1250	2500	ug/L	50	07/16/21 03:26	EPA 6020B	R-04
Manganese	**100**	25.0	50.0	ug/L	50	07/16/21 03:26	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 16:07	EPA 6020B	R-04
AP-SSE-F2-M3 (A1G0352-11)				Matrix: Water				
Batch: 1070420								
Arsenic	**344**	25.0	50.0	ug/L	50	07/16/21 03:30	EPA 6020B	
Iron	ND	1250	2500	ug/L	50	07/16/21 03:30	EPA 6020B	R-04
Manganese	**149**	25.0	50.0	ug/L	50	07/16/21 03:30	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 16:12	EPA 6020B	A-01, Q-06, R-04
AP-SSE-F2-M4 (A1G0352-12)				Matrix: Water				
Batch: 1070420								
Arsenic	**278**	25.0	50.0	ug/L	50	07/16/21 03:35	EPA 6020B	
Iron	ND	1250	2500	ug/L	50	07/16/21 03:35	EPA 6020B	R-04
Manganese	**193**	25.0	50.0	ug/L	50	07/16/21 03:35	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 16:18	EPA 6020B	A-01, Q-06, R-04
AP-SSE-F2-M5 (A1G0352-13)				Matrix: Water				
Batch: 1070464								

DRAFT REPORT

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F2-M5 (A1G0352-13)				**Matrix: Water**				
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 14:29	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 14:29	EPA 6020B	R-04
Manganese	ND	25.0	50.0	ug/L	50	07/16/21 14:29	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 18:23	EPA 6020B	R-04
AP-SSE-F2-M6 (A1G0352-14)				**Matrix: Water**				
Batch: 1070464								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 14:34	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 14:34	EPA 6020B	R-04
Manganese	**26.2**	25.0	50.0	ug/L	50	07/16/21 14:34	EPA 6020B	**R-04, J**
Lithium	ND	125	250	ug/L	50	07/15/21 18:28	EPA 6020B	R-04
AP-SSE-F2-M7 (A1G0352-15)				**Matrix: Water**				
Batch: 1070464								
Arsenic	**356**	25.0	50.0	ug/L	50	07/16/21 14:38	EPA 6020B	
Iron	ND	1250	2500	ug/L	50	07/16/21 14:38	EPA 6020B	R-04
Manganese	**148**	25.0	50.0	ug/L	50	07/16/21 14:38	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 18:34	EPA 6020B	R-04
MB-SSE-F2-M8 (A1G0352-16)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 14:43	EPA 6020B	R-04
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 14:43	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 14:43	EPA 6020B	R-04
Manganese	ND	25.0	50.0	ug/L	50	07/16/21 14:43	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 18:39	EPA 6020B	R-04

DRAFT REPORT

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ORELAP ID: OR100062

Anchor QEA, LLC 6720 SW Macadam Ave. Suite 125 Portland, OR 97219	Project: Alabama Power-Miller Project Number: 201114-01.03 Project Manager: Anthony Dalton-Atha	Report ID: A1G0352 - 08 30 21 1304

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070420 - EPA 3015A							**Water**					
Blank (1070420-BLK1)			Prepared: 07/14/21 10:48		Analyzed: 07/16/21 01:36							
EPA 6020B												
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Iron	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Blank (1070420-BLK2)			Prepared: 07/14/21 10:48		Analyzed: 07/15/21 14:14							
EPA 6020B												
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
LCS (1070420-BS1)			Prepared: 07/14/21 10:48		Analyzed: 07/16/21 01:45							
EPA 6020B												
Arsenic	54.4	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	
Cobalt	54.2	0.500	1.00	ug/L	1	55.6	---	97	80-120%	---	---	
Iron	2750	25.0	50.0	ug/L	1	2780	---	99	80-120%	---	---	
Manganese	54.8	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
LCS (1070420-BS2)			Prepared: 07/14/21 10:48		Analyzed: 07/15/21 14:25							
EPA 6020B												
Lithium	42.6	2.50	5.00	ug/L	1	44.4	---	96	80-120%	---	---	
LCS Dup (1070420-BSD1)			Prepared: 07/14/21 10:48		Analyzed: 07/16/21 01:41							
EPA 6020B												
Arsenic	55.0	0.500	1.00	ug/L	1	55.6	---	99	80-120%	0.9	20%	
Cobalt	54.4	0.500	1.00	ug/L	1	55.6	---	98	80-120%	0.4	20%	
Iron	2780	25.0	50.0	ug/L	1	2780	---	100	80-120%	1	20%	
Manganese	56.0	0.500	1.00	ug/L	1	55.6	---	101	80-120%	2	20%	
LCS Dup (1070420-BSD2)			Prepared: 07/14/21 10:48		Analyzed: 07/15/21 14:19							
EPA 6020B												
Lithium	42.7	2.50	5.00	ug/L	1	44.4	---	96	80-120%	0.1	20%	
Batch 1070464 - EPA 3015A							**Water**					

DRAFT REPORT

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Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070464 - EPA 3015A							**Water**					
Blank (1070464-BLK1)					Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:15							
EPA 6020B												
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Iron	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Blank (1070464-BLK2)					Prepared: 07/15/21 08:47 Analyzed: 07/15/21 17:55							
EPA 6020B												
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
LCS (1070464-BS1)					Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:24							
EPA 6020B												
Arsenic	54.2	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	
Cobalt	54.5	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	
Iron	2700	25.0	50.0	ug/L	1	2780	---	97	80-120%	---	---	
Manganese	53.3	0.500	1.00	ug/L	1	55.6	---	96	80-120%	---	---	
LCS (1070464-BS2)					Prepared: 07/15/21 08:47 Analyzed: 07/15/21 18:17							
EPA 6020B												
Lithium	44.5	2.50	5.00	ug/L	1	44.4	---	100	80-120%	---	---	
LCS Dup (1070464-BSD1)					Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:19							
EPA 6020B												
Arsenic	53.2	0.500	1.00	ug/L	1	55.6	---	96	80-120%	2	20%	
Cobalt	54.2	0.500	1.00	ug/L	1	55.6	---	97	80-120%	0.6	20%	
Iron	2760	25.0	50.0	ug/L	1	2780	---	99	80-120%	2	20%	
Manganese	53.0	0.500	1.00	ug/L	1	55.6	---	95	80-120%	0.6	20%	
LCS Dup (1070464-BSD2)					Prepared: 07/15/21 08:47 Analyzed: 07/15/21 18:00							
EPA 6020B												
Lithium	42.6	2.50	5.00	ug/L	1	44.4	---	96	80-120%	5	20%	

APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC
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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1070420							
A1G0352-01	Water	EPA 6020B	07/07/21 10:00	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-02	Water	EPA 6020B	07/07/21 10:05	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-03	Water	EPA 6020B	07/07/21 10:10	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-04	Water	EPA 6020B	07/07/21 10:15	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-05	Water	EPA 6020B	07/07/21 10:20	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-06	Water	EPA 6020B	07/07/21 10:25	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-07	Water	EPA 6020B	07/07/21 10:30	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-08	Water	EPA 6020B	07/07/21 10:35	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-09	Water	EPA 6020B	07/08/21 10:00	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-10	Water	EPA 6020B	07/08/21 10:05	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-11	Water	EPA 6020B	07/08/21 10:10	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
A1G0352-12	Water	EPA 6020B	07/08/21 10:15	07/14/21 10:48	45mL/50mL	45mL/50mL	1.00
Batch: 1070464							
A1G0352-13	Water	EPA 6020B	07/08/21 10:20	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0352-14	Water	EPA 6020B	07/08/21 10:25	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0352-15	Water	EPA 6020B	07/08/21 10:30	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0352-16	Water	EPA 6020B	07/08/21 10:35	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	Results do not meet EPA 6020B criteria. Results reportes for research and development and client information.
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-06	Internal Standard area outside of method specified limits. Data is Not Reported. See previous or subsequent runs for reportable sample data.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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ANALYTICAL REPORT

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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

"   " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

DRAFT REPORT

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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

‘B’ and ‘B-02’ qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0352 - 08 30 21 1304

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

A1G0352

Chain of Custody Record & Laboratory Analysis Request

ANCHOR QEA

Company: Anchor QEA
Date: 7/13/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Modi Raduma &Paloma Spina

Line	Field Sample ID	Collection Date	Time	Matrix	No. of Containers	As, Li	Co, Li	As, Co, Li	As, Li, Fe, Mn	Co,Li,Fe,Mn	As, Co, Li, Fe, Mn	Comments/Preservation
1	AP-SSE-F1-M1	7/7/2021	10:00	Water	1	x						1M MgCl2 sol'n
2	AP-SSE-F1-M2	7/7/2021	10:05	Water	1	x						
3	AP-SSE-F1-M3	7/7/2021	10:10	Water	1	x						
4	AP-SSE-F1-M4	7/7/2021	10:15	Water	1	x						
5	AP-SSE-F1-M5	7/7/2021	10:20	Water	1		x					
6	AP-SSE-F1-M6	7/7/2021	10:25	Water	1		x					
7	AP-SSE-F1-M7	7/7/2021	10:30	Water	1	x						
8	MB-SSE-F1-M8	7/7/2021	10:35	Water	1			x				
9	AP-SSE-F2-M1	7/8/2021	10:00	Water	1				x			1M monosodium phosphate
10	AP-SSE-F2-M2	7/8/2021	10:05	Water	1				x			
11	AP-SSE-F2-M3	7/8/2021	10:10	Water	1				x			
12	AP-SSE-F2-M4	7/8/2021	10:15	Water	1				x			
13	AP-SSE-F2-M5	7/8/2021	10:20	Water	1					x		
14	AP-SSE-F2-M6	7/8/2021	10:25	Water	1					x		
15	AP-SSE-F2-M7	7/8/2021	10:30	Water	1				x			
16	MB-SSE-F2-M8	7/8/2021	10:35	Water	1						x	

Comments: Samples may contain elevated Mg and Ca levels. Please analyze with minimal dilution to achieve best DLs. Samples have been preserved with nitric acid.

Relinquished By: Paloma Spina	Company: Anchor QEA
Signature/Printed Name	Date/Time 12/13/2021
Received By:	Company: Apex Labs
Signature/Printed Name Michael Kushnik	Date/Time 7-13-21 / 1408
Relinquished By:	Company:
Signature/Printed Name	Date/Time
Received By:	Company:
Signature/Printed Name	Date/Time

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503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0352 - 08 30 21 1304**

APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 G0352

Project/Project #: Alabama Power-Miller / 201114-01.03

Delivery Info:

Date/time received: 7-13-21 @ 1408 By: MK

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 7-13-21 @ 1500 By: MK

Chain of Custody included? Yes X No ___ Custody seals? Yes ___ No X

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	5.7						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Gel						
Condition:	good						

Cooler out of temp? (Y/N) Possible reason why: ___

Green dots applied to out of temperature samples? Yes/No

Out of temperature samples form initiated? Yes/No

Sample Inspection: Date/time inspected: 7/13/21 @ 1631 By: 80

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes X No ___ Comments: ___

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments ___

Water samples: pH checked: Yes X No ___ NA ___ pH appropriate? Yes X No ___ NA ___

Comments: ___

Additional information: ___

Labeled by: 80 Witness: OM Cooler Inspected by: 80

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
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ANALYTICAL REPORT

Friday, July 16, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1G0356 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1G0356, which was received by the laboratory on 7/13/2021 at 2:08:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	5.7 degC

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Apex Laboratories, LLC
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503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0356 - 07 16 21 1647

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
AP-SSE-F3-M1	A1G0356-01	Water	07/09/21 10:00	07/13/21 14:08
AP-SSE-F3-M2	A1G0356-02	Water	07/09/21 10:05	07/13/21 14:08
AP-SSE-F3-M3	A1G0356-03	Water	07/09/21 10:10	07/13/21 14:08
AP-SSE-F3-M4	A1G0356-04	Water	07/09/21 10:15	07/13/21 14:08
AP-SSE-F3-M5	A1G0356-05	Water	07/09/21 10:20	07/13/21 14:08
AP-SSE-F3-M6	A1G0356-06	Water	07/09/21 10:25	07/13/21 14:08
AP-SSE-F3-M7	A1G0356-07	Water	07/09/21 10:30	07/13/21 14:08
MB-SSE-F3-M8	A1G0356-08	Water	07/09/21 10:35	07/13/21 14:08
AP-SSE-F4-M1	A1G0356-09	Water	07/12/21 10:00	07/13/21 14:08
AP-SSE-F4-M2	A1G0356-10	Water	07/12/21 10:05	07/13/21 14:08
AP-SSE-F4-M3	A1G0356-11	Water	07/12/21 10:10	07/13/21 14:08
AP-SSE-F4-M4	A1G0356-12	Water	07/12/21 10:15	07/13/21 14:08
AP-SSE-F4-M5	A1G0356-13	Water	07/12/21 10:20	07/13/21 14:08
AP-SSE-F4-M6	A1G0356-14	Water	07/12/21 10:25	07/13/21 14:08
AP-SSE-F4-M7	A1G0356-15	Water	07/12/21 10:30	07/13/21 14:08
MB-SSE-F4-M8	A1G0356-16	Water	07/12/21 10:35	07/13/21 14:08

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F3-M1 (A1G0356-01)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 14:48	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 14:48	EPA 6020B	R-04
Manganese	**91.5**	25.0	50.0	ug/L	50	07/16/21 14:48	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 18:45	EPA 6020B	R-04
AP-SSE-F3-M2 (A1G0356-02)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 14:53	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 14:53	EPA 6020B	R-04
Manganese	**507**	25.0	50.0	ug/L	50	07/16/21 14:53	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 18:51	EPA 6020B	R-04
AP-SSE-F3-M3 (A1G0356-03)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:07	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 15:07	EPA 6020B	R-04
Manganese	**1120**	25.0	50.0	ug/L	50	07/16/21 15:07	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 18:56	EPA 6020B	R-04
AP-SSE-F3-M4 (A1G0356-04)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:12	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 15:12	EPA 6020B	R-04
Manganese	**1380**	25.0	50.0	ug/L	50	07/16/21 15:12	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:02	EPA 6020B	R-04
AP-SSE-F3-M5 (A1G0356-05)				**Matrix: Water**				
Batch: 1070464								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 15:17	EPA 6020B	R-04
Iron	**1670**	1250	2500	ug/L	50	07/16/21 15:17	EPA 6020B	**J**
Manganese	**76.6**	25.0	50.0	ug/L	50	07/16/21 15:17	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:07	EPA 6020B	R-04
AP-SSE-F3-M6 (A1G0356-06)				**Matrix: Water**				

DRAFT REPORT

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APEX LABORATORIES

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503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F3-M6 (A1G0356-06)				**Matrix: Water**				
Batch: 1070464								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 15:21	EPA 6020B	R-04
Iron	**2070**	1250	2500	ug/L	50	07/16/21 15:21	EPA 6020B	**J**
Manganese	**129**	25.0	50.0	ug/L	50	07/16/21 15:21	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:23	EPA 6020B	R-04
AP-SSE-F3-M7 (A1G0356-07)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:26	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 15:26	EPA 6020B	R-04
Manganese	**1410**	25.0	50.0	ug/L	50	07/16/21 15:26	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:28	EPA 6020B	R-04
MB-SSE-F3-M8 (A1G0356-08)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:31	EPA 6020B	R-04
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 15:31	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 15:31	EPA 6020B	R-04
Manganese	**61.1**	25.0	50.0	ug/L	50	07/16/21 15:31	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:34	EPA 6020B	R-04
AP-SSE-F4-M1 (A1G0356-09)				**Matrix: Water**				
Batch: 1070464								
Arsenic	**40.0**	25.0	50.0	ug/L	50	07/16/21 15:36	EPA 6020B	**J**
Iron	**6650**	1250	2500	ug/L	50	07/16/21 15:36	EPA 6020B	
Manganese	ND	25.0	50.0	ug/L	50	07/16/21 15:36	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 19:39	EPA 6020B	R-04
AP-SSE-F4-M2 (A1G0356-10)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:41	EPA 6020B	R-04
Iron	**3370**	1250	2500	ug/L	50	07/16/21 15:41	EPA 6020B	
Manganese	**55.2**	25.0	50.0	ug/L	50	07/16/21 15:41	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:45	EPA 6020B	R-04

DRAFT REPORT

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APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC
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503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F4-M3 (A1G0356-11)				Matrix: Water				
Batch: 1070464								
Arsenic	**25.3**	25.0	50.0	ug/L	50	07/16/21 15:46	EPA 6020B	**J**
Iron	**5190**	1250	2500	ug/L	50	07/16/21 15:46	EPA 6020B	
Manganese	**166**	25.0	50.0	ug/L	50	07/16/21 15:46	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:50	EPA 6020B	R-04
AP-SSE-F4-M4 (A1G0356-12)				Matrix: Water				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 15:50	EPA 6020B	R-04
Iron	**7370**	1250	2500	ug/L	50	07/16/21 15:50	EPA 6020B	
Manganese	**315**	25.0	50.0	ug/L	50	07/16/21 15:50	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 19:55	EPA 6020B	R-04
AP-SSE-F4-M5 (A1G0356-13)				Matrix: Water				
Batch: 1070464								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 16:05	EPA 6020B	R-04
Iron	**36800**	1250	2500	ug/L	50	07/16/21 16:05	EPA 6020B	
Manganese	**69.5**	25.0	50.0	ug/L	50	07/16/21 16:05	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 20:01	EPA 6020B	R-04
AP-SSE-F4-M6 (A1G0356-14)				Matrix: Water				
Batch: 1070464								
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 16:10	EPA 6020B	R-04
Iron	**31900**	1250	2500	ug/L	50	07/16/21 16:10	EPA 6020B	
Manganese	**114**	25.0	50.0	ug/L	50	07/16/21 16:10	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 20:06	EPA 6020B	R-04
AP-SSE-F4-M7 (A1G0356-15)				Matrix: Water				
Batch: 1070464								
Arsenic	**26.5**	25.0	50.0	ug/L	50	07/16/21 16:14	EPA 6020B	**J**
Iron	**6360**	1250	2500	ug/L	50	07/16/21 16:14	EPA 6020B	
Manganese	**208**	25.0	50.0	ug/L	50	07/16/21 16:14	EPA 6020B	
Lithium	ND	125	250	ug/L	50	07/15/21 20:11	EPA 6020B	R-04
MB-SSE-F4-M8 (A1G0356-16)				Matrix: Water				

APEX LABORATORIES

ANALYTICAL REPORT

Apex Laboratories, LLC
6700 S.W. Sandburg Street
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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MB-SSE-F4-M8 (A1G0356-16)				**Matrix: Water**				
Batch: 1070464								
Arsenic	ND	25.0	50.0	ug/L	50	07/16/21 16:19	EPA 6020B	R-04
Cobalt	ND	25.0	50.0	ug/L	50	07/16/21 16:19	EPA 6020B	R-04
Iron	ND	1250	2500	ug/L	50	07/16/21 16:19	EPA 6020B	R-04
Manganese	ND	25.0	50.0	ug/L	50	07/16/21 16:19	EPA 6020B	R-04
Lithium	ND	125	250	ug/L	50	07/15/21 20:27	EPA 6020B	Q-41, R-04

Apex Laboratories, LLC
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Anchor QEA, LLC 6720 SW Macadam Ave. Suite 125 Portland, OR 97219	Project: Alabama Power-Miller Project Number: 201114-01.03 Project Manager: Anthony Dalton-Atha	Report ID: A1G0356 - 07 16 21 1647

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070464 - EPA 3015A							Water					
Blank (1070464-BLK1)				Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:15								
EPA 6020B												
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Iron	ND	25.0	50.0	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Blank (1070464-BLK2)				Prepared: 07/15/21 08:47 Analyzed: 07/15/21 17:55								
EPA 6020B												
Lithium	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
LCS (1070464-BS1)				Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:24								
EPA 6020B												
Arsenic	54.2	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	
Cobalt	54.5	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	
Iron	2700	25.0	50.0	ug/L	1	2780	---	97	80-120%	---	---	
Manganese	53.3	0.500	1.00	ug/L	1	55.6	---	96	80-120%	---	---	
LCS (1070464-BS2)				Prepared: 07/15/21 08:47 Analyzed: 07/15/21 18:17								
EPA 6020B												
Lithium	44.5	2.50	5.00	ug/L	1	44.4	---	100	80-120%	---	---	
LCS Dup (1070464-BSD1)				Prepared: 07/15/21 08:47 Analyzed: 07/16/21 14:19								
EPA 6020B												
Arsenic	53.2	0.500	1.00	ug/L	1	55.6	---	96	80-120%	2	20%	
Cobalt	54.2	0.500	1.00	ug/L	1	55.6	---	97	80-120%	0.6	20%	
Iron	2760	25.0	50.0	ug/L	1	2780	---	99	80-120%	2	20%	
Manganese	53.0	0.500	1.00	ug/L	1	55.6	---	95	80-120%	0.6	20%	
LCS Dup (1070464-BSD2)				Prepared: 07/15/21 08:47 Analyzed: 07/15/21 18:00								
EPA 6020B												
Lithium	42.6	2.50	5.00	ug/L	1	44.4	---	96	80-120%	5	20%	

DRAFT REPORT

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ANALYTICAL REPORT

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Portland, OR 97219

Project: **Alabama Power-Miller**
Project Number: **201114-01.03**
Project Manager: **Anthony Dalton-Atha**

Report ID:
A1G0356 - 07 16 21 1647

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1070464							
A1G0356-01	Water	EPA 6020B	07/09/21 10:00	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-02	Water	EPA 6020B	07/09/21 10:05	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-03	Water	EPA 6020B	07/09/21 10:10	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-04	Water	EPA 6020B	07/09/21 10:15	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-05	Water	EPA 6020B	07/09/21 10:20	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-06	Water	EPA 6020B	07/09/21 10:25	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-07	Water	EPA 6020B	07/09/21 10:30	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-08	Water	EPA 6020B	07/09/21 10:35	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-09	Water	EPA 6020B	07/12/21 10:00	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-10	Water	EPA 6020B	07/12/21 10:05	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-11	Water	EPA 6020B	07/12/21 10:10	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-12	Water	EPA 6020B	07/12/21 10:15	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-13	Water	EPA 6020B	07/12/21 10:20	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-14	Water	EPA 6020B	07/12/21 10:25	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-15	Water	EPA 6020B	07/12/21 10:30	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00
A1G0356-16	Water	EPA 6020B	07/12/21 10:35	07/15/21 08:47	45mL/50mL	45mL/50mL	1.00

Apex Laboratories, LLC

6700 S.W. Sandburg Street
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Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-41	Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

"   " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

DRAFT REPORT

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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

‘B’ and ‘B-02’ qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

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A1G0356

Chain of Custody Record & Laboratory Analysis Request

ANCHOR QEA

Company: Anchor QEA
Date: 7/13/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Modi Raduma &Paloma Spina

Test Parameters

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	As, Li, Fe, Mn	Co,Li,Fe,Mn	As, Co, Li, Fe, Mn	Comments/Preservation
1	AP-SSE-F3-M1	7/9/2021	10:00	Water	1	x			0.1M
2	AP-SSE-F3-M2	7/9/2021	10:05	Water	1	x			hydroxylamine HCl
3	AP-SSE-F3-M3	7/9/2021	10:10	Water	1	x			
4	AP-SSE-F3-M4	7/9/2021	10:15	Water	1	x			
5	AP-SSE-F3-M5	7/9/2021	10:20	Water	1		x		
6	AP-SSE-F3-M6	7/9/2021	10:25	Water	1		x		
7	AP-SSE-F3-M7	7/9/2021	10:30	Water	1	x			
8	MB-SSE-F3-M8	7/9/2021	10:35	Water	1			x	
9	AP-SSE-F4-M1	7/12/2021	10:00	Water	1	x			Caution! Conc. Nitric acid.
10	AP-SSE-F4-M2	7/12/2021	10:05	Water	1	x			Caution! Conc. Nitric acid.
11	AP-SSE-F4-M3	7/12/2021	10:10	Water	1	x			Caution! Conc. Nitric acid.
12	AP-SSE-F4-M4	7/12/2021	10:15	Water	1	x			Caution! Conc. Nitric acid.
13	AP-SSE-F4-M5	7/12/2021	10:20	Water	1		x		Caution! Conc. Nitric acid.
14	AP-SSE-F4-M6	7/12/2021	10:25	Water	1		x		Caution! Conc. Nitric acid.
15	AP-SSE-F4-M7	7/12/2021	10:30	Water	1	x			Caution! Conc. Nitric acid.
16	MB-SSE-F4-M8	7/12/2021	10:35	Water	1			x	Caution! Conc. Nitric acid.

Comments: Samples may contain elevated Mg and Ca levels. Please analyze with minimal dilution to achieve best DLs. Samples have been preserved with nitric acid.

Relinquished By: Paloma Spina	Company: Anchor QEA	Received By:	Company: Apex Labs
Signature/Printed Name: Paloma Spina	Date/Time: 12/13/2021	Signature/Printed Name: Michael Hackinth	Date/Time: 7-13-21/1408
Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Page 1 of 1

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APEX LABORATORIES

Apex Laboratories, LLC

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ANALYTICAL REPORT

Anchor QEA, LLC	Project:	**Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number:	**201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager:	**Anthony Dalton-Atha**	**A1G0356 - 07 16 21 1647**

APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 G0356

Project/Project #: Alabama Power-Miller /201114-01.03

Delivery Info:

Date/time received: 7-13-21 @ 1408 By: MK

Delivered by: Apex X Client___ ESS___ FedEx___ UPS___ Swift___ Senvoy___ SDS___ Other___

Cooler Inspection Date/time inspected: 7-13-21 @ 1500 By: MK

Chain of Custody included? Yes X No ___ Custody seals? Yes___ No X

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	5.7						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Gel						
Condition:	good						

Cooler out of temp? (Y/N) Possible reason why:___

Green dots applied to out of temperature samples? Yes/No

Out of temperature samples form initiated? Yes/No

Sample Inspection: Date/time inspected: 7/13/21 @ 1640 By: SD

All samples intact? Yes X No ___ Comments:___

Bottle labels/COCs agree? Yes X No ___ Comments:___

COC/container discrepancies form initiated? Yes ___ No Y

Containers/volumes received appropriate for analysis? Yes X No ___ Comments:___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments___

Water samples: pH checked: Yes X No___ NA___ pH appropriate? Yes Y No___ NA___

Comments:___

Additional information:___

Labeled by: SD Witness: AKK Cooler Inspected by: SD

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ORELAP ID: **OR100062**

ANALYTICAL REPORT

Friday, July 16, 2021

Anthony Dalton-Atha
Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

RE: A1G0358 - Alabama Power-Miller - 201114-01.03

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1G0358, which was received by the laboratory on 7/13/2021 at 2:08:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: dthomas@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	5.7 degC

DRAFT REPORT

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0358 - 07 16 21 1551**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
AP-SSE-F5-M1	A1G0358-01	Soil	07/13/21 10:00	07/13/21 14:08
AP-SSE-F5-M2	A1G0358-02	Soil	07/13/21 10:05	07/13/21 14:08
AP-SSE-F5-M3	A1G0358-03	Soil	07/13/21 10:10	07/13/21 14:08
AP-SSE-F5-M4	A1G0358-04	Soil	07/13/21 10:15	07/13/21 14:08
AP-SSE-F5-M5	A1G0358-05	Soil	07/13/21 10:20	07/13/21 14:08
AP-SSE-F5-M6	A1G0358-06	Soil	07/13/21 10:25	07/13/21 14:08
AP-SSE-F5-M7	A1G0358-07	Soil	07/13/21 10:30	07/13/21 14:08

DRAFT REPORT

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0358 - 07 16 21 1551

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F5-M1 (A1G0358-01)				Matrix: Soil				
Batch: 1070436								
Arsenic	**4.70**	2.69	5.38	mg/kg	50	07/16/21 04:47	EPA 6020B	**J**
Iron	**7440**	134	269	mg/kg	50	07/16/21 04:47	EPA 6020B	
Manganese	**7.63**	2.69	5.38	mg/kg	50	07/16/21 04:47	EPA 6020B	
Lithium	ND	13.4	26.9	mg/kg	50	07/15/21 17:15	EPA 6020B	R-04
AP-SSE-F5-M2 (A1G0358-02)				Matrix: Soil				
Batch: 1070436								
Arsenic	**3.21**	2.61	5.22	mg/kg	50	07/16/21 04:52	EPA 6020B	**J**
Iron	**4450**	130	261	mg/kg	50	07/16/21 04:52	EPA 6020B	
Manganese	**4.33**	2.61	5.22	mg/kg	50	07/16/21 04:52	EPA 6020B	**J**
Lithium	ND	13.0	26.1	mg/kg	50	07/15/21 17:20	EPA 6020B	R-04
AP-SSE-F5-M3 (A1G0358-03)				Matrix: Soil				
Batch: 1070436								
Arsenic	ND	2.55	5.09	mg/kg	50	07/16/21 04:56	EPA 6020B	R-04
Iron	**3140**	127	255	mg/kg	50	07/16/21 04:56	EPA 6020B	
Manganese	**5.88**	2.55	5.09	mg/kg	50	07/16/21 04:56	EPA 6020B	
Lithium	ND	12.7	25.5	mg/kg	50	07/15/21 17:26	EPA 6020B	R-04
AP-SSE-F5-M4 (A1G0358-04)				Matrix: Soil				
Batch: 1070436								
Arsenic	**2.93**	2.65	5.31	mg/kg	50	07/16/21 05:11	EPA 6020B	**A-01, Q-06, J**
Iron	**5140**	133	265	mg/kg	50	07/16/21 05:11	EPA 6020B	**A-01, Q-06**
Manganese	**13.6**	2.65	5.31	mg/kg	50	07/16/21 05:11	EPA 6020B	**A-01, Q-06**
Lithium	ND	13.3	26.5	mg/kg	50	07/15/21 17:32	EPA 6020B	R-04
AP-SSE-F5-M5 (A1G0358-05)				Matrix: Soil				
Batch: 1070436								
Cobalt	ND	2.75	5.51	mg/kg	50	07/16/21 05:15	EPA 6020B	A-01, Q-06, R-04
Iron	**9800**	138	275	mg/kg	50	07/16/21 05:15	EPA 6020B	**A-01, Q-06**
Manganese	**11.7**	2.75	5.51	mg/kg	50	07/16/21 05:15	EPA 6020B	**A-01, Q-06**
Lithium	ND	13.8	27.5	mg/kg	50	07/15/21 17:37	EPA 6020B	R-04

DRAFT REPORT

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APEX LABORATORIES

ANALYTICAL REPORT

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503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0358 - 07 16 21 1551**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
AP-SSE-F5-M6 (A1G0358-06)				**Matrix: Soil**				
Batch: 1070436								
Cobalt	ND	2.61	5.22	mg/kg	50	07/16/21 05:20	EPA 6020B	A-01, Q-06, R-04
Iron	**8700**	130	261	mg/kg	50	07/16/21 05:20	EPA 6020B	**A-01, Q-06**
Manganese	**29.0**	2.61	5.22	mg/kg	50	07/16/21 05:20	EPA 6020B	**A-01, Q-06**
Lithium	ND	13.0	26.1	mg/kg	50	07/15/21 17:43	EPA 6020B	R-04
AP-SSE-F5-M7 (A1G0358-07)				**Matrix: Soil**				
Batch: 1070436								
Arsenic	**4.39**	2.67	5.33	mg/kg	50	07/16/21 05:25	EPA 6020B	**A-01, Q-06, J**
Iron	**5490**	133	267	mg/kg	50	07/16/21 05:25	EPA 6020B	**A-01, Q-06**
Manganese	**9.84**	2.67	5.33	mg/kg	50	07/16/21 05:25	EPA 6020B	**A-01, Q-06**
Lithium	ND	13.3	26.7	mg/kg	50	07/15/21 17:49	EPA 6020B	R-04

ANALYTICAL REPORT

Anchor QEA, LLC
6720 SW Macadam Ave. Suite 125
Portland, OR 97219

Project: **Alabama Power-Miller**
Project Number: **201114-01.03**
Project Manager: **Anthony Dalton-Atha**

Report ID:
A1G0358 - 07 16 21 1551

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070436 - EPA 3051A							**Solid**					
Blank (1070436-BLK1)				Prepared: 07/14/21 13:30 Analyzed: 07/16/21 03:40								
EPA 6020B												
Arsenic	ND	0.500	1.00	mg/kg	10	---	---	---	---	---	---	
Cobalt	ND	0.500	1.00	mg/kg	10	---	---	---	---	---	---	
Iron	ND	25.0	50.0	mg/kg	10	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	mg/kg	10	---	---	---	---	---	---	
Blank (1070436-BLK2)				Prepared: 07/14/21 13:30 Analyzed: 07/15/21 16:23								
EPA 6020B												
Lithium	ND	2.50	5.00	mg/kg	10	---	---	---	---	---	---	
LCS (1070436-BS1)				Prepared: 07/14/21 13:30 Analyzed: 07/16/21 03:45								
EPA 6020B												
Arsenic	50.5	0.500	1.00	mg/kg	10	50.0	---	101	80-120%	---	---	
Cobalt	49.8	0.500	1.00	mg/kg	10	50.0	---	100	80-120%	---	---	
Iron	2560	25.0	50.0	mg/kg	10	2500	---	102	80-120%	---	---	
Manganese	50.0	0.500	1.00	mg/kg	10	50.0	---	100	80-120%	---	---	
LCS (1070436-BS2)				Prepared: 07/14/21 13:30 Analyzed: 07/15/21 16:29								
EPA 6020B												
Lithium	41.7	2.50	5.00	mg/kg	10	40.0	---	104	80-120%	---	---	
Duplicate (1070436-DUP1)				Prepared: 07/14/21 13:30 Analyzed: 07/16/21 03:54								
QC Source Sample: Non-SDG (A1G0245-01)												
Arsenic	ND	25.3	50.5	mg/kg	100	---	ND	---	---	---	20%	
Cobalt	ND	25.3	50.5	mg/kg	100	---	ND	---	---	---	20%	
Iron	**116000**	1260	2530	mg/kg	100	---	113000	---	---	2	20%	
Manganese	**1260**	25.3	50.5	mg/kg	100	---	1250	---	---	0.5	20%	
Duplicate (1070436-DUP2)				Prepared: 07/14/21 13:30 Analyzed: 07/15/21 16:41								
QC Source Sample: Non-SDG (A1G0245-01)												
Lithium	ND	126	253	mg/kg	100	---	ND	---	---	---	20%	R-04
Matrix Spike (1070436-MS1)				Prepared: 07/14/21 13:30 Analyzed: 07/16/21 03:59								

DRAFT REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1070436 - EPA 3051A							**Solid**					
Matrix Spike (1070436-MS1)			Prepared: 07/14/21 13:30		Analyzed: 07/16/21 03:59							
QC Source Sample: Non-SDG (A1G0245-01)												
EPA 6020B												
Arsenic	267	25.5	51.0	mg/kg	100	255	ND	105	75-125%	---	---	
Cobalt	272	25.5	51.0	mg/kg	100	255	ND	107	75-125%	---	---	
Iron	139000	1280	2550	mg/kg	100	12800	113000	**201**	**75-125%**	---	---	Q-03
Manganese	1680	25.5	51.0	mg/kg	100	255	1250	**167**	**75-125%**	---	---	Q-03
Matrix Spike (1070436-MS2)			Prepared: 07/14/21 13:30		Analyzed: 07/15/21 16:46							
QC Source Sample: Non-SDG (A1G0245-01)												
EPA 6020B												
Lithium	207	124	248	mg/kg	100	198	ND	105	75-125%	---	---	R-04, J

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Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0358 - 07 16 21 1551**

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1070436							
A1G0358-01	Soil	EPA 6020B	07/13/21 10:00	07/14/21 13:30	0.465g/50mL	0.5g/50mL	1.08
A1G0358-02	Soil	EPA 6020B	07/13/21 10:05	07/14/21 13:30	0.479g/50mL	0.5g/50mL	1.04
A1G0358-03	Soil	EPA 6020B	07/13/21 10:10	07/14/21 13:30	0.491g/50mL	0.5g/50mL	1.02
A1G0358-04	Soil	EPA 6020B	07/13/21 10:15	07/14/21 13:30	0.471g/50mL	0.5g/50mL	1.06
A1G0358-05	Soil	EPA 6020B	07/13/21 10:20	07/14/21 13:30	0.454g/50mL	0.5g/50mL	1.10
A1G0358-06	Soil	EPA 6020B	07/13/21 10:25	07/14/21 13:30	0.479g/50mL	0.5g/50mL	1.04
A1G0358-07	Soil	EPA 6020B	07/13/21 10:30	07/14/21 13:30	0.469g/50mL	0.5g/50mL	1.07

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	Results do not meet EPA 6020B criteria. Results reportes for research and development and client information.
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-03	Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
Q-06	Internal Standard area outside of method specified limits. Data is Not Reported. See previous or subsequent runs for reportable sample data.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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ANALYTICAL REPORT

Anchor QEA, LLC	Project: Alabama Power-Miller	
6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	Report ID:
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0358 - 07 16 21 1551

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

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6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0358 - 07 16 21 1551**

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

‘B’ and ‘B-02’ qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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6720 SW Macadam Ave. Suite 125	Project Number: 201114-01.03	**Report ID:**
Portland, OR 97219	Project Manager: Anthony Dalton-Atha	A1G0358 - 07 16 21 1551

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

ANALYTICAL REPORT

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	**A1G0358 - 07 16 21 1551**

A1G0358

Chain of Custody Record & Laboratory Analysis Request

ANCHOR QEA

Company: Anchor QEA
Date: 7/13/2021
Project Name: Alabama Power - Miller
Project Number: 201114-01.03
Project Manager: Anthony Dalton-Atha adalton-atha@anchorqea.com
Phone Number: 503-924-6186
Shipment Method: Pick-up
Samplers: Modi Raduma &Paloma Spina

Line	Field Sample ID	Collection Date/Time		Matrix	No. of Containers	As, Li, Fe, Mn	Co,Li,Fe,Mn	Comments/Preservation
1	AP-SSE-F5-M1	7/13/2021	10:00	Soil	1	x		
2	AP-SSE-F5-M2	7/13/2021	10:05	Soil	1	x		
3	AP-SSE-F5-M3	7/13/2021	10:10	Soil	1	x		
4	AP-SSE-F5-M4	7/13/2021	10:15	Soil	1	x		
5	AP-SSE-F5-M5	7/13/2021	10:20	Soil	1		x	
6	AP-SSE-F5-M6	7/13/2021	10:25	Soil	1		x	
7	AP-SSE-F5-M7	7/13/2021	10:30	Soil	1	x		
8								
9								
10								
11								
12								
13								
14								
15								
16								

Comments: Samples may contain elevated Mg and Ca levels. Please analyze with minimal dilution to achieve best DLs. Samples have been preserved with nitric acid.

Relinquished By: Paloma Spina	Company: Anchor QEA
Signature/Printed Name: Palo Spi	Date/Time
Received By: [signature]	Company: Apex Labs
Signature/Printed Name: Michael Kuchnik	Date/Time: 7-13-21 / 1408
Relinquished By:	Company:
Signature/Printed Name	Date/Time
Received By:	Company:
Signature/Printed Name	Date/Time

Page 1 of 1

DRAFT REPORT

The results provided in this report are PRELIMINARY and are subject to change based on subsequent analysis, QC validation or final data review. Please use these results with the understanding that they may have not been finalized by the laboratory.

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
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ORELAP ID: OR100062

Anchor QEA, LLC	Project: **Alabama Power-Miller**	
6720 SW Macadam Ave. Suite 125	Project Number: **201114-01.03**	**Report ID:**
Portland, OR 97219	Project Manager: **Anthony Dalton-Atha**	A1G0358 - 07 16 21 1551

APEX LABS COOLER RECEIPT FORM

Client: Anchor QEA Element WO#: A1 G0358

Project/Project #: Alabama Power-Miller / 201114-01.03

Delivery Info:

Date/time received: 7-13-21 @ 1408 By: MK

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 7-13-21 @ 1500 By: MK

Chain of Custody included? Yes X No ___ Custody seals? Yes ___ No X

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	5.7						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Gel						
Condition:	good						

Cooler out of temp? (Y/N) Possible reason why: ___

Green dots applied to out of temperature samples? Yes/No

Out of temperature samples form initiated? Yes/No

Sample Inspection: Date/time inspected: 7/13/21 @ 1622 By: ___

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes X No ___ Comments: ___

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments ___

Water samples: pH checked: Yes ___ No ___ NA X pH appropriate? Yes ___ No ___ NA X

Comments: ___

Additional information: ___

Labeled by: Witness: Cooler Inspected by:

DRAFT REPORT

The results provided in this report are PRELIMINARY and are subject to change based on subsequent analysis, QC validation or final data review. Please use these results with the understanding that they may have not been finalized by the laboratory.

June 11, 2021 Service Request No:K2104838

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: CCR-MLR

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory May 04, 2021
For your reference, these analyses have been assigned our service request number **K2104838.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC
Project: CCR-MLR
Sample Matrix: Water

Service Request: K2104838
Date Received: 05/04/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three water samples were received for analysis at ALS Environmental on 05/04/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Noel D. Davis

Date 06/11/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: MLR-MW-6V-20210503			Lab ID: K2104838-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	184		3	15	mg/L	SM 2320 B
Ammonia as Nitrogen	0.373		0.020	0.050	mg/L	350.1
Carbon, Total Organic	1.40		0.07	0.50	mg/L	SM 5310 C
Chloride	21.1		0.04	0.50	mg/L	300.0
Sulfate	329		0.1	1.0	mg/L	300.0
Aluminum, Dissolved	1.7	J	0.5	4.0	ug/L	200.8
Arsenic, Dissolved	1.69		0.09	0.50	ug/L	200.8
Barium, Dissolved	29.3		0.020	0.050	ug/L	200.8
Boron, Dissolved	497		3	10	ug/L	200.8
Calcium, Dissolved	102000		3	21	ug/L	6010C
Chromium, Dissolved	0.07	J	0.03	0.20	ug/L	200.8
Cobalt, Dissolved	0.474		0.009	0.020	ug/L	200.8
Iron, Dissolved	8.7		0.3	2.0	ug/L	200.8
Lithium, Dissolved	92.6		0.50	0.50	ug/L	200.8
Magnesium, Dissolved	27400		0.4	5.3	ug/L	6010C
Manganese, Dissolved	590		0.2	1.0	ug/L	200.8
Molybdenum, Dissolved	7.40		0.03	0.10	ug/L	200.8
Nickel, Dissolved	0.53		0.04	0.20	ug/L	200.8
Potassium, Dissolved	1980		60	420	ug/L	6010C
Silicon, Dissolved	7940		30	210	ug/L	6010C
Sodium, Dissolved	57900		30	210	ug/L	6010C
Zinc, Dissolved	2.2		0.5	2.0	ug/L	200.8
Aluminum	1.5	J	0.5	4.0	ug/L	200.8
Iron	770		0.3	2.0	ug/L	200.8
Manganese	594		0.2	1.0	ug/L	200.8

CLIENT ID: MLR-MW-15-20210503			Lab ID: K2104838-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	51		3	15	mg/L	SM 2320 B
Ammonia as Nitrogen	0.094		0.020	0.050	mg/L	350.1
Carbon, Total Organic	0.23	J	0.07	0.50	mg/L	SM 5310 C
Chloride	17.5		0.02	0.20	mg/L	300.0
Orthophosphate as Phosphorus	0.035	J	0.020	0.050	mg/L	SM 4500-P E
Sulfate	156		0.8	8.0	mg/L	300.0
Aluminum, Dissolved	1.2	J	0.5	4.0	ug/L	200.8
Arsenic, Dissolved	0.21	J	0.09	0.50	ug/L	200.8
Barium, Dissolved	29.7		0.020	0.050	ug/L	200.8
Boron, Dissolved	596		3	10	ug/L	200.8
Calcium, Dissolved	47800		3	21	ug/L	6010C
Chromium, Dissolved	0.10	J	0.03	0.20	ug/L	200.8
Cobalt, Dissolved	0.753		0.009	0.020	ug/L	200.8
Iron, Dissolved	7530		2	10	ug/L	200.8

ALS Environmental

SAMPLE DETECTION SUMMARY

CLIENT ID: MLR-MW-15-20210503		Lab ID: K2104838-002				
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	17.4		0.50	0.50	ug/L	200.8
Magnesium, Dissolved	14500		0.4	5.3	ug/L	6010C
Manganese, Dissolved	609		0.2	1.0	ug/L	200.8
Molybdenum, Dissolved	0.13		0.03	0.10	ug/L	200.8
Nickel, Dissolved	0.93		0.04	0.20	ug/L	200.8
Potassium, Dissolved	1050		60	420	ug/L	6010C
Silicon, Dissolved	15300		30	210	ug/L	6010C
Sodium, Dissolved	24700		30	210	ug/L	6010C
Zinc, Dissolved	2.2		0.5	2.0	ug/L	200.8
Aluminum	1.2	J	0.5	4.0	ug/L	200.8
Iron	9690		2	10	ug/L	200.8
Manganese	602		0.2	1.0	ug/L	200.8

CLIENT ID: MLR-MW-2-20210503		Lab ID: K2104838-003				
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	1.12		0.020	0.050	mg/L	350.1
Carbon, Total Organic	0.90		0.07	0.50	mg/L	SM 5310 C
Chloride	3.98		0.02	0.20	mg/L	300.0
Sulfate	1520		8	80	mg/L	300.0
Aluminum, Dissolved	1.9	J	0.5	4.0	ug/L	200.8
Arsenic, Dissolved	0.21	J	0.09	0.50	ug/L	200.8
Barium, Dissolved	21.1		0.020	0.050	ug/L	200.8
Beryllium, Dissolved	0.145		0.005	0.020	ug/L	200.8
Boron, Dissolved	58.6		0.5	2.0	ug/L	200.8
Calcium, Dissolved	221000		3	21	ug/L	6010C
Chromium, Dissolved	0.11	J	0.03	0.20	ug/L	200.8
Cobalt, Dissolved	57.0		0.009	0.020	ug/L	200.8
Iron, Dissolved	181000		3	20	ug/L	200.8
Lithium, Dissolved	197		1.0	1.0	ug/L	200.8
Magnesium, Dissolved	134000		0.4	5.3	ug/L	6010C
Manganese, Dissolved	3660		0.4	2.0	ug/L	200.8
Molybdenum, Dissolved	0.08	J	0.03	0.10	ug/L	200.8
Nickel, Dissolved	49.3		0.04	0.20	ug/L	200.8
Potassium, Dissolved	4000		60	420	ug/L	6010C
Silicon, Dissolved	9690		30	210	ug/L	6010C
Sodium, Dissolved	103000		30	210	ug/L	6010C
Thallium, Dissolved	0.039		0.009	0.020	ug/L	200.8
Zinc, Dissolved	188		0.5	2.0	ug/L	200.8
Aluminum	14.9		0.5	4.0	ug/L	200.8
Iron	188000		3	20	ug/L	200.8
Manganese	3510		0.4	2.0	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2104838
Project: CCR-MLR/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2104838-001	MLR-MW-6V-20210503	5/3/2021	1315
K2104838-002	MLR-MW-15-20210503	5/3/2021	1330
K2104838-003	MLR-MW-2-20210503	5/3/2021	1345

K2104838
~~K2101836~~ [illegible] 5/4

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number: 503-972-5019	
Date:	5/3/2021
Project Name:	CCR-MLR
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	Fedex Overnight

ANCHOR QEA

Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Arsenic (diss.) 3d TAT	Cobalt, Lithium (diss.) 3d TAT	Dissolved metals	Total Metals (Al, Fe, Mn)	Anions	Ortho-Phosphate	Alkalinity	Total Organic Carbon	Ammonia as N								Comments/Preservation
1	MLR-MW-6V-20210503	5/3/3021	13:15	Water	6	X		X	X	X	X	X	X	X								HNO_3 preserved, filtered
2	MLR-MW-15-20210503	5/3/3021	13:30	Water	6			X	X	X	X	X	X	X								HNO_3 preserved, filtered
3	MLR-MW-2-20210503	5/3/3021	13:45	Water	6		X	X	X	X	X	X	X	X								HNO_3 preserved, filtered
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						

Notes: **Please analyze all analytes with Standard TAT on this page otherwise noted.** For specific dissolved metals, please analyze with 3 day TAT if possible.
Dissolved metals: Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Se, Si, Ag, Na, Tl, Zn). Anions (Cl, F, nitrate, nitrite, Sulfate)

Relinquished by:	Company:
Masa Kanematsu	Anchor QEA
Signature/Print Name:	Date/Time:
[signature]	5/3/2020 16:40

Received by:	Company:
[signature] Jwerf	ALS 5/4/21 0950
Signature/Print Name:	Date/Time:

Relinquished by:	Company:
Signature/Print Name:	Date/Time:

Received by:	Company:
Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Page 1 of 1

K2104838 PM MH

Cooler Receipt and Preservation Form

Client Anchor QEA Service Request K21 ~~04836~~ 5/4

Received: 5/4/21 Opened: 5/4/21 By: [signature] Unloaded: 5/4/21 By: [signature]

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified if out of temp	Tracking Number NA	Filed
5.4	—	IR01				7736 1943 0275	

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* ______
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was Cl2/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ______

RUSH

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client: Anchor QEA, LLC **Service Request:** K2104838
Project: CCR-MLR/201114-01.03 Task 02

Sample Name: MLR-MW-6V-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-001 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE
300.0		KABROWN
350.1	ESCHLOSS	ESCHLOSS
6010C	ABOYER	RMOORE
SM 2320 B		GOLSON
SM 4500-P E		BNETLING
SM 5310 C		MSPECHT

Sample Name: MLR-MW-6V-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-001.R01 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE
300.0		KABROWN

Sample Name: MLR-MW-15-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-002 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE
300.0		KABROWN
350.1	ESCHLOSS	ESCHLOSS
6010C	ABOYER	RMOORE
SM 2320 B		GOLSON
SM 4500-P E		BNETLING
SM 5310 C		MSPECHT

Client: Anchor QEA, LLC **Service Request:** K2104838
Project: CCR-MLR/201114-01.03 Task 02

Sample Name: MLR-MW-15-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-002.R01 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE
300.0		KABROWN

Sample Name: MLR-MW-2-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-003 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE
300.0		KABROWN
350.1	ESCHLOSS	ESCHLOSS
6010C	ABOYER	RMOORE
SM 2320 B		GOLSON
SM 4500-P E		BNETLING
SM 5310 C		MSPECHT

Sample Name: MLR-MW-2-20210503 **Date Collected:** 05/3/21
Lab Code: K2104838-003.R01 **Date Received:** 05/4/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
300.0		KABROWN
SM 2320 B		GOLSON

Sample Results

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Metals

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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:15
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-6V-20210503	**Basis:**	NA
Lab Code:	K2104838-001		

Dissolved Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.7**	**J**	ug/L	4.0	0.5	1	06/10/21 16:11	05/28/21	
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	06/10/21 16:11	05/28/21	
Arsenic	200.8	**1.69**		ug/L	0.50	0.09	1	06/10/21 16:11	05/28/21	
Barium	200.8	**29.3**		ug/L	0.050	0.020	1	06/10/21 16:11	05/28/21	
Beryllium	200.8	ND	U	ug/L	0.10	0.03	5	06/10/21 14:12	05/28/21	
Boron	200.8	**497**		ug/L	10	3	5	06/10/21 14:12	05/28/21	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	06/10/21 16:11	05/28/21	
Calcium	6010C	**102000**		ug/L	21	3	1	05/25/21 18:05	05/07/21	
Chromium	200.8	**0.07**	**J**	ug/L	0.20	0.03	1	06/10/21 16:11	05/28/21	
Cobalt	200.8	**0.474**		ug/L	0.020	0.009	1	06/10/21 16:11	05/28/21	
Iron	200.8	**8.7**		ug/L	2.0	0.3	1	06/10/21 16:11	05/28/21	
Lead	200.8	ND	U	ug/L	0.020	0.006	1	06/10/21 16:11	05/28/21	
Lithium	200.8	**92.6**		ug/L	0.50	0.50	5	06/10/21 14:12	05/28/21	
Magnesium	6010C	**27400**		ug/L	5.3	0.4	1	05/25/21 18:05	05/07/21	
Manganese	200.8	**590**		ug/L	1.0	0.2	5	06/10/21 14:12	05/28/21	
Molybdenum	200.8	**7.40**		ug/L	0.10	0.03	1	06/10/21 16:11	05/28/21	
Nickel	200.8	**0.53**		ug/L	0.20	0.04	1	06/10/21 16:11	05/28/21	
Potassium	6010C	**1980**		ug/L	420	60	1	05/25/21 18:05	05/07/21	
Selenium	200.8	ND	U	ug/L	5.0	1.0	5	06/10/21 17:06	05/28/21	
Silicon	6010C	**7940**		ug/L	210	30	1	05/25/21 18:05	05/07/21	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	06/10/21 16:11	05/28/21	
Sodium	6010C	**57900**		ug/L	210	30	1	05/25/21 18:05	05/07/21	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	06/10/21 16:11	05/28/21	
Zinc	200.8	**2.2**		ug/L	2.0	0.5	1	06/10/21 16:11	05/28/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:15
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-6V-20210503	**Basis:**	NA
Lab Code:	K2104838-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.5 J**	ug/L	4.0	0.5	1	06/10/21 16:06	05/28/21	
Iron	200.8	**770**	ug/L	2.0	0.3	1	06/10/21 16:06	05/28/21	
Manganese	200.8	**594**	ug/L	1.0	0.2	5	06/10/21 13:57	05/28/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:30
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-15-20210503	**Basis:**	NA
Lab Code:	K2104838-002		

Dissolved Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.2**	**J**	ug/L	4.0	0.5	1	06/10/21 16:14	05/28/21	
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	06/10/21 16:14	05/28/21	
Arsenic	200.8	**0.21**	**J**	ug/L	0.50	0.09	1	06/10/21 16:14	05/28/21	
Barium	200.8	**29.7**		ug/L	0.050	0.020	1	06/10/21 16:14	05/28/21	
Beryllium	200.8	ND	U	ug/L	0.10	0.03	5	06/10/21 14:15	05/28/21	
Boron	200.8	**596**		ug/L	10	3	5	06/10/21 14:15	05/28/21	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	06/10/21 16:14	05/28/21	
Calcium	6010C	**47800**		ug/L	21	3	1	05/25/21 18:15	05/07/21	
Chromium	200.8	**0.10**	**J**	ug/L	0.20	0.03	1	06/10/21 16:14	05/28/21	
Cobalt	200.8	**0.753**		ug/L	0.020	0.009	1	06/10/21 16:14	05/28/21	
Iron	200.8	**7530**		ug/L	10	2	5	06/10/21 14:15	05/28/21	
Lead	200.8	ND	U	ug/L	0.020	0.006	1	06/10/21 16:14	05/28/21	
Lithium	200.8	**17.4**		ug/L	0.50	0.50	5	06/10/21 14:15	05/28/21	
Magnesium	6010C	**14500**		ug/L	5.3	0.4	1	05/25/21 18:15	05/07/21	
Manganese	200.8	**609**		ug/L	1.0	0.2	5	06/10/21 14:15	05/28/21	
Molybdenum	200.8	**0.13**		ug/L	0.10	0.03	1	06/10/21 16:14	05/28/21	
Nickel	200.8	**0.93**		ug/L	0.20	0.04	1	06/10/21 16:14	05/28/21	
Potassium	6010C	**1050**		ug/L	420	60	1	05/25/21 18:15	05/07/21	
Selenium	200.8	ND	U	ug/L	5.0	1.0	5	06/10/21 17:07	05/28/21	
Silicon	6010C	**15300**		ug/L	210	30	1	05/25/21 18:15	05/07/21	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	06/10/21 16:14	05/28/21	
Sodium	6010C	**24700**		ug/L	210	30	1	05/25/21 18:15	05/07/21	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	06/10/21 16:14	05/28/21	
Zinc	200.8	**2.2**		ug/L	2.0	0.5	1	06/10/21 16:14	05/28/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:30
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-15-20210503	**Basis:**	NA
Lab Code:	K2104838-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.2 J**	ug/L	4.0	0.5	1	06/10/21 16:08	05/28/21	
Iron	200.8	**9690**	ug/L	10	2	5	06/10/21 14:00	05/28/21	
Manganese	200.8	**602**	ug/L	1.0	0.2	5	06/10/21 14:00	05/28/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:45
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-2-20210503	**Basis:**	NA
Lab Code:	K2104838-003		

Dissolved Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.9**	**J**	ug/L	4.0	0.5	1	06/10/21 14:25	05/28/21	
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	06/10/21 14:25	05/28/21	
Arsenic	200.8	**0.21**	**J**	ug/L	0.50	0.09	1	06/10/21 14:25	05/28/21	
Barium	200.8	**21.1**		ug/L	0.050	0.020	1	06/10/21 14:25	05/28/21	
Beryllium	200.8	**0.145**		ug/L	0.020	0.005	1	06/10/21 14:25	05/28/21	
Boron	200.8	**58.6**		ug/L	2.0	0.5	1	06/10/21 14:25	05/28/21	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	06/10/21 14:25	05/28/21	
Calcium	6010C	**221000**		ug/L	21	3	1	05/25/21 18:18	05/07/21	
Chromium	200.8	**0.11**	**J**	ug/L	0.20	0.03	1	06/10/21 14:25	05/28/21	
Cobalt	200.8	**57.0**		ug/L	0.020	0.009	1	06/10/21 14:25	05/28/21	
Iron	200.8	**181000**		ug/L	20	3	10	06/10/21 14:18	05/28/21	
Lead	200.8	ND	U	ug/L	0.020	0.006	1	06/10/21 14:25	05/28/21	
Lithium	200.8	**197**		ug/L	1.0	1.0	10	06/10/21 14:18	05/28/21	
Magnesium	6010C	**134000**		ug/L	5.3	0.4	1	05/25/21 18:18	05/07/21	
Manganese	200.8	**3660**		ug/L	2.0	0.4	10	06/10/21 14:18	05/28/21	
Molybdenum	200.8	**0.08**	**J**	ug/L	0.10	0.03	1	06/10/21 14:25	05/28/21	
Nickel	200.8	**49.3**		ug/L	0.20	0.04	1	06/10/21 14:25	05/28/21	
Potassium	6010C	**4000**		ug/L	420	60	1	05/25/21 18:18	05/07/21	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	06/10/21 14:25	05/28/21	
Silicon	6010C	**9690**		ug/L	210	30	1	05/25/21 18:18	05/07/21	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	06/10/21 14:25	05/28/21	
Sodium	6010C	**103000**		ug/L	210	30	1	05/25/21 18:18	05/07/21	
Thallium	200.8	**0.039**		ug/L	0.020	0.009	1	06/10/21 14:25	05/28/21	
Zinc	200.8	**188**		ug/L	2.0	0.5	1	06/10/21 14:25	05/28/21	

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dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:45
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-2-20210503	**Basis:**	NA
Lab Code:	K2104838-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**14.9**	ug/L	4.0	0.5	1	06/10/21 14:22	05/28/21	
Iron	200.8	**188000**	ug/L	20	3	10	06/10/21 14:10	05/28/21	
Manganese	200.8	**3510**	ug/L	2.0	0.4	10	06/10/21 14:10	05/28/21	

General Chemistry

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:15
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-6V-20210503	**Basis:**	NA
Lab Code:	K2104838-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Alkalinity as CaCO3, Total	SM 2320 B	**184**		mg/L	15	3	1	05/05/21 18:30	NA	
Ammonia as Nitrogen	350.1	**0.373**		mg/L	0.050	0.020	1	05/06/21 11:48	05/06/21	
Carbon, Total Organic	SM 5310 C	**1.40**		mg/L	0.50	0.07	1	05/17/21 14:51	NA	
Chloride	300.0	**21.1**		mg/L	0.50	0.04	5	05/05/21 18:23	NA	
Fluoride	300.0	ND	U	mg/L	0.20	0.01	2	05/04/21 19:56	NA	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.10	0.02	2	05/04/21 19:56	NA	
Nitrite as Nitrogen	300.0	ND	U	mg/L	0.10	0.006	2	05/04/21 19:56	NA	
Orthophosphate as Phosphorus	SM 4500-P E	ND	U	mg/L	0.050	0.020	1	05/04/21 15:20	NA	
Sulfate	300.0	**329**		mg/L	1.0	0.1	5	05/05/21 18:23	NA	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21 13:30
Sample Matrix:	Water	**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-15-20210503	**Basis:**	NA
Lab Code:	K2104838-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Alkalinity as CaCO3, Total	SM 2320 B	**51**		mg/L	15	3	1	05/05/21 18:30	NA	
Ammonia as Nitrogen	350.1	**0.094**		mg/L	0.050	0.020	1	05/06/21 11:48	05/06/21	
Carbon, Total Organic	SM 5310 C	**0.23**	**J**	mg/L	0.50	0.07	1	05/17/21 14:51	NA	
Chloride	300.0	**17.5**		mg/L	0.20	0.02	2	05/04/21 20:07	NA	
Fluoride	300.0	ND	U	mg/L	0.20	0.01	2	05/04/21 20:07	NA	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.10	0.02	2	05/04/21 20:07	NA	
Nitrite as Nitrogen	300.0	ND	U	mg/L	0.10	0.006	2	05/04/21 20:07	NA	
Orthophosphate as Phosphorus	SM 4500-P E	**0.035**	**J**	mg/L	0.050	0.020	1	05/04/21 15:20	NA	
Sulfate	300.0	**156**		mg/L	8.0	0.8	40	05/05/21 19:01	NA	

Client:	Anchor QEA, LLC		**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02		**Date Collected:**	05/03/21 13:45
Sample Matrix:	Water		**Date Received:**	05/04/21 09:50
Sample Name:	MLR-MW-2-20210503		**Basis:**	NA
Lab Code:	K2104838-003			

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND	U	mg/L	15	3	1	05/07/21 18:54	NA	
Ammonia as Nitrogen	350.1	**1.12**		mg/L	0.050	0.020	1	05/06/21 11:48	05/06/21	
Carbon, Total Organic	SM 5310 C	**0.90**		mg/L	0.50	0.07	1	05/17/21 14:51	NA	
Chloride	300.0	**3.98**		mg/L	0.20	0.02	2	05/04/21 20:19	NA	
Fluoride	300.0	ND	U	mg/L	0.20	0.01	2	05/04/21 20:19	NA	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.10	0.02	2	05/04/21 20:19	NA	
Nitrite as Nitrogen	300.0	ND	U	mg/L	0.10	0.006	2	05/04/21 20:19	NA	
Orthophosphate as Phosphorus	SM 4500-P E	ND	U	mg/L	0.050	0.020	1	05/04/21 15:20	NA	
Sulfate	300.0	**1520**		mg/L	80	8	400	05/05/21 19:11	NA	

QC Summary Forms

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Metals

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2107495-02		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	6010C	ND U	ug/L	21	3	1	05/25/21 16:48	05/07/21	
Magnesium	6010C	ND U	ug/L	5.3	0.4	1	05/25/21 16:48	05/07/21	
Potassium	6010C	ND U	ug/L	420	60	1	05/25/21 16:48	05/07/21	
Silicon	6010C	**40 J**	ug/L	210	30	1	05/25/21 16:48	05/07/21	
Sodium	6010C	ND U	ug/L	210	30	1	05/25/21 16:48	05/07/21	

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Analytical Report

Client:	Anchor QEA, LLC		**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02		**Date Collected:**	NA
Sample Matrix:	Water		**Date Received:**	NA
Sample Name:	Method Blank		**Basis:**	NA
Lab Code:	KQ2108786-01			

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.1 J**	ug/L	4.0	0.5	1	06/10/21 13:02	05/28/21	
Antimony	200.8	ND U	ug/L	0.050	0.020	1	06/10/21 13:02	05/28/21	
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	06/10/21 13:02	05/28/21	
Barium	200.8	ND U	ug/L	0.050	0.020	1	06/10/21 13:02	05/28/21	
Beryllium	200.8	ND U	ug/L	0.020	0.005	1	06/10/21 13:02	05/28/21	
Boron	200.8	ND U	ug/L	2.0	0.5	1	06/10/21 13:02	05/28/21	
Cadmium	200.8	ND U	ug/L	0.020	0.008	1	06/10/21 13:02	05/28/21	
Chromium	200.8	ND U	ug/L	0.20	0.03	1	06/10/21 13:02	05/28/21	
Cobalt	200.8	ND U	ug/L	0.020	0.009	1	06/10/21 13:02	05/28/21	
Iron	200.8	ND U	ug/L	2.0	0.3	1	06/10/21 13:02	05/28/21	
Lead	200.8	ND U	ug/L	0.020	0.006	1	06/10/21 13:02	05/28/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	06/10/21 13:02	05/28/21	
Manganese	200.8	ND U	ug/L	0.20	0.04	1	06/10/21 13:02	05/28/21	
Molybdenum	200.8	ND U	ug/L	0.10	0.03	1	06/10/21 13:02	05/28/21	
Nickel	200.8	ND U	ug/L	0.20	0.04	1	06/10/21 13:02	05/28/21	
Selenium	200.8	ND U	ug/L	1.0	0.2	1	06/10/21 13:02	05/28/21	
Silver	200.8	ND U	ug/L	0.020	0.009	1	06/10/21 13:02	05/28/21	
Thallium	200.8	ND U	ug/L	0.020	0.009	1	06/10/21 13:02	05/28/21	
Zinc	200.8	ND U	ug/L	2.0	0.5	1	06/10/21 13:02	05/28/21	

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QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	05/25/21
Sample Matrix:	Water		

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2107495-01

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Calcium	6010C	12600	12500	101	80-120
Magnesium	6010C	12700	12500	102	80-120
Potassium	6010C	12600	12500	101	80-120
Sodium	6010C	12600	12500	101	80-120

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	05/25/21
Sample Matrix:	Water		

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2107495-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Silicon	6010C	10100	10000	101	80-120

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	06/10/21
Sample Matrix:	Water		

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2108786-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	105	100	105	85-115
Iron	200.8	49.6	50.0	99	85-115
Manganese	200.8	25.0	25.0	100	85-115

Client: Anchor QEA, LLC
Project: CCR-MLR/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2104838
Date Analyzed: 06/10/21

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2108786-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony	200.8	9.85	10.0	98	85-115
Arsenic	200.8	49.2	50.0	98	85-115
Barium	200.8	98.0	100	98	85-115
Beryllium	200.8	2.51	2.50	100	85-115
Boron	200.8	24.2	25.0	97	85-115
Cadmium	200.8	25.1	25.0	100	85-115
Chromium	200.8	9.66	10.0	97	85-115
Cobalt	200.8	24.2	25.0	97	85-115
Lead	200.8	50.5	50.0	101	85-115
Lithium	200.8	47.8	50.0	96	85-115
Molybdenum	200.8	26.0	25.0	104	85-115
Nickel	200.8	24.8	25.0	99	85-115
Selenium	200.8	53.0	50.0	106	85-115
Silver	200.8	12.2	12.5	98	85-115
Thallium	200.8	51.6	50.0	103	85-115
Zinc	200.8	25.3	25.0	101	85-115

General Chemistry

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Client:	Anchor QEA, LLC		**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02		**Date Collected:**	NA
Sample Matrix:	Water		**Date Received:**	NA
Sample Name:	Method Blank		**Basis:**	NA
Lab Code:	K2104838-MB1			

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Alkalinity as CaCO3, Total	SM 2320 B	**5**	**J**	mg/L	15	3	1	05/05/21 18:30	NA	
Ammonia as Nitrogen	350.1	ND	U	mg/L	0.050	0.020	1	05/06/21 11:48	05/06/21	
Carbon, Total Organic	SM 5310 C	ND	U	mg/L	0.50	0.07	1	05/17/21 14:51	NA	
Chloride	300.0	ND	U	mg/L	0.10	0.007	1	05/04/21 10:32	NA	
Fluoride	300.0	ND	U	mg/L	0.10	0.005	1	05/04/21 10:32	NA	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.050	0.007	1	05/04/21 10:32	NA	
Nitrite as Nitrogen	300.0	ND	U	mg/L	0.050	0.003	1	05/04/21 10:32	NA	
Orthophosphate as Phosphorus	SM 4500-P E	ND	U	mg/L	0.050	0.020	1	05/04/21 15:20	NA	
Sulfate	300.0	**0.05**	**J**	mg/L	0.20	0.02	1	05/05/21 15:45	NA	

Analytical Report

Client:	Anchor QEA, LLC		**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02		**Date Collected:**	NA
Sample Matrix:	Water		**Date Received:**	NA
Sample Name:	Method Blank		**Basis:**	NA
Lab Code:	K2104838-MB2			

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**51**	mg/L	15	3	1	05/07/21 18:54	
Chloride	300.0	ND U	mg/L	0.10	0.007	1	05/04/21 19:09	
Fluoride	300.0	ND U	mg/L	0.10	0.005	1	05/04/21 19:09	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.007	1	05/04/21 19:09	
Nitrite as Nitrogen	300.0	ND U	mg/L	0.050	0.003	1	05/04/21 19:09	

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2104838-MB3		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	300.0	ND U	mg/L	0.10	0.007	1	05/05/21 15:45	

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21
Sample Matrix:	Water	**Date Received:**	05/04/21
		Date Analyzed:	05/5/21
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Chloride

Sample Name:	MLR-MW-6V-20210503	**Units:**	mg/L
Lab Code:	K2104838-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	None		

		Matrix Spike K2104838-001MS			Duplicate Matrix Spike K2104838-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloride	21.1	40.2	20.0	96	39.3	20.0	91	90-110	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project	CCR-MLR/201114-01.03 Task 02	**Date Collected:**	05/03/21
Sample Matrix:	Water	**Date Received:**	05/04/21
		Date Analyzed:	05/05/21

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	MLR-MW-6V-20210503	**Units:**	mg/L
Lab Code:	K2104838-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2104838-001DUP Result	Average	RPD	RPD Limit
Chloride	300.0	0.50	0.04	21.1	20.2	20.6	4	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	05/04/21 - 05/17/21
Sample Matrix:	Water		

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2104838-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	182	180	101	90-110
Ammonia as Nitrogen	350.1	5.56	5.36	104	86-114
Carbon, Total Organic	SM 5310 C	26.3	25.0	105	83-117
Chloride	300.0	4.69	5.00	94	90-110
Fluoride	300.0	4.76	5.00	95	90-110
Nitrate as Nitrogen	300.0	2.38	2.50	95	90-110
Nitrite as Nitrogen	300.0	2.37	2.50	95	90-110
Orthophosphate as Phosphorus	SM 4500-P E	1.54	1.57	98	85-115
Sulfate	300.0	4.86	5.00	97	90-110

Client: Anchor QEA, LLC
Project: CCR-MLR/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2104838
Date Analyzed: 05/04/21 - 05/05/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2104838-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	195	180	108	90-110
Chloride	300.0	4.81	5.00	96	90-110
Fluoride	300.0	5.04	5.00	101	90-110
Nitrate as Nitrogen	300.0	2.43	2.50	97	90-110
Nitrite as Nitrogen	300.0	2.41	2.50	97	90-110

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	05/05/21 - 05/07/21
Sample Matrix:	Water		

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2104838-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	184	180	102	90-110
Chloride	300.0	4.68	5.00	94	90-110

Client:	Anchor QEA, LLC	**Service Request:**	K2104838
Project:	CCR-MLR/201114-01.03 Task 02	**Date Analyzed:**	05/07/21
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Alkalinity as CaCO3, Total

Analysis Method:	SM 2320 B	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	722671

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2104838-LCS4	183	180	102	90-110

July 21, 2021 Service Request No:K2107402

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107402.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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Narrative Documents

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ALS Environmental

Client: Anchor QEA, LLC
Project: Green County
Sample Matrix: Water

Service Request: K2107402
Date Received: 06/25/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Fifteen water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by ____________________ Date 07/21/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-INF-MW-2-1	Lab ID: K2107402-001					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	166		0.05	0.10	ug/L	200.8
Lithium, Dissolved	204		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-1	Lab ID: K2107402-002					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	134		0.05	0.10	ug/L	200.8
Lithium, Dissolved	102		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-1	Lab ID: K2107402-003					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	1520		0.05	0.10	ug/L	200.8
Lithium, Dissolved	146		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-2	Lab ID: K2107402-004					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	168		0.05	0.10	ug/L	200.8
Lithium, Dissolved	169		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-2	Lab ID: K2107402-005					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	1020		0.05	0.10	ug/L	200.8
Lithium, Dissolved	184		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-3	Lab ID: K2107402-006					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	164		0.05	0.10	ug/L	200.8
Lithium, Dissolved	191		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-3	Lab ID: K2107402-007					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	174		0.05	0.10	ug/L	200.8
Lithium, Dissolved	181		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-3	Lab ID: K2107402-008					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	384		0.05	0.10	ug/L	200.8
Lithium, Dissolved	194		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-4	Lab ID: K2107402-009					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	181		0.05	0.10	ug/L	200.8
Lithium, Dissolved	183		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-4	Lab ID: K2107402-010					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	448		0.05	0.10	ug/L	200.8

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-6-4	Lab ID: K2107402-010					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-5	Lab ID: K2107402-011					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	165		0.05	0.10	ug/L	200.8
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-5	Lab ID: K2107402-012					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	169		0.05	0.10	ug/L	200.8
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-5	Lab ID: K2107402-013					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	342		0.05	0.10	ug/L	200.8
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-6	Lab ID: K2107402-014					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	167		0.05	0.10	ug/L	200.8
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-6	Lab ID: K2107402-015					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	167		0.05	0.10	ug/L	200.8
Lithium, Dissolved	195		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2107402

Project: Green County/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107402-001	ML-COL-INF-MW-2-1	6/15/2021	1430
K2107402-002	ML-COL-5-1	6/15/2021	1430
K2107402-003	ML-COL-6-1	6/15/2021	1430
K2107402-004	ML-COL-5-2	6/15/2021	1800
K2107402-005	ML-COL-6-2	6/15/2021	1800
K2107402-006	ML-COL-INF-MW-2-3	6/16/2021	1300
K2107402-007	ML-COL-5-3	6/16/2021	1300
K2107402-008	ML-COL-6-3	6/16/2021	1300
K2107402-009	ML-COL-5-4	6/16/2021	1735
K2107402-010	ML-COL-6-4	6/16/2021	1735
K2107402-011	ML-COL-INF-MW-2-5	6/17/2021	1400
K2107402-012	ML-COL-5-5	6/17/2021	1400
K2107402-013	ML-COL-6-5	6/17/2021	1400
K2107402-014	ML-COL-INF-MW-2-6	6/18/2021	1300
K2107402-015	ML-COL-5-6	6/18/2021	1300

K2107402

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number: 503-972-5019	
Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA

Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Parameters: Cobalt, Lithium (dissolved, Method 200.8)	Comments/Preservation
1	ML-COL-INF-MW-2-1	6/15/2021	14:30	Water	1	X	HNO_3 preserved, filtered
2	ML-COL-5-1	6/15/2021	14:30	Water	1	X	HNO_3 preserved, filtered
3	ML-COL-6-1	6/15/2021	14:30	Water	1	X	HNO_3 preserved, filtered
4	ML-COL-5-2	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
5	ML-COL-6-2	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
6	ML-COL-INF-MW-2-3	6/16/2021	13:00	Water	1	X	HNO_3 preserved, filtered
7	ML-COL-5-3	6/16/2021	13:00	Water	1	X	HNO_3 preserved, filtered
8	ML-COL-6-3	6/16/2021	13:00	Water	1	X	HNO_3 preserved, filtered
9	ML-COL-5-4	6/16/2021	17:35	Water	1	X	HNO_3 preserved, filtered
10	ML-COL-6-4	6/16/2021	17:35	Water	1	X	HNO_3 preserved, filtered
11	ML-COL-INF-MW-2-5	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
12	ML-COL-5-5	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
13	ML-COL-6-5	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
14	ML-COL-INF-MW-2-6	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
15	ML-COL-5-6	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered

Notes: **Please analyze all analytes with** standard TAT **on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**

Desired reporting limits : Co (<1 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:
[signature]	6/25/2021 9:00	Perry Jones	6/25/21 1335
Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

PM M H

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07402

Received: 6-25-21 Opened: 6-25-21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ______ ***NA***
3. Were custody seals on coolers? **NA** Y N If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA **Y** N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA **Y** N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. **NA** Y ~~N~~ PJ

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.5		IR01					

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ______
7. Were custody papers properly filled out (ink, signed, etc.)? NA **Y** N
8. Were samples received in good condition (unbroken) NA **Y** N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA **Y** N
10. Did all sample labels and tags agree with custody papers? NA **Y** N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA **Y** N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA **Y** N
13. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y N
14. Was C12/Res negative? **NA** Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ______

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- `*` The result is an outlier. See case narrative.
- `#` The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- `#` The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- `+` The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- `*` The result is an outlier. See case narrative.
- `#` The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Anchor QEA, LLC
Service Request: K2107402
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-INF-MW-2-1
Date Collected: 06/15/21
Lab Code: K2107402-001
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-5-1
Date Collected: 06/15/21
Lab Code: K2107402-002
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-6-1
Date Collected: 06/15/21
Lab Code: K2107402-003
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-5-2
Date Collected: 06/15/21
Lab Code: K2107402-004
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-6-2
Date Collected: 06/15/21
Lab Code: K2107402-005
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Analyst Summary report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02		

Sample Name:	ML-COL-INF-MW-2-3	**Date Collected:**	06/16/21
Lab Code:	K2107402-006	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-5-3	**Date Collected:**	06/16/21
Lab Code:	K2107402-007	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-6-3	**Date Collected:**	06/16/21
Lab Code:	K2107402-008	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-5-4	**Date Collected:**	06/16/21
Lab Code:	K2107402-009	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-6-4	**Date Collected:**	06/16/21
Lab Code:	K2107402-010	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client: Anchor QEA, LLC
Service Request: K2107402
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-INF-MW-2-5
Date Collected: 06/17/21
Lab Code: K2107402-011
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-5-5
Date Collected: 06/17/21
Lab Code: K2107402-012
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-6-5
Date Collected: 06/17/21
Lab Code: K2107402-013
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-2-6
Date Collected: 06/18/21
Lab Code: K2107402-014
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-5-6
Date Collected: 06/18/21
Lab Code: K2107402-015
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 14:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-1	**Basis:**	NA
Lab Code:	K2107402-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**166**	ug/L	0.10	0.05	5	07/19/21 15:17	07/01/21	
Lithium	200.8	**204**	ug/L	0.50	0.50	5	07/19/21 15:17	07/01/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 14:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-1	**Basis:**	NA
Lab Code:	K2107402-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**134**	ug/L	0.10	0.05	5	07/19/21 15:22	07/01/21	
Lithium	200.8	**102**	ug/L	0.50	0.50	5	07/19/21 15:22	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 14:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-1	**Basis:**	NA
Lab Code:	K2107402-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**1520**	ug/L	0.10	0.05	5	07/19/21 15:26	07/01/21	
Lithium	200.8	**146**	ug/L	0.50	0.50	5	07/19/21 15:26	07/01/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-2	**Basis:**	NA
Lab Code:	K2107402-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**168**	ug/L	0.10	0.05	5	07/19/21 15:28	07/01/21	
Lithium	200.8	**169**	ug/L	0.50	0.50	5	07/19/21 15:28	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-2	**Basis:**	NA
Lab Code:	K2107402-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**1020**	ug/L	0.10	0.05	5	07/19/21 15:33	07/01/21	
Lithium	200.8	**184**	ug/L	0.50	0.50	5	07/19/21 15:33	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-3	**Basis:**	NA
Lab Code:	K2107402-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**164**	ug/L	0.10	0.05	5	07/19/21 15:34	07/01/21	
Lithium	200.8	**191**	ug/L	0.50	0.50	5	07/19/21 15:34	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-3	**Basis:**	NA
Lab Code:	K2107402-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**174**	ug/L	0.10	0.05	5	07/19/21 15:36	07/01/21	
Lithium	200.8	**181**	ug/L	0.50	0.50	5	07/19/21 15:36	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-3	**Basis:**	NA
Lab Code:	K2107402-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**384**	ug/L	0.10	0.05	5	07/19/21 15:38	07/01/21	
Lithium	200.8	**194**	ug/L	0.50	0.50	5	07/19/21 15:38	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 17:35
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-4	**Basis:**	NA
Lab Code:	K2107402-009		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**181**	ug/L	0.10	0.05	5	07/19/21 15:39	07/01/21	
Lithium	200.8	**183**	ug/L	0.50	0.50	5	07/19/21 15:39	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 17:35
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-4	**Basis:**	NA
Lab Code:	K2107402-010		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**448**	ug/L	0.10	0.05	5	07/19/21 15:41	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:41	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-5	**Basis:**	NA
Lab Code:	K2107402-011		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**165**	ug/L	0.10	0.05	5	07/19/21 15:42	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:42	07/01/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-5	**Basis:**	NA
Lab Code:	K2107402-012		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**169**	ug/L	0.10	0.05	5	07/19/21 15:44	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:44	07/01/21	

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107402
Date Collected: 06/17/21 14:00
Date Received: 06/25/21 13:35

Sample Name: ML-COL-6-5
Lab Code: K2107402-013

Basis: NA

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**342**	ug/L	0.10	0.05	5	07/19/21 15:46	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:46	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-6	**Basis:**	NA
Lab Code:	K2107402-014		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**167**	ug/L	0.10	0.05	5	07/19/21 15:47	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:47	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-6	**Basis:**	NA
Lab Code:	K2107402-015		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**167**	ug/L	0.10	0.05	5	07/19/21 15:52	07/01/21	
Lithium	200.8	**195**	ug/L	0.50	0.50	5	07/19/21 15:52	07/01/21	

ALS Environmental

QC Summary Forms

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Metals

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111980-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	ND U	ug/L	0.020	0.009	1	07/19/21 15:14	07/01/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	07/19/21 15:14	07/01/21	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/1/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-INF-MW-2-1	**Units:**	ug/L
Lab Code:	K2107402-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111980-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Cobalt	166	191	25.0	102 #	70-130
Lithium	204	249	50.0	91 #	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/1/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-5-1	**Units:**	ug/L
Lab Code:	K2107402-002	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111980-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Cobalt	134	165	25.0	124 #	70-130
Lithium	102	152	50.0	100	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-INF-MW-2-1	**Units:**	ug/L
Lab Code:	K2107402-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111980-03 Result	Average	RPD	RPD Limit
Cobalt	200.8	0.10	0.05	166	162	164	2	20
Lithium	200.8	0.50	0.50	204	198	201	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-5-1	**Units:**	ug/L
Lab Code:	K2107402-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111980-05 Result	Average	RPD	RPD Limit
Cobalt	200.8	0.10	0.05	134	138	136	3	20
Lithium	200.8	0.50	0.50	102	103	103	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Anchor QEA, LLC	**Service Request:**	K2107402
Project:	Green County/201114-01.03 Task 02	**Date Analyzed:**	07/19/21
Sample Matrix:	Water		

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2111980-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Cobalt	200.8	26.5	25.0	106	85-115
Lithium	200.8	51.8	50.0	104	85-115

July 21, 2021 Service Request No:K2107404

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107404.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

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Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County	**Date Received:**	06/25/2021
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Ten water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by ______________________ Date 07/21/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-6-6			Lab ID: K2107404-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	209		0.05	0.10	ug/L	200.8
Lithium, Dissolved	198		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-7			Lab ID: K2107404-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	167		0.05	0.10	ug/L	200.8
Lithium, Dissolved	194		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-7			Lab ID: K2107404-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	167		0.05	0.10	ug/L	200.8
Lithium, Dissolved	193		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-7			Lab ID: K2107404-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	180		0.05	0.10	ug/L	200.8
Lithium, Dissolved	192		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-8			Lab ID: K2107404-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	169		0.05	0.10	ug/L	200.8
Lithium, Dissolved	194		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-8			Lab ID: K2107404-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	168		0.05	0.10	ug/L	200.8
Lithium, Dissolved	190		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-8			Lab ID: K2107404-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	176		0.05	0.10	ug/L	200.8
Lithium, Dissolved	191		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-2-9			Lab ID: K2107404-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	166		0.05	0.10	ug/L	200.8
Lithium, Dissolved	191		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-5-9			Lab ID: K2107404-009			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	166		0.05	0.10	ug/L	200.8
Lithium, Dissolved	191		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-6-9			Lab ID: K2107404-010			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt, Dissolved	175		0.05	0.10	ug/L	200.8

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-6-9	Lab ID: K2107404-010					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	189		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107404-001	ML-COL-6-6	6/18/2021	1300
K2107404-002	ML-COL-INF-MW-2-7	6/20/2021	1040
K2107404-003	ML-COL-5-7	6/20/2021	1040
K2107404-004	ML-COL-6-7	6/20/2021	1040
K2107404-005	ML-COL-INF-MW-2-8	6/22/2021	1515
K2107404-006	ML-COL-5-8	6/22/2021	1515
K2107404-007	ML-COL-6-8	6/22/2021	1515
K2107404-008	ML-COL-INF-MW-2-9	6/24/2021	1628
K2107404-009	ML-COL-5-9	6/22/2021	1628
K2107404-010	ML-COL-6-9	6/22/2021	1628

K2107404

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number:	503-972-5019
Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA

Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Parameters: Cobalt, Lithium (dissolved, Method 200.8)															Comments/Preservation
16	ML-COL-6-6	6/18/2021	13:00	Water	1	X															HNO_3 preserved, filtered
17	ML-COL-INF-MW-2-7	6/20/2021	10:40	Water	1	X															HNO_3 preserved, filtered
18	ML-COL-5-7	6/20/2021	10:40	Water	1	X															HNO_3 preserved, filtered
19	ML-COL-6-7	6/20/2021	10:40	Water	1	X															HNO_3 preserved, filtered
20	ML-COL-INF-MW-2-8	6/22/2021	15:15	Water	1	X															HNO_3 preserved, filtered
21	ML-COL-5-8	6/22/2021	15:15	Water	1	X															HNO_3 preserved, filtered
22	ML-COL-6-8	6/22/2021	15:15	Water	1	X															HNO_3 preserved, filtered
23	ML-COL-INF-MW-2-9	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
24	ML-COL-5-9	6/22/2021	16:28	Water	1	X															HNO_3 preserved, filtered
25	ML-COL-6-9	6/22/2021	16:28	Water	1	X															HNO_3 preserved, filtered
26																					
27																					
28																					
29																					
30																					

Notes: **Please analyze all analytes with** standard TAT **on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**
Desired reporting limits : Co (<1 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	**Date/Time:**	**Signature/Print Name:**	**Date/Time:**
	6/25/2021 9:00	Perry Jones	6/25/21 1335

Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	**Date/Time:**	**Signature/Print Name:**	**Date/Time:**

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

PM M H

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07404

Received: 6-25-21 Opened: 6-25-21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ________ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? ________

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:

   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N

   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y ~~N~~ PJ

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.5		IR01					

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ________
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ________

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
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Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Anchor QEA, LLC **Service Request:** K2107404
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-6-6 **Date Collected:** 06/18/21
Lab Code: K2107404-001 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-2-7 **Date Collected:** 06/20/21
Lab Code: K2107404-002 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-5-7 **Date Collected:** 06/20/21
Lab Code: K2107404-003 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-6-7 **Date Collected:** 06/20/21
Lab Code: K2107404-004 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-2-8 **Date Collected:** 06/22/21
Lab Code: K2107404-005 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02		

Sample Name:	ML-COL-5-8	**Date Collected:**	06/22/21
Lab Code:	K2107404-006	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-6-8	**Date Collected:**	06/22/21
Lab Code:	K2107404-007	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-INF-MW-2-9	**Date Collected:**	06/24/21
Lab Code:	K2107404-008	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-5-9	**Date Collected:**	06/22/21
Lab Code:	K2107404-009	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-6-9	**Date Collected:**	06/22/21
Lab Code:	K2107404-010	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Results

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www.alsglobal.com

Client:	Anchor QEA, LLC		**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water		**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-6		**Basis:**	NA
Lab Code:	K2107404-001			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**209**	ug/L	0.10	0.05	5	07/19/21 15:57	07/01/21	
Lithium	200.8	**198**	ug/L	0.50	0.50	5	07/19/21 15:57	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/20/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-7	**Basis:**	NA
Lab Code:	K2107404-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**167**	ug/L	0.10	0.05	5	07/19/21 16:02	07/01/21	
Lithium	200.8	**194**	ug/L	0.50	0.50	5	07/19/21 16:02	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/20/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-7	**Basis:**	NA
Lab Code:	K2107404-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**167**	ug/L	0.10	0.05	5	07/19/21 16:03	07/01/21	
Lithium	200.8	**193**	ug/L	0.50	0.50	5	07/19/21 16:03	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/20/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-7	**Basis:**	NA
Lab Code:	K2107404-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**180**	ug/L	0.10	0.05	5	07/19/21 16:05	07/01/21	
Lithium	200.8	**192**	ug/L	0.50	0.50	5	07/19/21 16:05	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-8	**Basis:**	NA
Lab Code:	K2107404-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**169**	ug/L	0.10	0.05	5	07/19/21 16:06	07/01/21	
Lithium	200.8	**194**	ug/L	0.50	0.50	5	07/19/21 16:06	07/01/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-8	**Basis:**	NA
Lab Code:	K2107404-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**168**	ug/L	0.10	0.05	5	07/19/21 16:11	07/01/21	
Lithium	200.8	**190**	ug/L	0.50	0.50	5	07/19/21 16:11	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-8	**Basis:**	NA
Lab Code:	K2107404-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**176**	ug/L	0.10	0.05	5	07/19/21 16:13	07/01/21	
Lithium	200.8	**191**	ug/L	0.50	0.50	5	07/19/21 16:13	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-2-9	**Basis:**	NA
Lab Code:	K2107404-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**166**	ug/L	0.10	0.05	5	07/19/21 16:15	07/01/21	
Lithium	200.8	**191**	ug/L	0.50	0.50	5	07/19/21 16:15	07/01/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-5-9	**Basis:**	NA
Lab Code:	K2107404-009		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**166**	ug/L	0.10	0.05	5	07/19/21 16:16	07/01/21	
Lithium	200.8	**191**	ug/L	0.50	0.50	5	07/19/21 16:16	07/01/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-6-9	**Basis:**	NA
Lab Code:	K2107404-010		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	**175**	ug/L	0.10	0.05	5	07/19/21 16:18	07/01/21	
Lithium	200.8	**189**	ug/L	0.50	0.50	5	07/19/21 16:18	07/01/21	

QC Summary Forms

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107404
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111981-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Cobalt	200.8	ND U	ug/L	0.020	0.009	1	07/19/21 15:54	07/01/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	07/19/21 15:54	07/01/21	

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107404
Date Analyzed: 07/19/21

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2111981-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Cobalt	200.8	26.0	25.0	104	85-115
Lithium	200.8	49.7	50.0	99	85-115

July 21, 2021 Service Request No:K2107412

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107412.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

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ALS Environmental

Client: Anchor QEA, LLC
Project: Green County
Sample Matrix: Water

Service Request: K2107412
Date Received: 06/25/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Fifteen water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by [signature]

Date 07/21/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-INF-MW-6V-1 — **Lab ID: K2107412-001**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	459		0.5	2.5	ug/L	200.8
Lithium, Dissolved	94.6		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-1 — **Lab ID: K2107412-002**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.6	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	1.82		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-1 — **Lab ID: K2107412-003**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.9	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	2.50		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-1 — **Lab ID: K2107412-004**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	1.5	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	3.71		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-1 — **Lab ID: K2107412-005**

Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	4.11		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-2 — **Lab ID: K2107412-006**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.8	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	2.41		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-2 — **Lab ID: K2107412-007**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.9	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	1.32		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-2 — **Lab ID: K2107412-008**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	1.6	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	1.36		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-2 — **Lab ID: K2107412-009**

Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	16.3		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-3 — **Lab ID: K2107412-010**

Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.9	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	1.94		0.50	0.50	ug/L	200.8

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-2-3			Lab ID: K2107412-011			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	0.60		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-3			Lab ID: K2107412-012			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	0.9	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	1.68		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-3			Lab ID: K2107412-013			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	0.6	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	12.9		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-4			Lab ID: K2107412-014			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	447		0.5	2.5	ug/L	200.8
Lithium, Dissolved	92.6		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-4			Lab ID: K2107412-015			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	0.84		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2107412
Project: Green County/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107412-001	ML-COL-INF-MW-6V-1	6/14/2021	1000
K2107412-002	ML-COL-1-1	6/14/2021	1000
K2107412-003	ML-COL-2-1	6/14/2021	1000
K2107412-004	ML-COL-3-1	6/14/2021	1000
K2107412-005	ML-COL-4-1	6/14/2021	1000
K2107412-006	ML-COL-1-2	6/14/2021	1410
K2107412-007	ML-COL-2-2	6/14/2021	1410
K2107412-008	ML-COL-3-2	6/14/2021	1410
K2107412-009	ML-COL-4-2	6/14/2021	1410
K2107412-010	ML-COL-1-3	6/14/2021	1800
K2107412-011	ML-COL-2-3	6/14/2021	1800
K2107412-012	ML-COL-3-3	6/14/2021	1800
K2107412-013	ML-COL-4-3	6/14/2021	1800
K2107412-014	ML-COL-INF-MW-6V-4	6/15/2021	1330
K2107412-015	ML-COL-1-4	6/15/2021	1330

K2107412

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number:	503-972-5019
Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA
Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Arsenic, Lithium (dissolved, Method 200.8)	Comments/Preservation
1	ML-COL-INF-MW-6V-1	6/14/2021	10:00	Water	1	X	HNO_3 preserved, filtered
2	ML-COL-1-1	6/14/2021	10:00	Water	1	X	HNO_3 preserved, filtered
3	ML-COL-2-1	6/14/2021	10:00	Water	1	X	HNO_3 preserved, filtered
4	ML-COL-3-1	6/14/2021	10:00	Water	1	X	HNO_3 preserved, filtered
5	ML-COL-4-1	6/14/2021	10:00	Water	1	X	HNO_3 preserved, filtered
6	ML-COL-1-2	6/14/2021	14:10	Water	1	X	HNO_3 preserved, filtered
7	ML-COL-2-2	6/14/2021	14:10	Water	1	X	HNO_3 preserved, filtered
8	ML-COL-3-2	6/14/2021	14:10	Water	1	X	HNO_3 preserved, filtered
9	ML-COL-4-2	6/14/2021	14:10	Water	1	X	HNO_3 preserved, filtered
10	ML-COL-1-3	6/14/2021	18:00	Water	1	X	HNO_3 preserved, filtered
11	ML-COL-2-3	6/14/2021	18:00	Water	1	X	HNO_3 preserved, filtered
12	ML-COL-3-3	6/14/2021	18:00	Water	1	X	HNO_3 preserved, filtered
13	ML-COL-4-3	6/14/2021	18:00	Water	1	X	HNO_3 preserved, filtered
14	ML-COL-INF-MW-6V-4	6/15/2021	13:30	Water	1	X	HNO_3 preserved, filtered
15	ML-COL-1-4	6/15/2021	13:30	Water	1	X	HNO_3 preserved, filtered

Notes: **Please analyze all analytes with** standard TAT **on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**
Desired reporting limits : As (<2 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:
[signature]	6/25/2021 9:00	Perry Jones	6/25/21 1335
Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Page 1 of 4

PM MH

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07412

Received: 6-25-21 Opened: 6/25/21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ______ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.3		IR01					

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ______
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ______

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

- ***** The result is an outlier. See case narrative.
- **#** The control limit criteria is not applicable. See case narrative.
- **B** The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- **E** The result is an estimate amount because the value exceeded the instrument calibration range.
- **J** The result is an estimated value.
- **U** The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- **i** The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- **X** See case narrative.
- **Q** See case narrative. One or more quality control criteria was outside the limits.
- **H** The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- **#** The control limit criteria is not applicable. See case narrative.
- **J** The result is an estimated value.
- **E** The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- **M** The duplicate injection precision was not met.
- **N** The Matrix Spike sample recovery is not within control limits. See case narrative.
- **S** The reported value was determined by the Method of Standard Additions (MSA).
- **U** The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- **W** The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- **i** The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- **X** See case narrative.
- **+** The correlation coefficient for the MSA is less than 0.995.
- **Q** See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- ***** The result is an outlier. See case narrative.
- **#** The control limit criteria is not applicable. See case narrative.
- **A** A tentatively identified compound, a suspected aldol-condensation product.
- **B** The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- **C** The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- **D** The reported result is from a dilution.
- **E** The result is an estimated value.
- **J** The result is an estimated value.
- **N** The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- **P** The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- **U** The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- **i** The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- **X** See case narrative.
- **Q** See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- **F** The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- **L** The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- **H** The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- **O** The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- **Y** The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- **Z** The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02		

Sample Name:	ML-COL-INF-MW-6V-1	**Date Collected:**	06/14/21
Lab Code:	K2107412-001	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-1-1	**Date Collected:**	06/14/21
Lab Code:	K2107412-002	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-2-1	**Date Collected:**	06/14/21
Lab Code:	K2107412-003	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-3-1	**Date Collected:**	06/14/21
Lab Code:	K2107412-004	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-4-1	**Date Collected:**	06/14/21
Lab Code:	K2107412-005	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client: Anchor QEA, LLC **Service Request:** K2107412
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-1-2 **Date Collected:** 06/14/21
Lab Code: K2107412-006 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-2-2 **Date Collected:** 06/14/21
Lab Code: K2107412-007 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-3-2 **Date Collected:** 06/14/21
Lab Code: K2107412-008 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-2 **Date Collected:** 06/14/21
Lab Code: K2107412-009 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-3 **Date Collected:** 06/14/21
Lab Code: K2107412-010 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client: Anchor QEA, LLC **Service Request:** K2107412
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-2-3 **Date Collected:** 06/14/21
Lab Code: K2107412-011 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-3-3 **Date Collected:** 06/14/21
Lab Code: K2107412-012 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-3 **Date Collected:** 06/14/21
Lab Code: K2107412-013 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-6V-4 **Date Collected:** 06/15/21
Lab Code: K2107412-014 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-4 **Date Collected:** 06/15/21
Lab Code: K2107412-015 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 10:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-1	**Basis:**	NA
Lab Code:	K2107412-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**459**	ug/L	2.5	0.5	5	07/19/21 17:15	07/02/21	
Lithium	200.8	**94.6**	ug/L	0.50	0.50	5	07/19/21 17:15	07/02/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 10:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-1	**Basis:**	NA
Lab Code:	K2107412-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.6 J**	ug/L	2.5	0.5	5	07/19/21 17:20	07/02/21	
Lithium	200.8	**1.82**	ug/L	0.50	0.50	5	07/19/21 17:20	07/02/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 10:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-1	**Basis:**	NA
Lab Code:	K2107412-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.9 J**	ug/L	2.5	0.5	5	07/19/21 17:28	07/02/21	
Lithium	200.8	**2.50**	ug/L	0.50	0.50	5	07/19/21 17:28	07/02/21	

Client:	Anchor QEA, LLC		**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	06/14/21 10:00
Sample Matrix:	Water		**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-1		**Basis:**	NA
Lab Code:	K2107412-004			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**1.5 J**	ug/L	2.5	0.5	5	07/19/21 17:30	07/02/21	
Lithium	200.8	**3.71**	ug/L	0.50	0.50	5	07/19/21 17:30	07/02/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 10:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-1	**Basis:**	NA
Lab Code:	K2107412-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 17:31	07/02/21	
Lithium	200.8	**4.11**	ug/L	0.50	0.50	5	07/19/21 17:31	07/02/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 14:10
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-2	**Basis:**	NA
Lab Code:	K2107412-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.8 J**	ug/L	2.5	0.5	5	07/19/21 17:33	07/02/21	
Lithium	200.8	**2.41**	ug/L	0.50	0.50	5	07/19/21 17:33	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 14:10
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-2	**Basis:**	NA
Lab Code:	K2107412-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.9 J**	ug/L	2.5	0.5	5	07/19/21 17:35	07/02/21	
Lithium	200.8	**1.32**	ug/L	0.50	0.50	5	07/19/21 17:35	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 14:10
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-2	**Basis:**	NA
Lab Code:	K2107412-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**1.6 J**	ug/L	2.5	0.5	5	07/19/21 17:36	07/02/21	
Lithium	200.8	**1.36**	ug/L	0.50	0.50	5	07/19/21 17:36	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 14:10
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-2	**Basis:**	NA
Lab Code:	K2107412-009		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 17:38	07/02/21	
Lithium	200.8	**16.3**	ug/L	0.50	0.50	5	07/19/21 17:38	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-3	**Basis:**	NA
Lab Code:	K2107412-010		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.9 J**	ug/L	2.5	0.5	5	07/19/21 17:39	07/02/21	
Lithium	200.8	**1.94**	ug/L	0.50	0.50	5	07/19/21 17:39	07/02/21	

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dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-3	**Basis:**	NA
Lab Code:	K2107412-011		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 17:41	07/02/21	
Lithium	200.8	**0.60**	ug/L	0.50	0.50	5	07/19/21 17:41	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-3	**Basis:**	NA
Lab Code:	K2107412-012		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.9 J**	ug/L	2.5	0.5	5	07/19/21 17:43	07/02/21	
Lithium	200.8	**1.68**	ug/L	0.50	0.50	5	07/19/21 17:43	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-3	**Basis:**	NA
Lab Code:	K2107412-013		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.6 J**	ug/L	2.5	0.5	5	07/19/21 17:48	07/02/21	
Lithium	200.8	**12.9**	ug/L	0.50	0.50	5	07/19/21 17:48	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 13:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-4	**Basis:**	NA
Lab Code:	K2107412-014		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**447**	ug/L	2.5	0.5	5	07/19/21 18:32	07/02/21	
Lithium	200.8	**92.6**	ug/L	0.50	0.50	5	07/19/21 18:32	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 13:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-4	**Basis:**	NA
Lab Code:	K2107412-015		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 17:51	07/02/21	
Lithium	200.8	**0.84**	ug/L	0.50	0.50	5	07/19/21 17:51	07/02/21	

QC Summary Forms

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Metals

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC		**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	NA
Sample Matrix:	Water		**Date Received:**	NA
Sample Name:	Method Blank		**Basis:**	NA
Lab Code:	KQ2111982-01			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	07/19/21 17:12	07/02/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	07/19/21 17:12	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-INF-MW-6V-1	**Units:**	ug/L
Lab Code:	K2107412-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111982-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	459	503	50.0	87 #	70-130
Lithium	94.6	142	50.0	95	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-1-1	**Units:**	ug/L
Lab Code:	K2107412-002	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111982-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	0.6 J	50.6	50.0	100	70-130
Lithium	1.82	50.0	50.0	96	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-INF-MW-6V-1	**Units:**	ug/L
Lab Code:	K2107412-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111982-03 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	459	449	454	2	20
Lithium	200.8	0.50	0.50	94.6	93.0	93.8	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107412
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/14/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-1-1	**Units:**	ug/L
Lab Code:	K2107412-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111982-05 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	0.6 J	ND U	NC	NC	20
Lithium	200.8	0.50	0.50	1.82	1.71	1.77	6	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107412
Date Analyzed: 07/19/21

Lab Control Sample Summary
Dissolved Metals

Units: ug/L
Basis: NA

Lab Control Sample
KQ2111982-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	51.0	50.0	102	85-115
Lithium	200.8	49.2	50.0	98	85-115

July 21, 2021 Service Request No:K2107413

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107413.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
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Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County	**Date Received:**	06/25/2021
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Fifteen water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by ________________________ Date 07/21/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-2-4	Lab ID: K2107413-001					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	4.47		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-4	Lab ID: K2107413-002					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	28.9		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-4	Lab ID: K2107413-003					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	4.0		0.5	2.5	ug/L	200.8
Lithium, Dissolved	27.7		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-5	Lab ID: K2107413-004					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	1.16		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-5	Lab ID: K2107413-005					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	8.17		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-5	Lab ID: K2107413-006					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	35.4		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-5	Lab ID: K2107413-007					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	4.6		0.5	2.5	ug/L	200.8
Lithium, Dissolved	26.7		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-6	Lab ID: K2107413-008					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	451		0.5	2.5	ug/L	200.8
Lithium, Dissolved	94.1		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-6	Lab ID: K2107413-009					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	1.04		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-6	Lab ID: K2107413-010					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	6.66		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-6	Lab ID: K2107413-011					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	35.0		0.50	0.50	ug/L	200.8

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-4-6	Lab ID: K2107413-012					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	3.4		0.5	2.5	ug/L	200.8
Lithium, Dissolved	20.3		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-7	Lab ID: K2107413-013					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	447		0.5	2.5	ug/L	200.8
Lithium, Dissolved	92.4		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-7	Lab ID: K2107413-014					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	3.29		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-7	Lab ID: K2107413-015					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	30.5		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2107413
Project: Green County/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107413-001	ML-COL-2-4	6/15/2021	1330
K2107413-002	ML-COL-3-4	6/15/2021	1330
K2107413-003	ML-COL-4-4	6/15/2021	1330
K2107413-004	ML-COL-1-5	6/15/2021	1800
K2107413-005	ML-COL-2-5	6/15/2021	1800
K2107413-006	ML-COL-3-5	6/15/2021	1800
K2107413-007	ML-COL-4-5	6/15/2021	1800
K2107413-008	ML-COL-INF-MW-6V-6	6/16/2021	1500
K2107413-009	ML-COL-1-6	6/16/2021	1500
K2107413-010	ML-COL-2-6	6/16/2021	1500
K2107413-011	ML-COL-3-6	6/16/2021	1500
K2107413-012	ML-COL-4-6	6/16/2021	1500
K2107413-013	ML-COL-INF-MW-6V-7	6/17/2021	1400
K2107413-014	ML-COL-1-7	6/17/2021	1400
K2107413-015	ML-COL-2-7	6/17/2021	1400

K2107413

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number: 503-972-5019	
Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA
Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Arsenic, Lithium (dissolved, Method 200.8)	Comments/Preservation
16	ML-COL-2-4	6/15/2021	13:30	Water	1	X	HNO_3 preserved, filtered
17	ML-COL-3-4	6/15/2021	13:30	Water	1	X	HNO_3 preserved, filtered
18	ML-COL-4-4	6/15/2021	13:30	Water	1	X	HNO_3 preserved, filtered
19	ML-COL-1-5	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
20	ML-COL-2-5	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
21	ML-COL-3-5	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
22	ML-COL-4-5	6/15/2021	18:00	Water	1	X	HNO_3 preserved, filtered
23	ML-COL-INF-MW-6V-6	6/16/2021	15:00	Water	1	X	HNO_3 preserved, filtered
24	ML-COL-1-6	6/16/2021	15:00	Water	1	X	HNO_3 preserved, filtered
25	ML-COL-2-6	6/16/2021	15:00	Water	1	X	HNO_3 preserved, filtered
26	ML-COL-3-6	6/16/2021	15:00	Water	1	X	HNO_3 preserved, filtered
27	ML-COL-4-6	6/16/2021	15:00	Water	1	X	HNO_3 preserved, filtered
28	ML-COL-INF-MW-6V-7	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
29	ML-COL-1-7	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
30	ML-COL-2-7	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered

Notes: **Please analyze all analytes with** standard TAT **on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**
Desired reporting limits : As (<2 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:
	6/25/2021 9:00	Perry Jones	6/25/21 1335

Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

PM MH

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07413

Received: 6-25-21 Opened: 6/25/21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ________ NA
3. Were custody seals on coolers? **NA** Y N If yes, how many and where? ________

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA **Y** N If yes, notate the temperature in the appropriate column below:

   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA **Y** N

   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. **NA** Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.3		IR01					

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ________
7. Were custody papers properly filled out (ink, signed, etc.)? NA **Y** N
8. Were samples received in good condition (unbroken) NA **Y** N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA **Y** N
10. Did all sample labels and tags agree with custody papers? NA **Y** N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA **Y** N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA **Y** N
13. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y N
14. Was C12/Res negative? **NA** Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ________

Miscellaneous Forms

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www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Analyst Summary report

Client: Anchor QEA, LLC
Service Request: K2107413
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-2-4
Date Collected: 06/15/21
Lab Code: K2107413-001
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name: ML-COL-3-4
Date Collected: 06/15/21
Lab Code: K2107413-002
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-4
Date Collected: 06/15/21
Lab Code: K2107413-003
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-5
Date Collected: 06/15/21
Lab Code: K2107413-004
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name: ML-COL-2-5
Date Collected: 06/15/21
Lab Code: K2107413-005
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Service Request: K2107413

Sample Name: ML-COL-3-5
Lab Code: K2107413-006
Sample Matrix: Water
Date Collected: 06/15/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-5
Lab Code: K2107413-007
Sample Matrix: Water
Date Collected: 06/15/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-6V-6
Lab Code: K2107413-008
Sample Matrix: Water
Date Collected: 06/16/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-6
Lab Code: K2107413-009
Sample Matrix: Water
Date Collected: 06/16/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-2-6
Lab Code: K2107413-010
Sample Matrix: Water
Date Collected: 06/16/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client: Anchor QEA, LLC | **Service Request:** K2107413
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-3-6 | **Date Collected:** 06/16/21
Lab Code: K2107413-011 | **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-6 | **Date Collected:** 06/16/21
Lab Code: K2107413-012 | **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-6V-7 | **Date Collected:** 06/17/21
Lab Code: K2107413-013 | **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-7 | **Date Collected:** 06/17/21
Lab Code: K2107413-014 | **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-2-7 | **Date Collected:** 06/17/21
Lab Code: K2107413-015 | **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Results

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www.alsglobal.com

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 13:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-4	**Basis:**	NA
Lab Code:	K2107413-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 17:55	07/02/21	
Lithium	200.8	**4.47**	ug/L	0.50	0.50	5	07/19/21 17:55	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 13:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-4	**Basis:**	NA
Lab Code:	K2107413-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:00	07/02/21	
Lithium	200.8	**28.9**	ug/L	0.50	0.50	5	07/19/21 18:00	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 13:30
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-4	**Basis:**	NA
Lab Code:	K2107413-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**4.0**	ug/L	2.5	0.5	5	07/19/21 18:08	07/02/21	
Lithium	200.8	**27.7**	ug/L	0.50	0.50	5	07/19/21 18:08	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-5	**Basis:**	NA
Lab Code:	K2107413-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:10	07/02/21	
Lithium	200.8	**1.16**	ug/L	0.50	0.50	5	07/19/21 18:10	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-5	**Basis:**	NA
Lab Code:	K2107413-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:12	07/02/21	
Lithium	200.8	**8.17**	ug/L	0.50	0.50	5	07/19/21 18:12	07/02/21	

Client:	Anchor QEA, LLC		**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water		**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-5		**Basis:**	NA
Lab Code:	K2107413-006			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:13	07/02/21	
Lithium	200.8	**35.4**	ug/L	0.50	0.50	5	07/19/21 18:13	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21 18:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-5	**Basis:**	NA
Lab Code:	K2107413-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**4.6**	ug/L	2.5	0.5	5	07/19/21 18:15	07/02/21	
Lithium	200.8	**26.7**	ug/L	0.50	0.50	5	07/19/21 18:15	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 15:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-6	**Basis:**	NA
Lab Code:	K2107413-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**451**	ug/L	2.5	0.5	5	07/19/21 18:16	07/02/21	
Lithium	200.8	**94.1**	ug/L	0.50	0.50	5	07/19/21 18:16	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 15:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-6	**Basis:**	NA
Lab Code:	K2107413-009		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:18	07/02/21	
Lithium	200.8	**1.04**	ug/L	0.50	0.50	5	07/19/21 18:18	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 15:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-6	**Basis:**	NA
Lab Code:	K2107413-010		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:20	07/02/21	
Lithium	200.8	**6.66**	ug/L	0.50	0.50	5	07/19/21 18:20	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC		**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	06/16/21 15:00
Sample Matrix:	Water		**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-6		**Basis:**	NA
Lab Code:	K2107413-011			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:21	07/02/21	
Lithium	200.8	**35.0**	ug/L	0.50	0.50	5	07/19/21 18:21	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/16/21 15:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-6	**Basis:**	NA
Lab Code:	K2107413-012		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**3.4**	ug/L	2.5	0.5	5	07/19/21 18:26	07/02/21	
Lithium	200.8	**20.3**	ug/L	0.50	0.50	5	07/19/21 18:26	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-7	**Basis:**	NA
Lab Code:	K2107413-013		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**447**	ug/L	2.5	0.5	5	07/19/21 18:28	07/02/21	
Lithium	200.8	**92.4**	ug/L	0.50	0.50	5	07/19/21 18:28	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-7	**Basis:**	NA
Lab Code:	K2107413-014		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:29	07/02/21	
Lithium	200.8	**3.29**	ug/L	0.50	0.50	5	07/19/21 18:29	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-7	**Basis:**	NA
Lab Code:	K2107413-015		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	07/19/21 18:31	07/02/21	
Lithium	200.8	**30.5**	ug/L	0.50	0.50	5	07/19/21 18:31	07/02/21	

QC Summary Forms

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111984-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	07/19/21 17:52	07/02/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	07/19/21 17:52	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-2-4	**Units:**	ug/L
Lab Code:	K2107413-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111984-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	ND U	52.6	50.0	105	70-130
Lithium	4.47	52.1	50.0	95	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-3-4	**Units:**	ug/L
Lab Code:	K2107413-002	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111984-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	ND U	52.6	50.0	105	70-130
Lithium	28.9	77.5	50.0	97	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-2-4	**Units:**	ug/L
Lab Code:	K2107413-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111984-03 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	ND U	ND U	ND	-	20
Lithium	200.8	0.50	0.50	4.47	4.36	4.42	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107413
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/15/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary

Dissolved Metals

Sample Name:	ML-COL-3-4	**Units:**	ug/L
Lab Code:	K2107413-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111984-05 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	ND U	ND U	ND	-	20
Lithium	200.8	0.50	0.50	28.9	28.7	28.8	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 7/21/2021 9:01:56 AM Superset Reference:21-0000597279 rev 00

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107413
Date Analyzed: 07/19/21

Lab Control Sample Summary
Dissolved Metals

Units: ug/L
Basis: NA

Lab Control Sample
KQ2111984-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	51.0	50.0	102	85-115
Lithium	200.8	48.8	50.0	98	85-115

August 17, 2021 Service Request No:K2107414

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107414.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

1317 South 13th Ave, Kelso, WA 98626 | 1-360-577-7222 | www.alsglobal.com

Client: Anchor QEA, LLC
Project: Green County
Sample Matrix: Water

Service Request: K2107414
Date Received: 06/25/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Fifteen water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by ____________________ Date 08/17/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-3-7	Lab ID: K2107414-001					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.5	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	67.1		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-7	Lab ID: K2107414-002					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	3.8		0.5	2.5	ug/L	200.8
Lithium, Dissolved	46.0		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-8	Lab ID: K2107414-003					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	467		0.5	2.5	ug/L	200.8
Lithium, Dissolved	99.4		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-8	Lab ID: K2107414-004					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	7.17		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-8	Lab ID: K2107414-005					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	5.0		0.5	2.5	ug/L	200.8
Lithium, Dissolved	48.5		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-8	Lab ID: K2107414-006					
Analyte	Results	Flag	MDL	MRL	Units	Method
Lithium, Dissolved	72.5		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-8	Lab ID: K2107414-007					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	3.9		0.5	2.5	ug/L	200.8
Lithium, Dissolved	56.3		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-9	Lab ID: K2107414-008					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	436		0.5	2.5	ug/L	200.8
Lithium, Dissolved	95.6		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-9	Lab ID: K2107414-009					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	0.5	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	21.9		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-9	Lab ID: K2107414-010					
Analyte	Results	Flag	MDL	MRL	Units	Method
Arsenic, Dissolved	21.8		0.5	2.5	ug/L	200.8
Lithium, Dissolved	72.1		0.50	0.50	ug/L	200.8

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-3-9			Lab ID: K2107414-011			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	2.8		0.5	2.5	ug/L	200.8
Lithium, Dissolved	87.0		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-9			Lab ID: K2107414-012			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	34.1		0.5	2.5	ug/L	200.8
Lithium, Dissolved	73.8		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-10			Lab ID: K2107414-013			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	442		0.5	2.5	ug/L	200.8
Lithium, Dissolved	97.6		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-10			Lab ID: K2107414-014			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	37.9		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-10			Lab ID: K2107414-015			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Lithium, Dissolved	37.4		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2107414
Project: Green County/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107414-001	ML-COL-3-7	6/17/2021	1400
K2107414-002	ML-COL-4-7	6/17/2021	1400
K2107414-003	ML-COL-INF-MW-6V-8	6/18/2021	1300
K2107414-004	ML-COL-1-8	6/18/2021	1300
K2107414-005	ML-COL-2-8	6/18/2021	1300
K2107414-006	ML-COL-3-8	6/18/2021	1300
K2107414-007	ML-COL-4-8	6/18/2021	1300
K2107414-008	ML-COL-INF-MW-6V-9	6/19/2021	1040
K2107414-009	ML-COL-1-9	6/19/2021	1040
K2107414-010	ML-COL-2-9	6/19/2021	1040
K2107414-011	ML-COL-3-9	6/19/2021	1040
K2107414-012	ML-COL-4-9	6/19/2021	1040
K2107414-013	ML-COL-INF-MW-6V-10	6/22/2021	1515
K2107414-014	ML-COL-1-10	6/22/2021	1515
K2107414-015	ML-COL-2-10	6/22/2021	1515

K2107414

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number:	503-972-5019
Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA
Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Arsenic, Lithium (dissolved, Method 200.8)	Comments/Preservation
31	ML-COL-3-7	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
32	ML-COL-4-7	6/17/2021	14:00	Water	1	X	HNO_3 preserved, filtered
33	ML-COL-INF-MW-6V-8	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
34	ML-COL-1-8	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
35	ML-COL-2-8	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
36	ML-COL-3-8	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
37	ML-COL-4-8	6/18/2021	13:00	Water	1	X	HNO_3 preserved, filtered
38	ML-COL-INF-MW-6V-9	6/19/2021	10:40	Water	1	X	HNO_3 preserved, filtered
39	ML-COL-1-9	6/19/2021	10:40	Water	1	X	HNO_3 preserved, filtered
40	ML-COL-2-9	6/19/2021	10:40	Water	1	X	HNO_3 preserved, filtered
41	ML-COL-3-9	6/19/2021	10:40	Water	1	X	HNO_3 preserved, filtered
42	ML-COL-4-9	6/19/2021	10:40	Water	1	X	HNO_3 preserved, filtered
43	ML-COL-INF-MW-6V-10	6/22/2021	15:15	Water	1	X	HNO_3 preserved, filtered
44	ML-COL-1-10	6/22/2021	15:15	Water	1	X	HNO_3 preserved, filtered
45	ML-COL-2-10	6/22/2021	15:15	Water	1	X	HNO_3 preserved, filtered

Notes: **Please analyze all analytes with standard TAT on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**
Desired reporting limits : As (<2 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:
[signature]	6/25/2021 9:00	Perry Jones	6/25/21 1335

Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Page 3 of 4

PM MH

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07414

Received: 6-25-21 Opened: 6/25/21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ______ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? ______

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:

   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N

   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.3		IR01					

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ______
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ______

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Anchor QEA, LLC
Service Request: K2107414
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-3-7
Date Collected: 06/17/21
Lab Code: K2107414-001
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-4-7
Date Collected: 06/17/21
Lab Code: K2107414-002
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-INF-MW-6V-8
Date Collected: 06/18/21
Lab Code: K2107414-003
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-1-8
Date Collected: 06/18/21
Lab Code: K2107414-004
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-2-8
Date Collected: 06/18/21
Lab Code: K2107414-005
Date Received: 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Client: Anchor QEA, LLC **Service Request:** K2107414
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-3-8 **Date Collected:** 06/18/21
Lab Code: K2107414-006 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-4-8 **Date Collected:** 06/18/21
Lab Code: K2107414-007 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-INF-MW-6V-9 **Date Collected:** 06/19/21
Lab Code: K2107414-008 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-1-9 **Date Collected:** 06/19/21
Lab Code: K2107414-009 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-2-9 **Date Collected:** 06/19/21
Lab Code: K2107414-010 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Client: Anchor QEA, LLC **Service Request:** K2107414
Project: Green County/201114-01.03 Task 02

Sample Name: ML-COL-3-9 **Date Collected:** 06/19/21
Lab Code: K2107414-011 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-4-9 **Date Collected:** 06/19/21
Lab Code: K2107414-012 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-INF-MW-6V-10 **Date Collected:** 06/22/21
Lab Code: K2107414-013 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-1-10 **Date Collected:** 06/22/21
Lab Code: K2107414-014 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: ML-COL-2-10 **Date Collected:** 06/22/21
Lab Code: K2107414-015 **Date Received:** 06/25/21
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Results

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Metals

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www.alsglobal.com

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-7	**Basis:**	NA
Lab Code:	K2107414-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.5 J**	ug/L	2.5	0.5	5	08/16/21 17:28	07/02/21	
Lithium	200.8	**67.1**	ug/L	0.50	0.50	5	08/16/21 17:28	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21 14:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-7	**Basis:**	NA
Lab Code:	K2107414-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**3.8**	ug/L	2.5	0.5	5	08/16/21 17:33	07/02/21	
Lithium	200.8	**46.0**	ug/L	0.50	0.50	5	08/16/21 17:33	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-8	**Basis:**	NA
Lab Code:	K2107414-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**467**	ug/L	2.5	0.5	5	08/16/21 17:38	07/02/21	
Lithium	200.8	**99.4**	ug/L	0.50	0.50	5	08/16/21 17:38	07/02/21	

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107414
Date Collected: 06/18/21 13:00
Date Received: 06/25/21 13:35

Sample Name: ML-COL-1-8
Lab Code: K2107414-004

Basis: NA

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	08/16/21 17:39	07/02/21	
Lithium	200.8	**7.17**	ug/L	0.50	0.50	5	08/16/21 17:39	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-8	**Basis:**	NA
Lab Code:	K2107414-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**5.0**	ug/L	2.5	0.5	5	08/16/21 17:44	07/02/21	
Lithium	200.8	**48.5**	ug/L	0.50	0.50	5	08/16/21 17:44	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-8	**Basis:**	NA
Lab Code:	K2107414-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	08/16/21 17:46	07/02/21	
Lithium	200.8	**72.5**	ug/L	0.50	0.50	5	08/16/21 17:46	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/18/21 13:00
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-8	**Basis:**	NA
Lab Code:	K2107414-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**3.9**	ug/L	2.5	0.5	5	08/16/21 17:47	07/02/21	
Lithium	200.8	**56.3**	ug/L	0.50	0.50	5	08/16/21 17:47	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/19/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-9	**Basis:**	NA
Lab Code:	K2107414-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**436**	ug/L	2.5	0.5	5	08/16/21 17:49	07/02/21	
Lithium	200.8	**95.6**	ug/L	0.50	0.50	5	08/16/21 17:49	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/19/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-9	**Basis:**	NA
Lab Code:	K2107414-009		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.5 J**	ug/L	2.5	0.5	5	08/16/21 17:51	07/02/21	
Lithium	200.8	**21.9**	ug/L	0.50	0.50	5	08/16/21 17:51	07/02/21	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/19/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-9	**Basis:**	NA
Lab Code:	K2107414-010		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**21.8**	ug/L	2.5	0.5	5	08/16/21 17:52	07/02/21	
Lithium	200.8	**72.1**	ug/L	0.50	0.50	5	08/16/21 17:52	07/02/21	

Client:	Anchor QEA, LLC		**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02		**Date Collected:**	06/19/21 10:40
Sample Matrix:	Water		**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-9		**Basis:**	NA
Lab Code:	K2107414-011			

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**2.8**	ug/L	2.5	0.5	5	08/16/21 17:54	07/02/21	
Lithium	200.8	**87.0**	ug/L	0.50	0.50	5	08/16/21 17:54	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/19/21 10:40
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-9	**Basis:**	NA
Lab Code:	K2107414-012		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**34.1**	ug/L	2.5	0.5	5	08/16/21 17:55	07/02/21	
Lithium	200.8	**73.8**	ug/L	0.50	0.50	5	08/16/21 17:55	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-10	**Basis:**	NA
Lab Code:	K2107414-013		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**442**	ug/L	2.5	0.5	5	08/16/21 17:57	07/02/21	
Lithium	200.8	**97.6**	ug/L	0.50	0.50	5	08/16/21 17:57	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-10	**Basis:**	NA
Lab Code:	K2107414-014		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	08/16/21 17:59	07/02/21	
Lithium	200.8	**37.9**	ug/L	0.50	0.50	5	08/16/21 17:59	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-10	**Basis:**	NA
Lab Code:	K2107414-015		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	2.5	0.5	5	08/16/21 18:03	07/02/21	
Lithium	200.8	**37.4**	ug/L	0.50	0.50	5	08/16/21 18:03	07/02/21	

QC Summary Forms

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111985-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	08/16/21 17:25	07/02/21	
Lithium	200.8	ND U	ug/L	0.10	0.10	1	08/16/21 17:25	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	08/16/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-3-7	**Units:**	ug/L
Lab Code:	K2107414-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111985-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	0.5 J	51.7	50.0	103	70-130
Lithium	67.1	118	50.0	101	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	08/16/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-4-7	**Units:**	ug/L
Lab Code:	K2107414-002	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111985-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	3.8	55.5	50.0	103	70-130
Lithium	46.0	98.0	50.0	104	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Printed 8/17/2021 4:09:17 PM Superset Reference:21-0000600213 rev 00

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	08/16/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-3-7	**Units:**	ug/L
Lab Code:	K2107414-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111985-03 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	0.5 J	ND U	NC	NC	20
Lithium	200.8	0.50	0.50	67.1	67.9	67.5	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107414
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/17/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	08/16/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-4-7	**Units:**	ug/L
Lab Code:	K2107414-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111985-05 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	3.8	3.5	3.7	8	20
Lithium	200.8	0.50	0.50	46.0	45.3	45.7	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 8/17/2021 4:09:16 PM　　Superset Reference:21-0000600213 rev 00

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Sample Matrix: Water

Service Request: K2107414
Date Analyzed: 08/16/21

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2111985-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	50.1	50.0	100	85-115
Lithium	200.8	50.3	50.0	101	85-115

July 21, 2021 Service Request No:K2107415

Masa Kanematsu
Anchor QEA, LLC
6720 SW Macadam Avenue
Suite 125
Portland, OR 97219

Laboratory Results for: Green County

Dear Masa,

Enclosed are the results of the sample(s) submitted to our laboratory June 25, 2021
For your reference, these analyses have been assigned our service request number **K2107415.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

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ALS Environmental

Client: Anchor QEA, LLC
Project: Green County
Sample Matrix: Water

Service Request: K2107415
Date Received: 06/25/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Seven water samples were received for analysis at ALS Environmental on 06/25/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by ____________________ Date 07/21/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: ML-COL-3-10			Lab ID: K2107415-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	9.7		0.5	2.5	ug/L	200.8
Lithium, Dissolved	93.0		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-10			Lab ID: K2107415-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	155		0.5	2.5	ug/L	200.8
Lithium, Dissolved	88.9		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-INF-MW-6V-11			Lab ID: K2107415-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	413		0.5	2.5	ug/L	200.8
Lithium, Dissolved	92.4		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-1-11			Lab ID: K2107415-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	0.6	J	0.5	2.5	ug/L	200.8
Lithium, Dissolved	50.2		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-2-11			Lab ID: K2107415-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	115		0.5	2.5	ug/L	200.8
Lithium, Dissolved	83.8		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-3-11			Lab ID: K2107415-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	31.5		0.5	2.5	ug/L	200.8
Lithium, Dissolved	103		0.50	0.50	ug/L	200.8

CLIENT ID: ML-COL-4-11			Lab ID: K2107415-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic, Dissolved	104		0.5	2.5	ug/L	200.8
Lithium, Dissolved	79.2		0.50	0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Anchor QEA, LLC **Service Request:** K2107415
Project: Green County/201114-01.03 Task 02

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107415-001	ML-COL-3-10	6/22/2021	1515
K2107415-002	ML-COL-4-10	6/22/2021	1515
K2107415-003	ML-COL-INF-MW-6V-11	6/24/2021	1628
K2107415-004	ML-COL-1-11	6/24/2021	1628
K2107415-005	ML-COL-2-11	6/24/2021	1628
K2107415-006	ML-COL-3-11	6/24/2021	1628
K2107415-007	ML-COL-4-11	6/24/2021	1628

K2107415

Chain of Custody Record & Laboratory Analysis Request

Laboratory Number: 503-972-5019

Date:	6/25/2021
Project Name:	Green County
Project Number:	201114-01.03 Task 02
Project Manager:	Masa Kanematsu
Phone Number:	503-972-5001 (Masa Kanematsu)
Shipment Method:	ALS Carrier

ANCHOR QEA

Jessica Goin
6720 SW Macadam Ave
Suite 125
Portland OR 97219

Line	Field Sample ID	Collection Date	Collection Time	Matrix	No. of Containers	Arsenic, Lithium (dissolved, Method 200.8)															Comments/Preservation
31	ML-COL-3-10	6/22/2021	15:15	Water	1	X															HNO_3 preserved, filtered
32	ML-COL-4-10	6/22/2021	15:15	Water	1	X															HNO_3 preserved, filtered
33	ML-COL-INF-MW-6V-11	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
34	ML-COL-1-11	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
35	ML-COL-2-11	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
36	ML-COL-3-11	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
37	ML-COL-4-11	6/24/2021	16:28	Water	1	X															HNO_3 preserved, filtered
38																					
39																					
40																					
41																					
42																					
43																					
44																					
45																					

Notes: **Please analyze all analytes with** standard TAT **on this page. Please analyze with Method 200.8 (ICP-MS) for better detection limit.**
Desired reporting limits : As (<2 ug/L). For Lithium, please use Method 200.8 for better detection limit if possible. Report requirement: Type II (PDF & csv files)

Relinquished by:	Company:	Received by:	Company:
Masa Kanematsu	Anchor QEA	Perry Jones	ALS
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:
[signature]	6/25/2021 9:00	Perry Jones	6-25-21 1335

Relinquished by:	Company:	Received by:	Company:
Signature/Print Name:	Date/Time:	Signature/Print Name:	Date/Time:

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Page 4 of 4

PM MH

Cooler Receipt and Preservation Form

Client Anchor Service Request K21 07415

Received: 6-25-21 Opened: 6/25/21 By: PJ Unloaded: 6-25-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* ***Courier*** *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ______ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.3		IR01		—	—		

6. Packing material: *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Dry Ice* *Sleeves* ______
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ______

Miscellaneous Forms

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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Analyst Summary report

Client: Anchor QEA, LLC
Project: Green County/201114-01.03 Task 02
Service Request: K2107415

Sample Name: ML-COL-3-10
Lab Code: K2107415-001
Sample Matrix: Water
Date Collected: 06/22/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-4-10
Lab Code: K2107415-002
Sample Matrix: Water
Date Collected: 06/22/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-INF-MW-6V-11
Lab Code: K2107415-003
Sample Matrix: Water
Date Collected: 06/24/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-1-11
Lab Code: K2107415-004
Sample Matrix: Water
Date Collected: 06/24/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Sample Name: ML-COL-2-11
Lab Code: K2107415-005
Sample Matrix: Water
Date Collected: 06/24/21
Date Received: 06/25/21

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	RMOORE

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02		

Sample Name:	ML-COL-3-11	**Date Collected:**	06/24/21
Lab Code:	K2107415-006	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Name:	ML-COL-4-11	**Date Collected:**	06/24/21
Lab Code:	K2107415-007	**Date Received:**	06/25/21
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
200.8	ABOYER	RMOORE

Sample Results

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-10	**Basis:**	NA
Lab Code:	K2107415-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**9.7**	ug/L	2.5	0.5	5	07/19/21 16:54	07/02/21	
Lithium	200.8	**93.0**	ug/L	0.50	0.50	5	07/19/21 16:54	07/02/21	

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21 15:15
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-10	**Basis:**	NA
Lab Code:	K2107415-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**155**	ug/L	2.5	0.5	5	07/19/21 16:59	07/02/21	
Lithium	200.8	**88.9**	ug/L	0.50	0.50	5	07/19/21 16:59	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-INF-MW-6V-11	**Basis:**	NA
Lab Code:	K2107415-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**413**	ug/L	2.5	0.5	5	07/19/21 17:01	07/02/21	
Lithium	200.8	**92.4**	ug/L	0.50	0.50	5	07/19/21 17:01	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-1-11	**Basis:**	NA
Lab Code:	K2107415-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.6 J**	ug/L	2.5	0.5	5	07/19/21 17:02	07/02/21	
Lithium	200.8	**50.2**	ug/L	0.50	0.50	5	07/19/21 17:02	07/02/21	

Printed 7/21/2021 8:59:55 AM

Superset Reference:21-0000597277 rev 00

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-2-11	**Basis:**	NA
Lab Code:	K2107415-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**115**	ug/L	2.5	0.5	5	07/19/21 17:04	07/02/21	
Lithium	200.8	**83.8**	ug/L	0.50	0.50	5	07/19/21 17:04	07/02/21	

Printed 7/21/2021 8:59:55 AM

Superset Reference:21-0000597277 rev 00

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-3-11	**Basis:**	NA
Lab Code:	K2107415-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**31.5**	ug/L	2.5	0.5	5	07/19/21 17:09	07/02/21	
Lithium	200.8	**103**	ug/L	0.50	0.50	5	07/19/21 17:09	07/02/21	

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Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/24/21 16:28
Sample Matrix:	Water	**Date Received:**	06/25/21 13:35
Sample Name:	ML-COL-4-11	**Basis:**	NA
Lab Code:	K2107415-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**104**	ug/L	2.5	0.5	5	07/19/21 17:11	07/02/21	
Lithium	200.8	**79.2**	ug/L	0.50	0.50	5	07/19/21 17:11	07/02/21	

QC Summary Forms

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111986-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	07/19/21 16:35	07/02/21	
Lithium	200.8	**0.19**	ug/L	0.10	0.10	1	07/19/21 16:35	07/02/21	

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21
		Date Extracted:	07/2/21

Matrix Spike Summary
Dissolved Metals

Sample Name:	ML-COL-3-10	**Units:**	ug/L
Lab Code:	K2107415-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111986-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	9.7	60.2	50.0	101	70-130
Lithium	93.0	132	50.0	78	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

QA/QC Report

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project	Green County/201114-01.03 Task 02	**Date Collected:**	06/22/21
Sample Matrix:	Water	**Date Received:**	06/25/21
		Date Analyzed:	07/19/21

Replicate Sample Summary
Dissolved Metals

Sample Name:	ML-COL-3-10	**Units:**	ug/L
Lab Code:	K2107415-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2111986-05 Result	Average	RPD	RPD Limit
Arsenic	200.8	2.5	0.5	9.7	8.2	9.0	17	20
Lithium	200.8	0.50	0.50	93.0	82.4	87.7	12	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Anchor QEA, LLC	**Service Request:**	K2107415
Project:	Green County/201114-01.03 Task 02	**Date Analyzed:**	07/19/21
Sample Matrix:	Water		

Lab Control Sample Summary
Dissolved Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2111986-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	51.6	50.0	103	85-115
Lithium	200.8	49.1	50.0	98	85-115

PETROLEUM SERVICES

INNOVATIVE SOLUTIONS | INTEGRITY | SUPERIOR SERVICE

Core Lab
RESERVOIR OPTIMIZATION

Thin Section Petrography

Anchor QEA, LLC
SoCo Fractured Rock MNA Project
Alabama, USA
Proprietary - Anchor QEA

RAPIDZOOM
(Images & Captions generated from RAPIDZoom™)

Houston ATC Job File No.: 202103975

October 2021

Core Laboratories, Inc.
Houston Advanced Technology Center
6316 Windfern Road
Houston, Texas 77040

Anchor QEA, LLC
SoCo Fractured Rock MNA Project
Alabama, USA
Proprietary - Anchor QEA

Thin Section Analysis

Sample Depth (ft):	**11.00**
Sample ID:	MR-AP-MW-2V

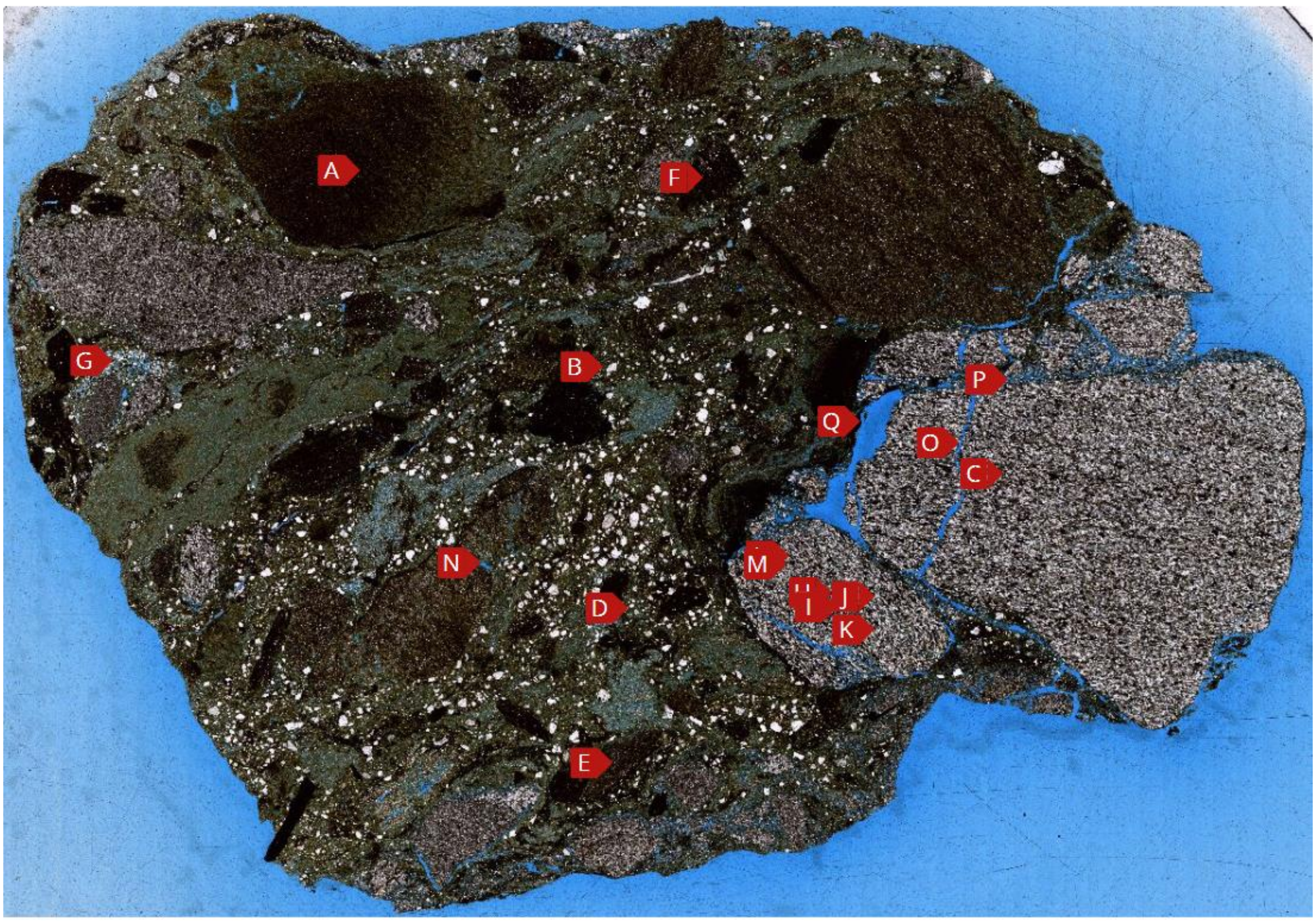


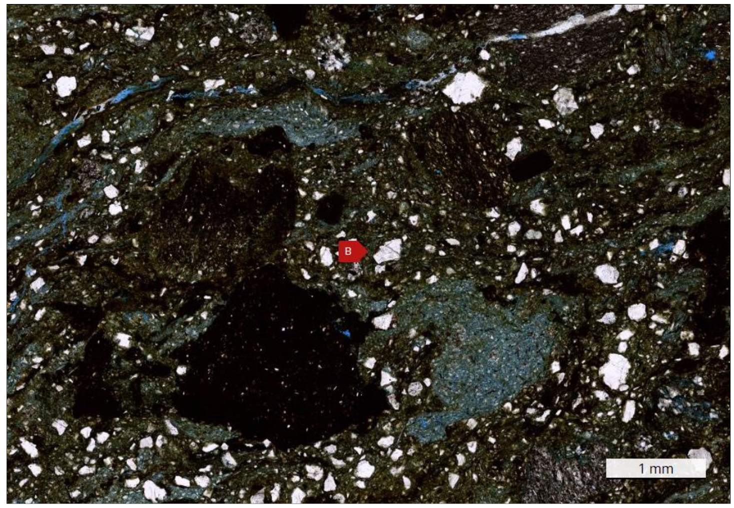
Image Note: Plane Light, Depth = Measured sample depth

RAPIDZoom Report Created - 20-Oct-2021

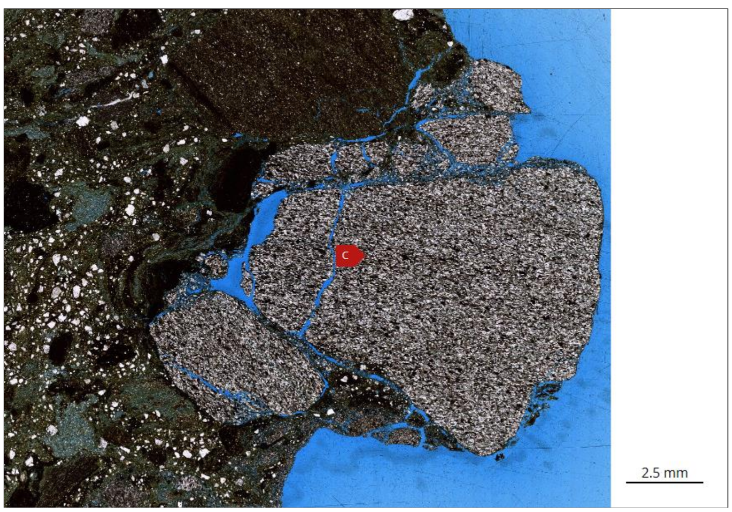
Anchor QEA, LLC
SoCo Fractured Rock MNA Project
Alabama, USA
Proprietary - Anchor QEA

Depth: 11.00 - Sample ID: MR-AP-MW-2V

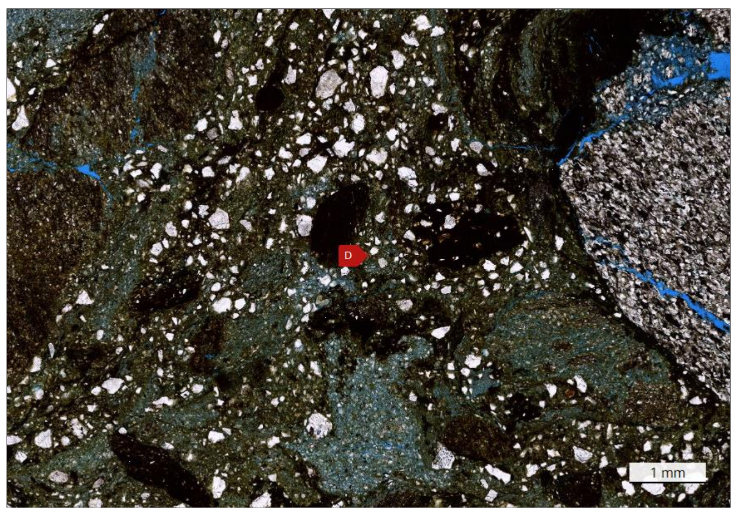
A - Pebble-size mudrock fragment



B - Sandy mudrock fragment



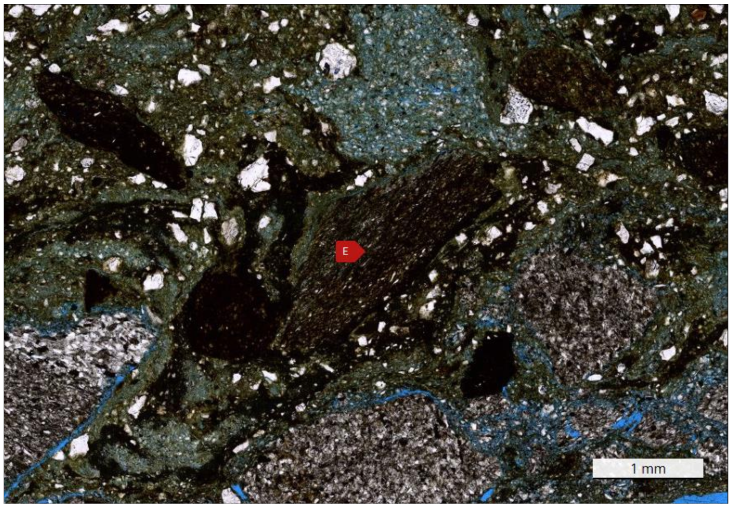
C - Pebble-size sandstone fragment



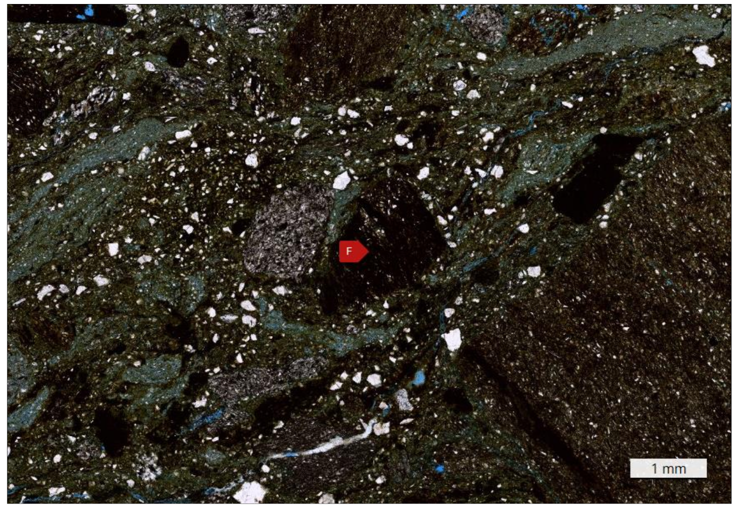
D - Intergranular pore-fill is a mixture of detrital clay matrix and silt/sand-size detrital grains

Image Description: This is conglomerate. Granule- to pebble-size grains are mostly mudrock (A), sandy mudrock (B), and sandstone (C). Between these grains is usually a mixture of detrital clay matrix and silt/sand-size detrital grains (D). Some mudrock fragments are laminated (E) or stained with hematite (F). Sand/silt-rich burrows (G) are locally observed. Sandstone fragments are composed of quartz (H), metamorphic rock fragments (I), feldspars (J), and mica (K). Pore-filling constituents are minor to moderate and include hematite (L), illitic clays (M), and quartz overgrowths. Visible intergranular pores (N) are rare. Open fractures (O) are induced.

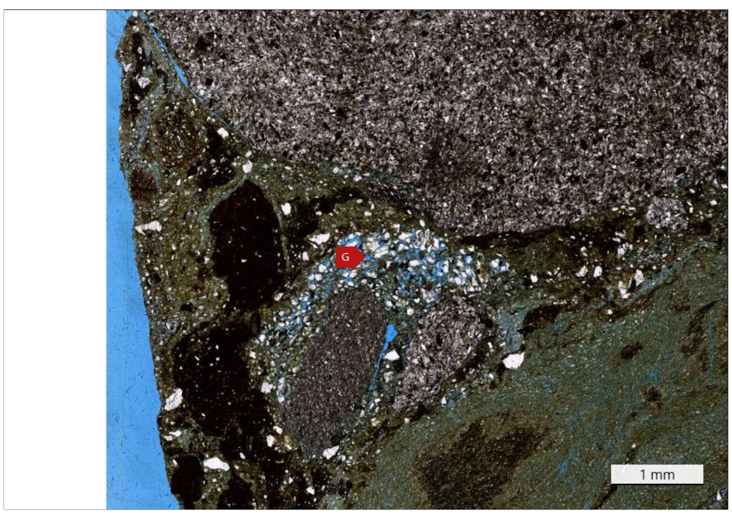
Depth: 11.00 - Sample ID: MR-AP-MW-2V



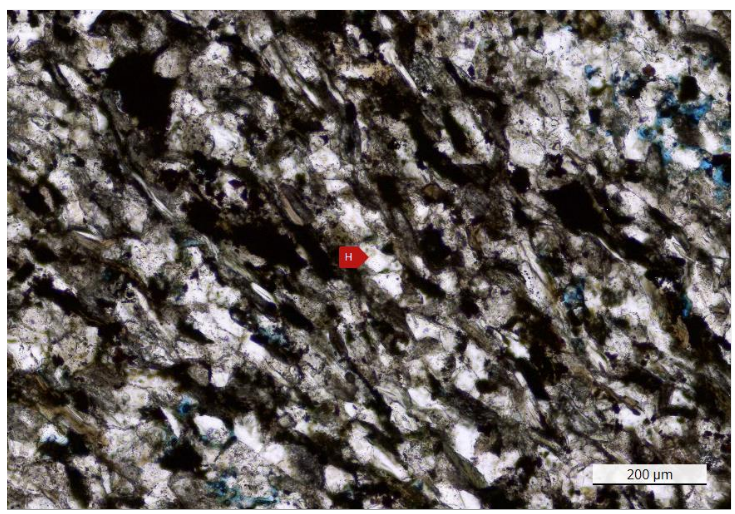
E - Laminated mudrock fragment



F - Mudrock fragment stained with hematite



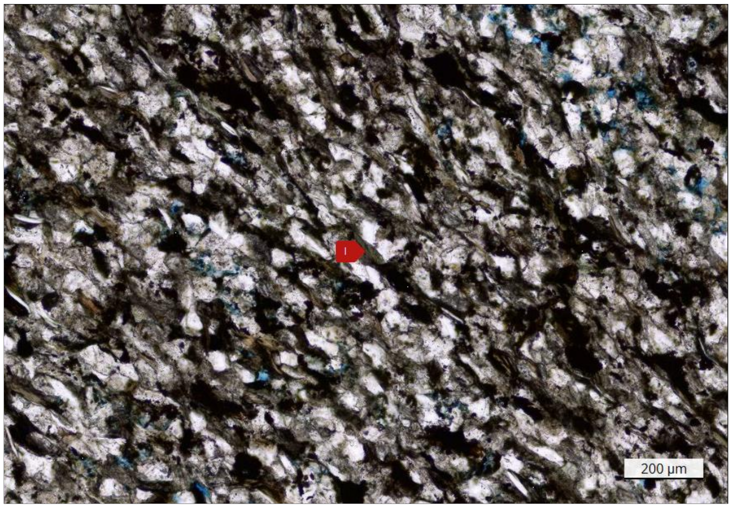
G - Sand-rich burrow with intergranular pores (blue)



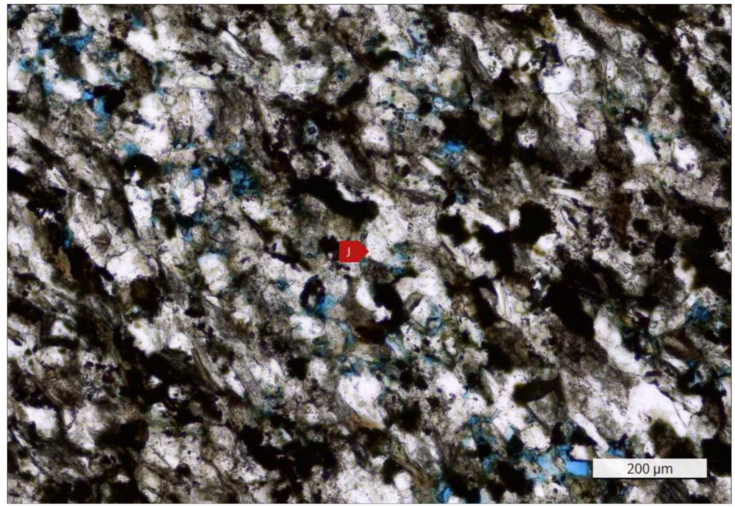
H - Detrital quartz grain

Image Description: This is conglomerate. Granule- to pebble-size grains are mostly mudrock (A), sandy mudrock (B), and sandstone (C). Between these grains is usually a mixture of detrital clay matrix and silt/sand-size detrital grains (D). Some mudrock fragments are laminated (E) or stained with hematite (F). Sand/silt-rich burrows (G) are locally observed. Sandstone fragments are composed of quartz (H), metamorphic rock fragments (I), feldspars (J), and mica (K). Pore-filling constituents are minor to moderate and include hematite (L), illitic clays (M), and quartz overgrowths. Visible intergranular pores (N) are rare. Open fractures (O) are induced.

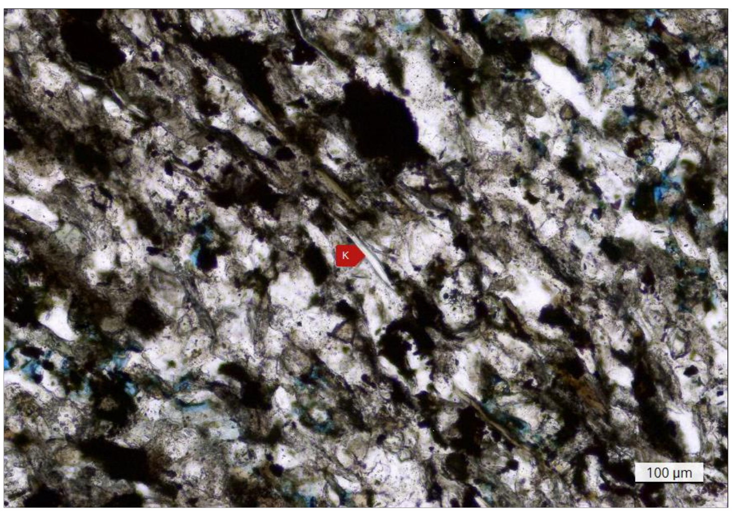
Depth: 11.00 - Sample ID: MR-AP-MW-2V



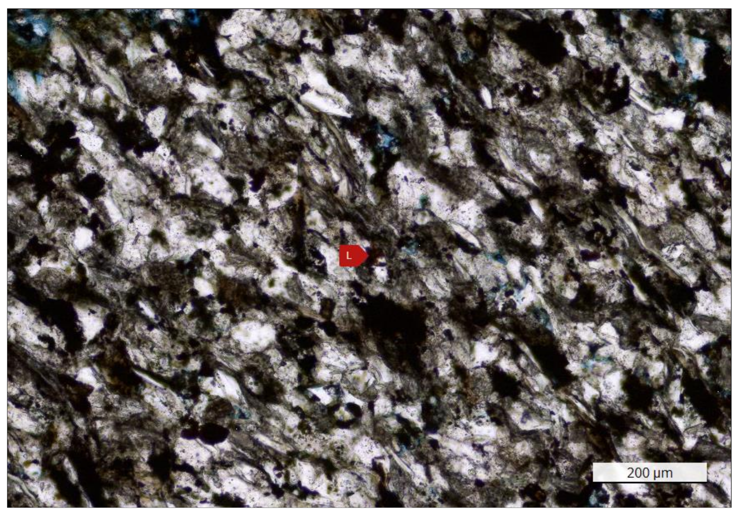
I - Metamorphic rock fragment



J - Detrital feldspar grain



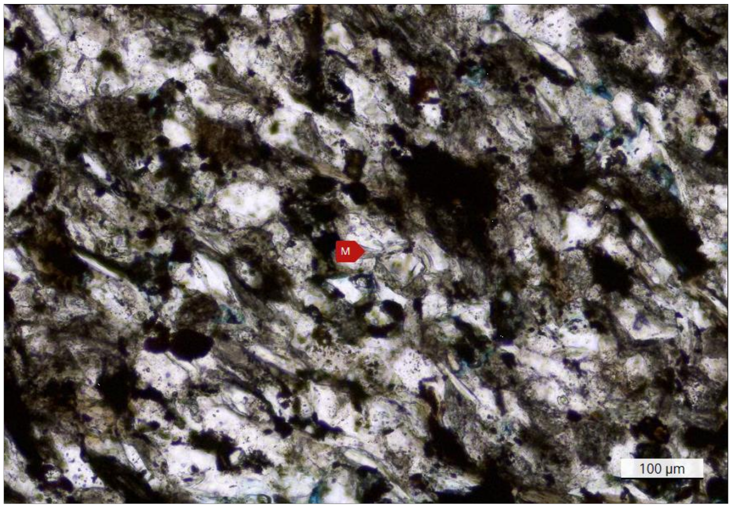
K - Muscovite mica grain



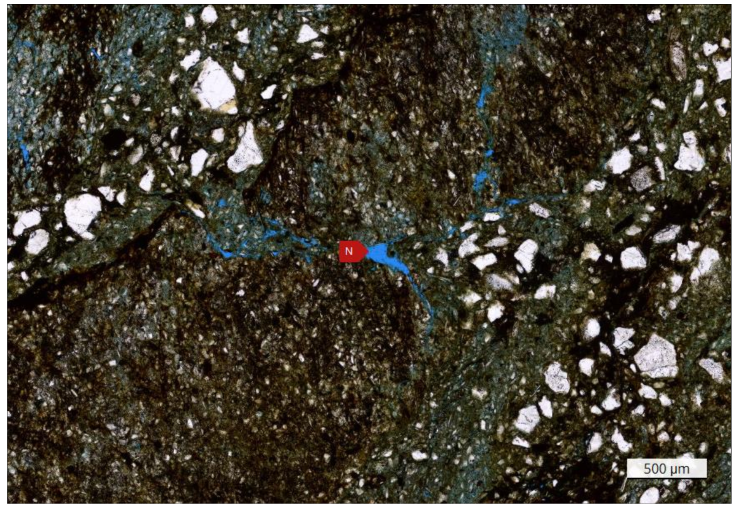
L - Hematite filling intergranular areas

Image Description: This is conglomerate. Granule- to pebble-size grains are mostly mudrock (A), sandy mudrock (B), and sandstone (C). Between these grains is usually a mixture of detrital clay matrix and silt/sand-size detrital grains (D). Some mudrock fragments are laminated (E) or stained with hematite (F). Sand/silt-rich burrows (G) are locally observed. Sandstone fragments are composed of quartz (H), metamorphic rock fragments (I), feldspars (J), and mica (K). Pore-filling constituents are minor to moderate and include hematite (L), illitic clays (M), and quartz overgrowths. Visible intergranular pores (N) are rare. Open fractures (O) are induced.

Depth: 11.00 - Sample ID: MR-AP-MW-2V

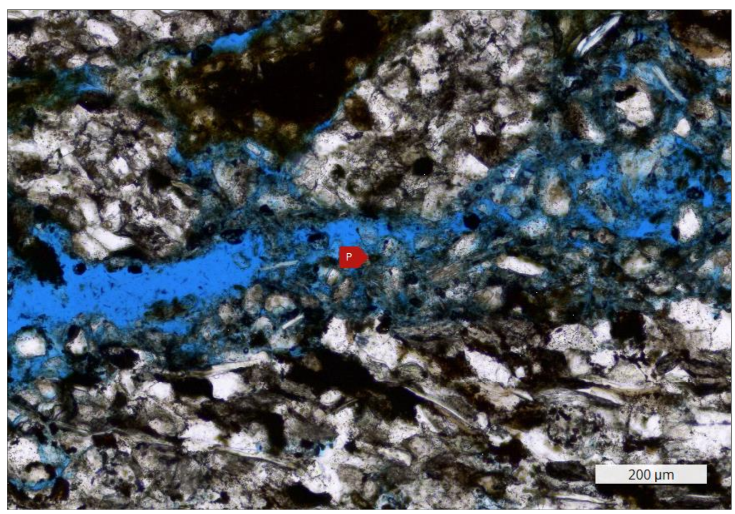


M - Illitic clays filling intergranular areas



N - Intergranular pore; potential contaminant precipitates from the leaching of coal ash are not observed in these pores

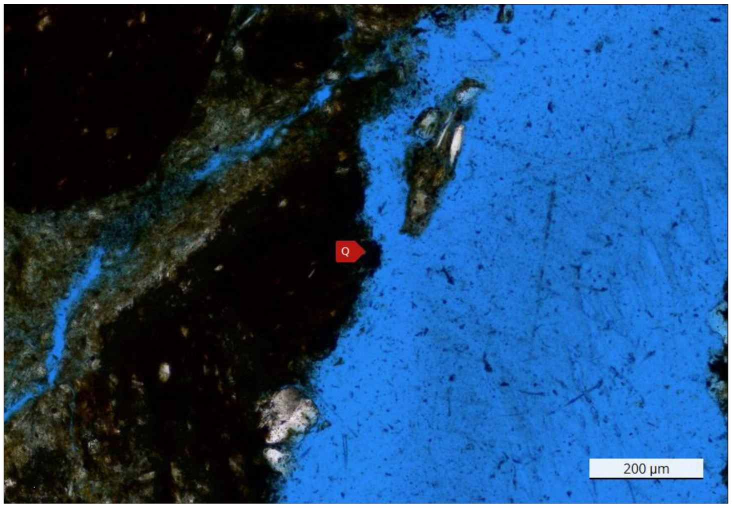
O - Induced fracture



P - Fracture featured in SEM

Image Description: This is conglomerate. Granule- to pebble-size grains are mostly mudrock (A), sandy mudrock (B), and sandstone (C). Between these grains is usually a mixture of detrital clay matrix and silt/sand-size detrital grains (D). Some mudrock fragments are laminated (E) or stained with hematite (F). Sand/silt-rich burrows (G) are locally observed. Sandstone fragments are composed of quartz (H), metamorphic rock fragments (I), feldspars (J), and mica (K). Pore-filling constituents are minor to moderate and include hematite (L), illitic clays (M), and quartz overgrowths. Visible intergranular pores (N) are rare. Open fractures (O) are induced.

Depth: 11.00 - Sample ID: MR-AP-MW-2V



Q - Opaque fracture wall is featured in SEM

Image Description: This is conglomerate. Granule- to pebble-size grains are mostly mudrock (A), sandy mudrock (B), and sandstone (C). Between these grains is usually a mixture of detrital clay matrix and silt/sand-size detrital grains (D). Some mudrock fragments are laminated (E) or stained with hematite (F). Sand/silt-rich burrows (G) are locally observed. Sandstone fragments are composed of quartz (H), metamorphic rock fragments (I), feldspars (J), and mica (K). Pore-filling constituents are minor to moderate and include hematite (L), illitic clays (M), and quartz overgrowths. Visible intergranular pores (N) are rare. Open fractures (O) are induced.

Thin Section Analysis

Sample Depth (ft):	**16.25**
Sample ID:	MR-AP-MW-3V

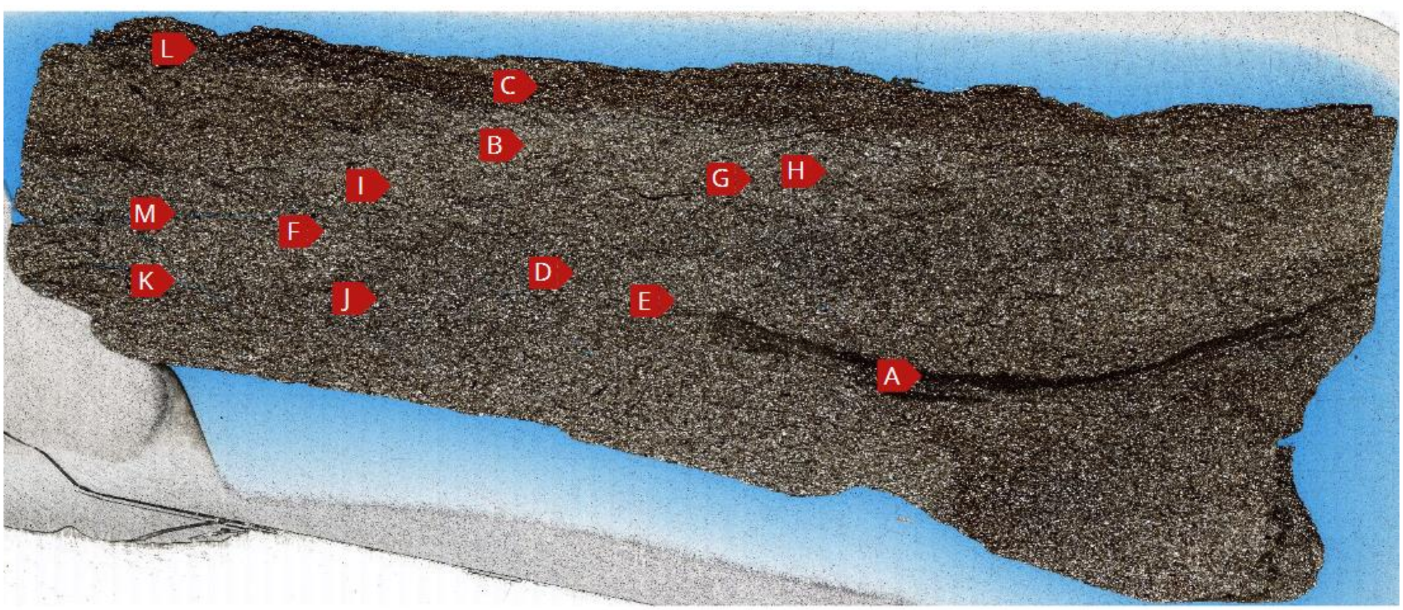


Image Note: Plane Light, Depth = Measured sample depth

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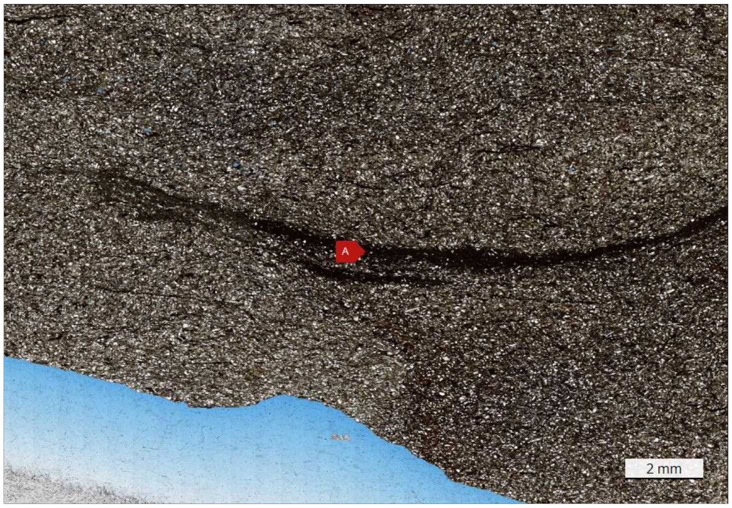
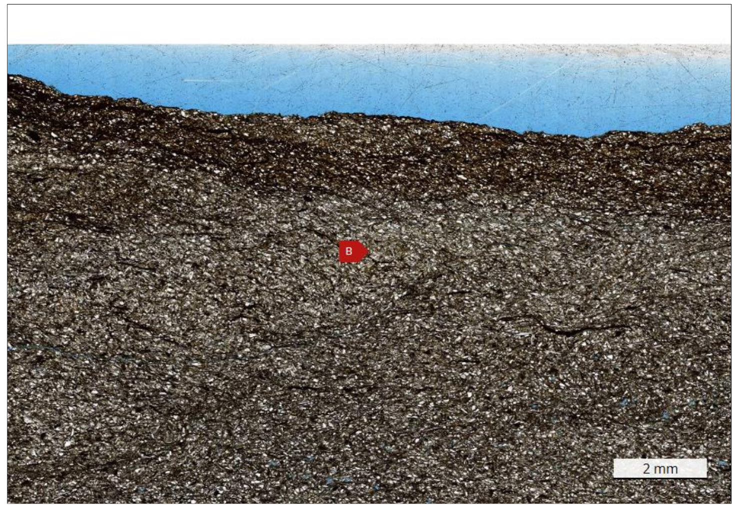
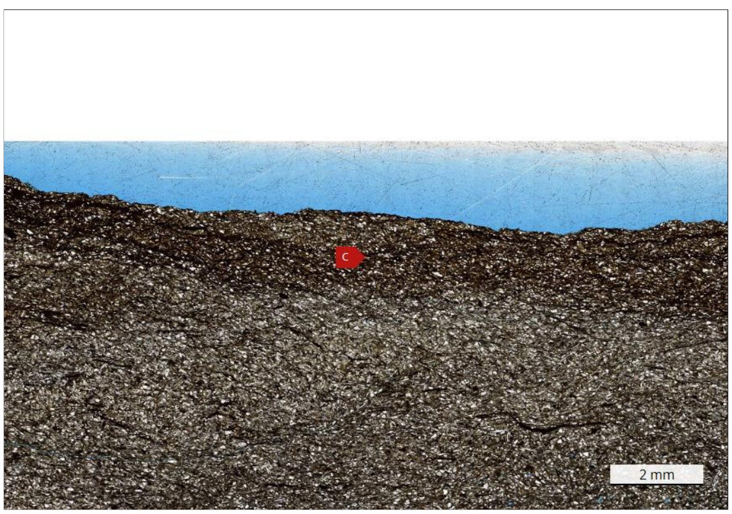
Depth: 16.25 - Sample ID: MR-AP-MW-3V



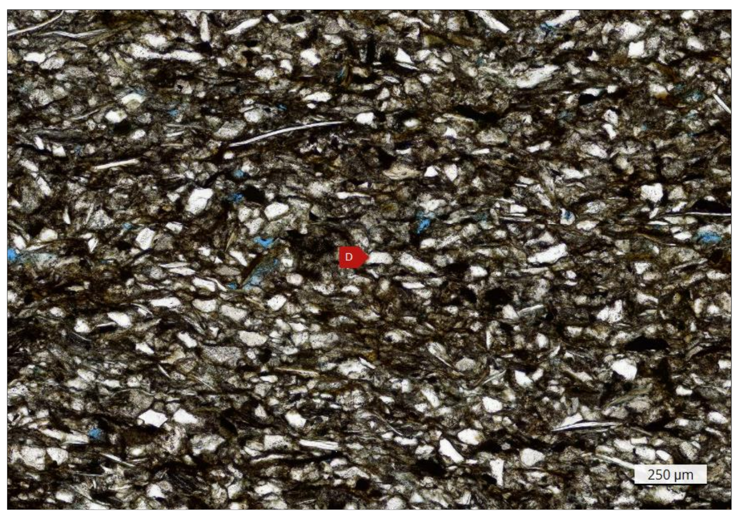
A - Wavy clay-rich lamina



B - Sand-rich burrow



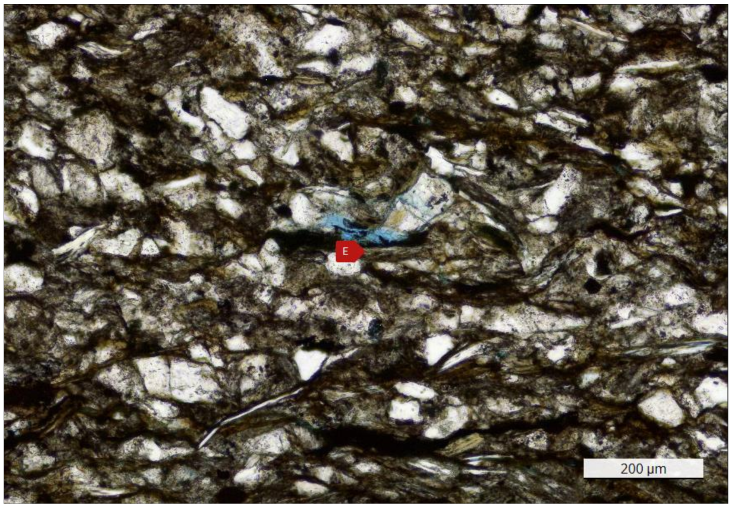
C - Hematite-stained lamina



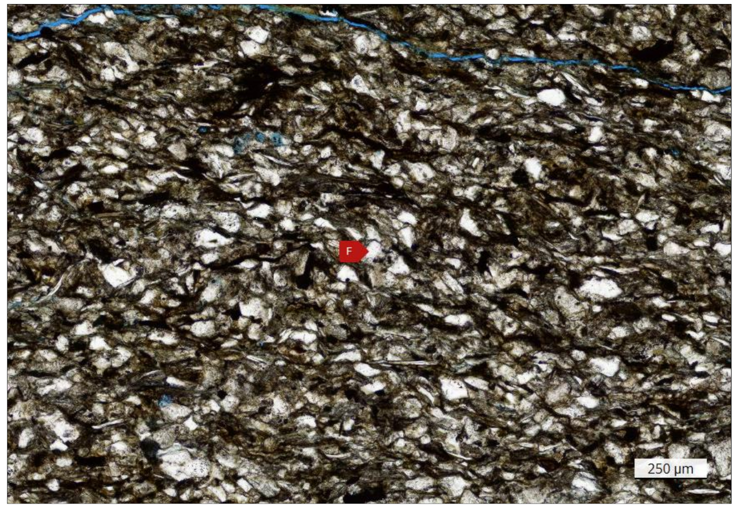
D - Detrital quartz grain

Image Description: This is argillaceous sandstone, which is lower very fine-grained (average 0.067 mm) and well sorted. Laminae (A) and burrows (B) are locally present, while some laminae (C) are stained with hematite. Framework grains consist of quartz (D), metamorphic fragments (E), feldspars (F), mica (G), argillaceous rock fragments, and igneous rock fragments. Organic fragments (H) and other accessory grains are rare to minor. Detrital clay matrix (I) is the predominant pore-filling constituent and is locally concentrated into laminae; other pore-filling minerals, such as hematite, are rare to minor and scattered. Visible pores(J) are rare; micropores are the principal pore type. Open fractures (K) are probably induced.

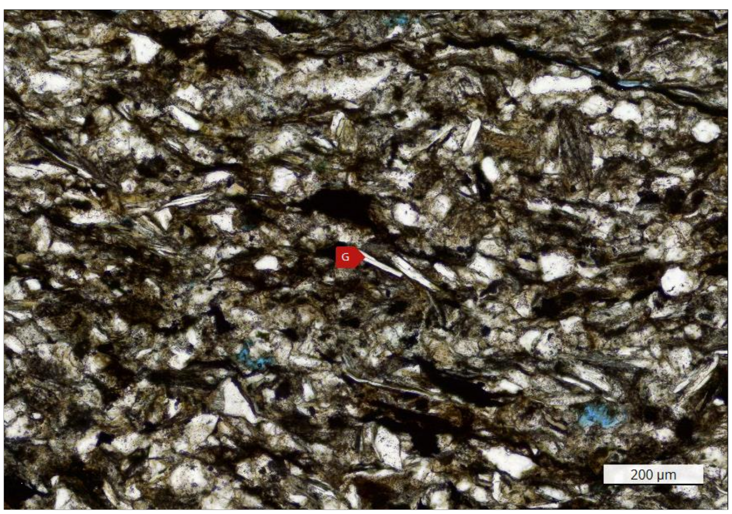
Depth: 16.25 - Sample ID: MR-AP-MW-3V



E - Metamorphic rock fragment



F - Detrital feldspar grain



G - Detrital muscovite mica grain

H - Elongate organic fragment

Image Description: This is argillaceous sandstone, which is lower very fine-grained (average 0.067 mm) and well sorted. Laminae (A) and burrows (B) are locally present, while some laminae (C) are stained with hematite. Framework grains consist of quartz (D), metamorphic fragments (E), feldspars (F), mica (G), argillaceous rock fragments, and igneous rock fragments. Organic fragments (H) and other accessory grains are rare to minor. Detrital clay matrix (I) is the predominant pore-filling constituent and is locally concentrated into laminae; other pore-filling minerals, such as hematite, are rare to minor and scattered. Visible pores(J) are rare; micropores are the principal pore type. Open fractures (K) are probably induced.

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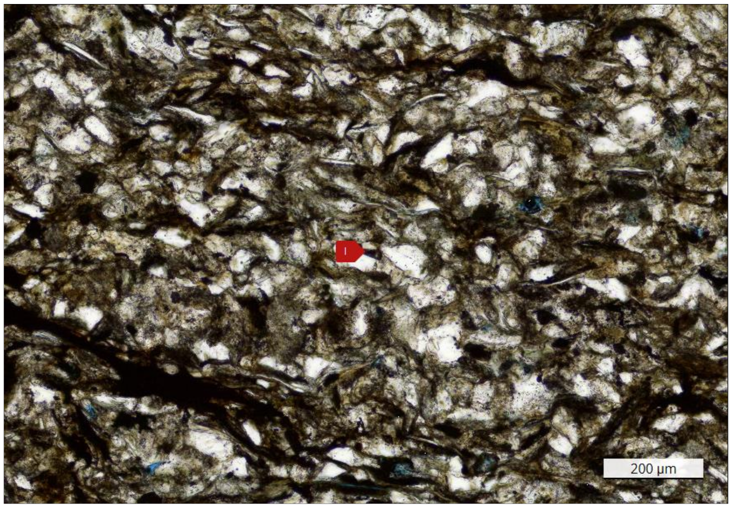
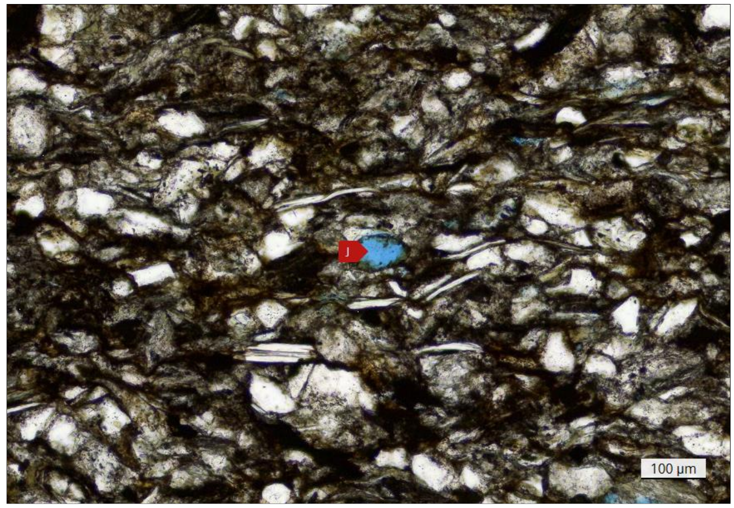
Depth: 16.25 - Sample ID: MR-AP-MW-3V

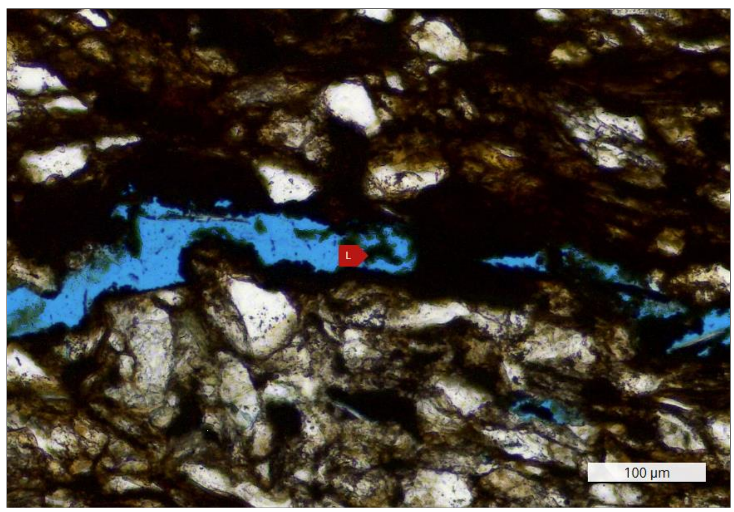


I - Detrital clay matrix occluding intergranular areas



J - Moldic pore

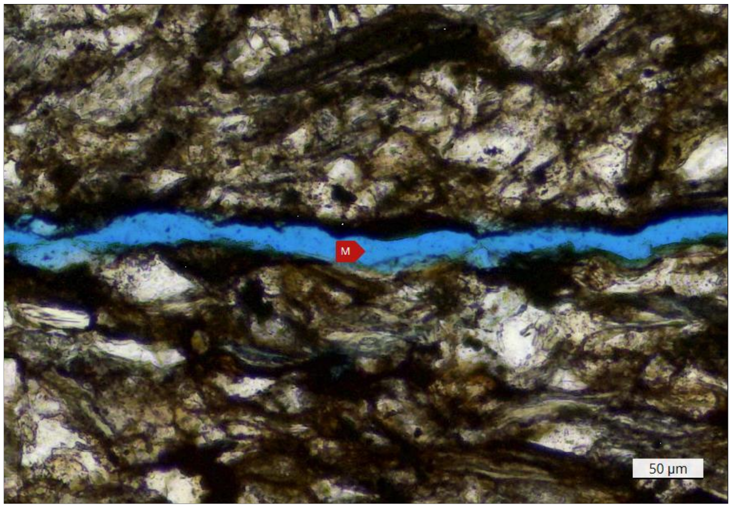
K - Induced fracture



L - Opaque material lining fracture is featured in SEM

Image Description: This is argillaceous sandstone, which is lower very fine-grained (average 0.067 mm) and well sorted. Laminae (A) and burrows (B) are locally present, while some laminae (C) are stained with hematite. Framework grains consist of quartz (D), metamorphic fragments (E), feldspars (F), mica (G), argillaceous rock fragments, and igneous rock fragments. Organic fragments (H) and other accessory grains are rare to minor. Detrital clay matrix (I) is the predominant pore-filling constituent and is locally concentrated into laminae; other pore-filling minerals, such as hematite, are rare to minor and scattered. Visible pores(J) are rare; micropores are the principal pore type. Open fractures (K) are probably induced.

Depth: 16.25 - Sample ID: MR-AP-MW-3V



M - Fracture developed parallel to an organic matter fragment is featured in SEM

Image Description: This is argillaceous sandstone, which is lower very fine-grained (average 0.067 mm) and well sorted. Laminae (A) and burrows (B) are locally present, while some laminae (C) are stained with hematite. Framework grains consist of quartz (D), metamorphic fragments (E), feldspars (F), mica (G), argillaceous rock fragments, and igneous rock fragments. Organic fragments (H) and other accessory grains are rare to minor. Detrital clay matrix (I) is the predominant pore-filling constituent and is locally concentrated into laminae; other pore-filling minerals, such as hematite, are rare to minor and scattered. Visible pores(J) are rare; micropores are the principal pore type. Open fractures (K) are probably induced.

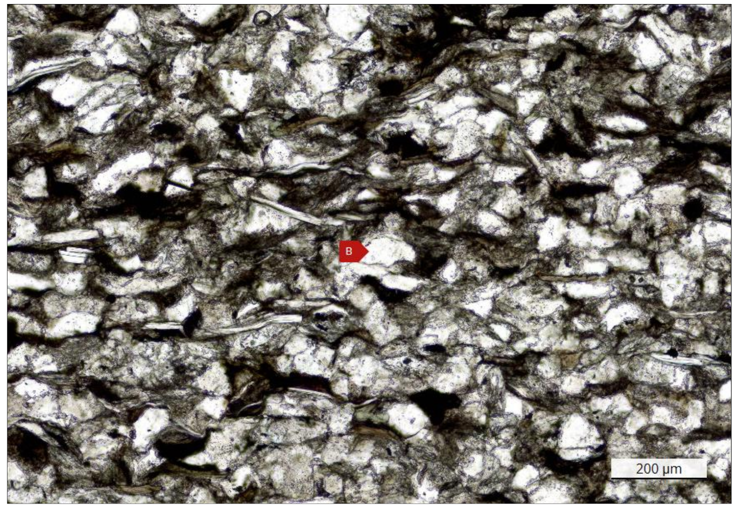
Thin Section Analysis

Sample Depth (ft):	**22.50**
Sample ID:	MR-AP-MW-3V

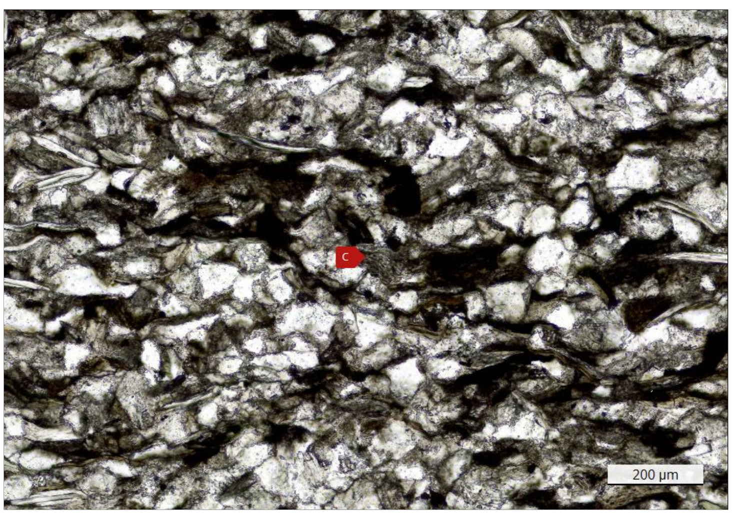
Image Note: Plane Light, Depth = Measured sample depth

Depth: 22.50 - Sample ID: MR-AP-MW-3V

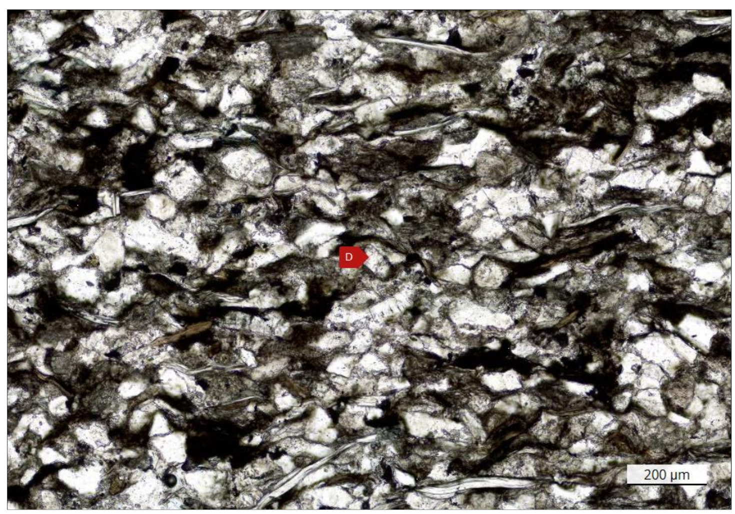
A - Clay-rich lamina locally stained with hematite



B - Detrital quartz grain



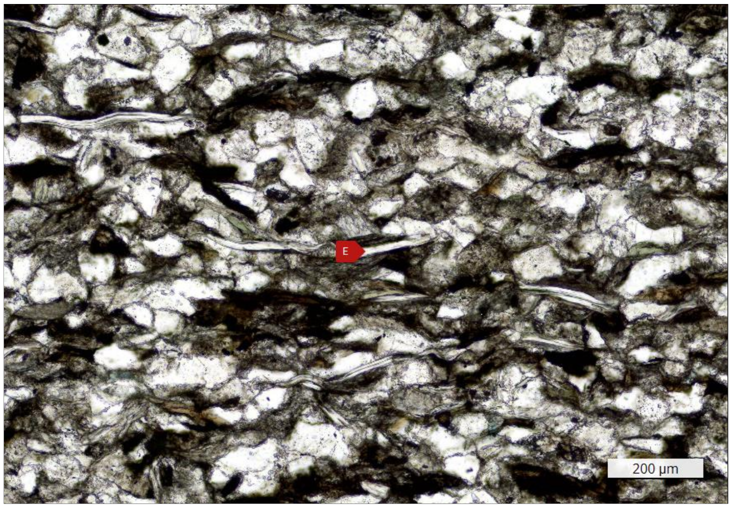
C - Metamorphic rock fragment



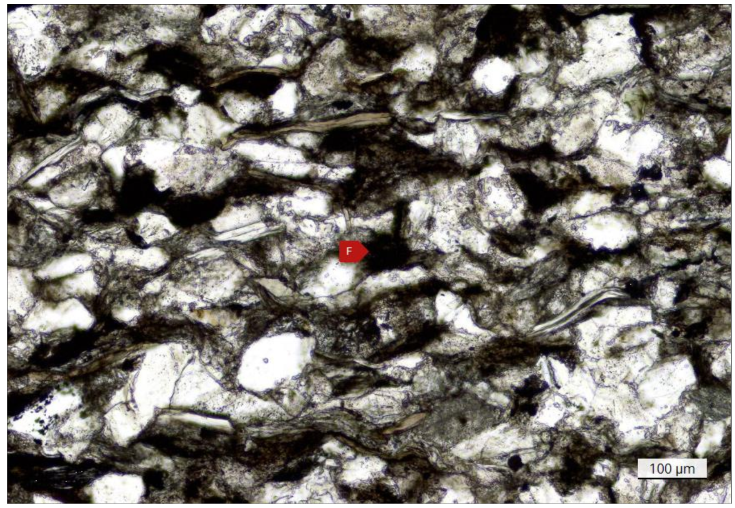
D - Detrital feldspar grain

Image Description: This argillaceous sandstone is lower very fine-grained (average 0.084 mm) and well sorted. Laminae (A) are rich in detrital clay matrix and are locally stained with hematite. Burrows are also observed. Framework grains include quartz (B), metamorphic fragments (C), feldspars (D), mica (E), argillaceous rock fragments (F), and igneous rock fragments. Organic fragments (G) and other accessory grains are rare and dispersed. Detrital clay matrix (H) is the principal pore-filling constituent; other pore-fillings minerals, such as hematite, are rare to minor and scattered. Visible intergranular pores (I) are rare. The potential contaminant precipitates from the leaching of coal ash are not observed in these pores. Open fractures (J) are probably induced.

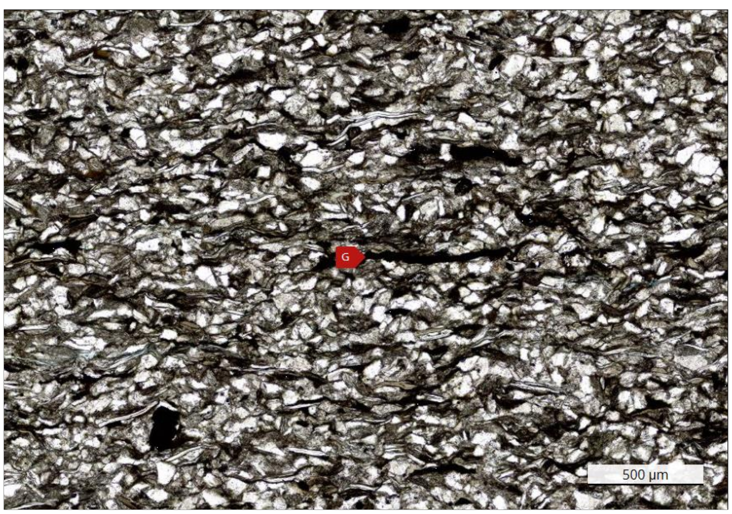
Depth: 22.50 - Sample ID: MR-AP-MW-3V



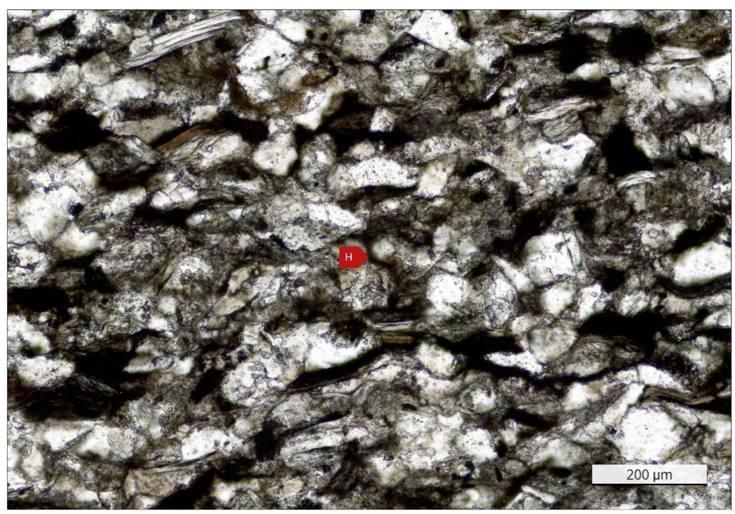
E - Muscovite mica grain



F - Argillaceous rock fragment



G - Elongate organic fragment deformed due to compaction



H - Detrital clay matrix filling intergranular areas

Image Description: This argillaceous sandstone is lower very fine-grained (average 0.084 mm) and well sorted. Laminae (A) are rich in detrital clay matrix and are locally stained with hematite. Burrows are also observed. Framework grains include quartz (B), metamorphic fragments (C), feldspars (D), mica (E), argillaceous rock fragments (F), and igneous rock fragments. Organic fragments (G) and other accessory grains are rare and dispersed. Detrital clay matrix (H) is the principal pore-filling constituent; other pore-fillings minerals, such as hematite, are rare to minor and scattered. Visible intergranular pores (I) are rare. The potential contaminant precipitates from the leaching of coal ash are not observed in these pores. Open fractures (J) are probably induced.

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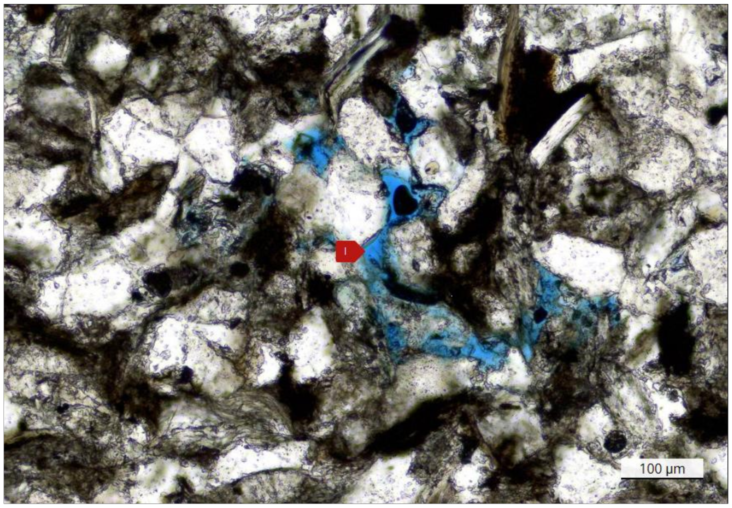
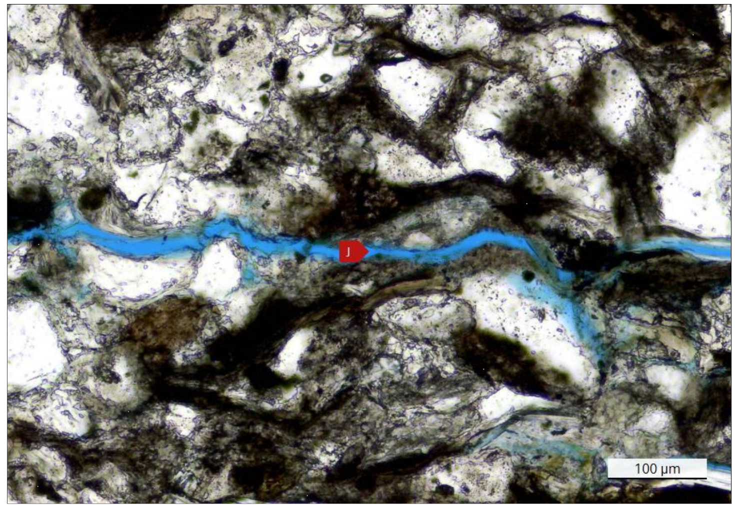
Depth: 22.50 - Sample ID: MR-AP-MW-3V



I - Intergranular pore



J - Induced fracture

Image Description: This argillaceous sandstone is lower very fine-grained (average 0.084 mm) and well sorted. Laminae (A) are rich in detrital clay matrix and are locally stained with hematite. Burrows are also observed. Framework grains include quartz (B), metamorphic fragments (C), feldspars (D), mica (E), argillaceous rock fragments (F), and igneous rock fragments. Organic fragments (G) and other accessory grains are rare and dispersed. Detrital clay matrix (H) is the principal pore-filling constituent; other pore-fillings minerals, such as hematite, are rare to minor and scattered. Visible intergranular pores (I) are rare. The potential contaminant precipitates from the leaching of coal ash are not observed in these pores. Open fractures (J) are probably induced.

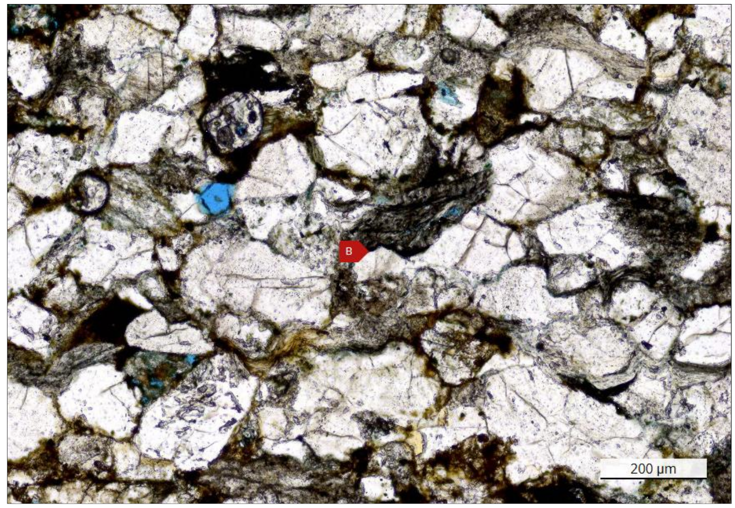
Thin Section Analysis

Sample Depth (ft): **29.00**
Sample ID: MR-AP-MW-20H

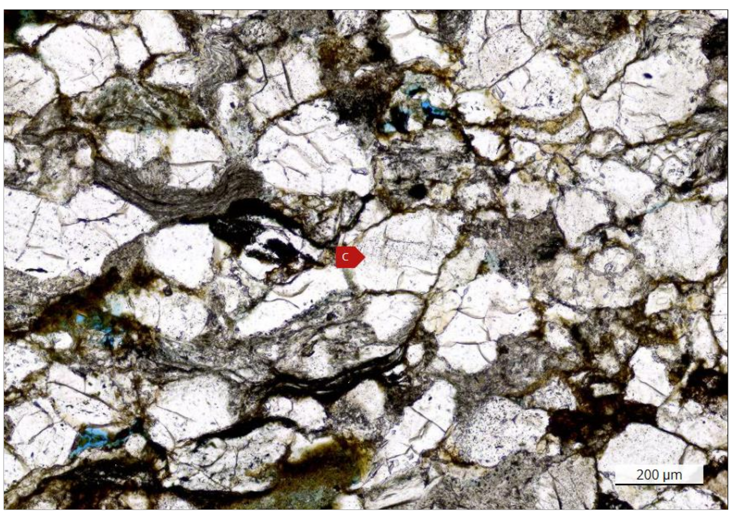
Image Note: Plane Light, Depth = Measured sample depth

Depth: 29.00 - Sample ID: MR-AP-MW-20H

A - Planar grain contact



B - Concave-convex grain contact between rock fragment (dark) and quartz grain (white)



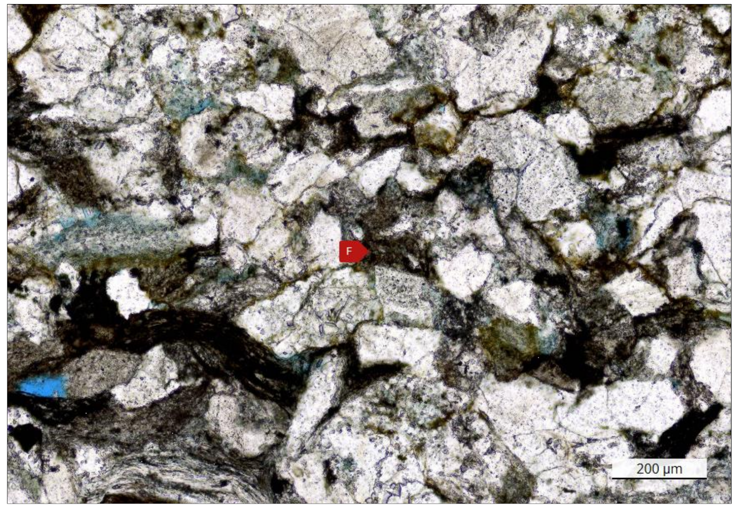
C - Detrital quartz grain

D - Metamorphic rock fragment

Image Description: This sandstone is upper fine-grained (average 0.195 mm) and very well sorted. Framework grains are tightly compacted, as indicated by the dominance of planar (A) and concave-convex (B) grain contacts. Some sutured grain contacts are also observed. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by moderate feldspars (E) and igneous fragments, minor argillaceous fragments (F), and rare chert. Accessory grains, such as mica (G) and heavy minerals, are rare and scattered. Authigenic illitic clay (H) is the principal pore-filling constituent. Quartz overgrowths (I), hematite, and titanium oxides are locally observed. Visible pores are rare to minor and consist of intergranular (J), secondary intragranular (K), and moldic (L). The potential contaminant precipitates from the leaching of coal ash are not observed in these pores.

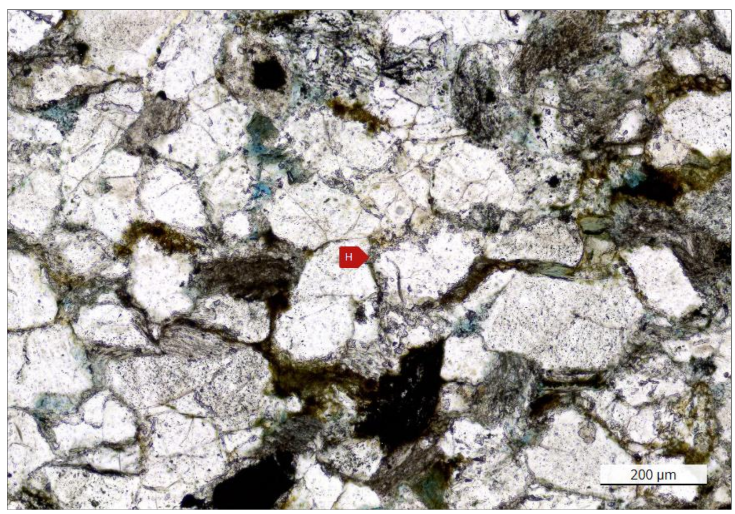
Depth: 29.00 - Sample ID: MR-AP-MW-20H

E - Detrital feldspar grain



F - Argillaceous rock fragment partly deformed due to compaction

G - Muscovite mica grain



H - Authigenic illitic clay filling intergranular areas

Image Description: This sandstone is upper fine-grained (average 0.195 mm) and very well sorted. Framework grains are tightly compacted, as indicated by the dominance of planar (A) and concave-convex (B) grain contacts. Some sutured grain contacts are also observed. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by moderate feldspars (E) and igneous fragments, minor argillaceous fragments (F), and rare chert. Accessory grains, such as mica (G) and heavy minerals, are rare and scattered. Authigenic illitic clay (H) is the principal pore-filling constituent. Quartz overgrowths (I), hematite, and titanium oxides are locally observed. Visible pores are rare to minor and consist of intergranular (J), secondary intragranular (K), and moldic (L). The potential contaminant precipitates from the leaching of coal ash are not observed in these pores.

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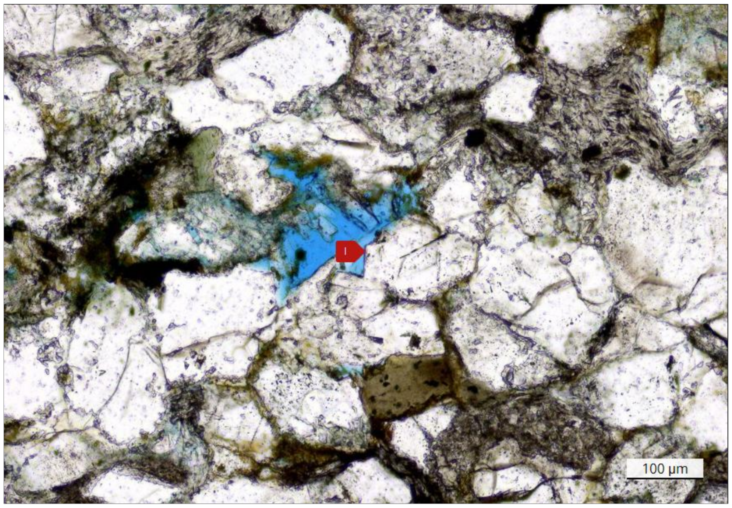
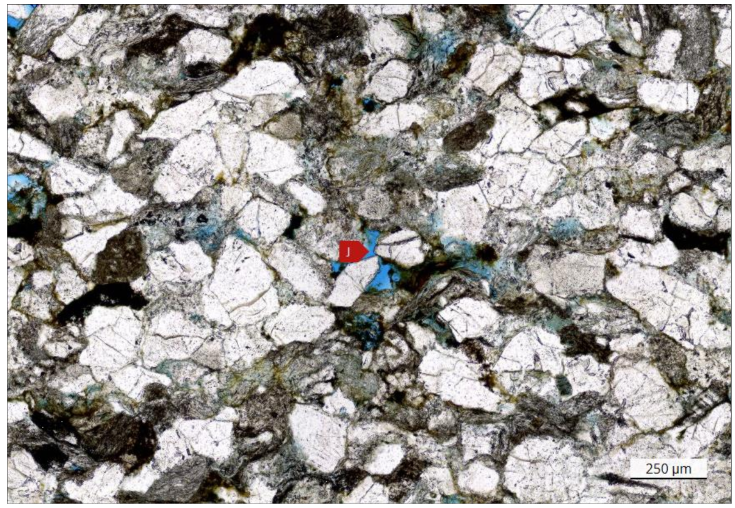
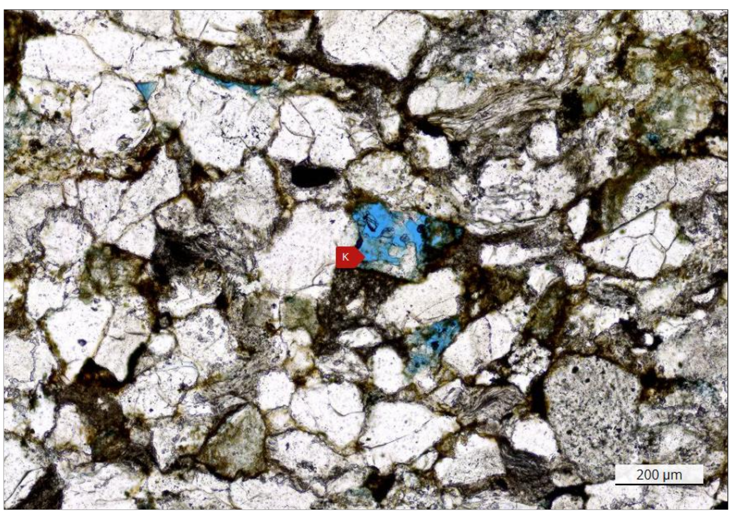
Depth: 29.00 - Sample ID: MR-AP-MW-20H



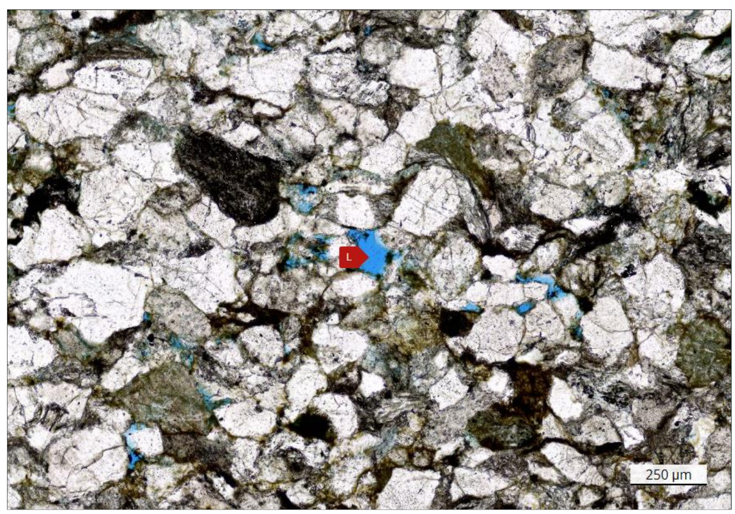
I - Quartz overgrowths



J - Intergranular pore; locally filled with clays



K - Secondary intragranular pore



L - Secondary moldic pore; locally filled with clays

Image Description: This sandstone is upper fine-grained (average 0.195 mm) and very well sorted. Framework grains are tightly compacted, as indicated by the dominance of planar (A) and concave-convex (B) grain contacts. Some sutured grain contacts are also observed. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by moderate feldspars (E) and igneous fragments, minor argillaceous fragments (F), and rare chert. Accessory grains, such as mica (G) and heavy minerals, are rare and scattered. Authigenic illitic clay (H) is the principal pore-filling constituent. Quartz overgrowths (I), hematite, and titanium oxides are locally observed. Visible pores are rare to minor and consist of intergranular (J), secondary intragranular (K), and moldic (L). The potential contaminant precipitates from the leaching of coal ash are not observed in these pores.

Anchor QEA, LLC

SoCo Fractured Rock MNA Project

Alabama, USA

Proprietary - Anchor QEA

Thin Section Analysis

Sample Depth (ft):	**35.00**
Sample ID:	MR-AP-MW-2V

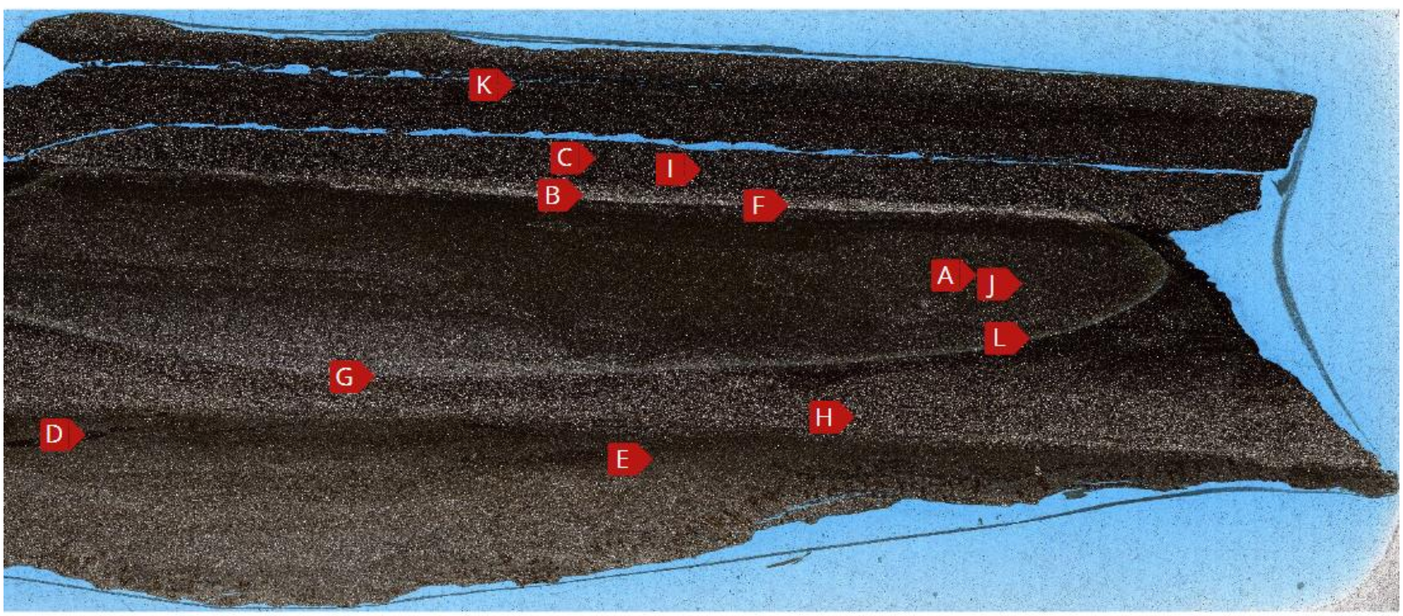
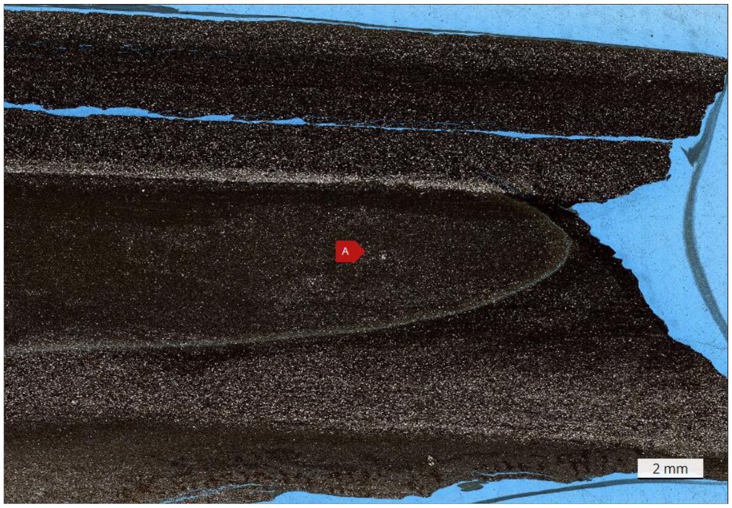


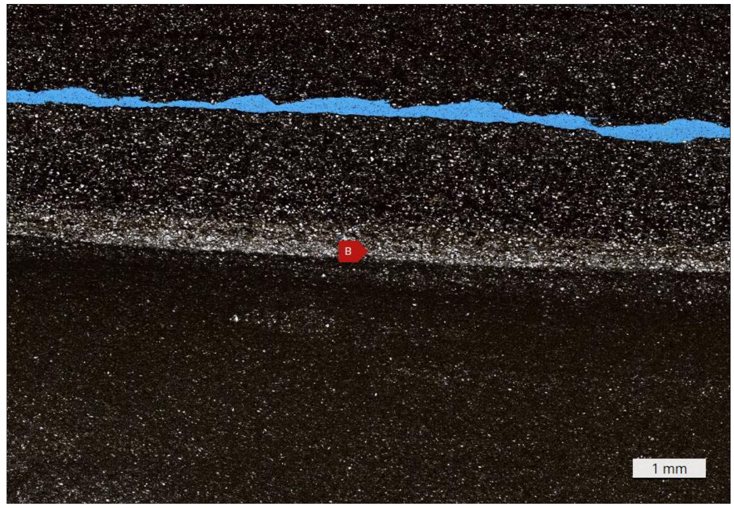
Image Note: Plane Light, Depth = Measured sample depth

RAPIDZoom Report Created - 20-Oct-2021

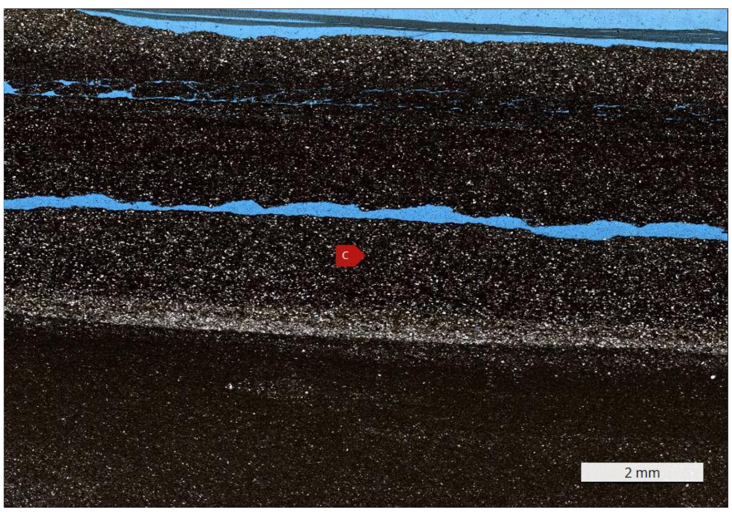
Depth: 35.00 - Sample ID: MR-AP-MW-2V



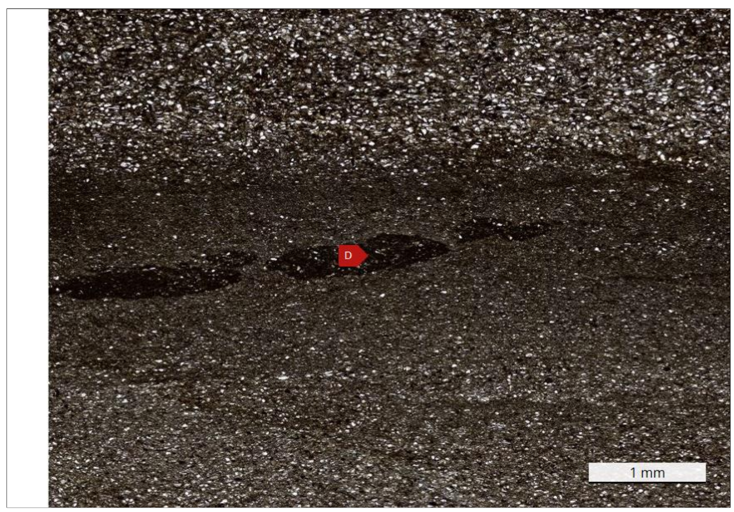
A - Lenticular siderite-rich nodule



B - Silt-rich lamina



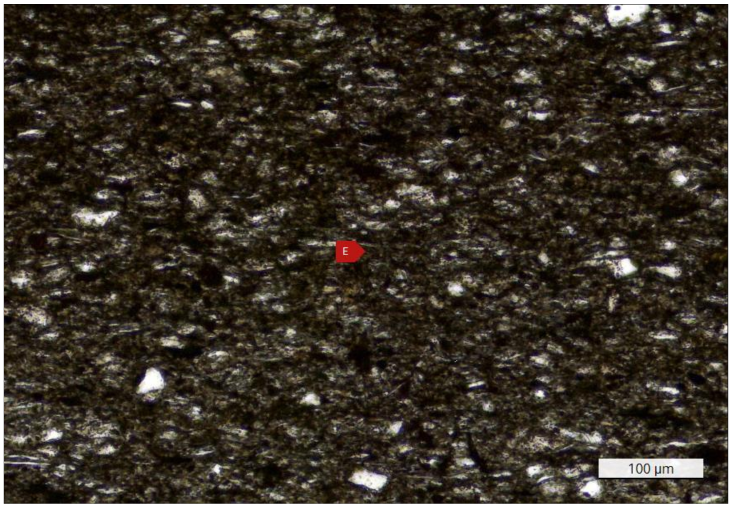
C - Clay-rich lamina; stained by hematite



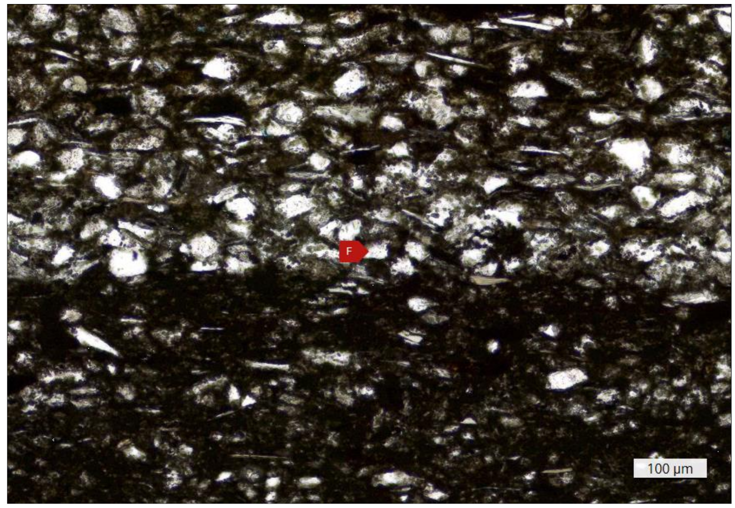
D - Possible burrow

Image Description: This is sideritic mudrock. Siderite is mostly concentrated in a lenticular nodule (A), although it may have replaced some detrital clay matrix. Laminae (B & C) are rich in detrital clays or silt grains, and some clay-rich laminae are stained with hematite. Burrows (D) are locally observed. Overall, detrital clay matrix (E) and silt-size detrital grains are the most abundant constituents. The grains include quartz (F), feldspar (G), mica (H), and rock fragments. Note that detrital clay matrix is locally stained with hematite (I) and replaced by siderite (J). Visible pores are very rare. Open fractures (K & L) are probably induced.

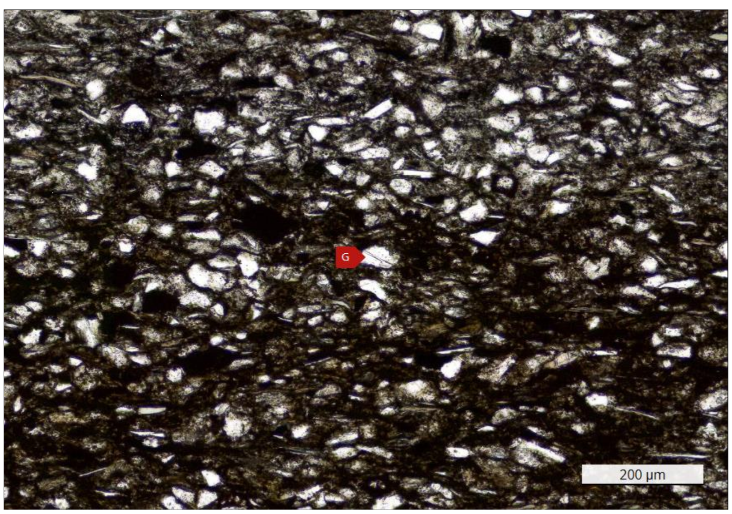
Depth: 35.00 - Sample ID: MR-AP-MW-2V



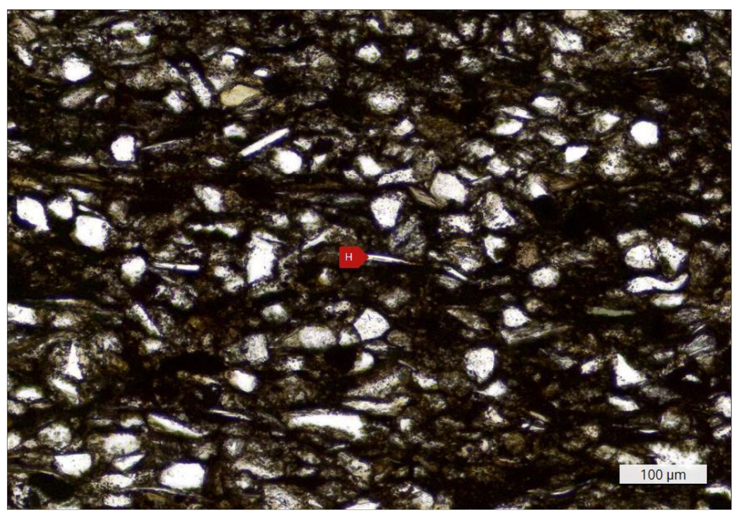
E - Detrital clay matrix



F - Silt-size detrital quartz grain



G - Silt-size detrital feldspar grain

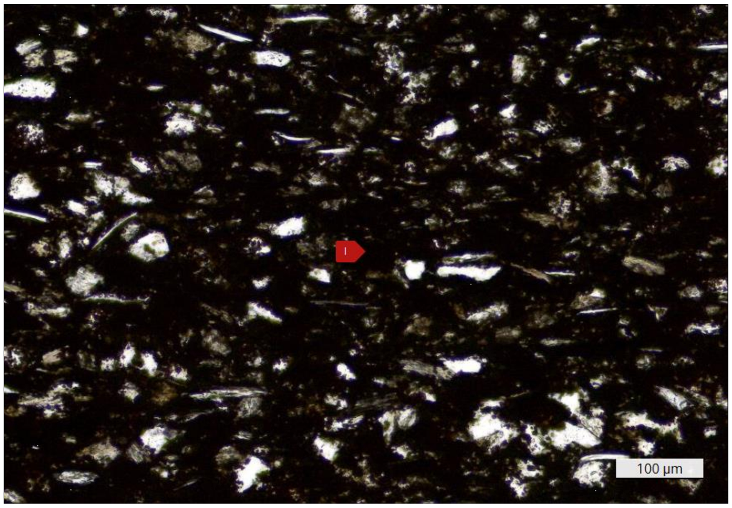


H - Muscovite mica grain

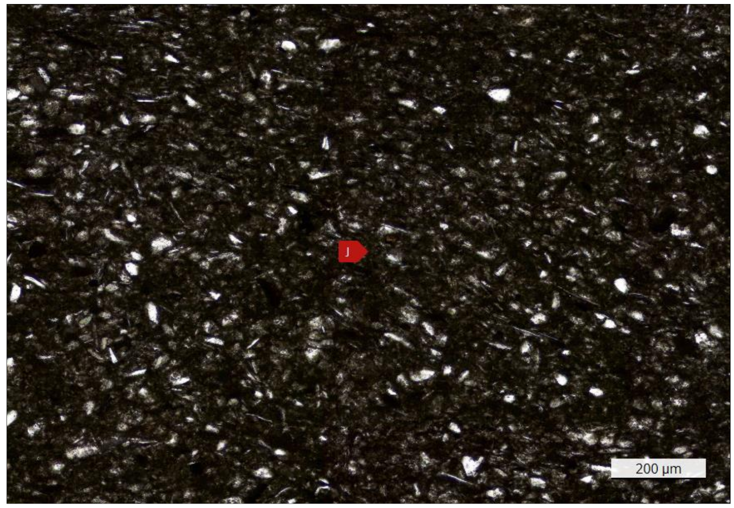
Image Description: This is sideritic mudrock. Siderite is mostly concentrated in a lenticular nodule (A), although it may have replaced some detrital clay matrix. Laminae (B & C) are rich in detrital clays or silt grains, and some clay-rich laminae are stained with hematite. Burrows (D) are locally observed. Overall, detrital clay matrix (E) and silt-size detrital grains are the most abundant constituents. The grains include quartz (F), feldspar (G), mica (H), and rock fragments. Note that detrital clay matrix is locally stained with hematite (I) and replaced by siderite (J). Visible pores are very rare. Open fractures (K & L) are probably induced.

Anchor QEA, LLC
SoCo Fractured Rock MNA Project
Alabama, USA
Proprietary - Anchor QEA

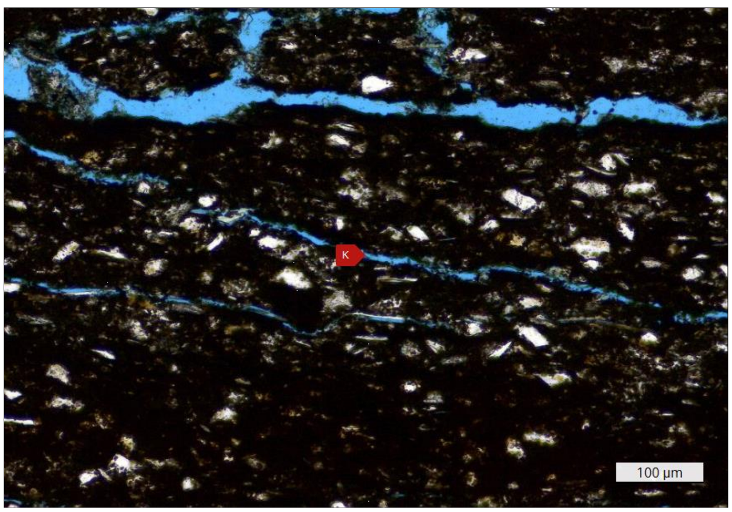
Depth: 35.00 - Sample ID: MR-AP-MW-2V



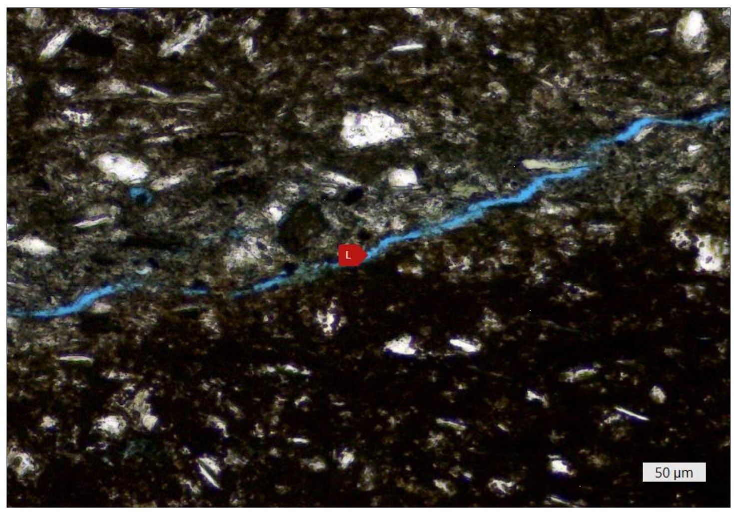
I - This dark colored material is a mixture of detrital clay matrix and hematite



J - Dark material is a mixture of detrital clay matrix and siderite



K - Induced fracture



L - Induced fracture

Image Description: This is sideritic mudrock. Siderite is mostly concentrated in a lenticular nodule (A), although it may have replaced some detrital clay matrix. Laminae (B & C) are rich in detrital clays or silt grains, and some clay-rich laminae are stained with hematite. Burrows (D) are locally observed. Overall, detrital clay matrix (E) and silt-size detrital grains are the most abundant constituents. The grains include quartz (F), feldspar (G), mica (H), and rock fragments. Note that detrital clay matrix is locally stained with hematite (I) and replaced by siderite (J). Visible pores are very rare. Open fractures (K & L) are probably induced.

Thin Section Analysis

Sample Depth (ft): **47.50**
Sample ID: MR-AP-MW-3V

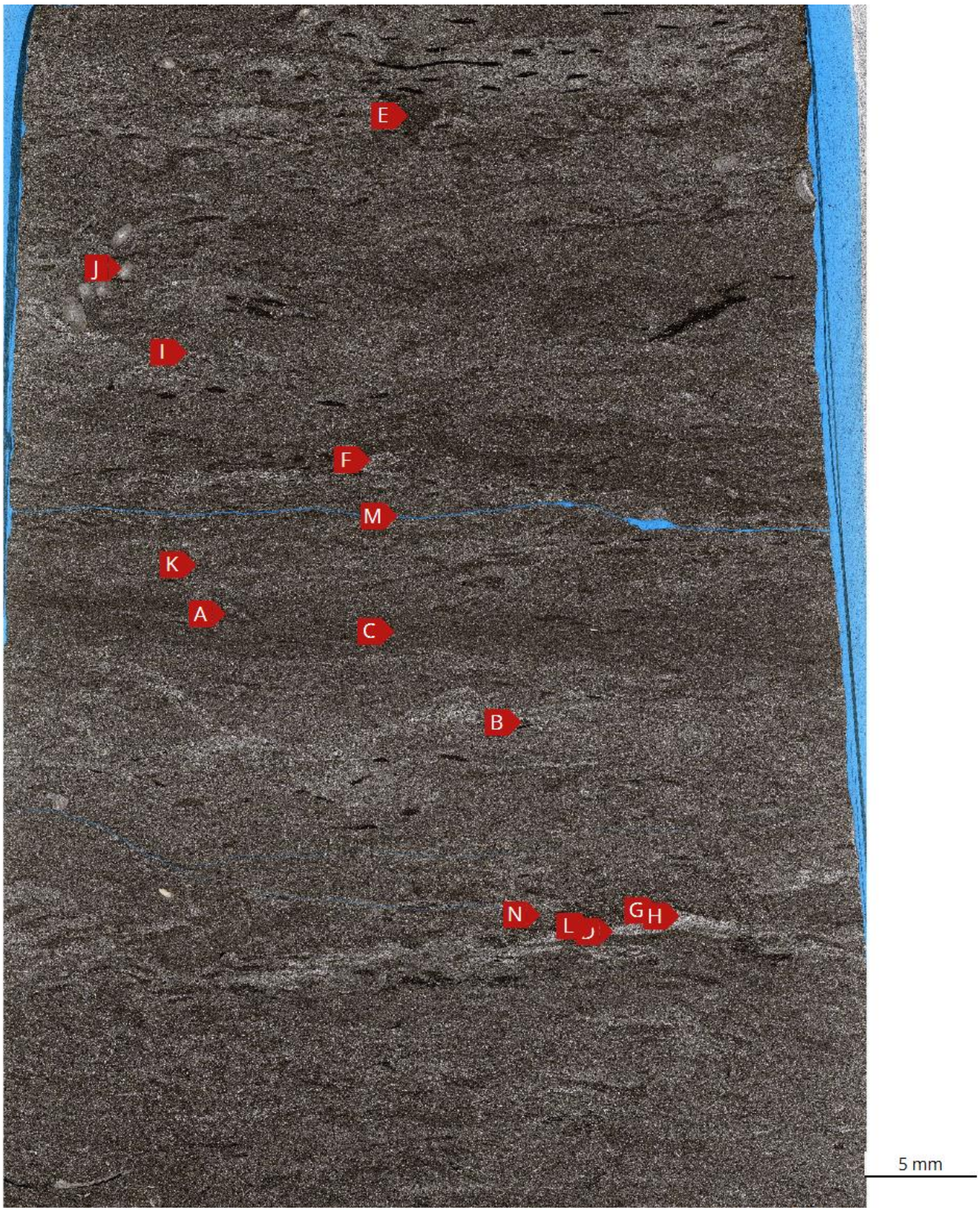


Image Note: Plane Light, Depth = Measured sample depth

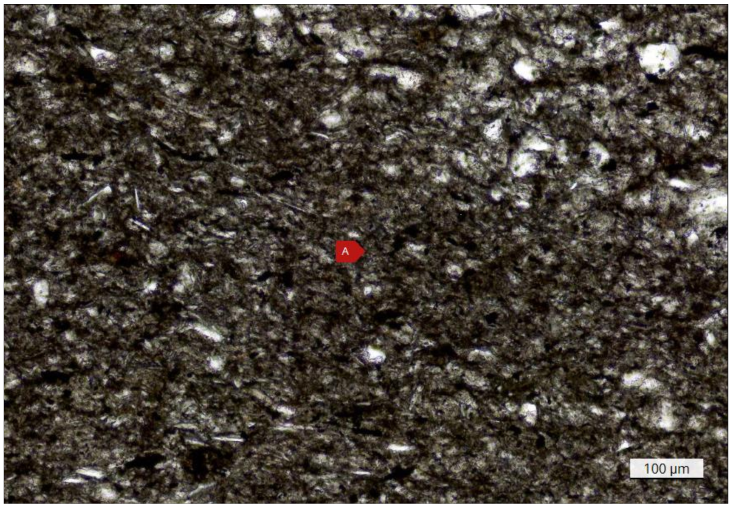
Anchor QEA, LLC

SoCo Fractured Rock MNA Project

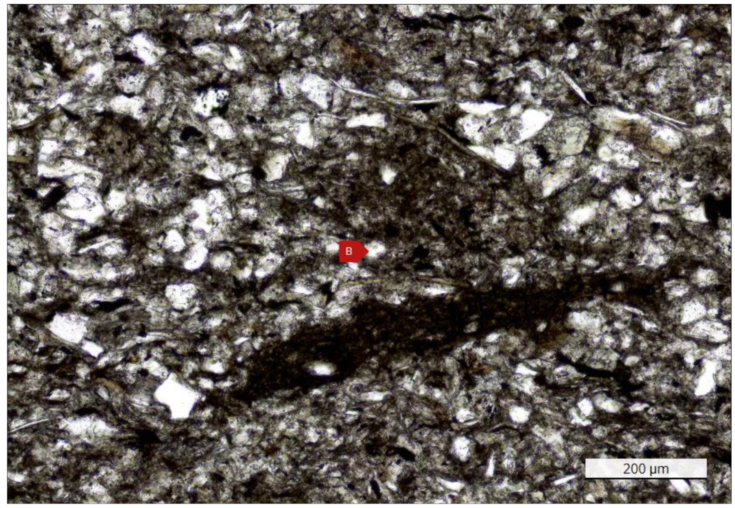
Alabama, USA

Proprietary - Anchor QEA

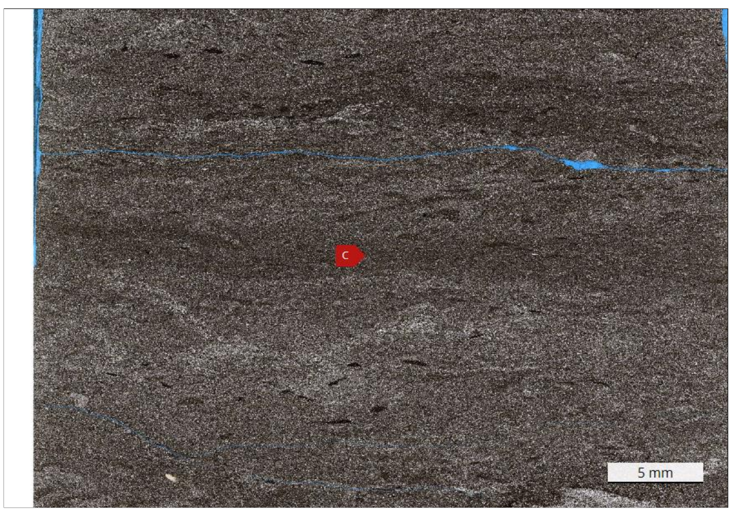
Depth: 47.50 - Sample ID: MR-AP-MW-3V



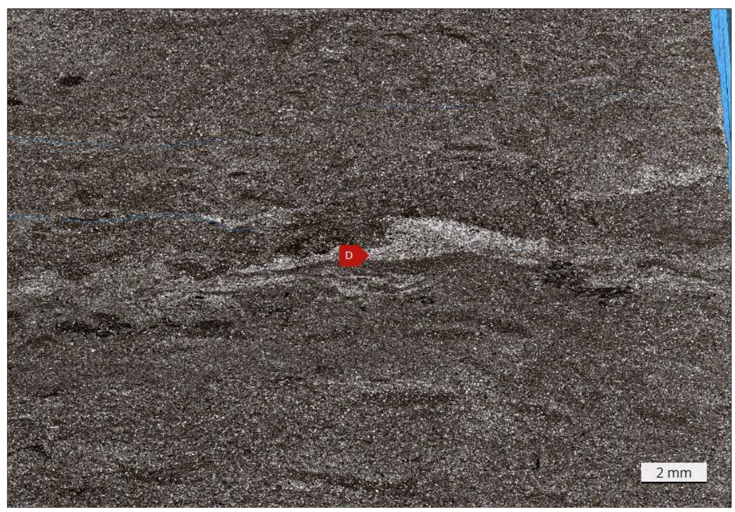
A - Detrital clay matrix



B - Silt-size detrital quartz grain



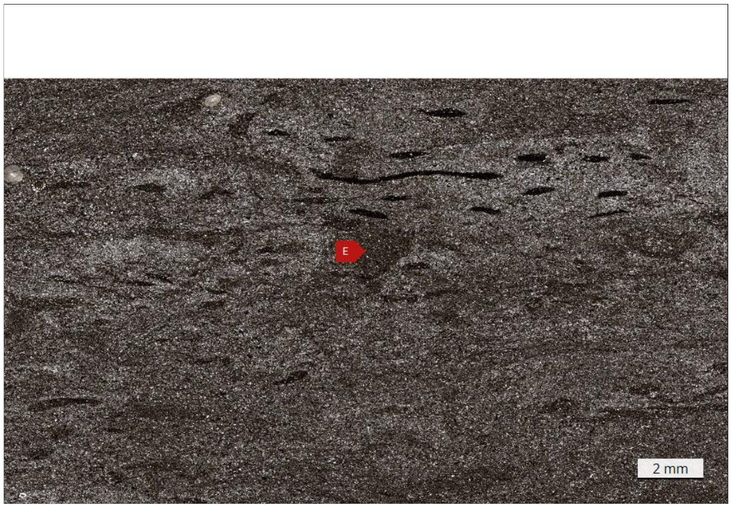
C - Clay-rich lamina



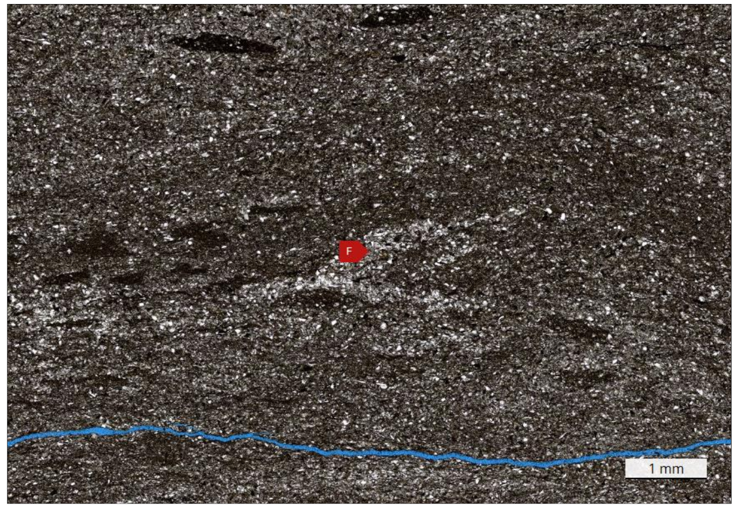
D - Silt-rich lamina locally disrupted by burrows

Image Description: Detrital clay matrix (A) and silt-size detrital quartz grains (B) are the most abundant constituents in this mudrock. Clay-rich or silt-rich laminae (C & D) and burrows (E & F) are widespread, and many laminae have been disrupted by burrows. The silt-size detrital grains include quartz, feldspar (G), rock fragments (H), and mica (I). Skeletal fragments (J) are locally observed and are mostly calcitic; siliceous skeletal fragments are very rare. Authigenic pyrite (K), calcite cement (L), and authigenic titanium oxides are sporadically observed. Open fractures (M & N) are probably induced. No natural pores are visible; micropores associated with the detrital clay matrix are the principal pore type.

Depth: 47.50 - Sample ID: MR-AP-MW-3V

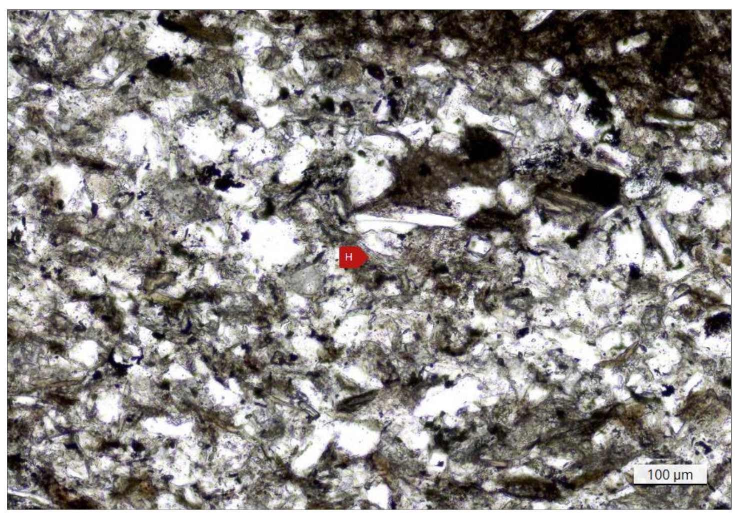


E - Clay-rich burrow



F - Silt-rich burrow

G - Detrital feldspar grain

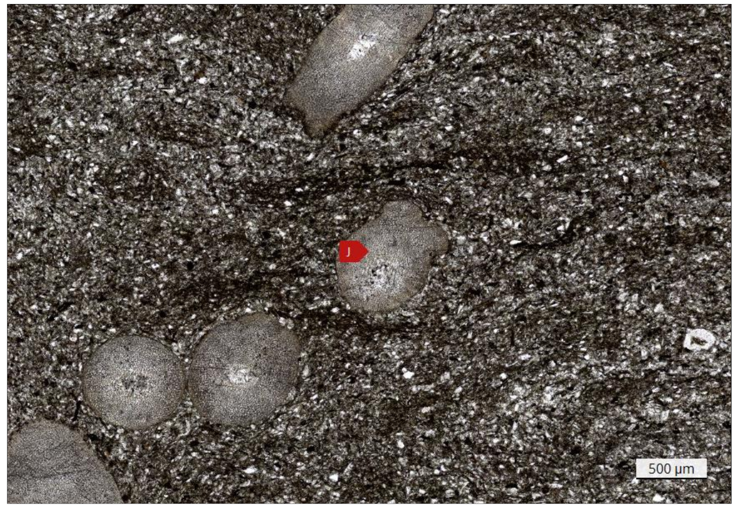


H - Metamorphic rock fragment

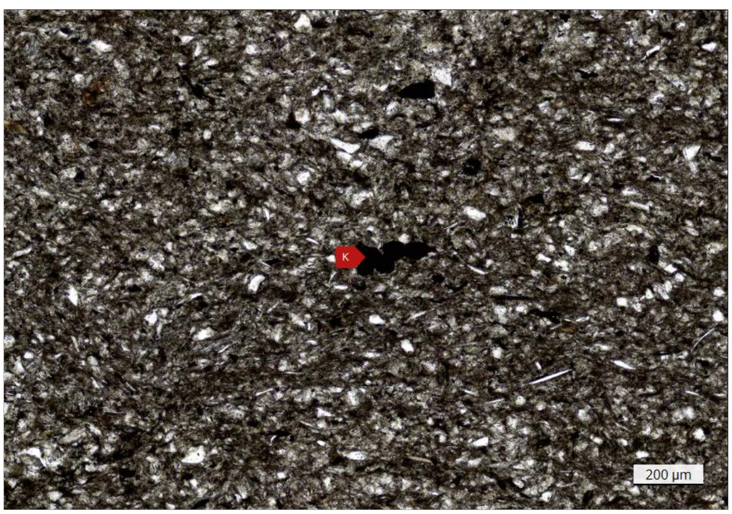
Image Description: Detrital clay matrix (A) and silt-size detrital quartz grains (B) are the most abundant constituents in this mudrock. Clay-rich or silt-rich laminae (C & D) and burrows (E & F) are widespread, and many laminae have been disrupted by burrows. The silt-size detrital grains include quartz, feldspar (G), rock fragments (H), and mica (I). Skeletal fragments (J) are locally observed and are mostly calcitic; siliceous skeletal fragments are very rare. Authigenic pyrite (K), calcite cement (L), and authigenic titanium oxides are sporadically observed. Open fractures (M & N) are probably induced. No natural pores are visible; micropores associated with the detrital clay matrix are the principal pore type.

Depth: 47.50 - Sample ID: MR-AP-MW-3V

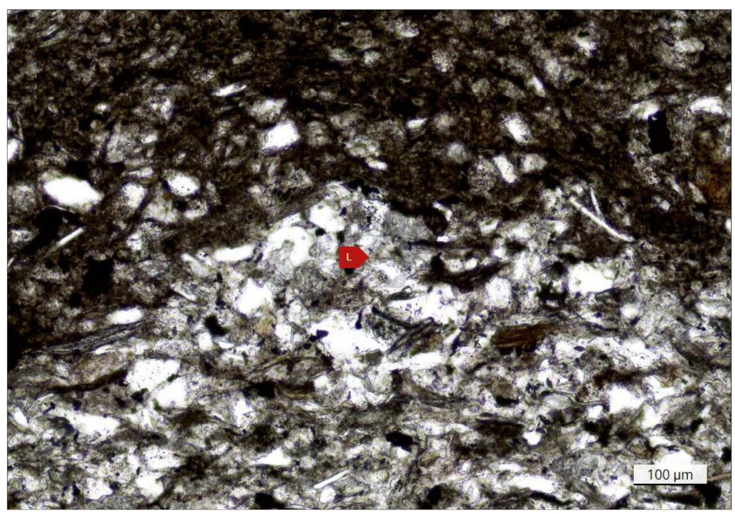
I - Muscovite mica grain



J - Echinoderm skeletal fragments are locally concentrated in this view



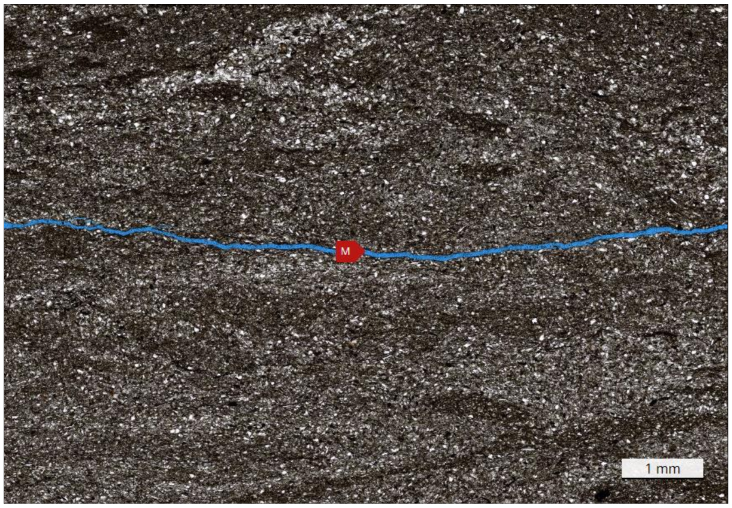
K - Authigenic pyrite



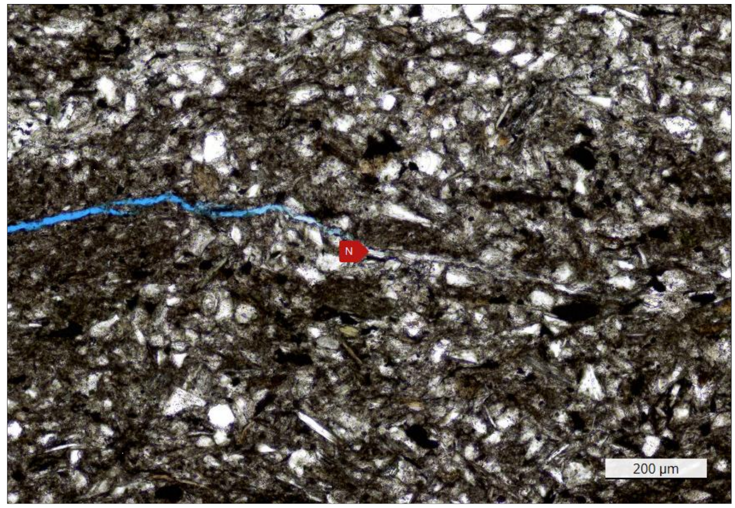
L - Calcite cement

Image Description: Detrital clay matrix (A) and silt-size detrital quartz grains (B) are the most abundant constituents in this mudrock. Clay-rich or silt-rich laminae (C & D) and burrows (E & F) are widespread, and many laminae have been disrupted by burrows. The silt-size detrital grains include quartz, feldspar (G), rock fragments (H), and mica (I). Skeletal fragments (J) are locally observed and are mostly calcitic; siliceous skeletal fragments are very rare. Authigenic pyrite (K), calcite cement (L), and authigenic titanium oxides are sporadically observed. Open fractures (M & N) are probably induced. No natural pores are visible; micropores associated with the detrital clay matrix are the principal pore type.

Depth: 47.50 - Sample ID: MR-AP-MW-3V



M - Induced fracture



N - Induced fracture; locally filled with possible air (white) rather than blue epoxy

Image Description: Detrital clay matrix (A) and silt-size detrital quartz grains (B) are the most abundant constituents in this mudrock. Clay-rich or silt-rich laminae (C & D) and burrows (E & F) are widespread, and many laminae have been disrupted by burrows. The silt-size detrital grains include quartz, feldspar (G), rock fragments (H), and mica (I). Skeletal fragments (J) are locally observed and are mostly calcitic; siliceous skeletal fragments are very rare. Authigenic pyrite (K), calcite cement (L), and authigenic titanium oxides are sporadically observed. Open fractures (M & N) are probably induced. No natural pores are visible; micropores associated with the detrital clay matrix are the principal pore type.

Anchor QEA, LLC

SoCo Fractured Rock MNA Project

Alabama, USA

Proprietary - Anchor QEA

Thin Section Analysis

Sample Depth (ft):	**142.00**
Sample ID:	MR-AP-MW-3V

Image Note: Plane Light, Depth = Measured sample depth

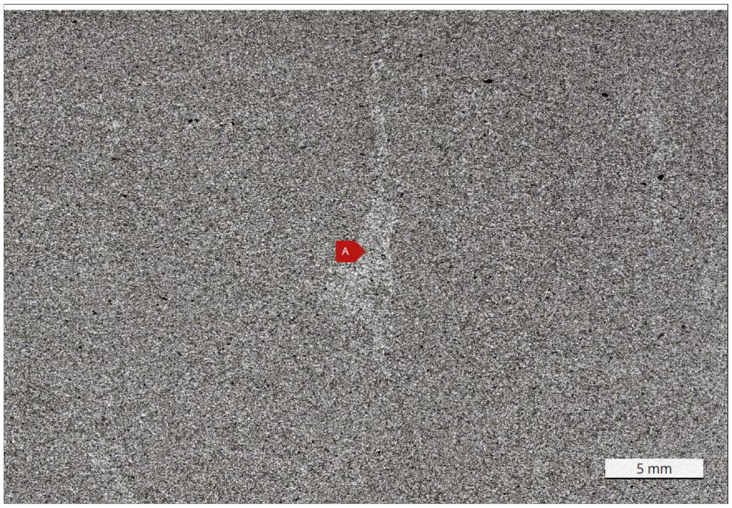
Anchor QEA, LLC

SoCo Fractured Rock MNA Project

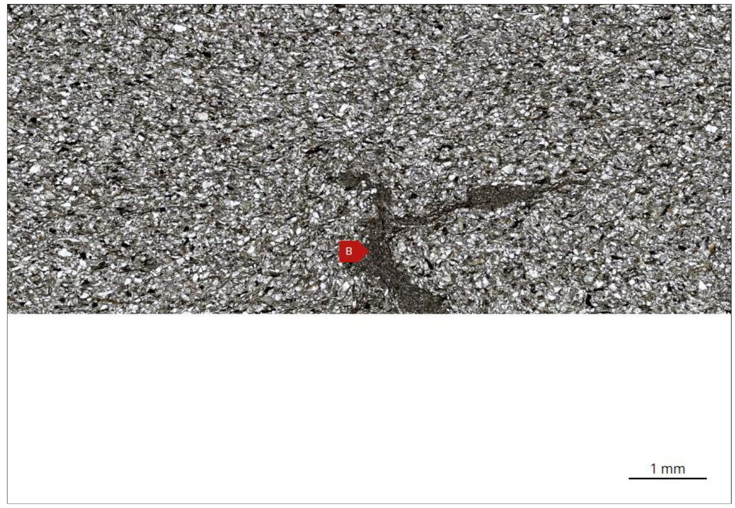
Alabama, USA

Proprietary - Anchor QEA

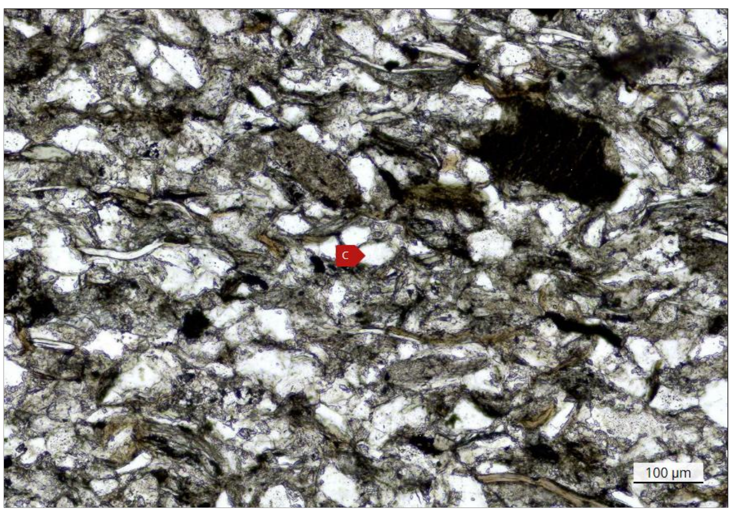
Depth: 142.00 - Sample ID: MR-AP-MW-3V



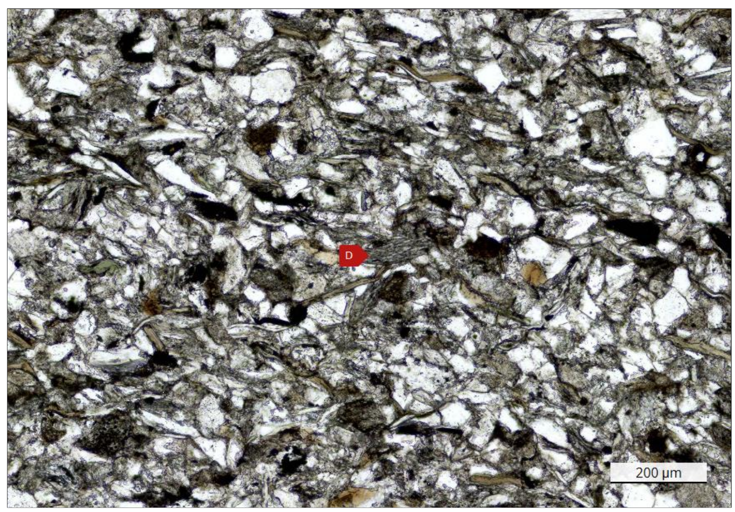
A - Burrow; light-colored



B - Clay-rich burrow



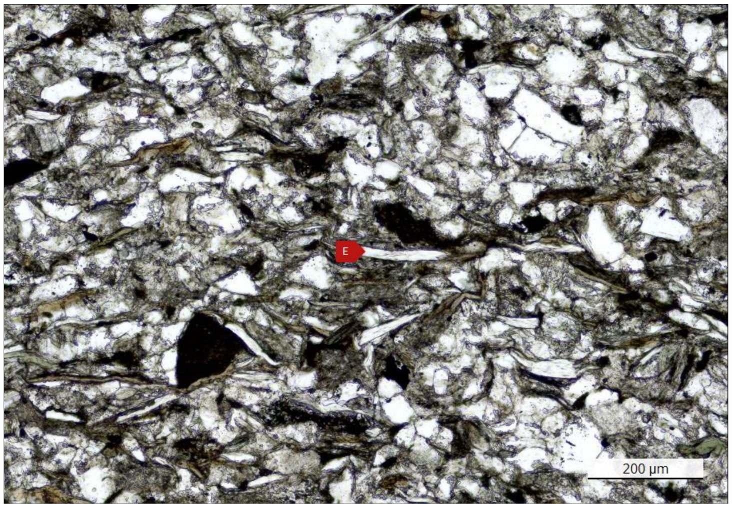
C - Silt-sized detrital quartz grain



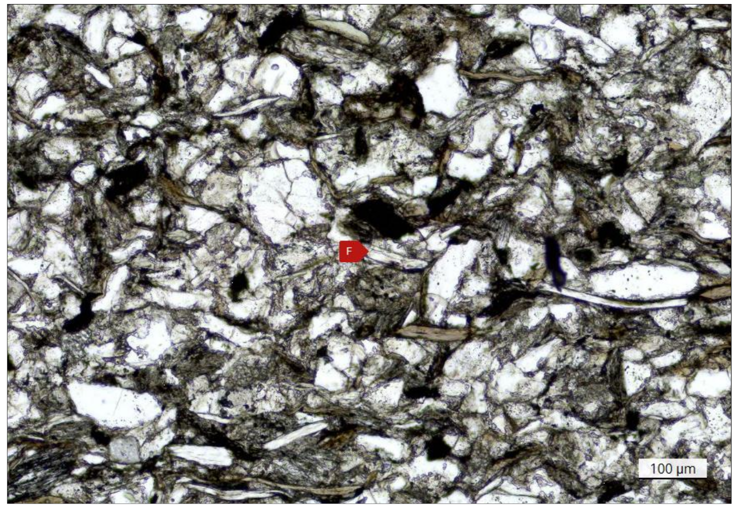
D - Metamorphic rock fragment

Image Description: This siltstone is well sorted with an average grain size of 0.051 mm. Burrows (A & B) are locally present. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by mica (E), feldspars (F), argillaceous fragments (G), and igneous fragments. Framework grains are tightly compacted, as indicated by the dominance of planar and concave-convex grain contacts. Organic fragments (H), carbonate-replaced grains, and chlorite grains (I) are rare to minor in abundance. Pore-filling constituents are minor to moderate and consist of authigenic illitic clays (J), authigenic pyrite (K), quartz overgrowths, and titanium oxides. Visible pores are absent in this sample. Open fractures (L) are probably induced artificially.

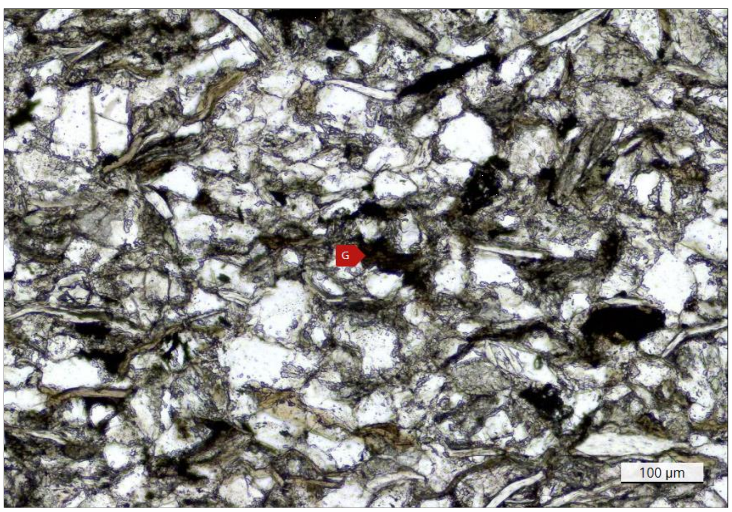
Depth: 142.00 - Sample ID: MR-AP-MW-3V



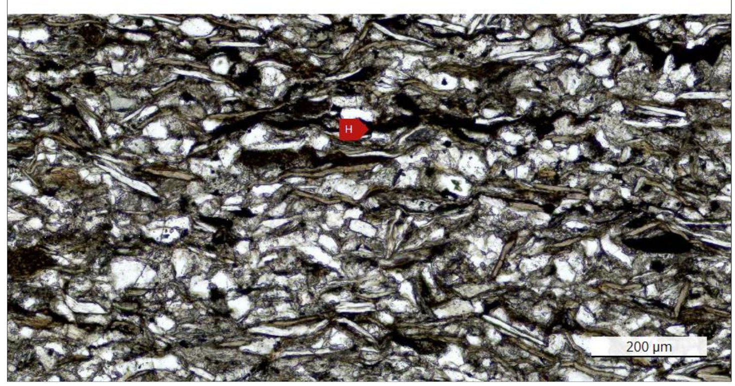
E - Muscovite mica grain



F - Detrital feldspar grain



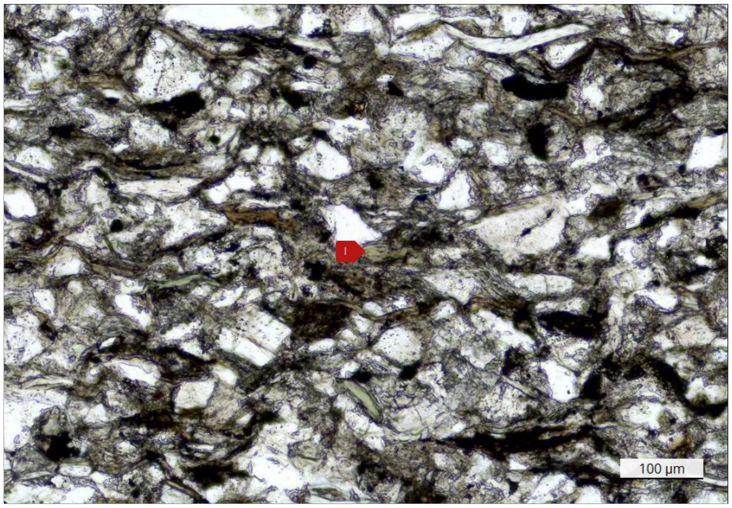
G - Argillaceous rock fragment; deformed due to compaction



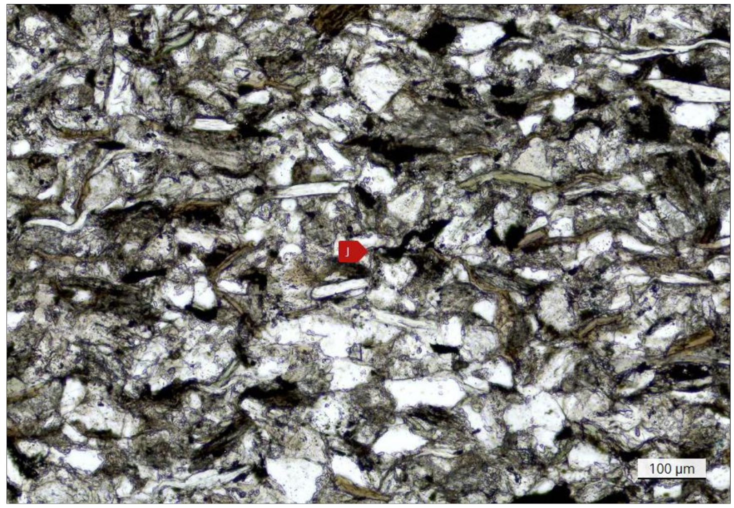
H - Elongate organic fragment

Image Description: This siltstone is well sorted with an average grain size of 0.051 mm. Burrows (A & B) are locally present. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by mica (E), feldspars (F), argillaceous fragments (G), and igneous fragments. Framework grains are tightly compacted, as indicated by the dominance of planar and concave-convex grain contacts. Organic fragments (H), carbonate-replaced grains, and chlorite grains (I) are rare to minor in abundance. Pore-filling constituents are minor to moderate and consist of authigenic illitic clays (J), authigenic pyrite (K), quartz overgrowths, and titanium oxides. Visible pores are absent in this sample. Open fractures (L) are probably induced artificially.

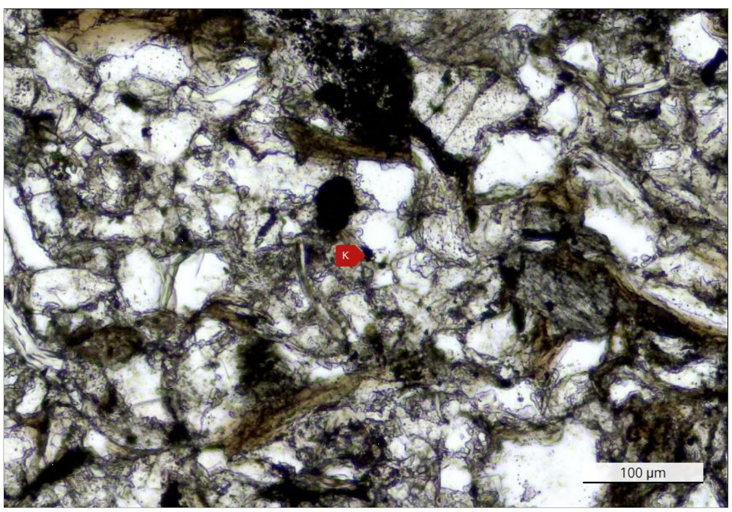
Depth: 142.00 - Sample ID: MR-AP-MW-3V



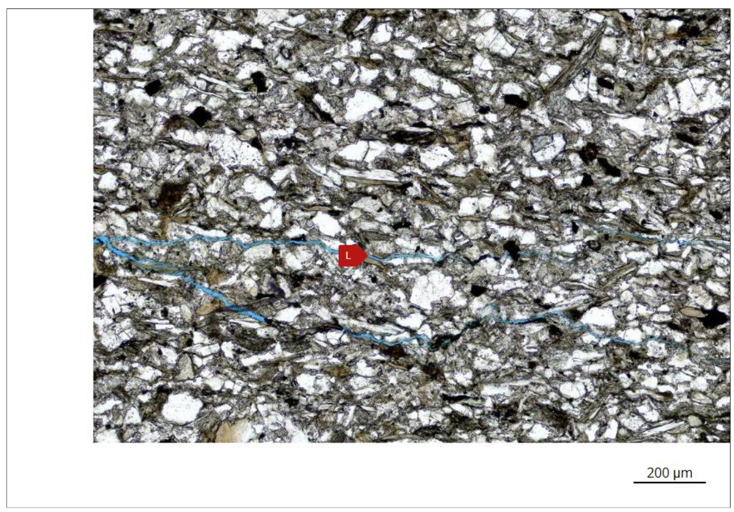
I - Chlorite grain



J - Authigenic illitic clay filling intergranular areas



K - Authigenic pyrite

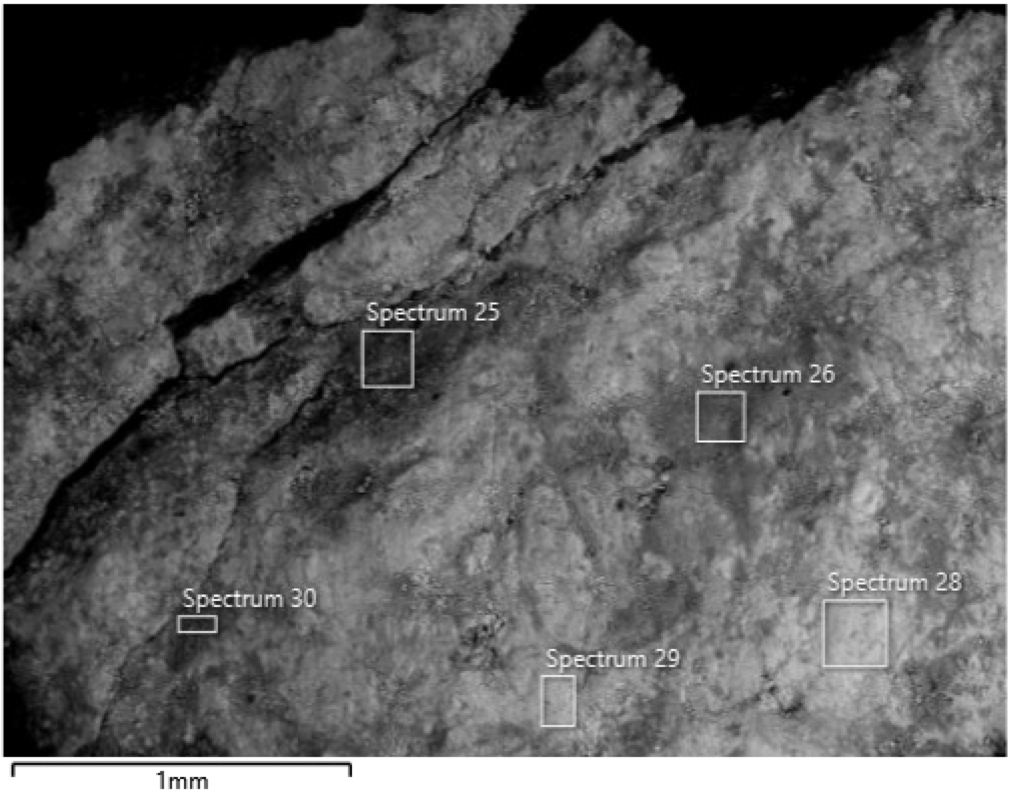


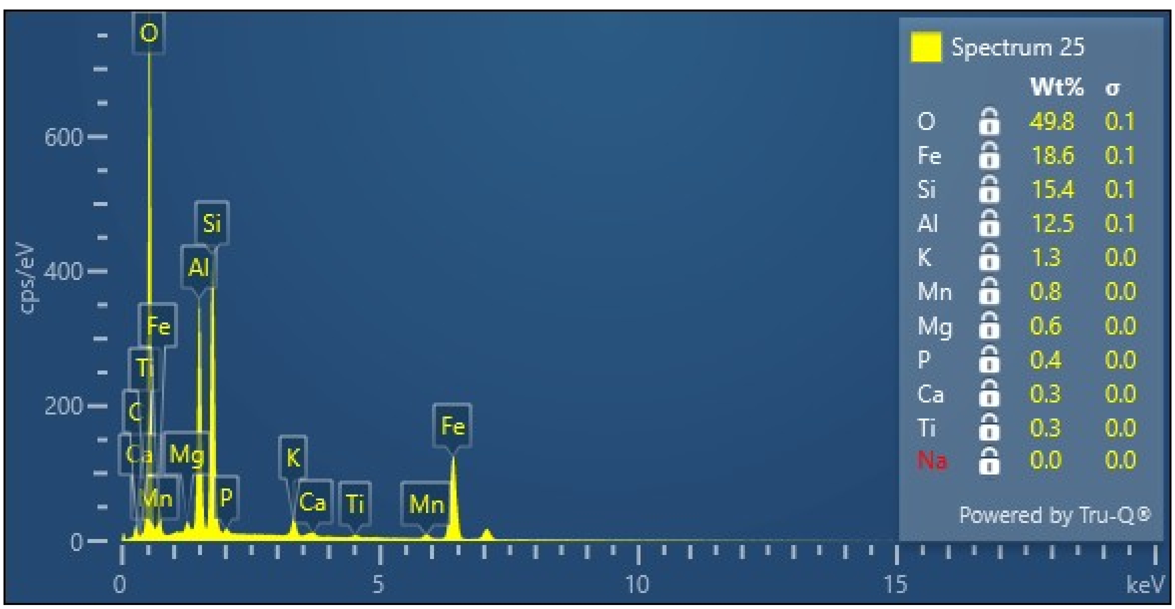
L - Induced fracture

Image Description: This siltstone is well sorted with an average grain size of 0.051 mm. Burrows (A & B) are locally present. Quartz (C) and metamorphic rock fragments (D) are the most abundant framework grains, followed by mica (E), feldspars (F), argillaceous fragments (G), and igneous fragments. Framework grains are tightly compacted, as indicated by the dominance of planar and concave-convex grain contacts. Organic fragments (H), carbonate-replaced grains, and chlorite grains (I) are rare to minor in abundance. Pore-filling constituents are minor to moderate and consist of authigenic illitic clays (J), authigenic pyrite (K), quartz overgrowths, and titanium oxides. Visible pores are absent in this sample. Open fractures (L) are probably induced artificially.

Site 1

MR-AP-MW-2V_11-12 Site 1 100x





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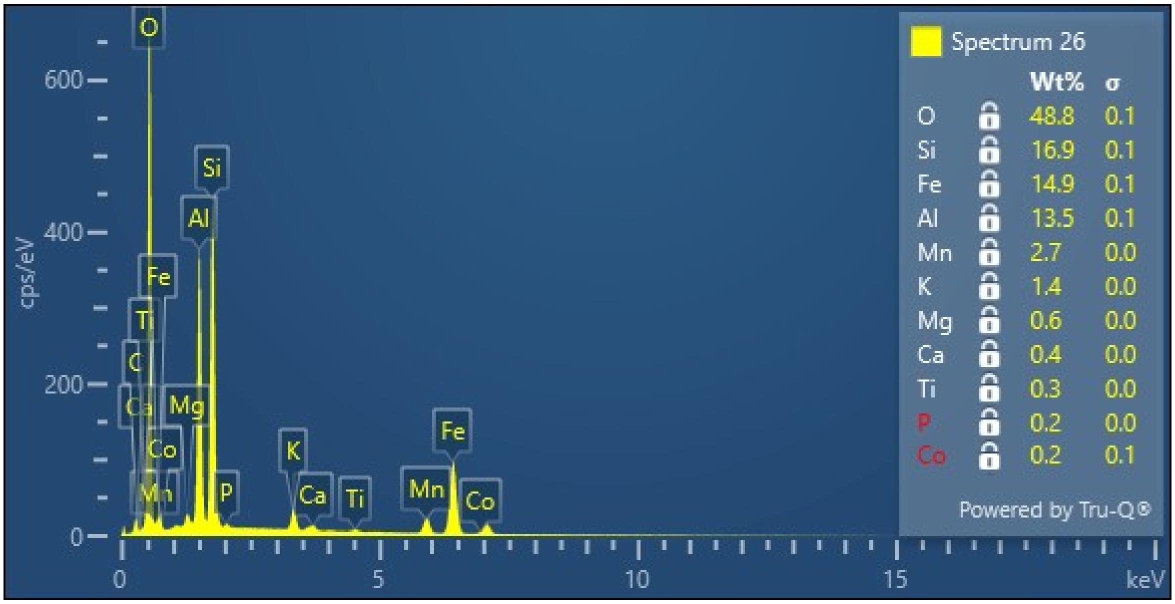

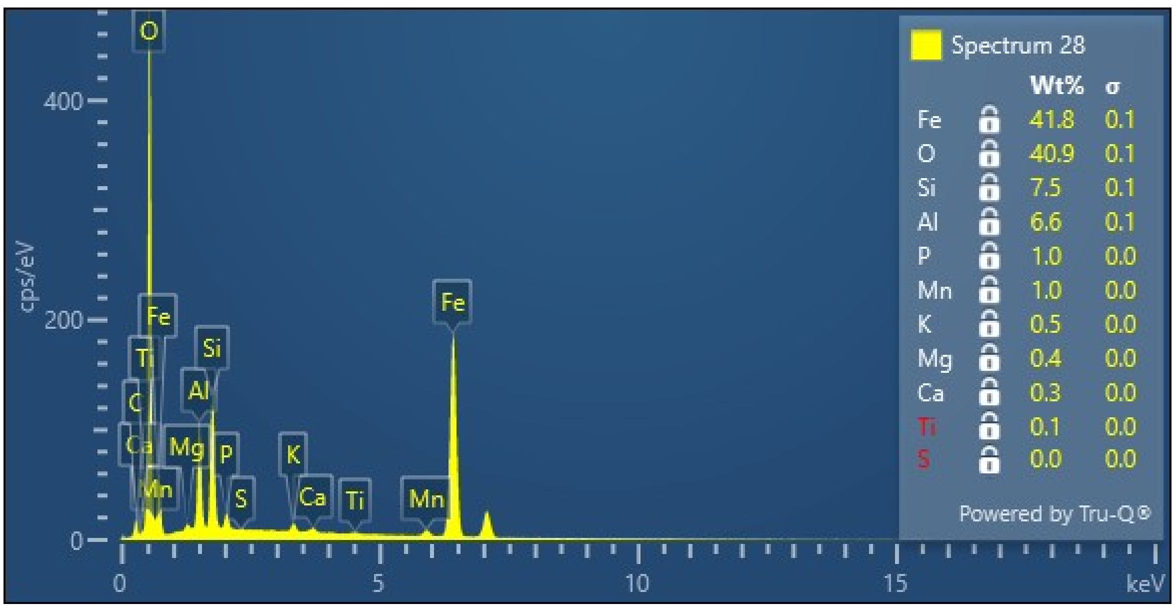

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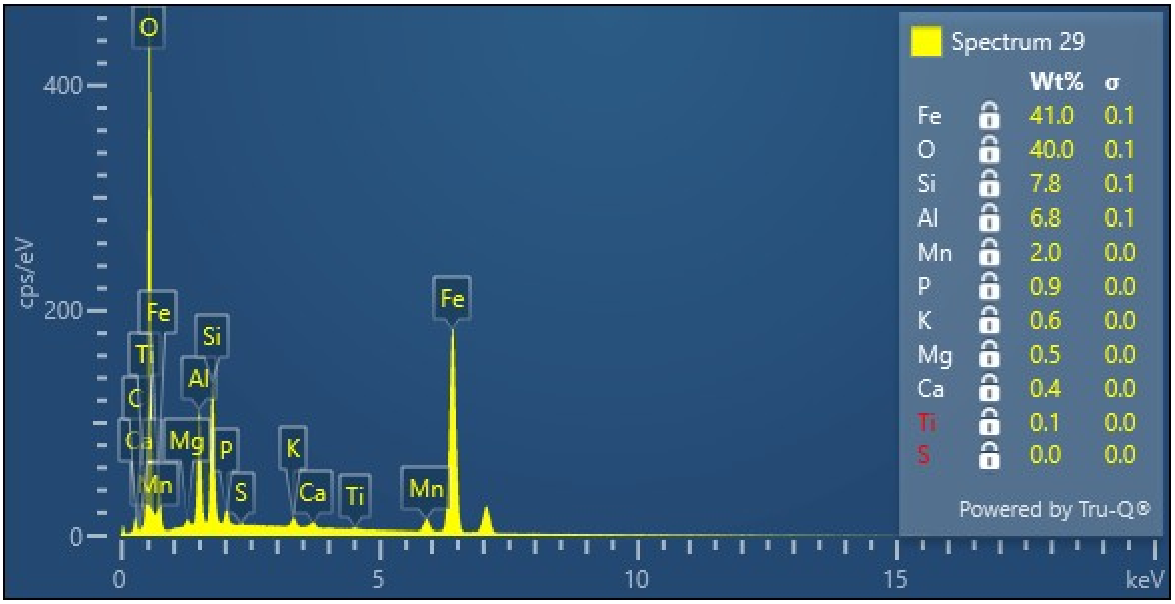

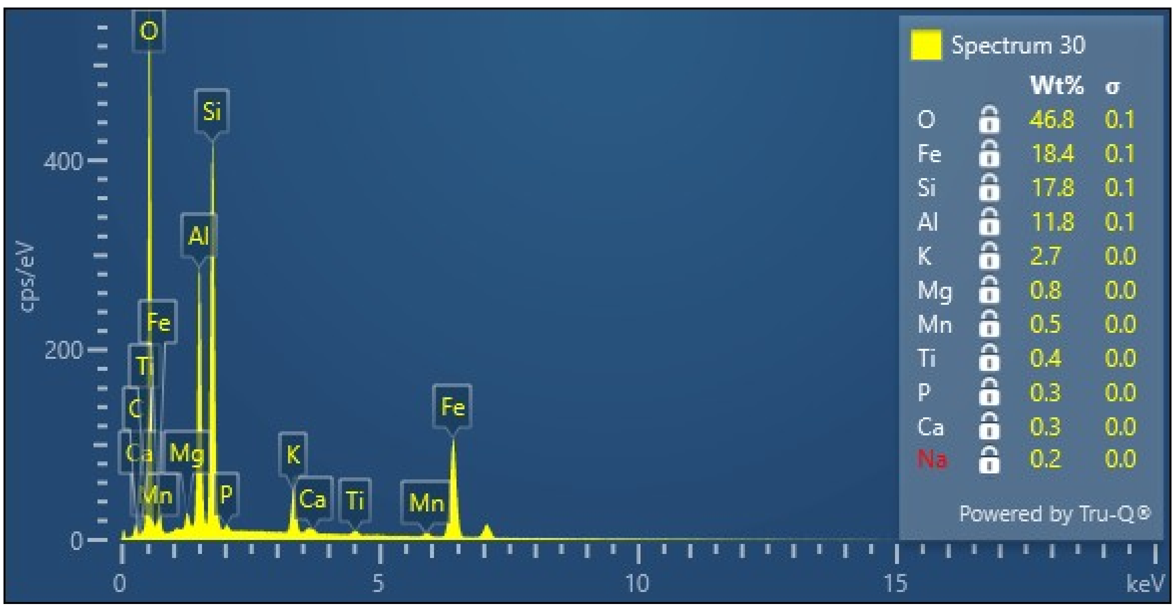

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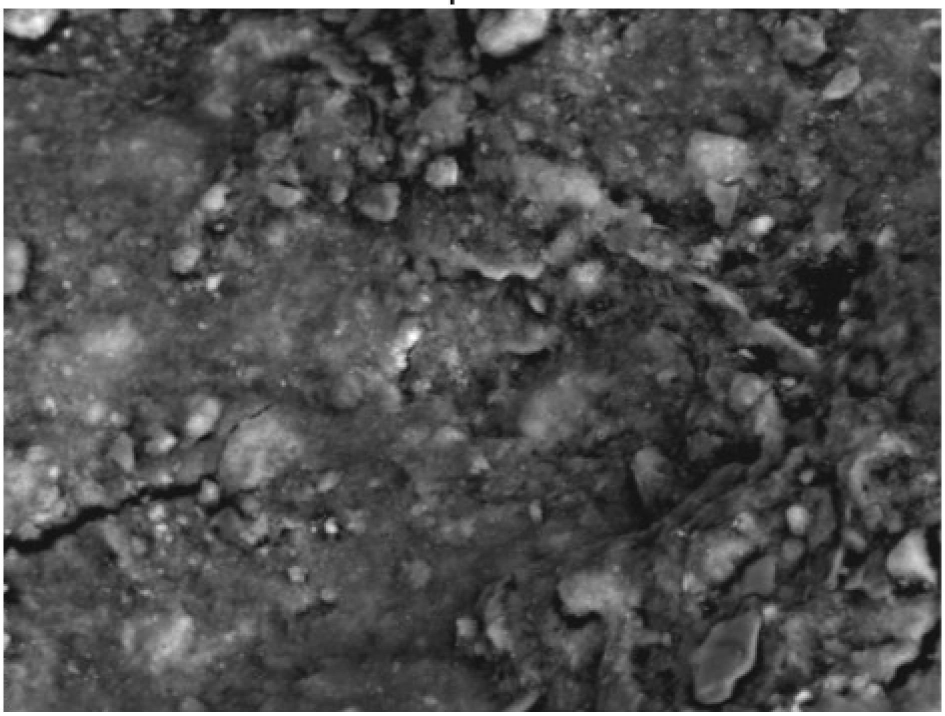
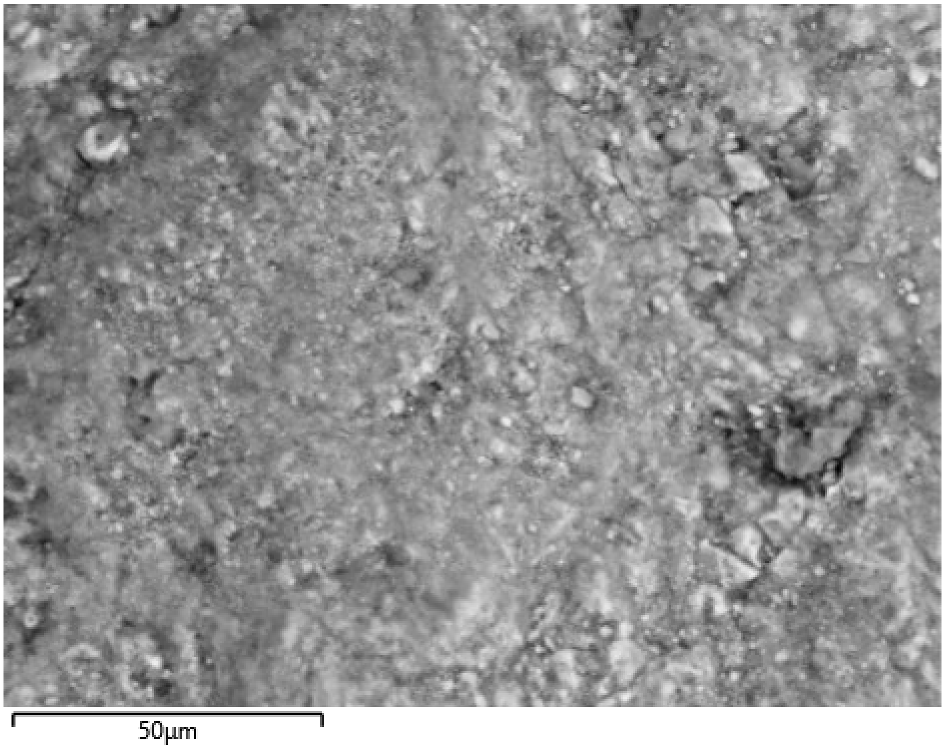
Site 1 detail images

Site 1 sp25 2000x



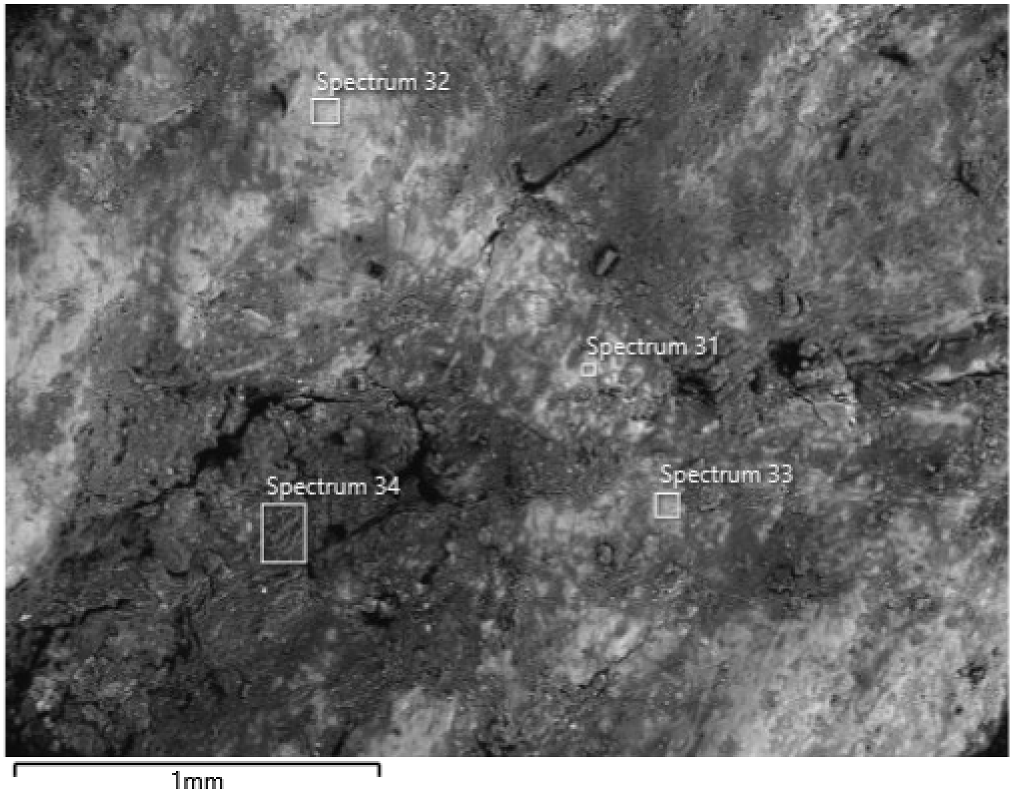
50µm

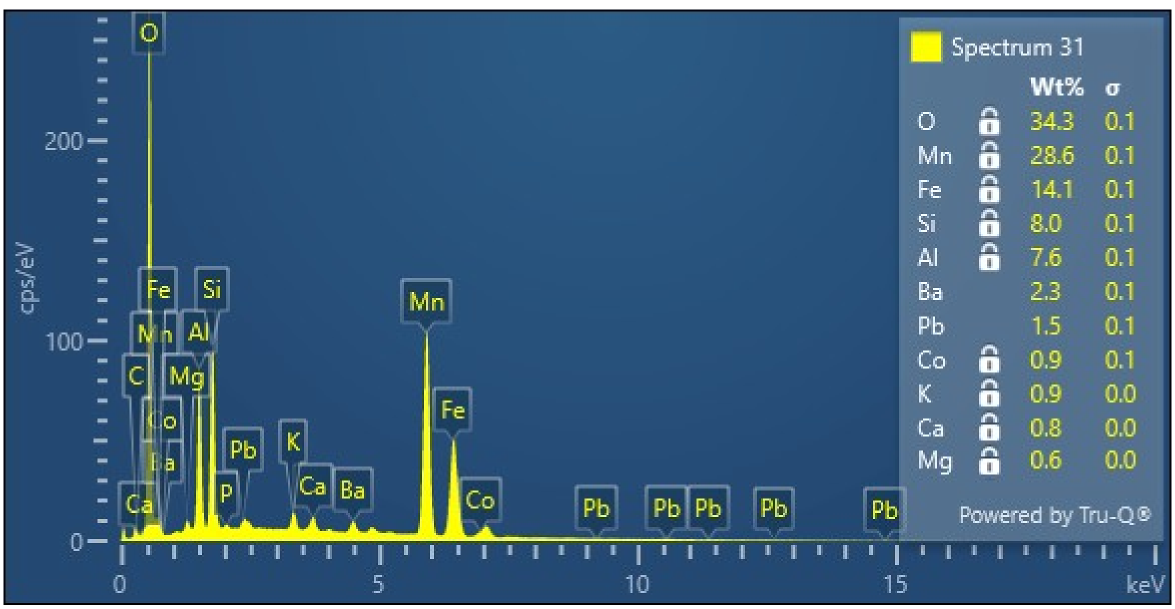
Site 1 sp27 2000x



Site 2

MR-AP-MW-2V_11-12 Site 2 100x





	Wt%	σ
O	34.3	0.1
Mn	28.6	0.1
Fe	14.1	0.1
Si	8.0	0.1
Al	7.6	0.1
Ba	2.3	0.1
Pb	1.5	0.1
Co	0.9	0.1
K	0.9	0.0
Ca	0.8	0.0
Mg	0.6	0.0

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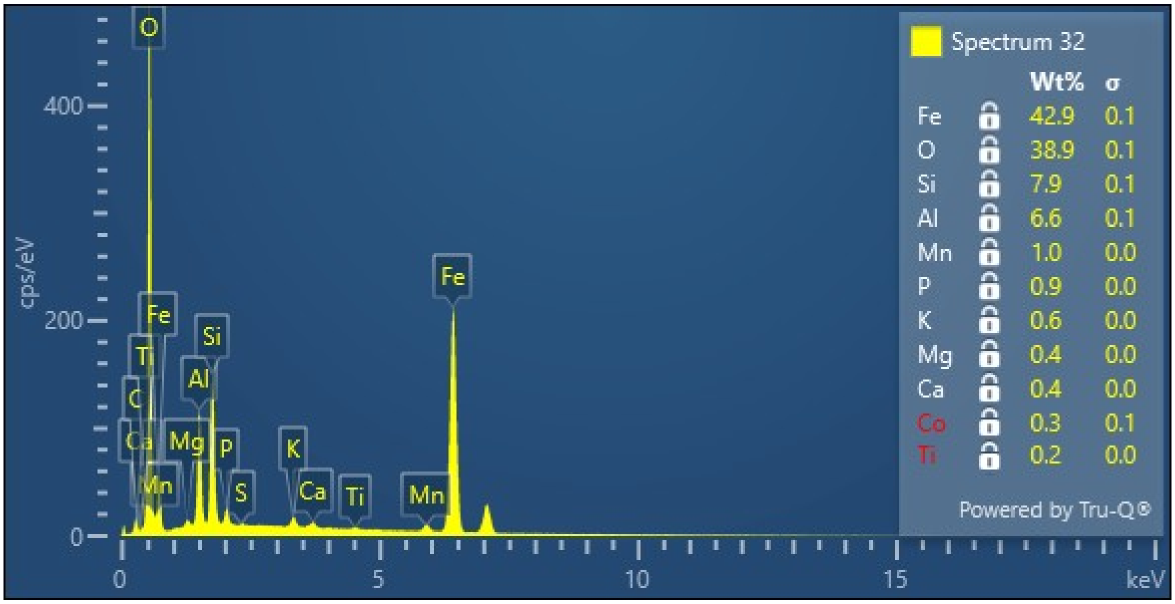
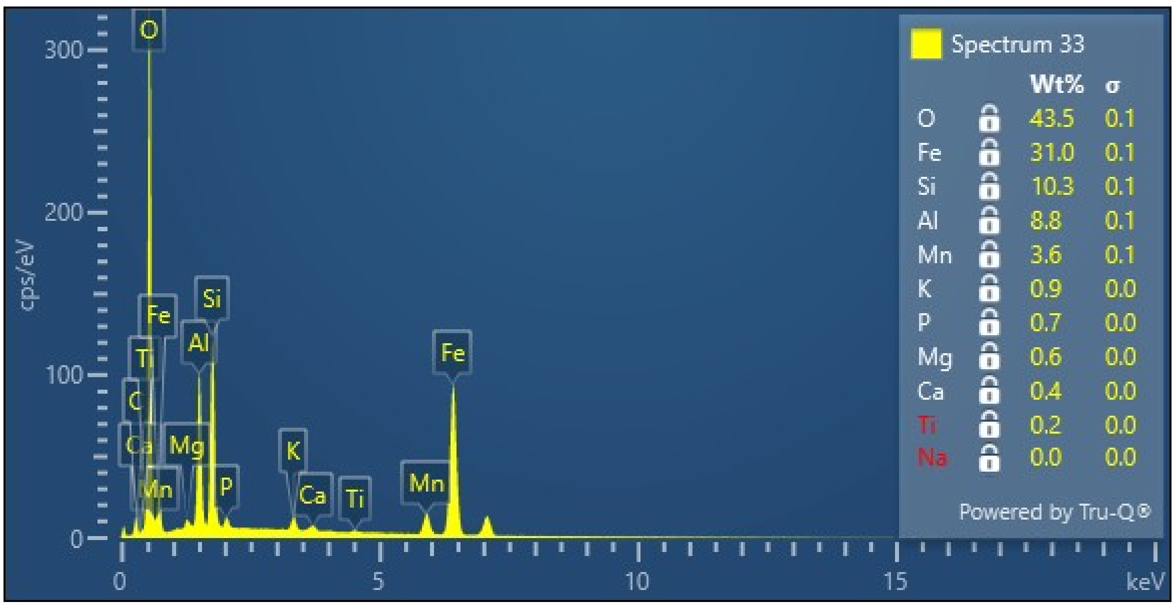
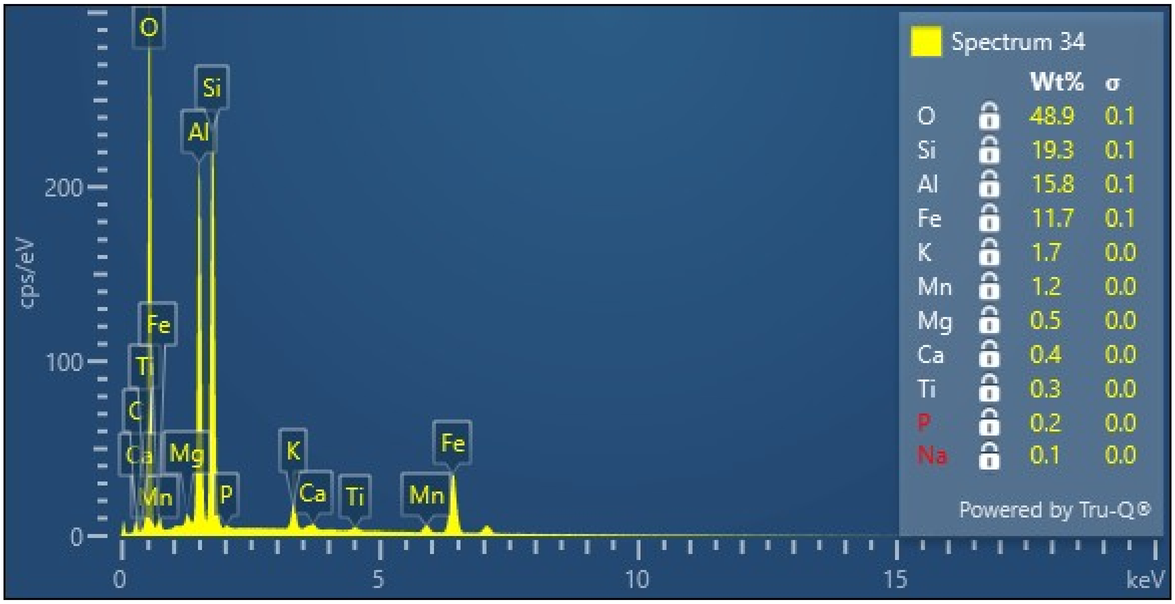
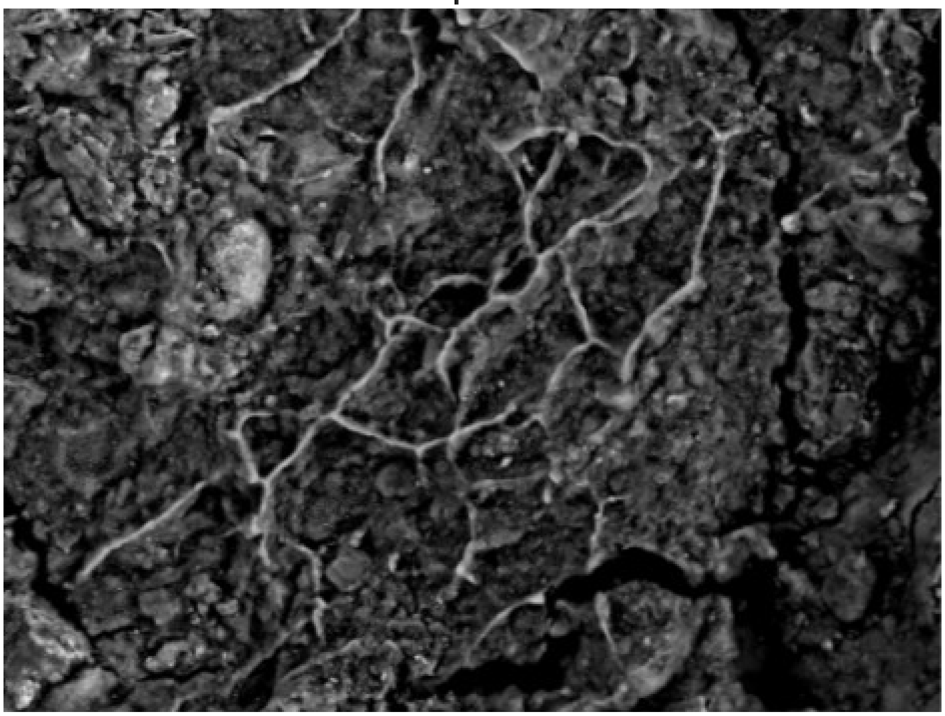

O
Fe
Ti
C
Ca
Mn
Mg
Al
Si
P
S
K
Ca
Ti
Mn
Fe
cps/eV
400
200
0
0
5
10
15
keV
Spectrum 32
Wt% σ
Fe 42.9 0.1
O 38.9 0.1
Si 7.9 0.1
Al 6.6 0.1
Mn 1.0 0.0
P 0.9 0.0
K 0.6 0.0
Mg 0.4 0.0
Ca 0.4 0.0
Co 0.3 0.1
Ti 0.2 0.0
Powered by Tru-Q®


O
Fe
Ti
C
Ca
Mn
Mg
Al
Si
P
K
Ca
Ti
Mn
Fe
cps/eV
300
200
100
0
0
5
10
15
keV
Spectrum 33
Wt% σ
O 43.5 0.1
Fe 31.0 0.1
Si 10.3 0.1
Al 8.8 0.1
Mn 3.6 0.1
K 0.9 0.0
P 0.7 0.0
Mg 0.6 0.0
Ca 0.4 0.0
Ti 0.2 0.0
Na 0.0 0.0
Powered by Tru-Q®


Spectrum 34
Wt% σ
O 48.9 0.1
Si 19.3 0.1
Al 15.8 0.1
Fe 11.7 0.1
K 1.7 0.0
Mn 1.2 0.0
Mg 0.5 0.0
Ca 0.4 0.0
Ti 0.3 0.0
P 0.2 0.0
Na 0.1 0.0
Powered by Tru-Q®
cps/eV
keV
O
Si
Al
Fe
Ti
C
Ca
Mg
Mn
P
K
Ca
Ti
Mn
Fe

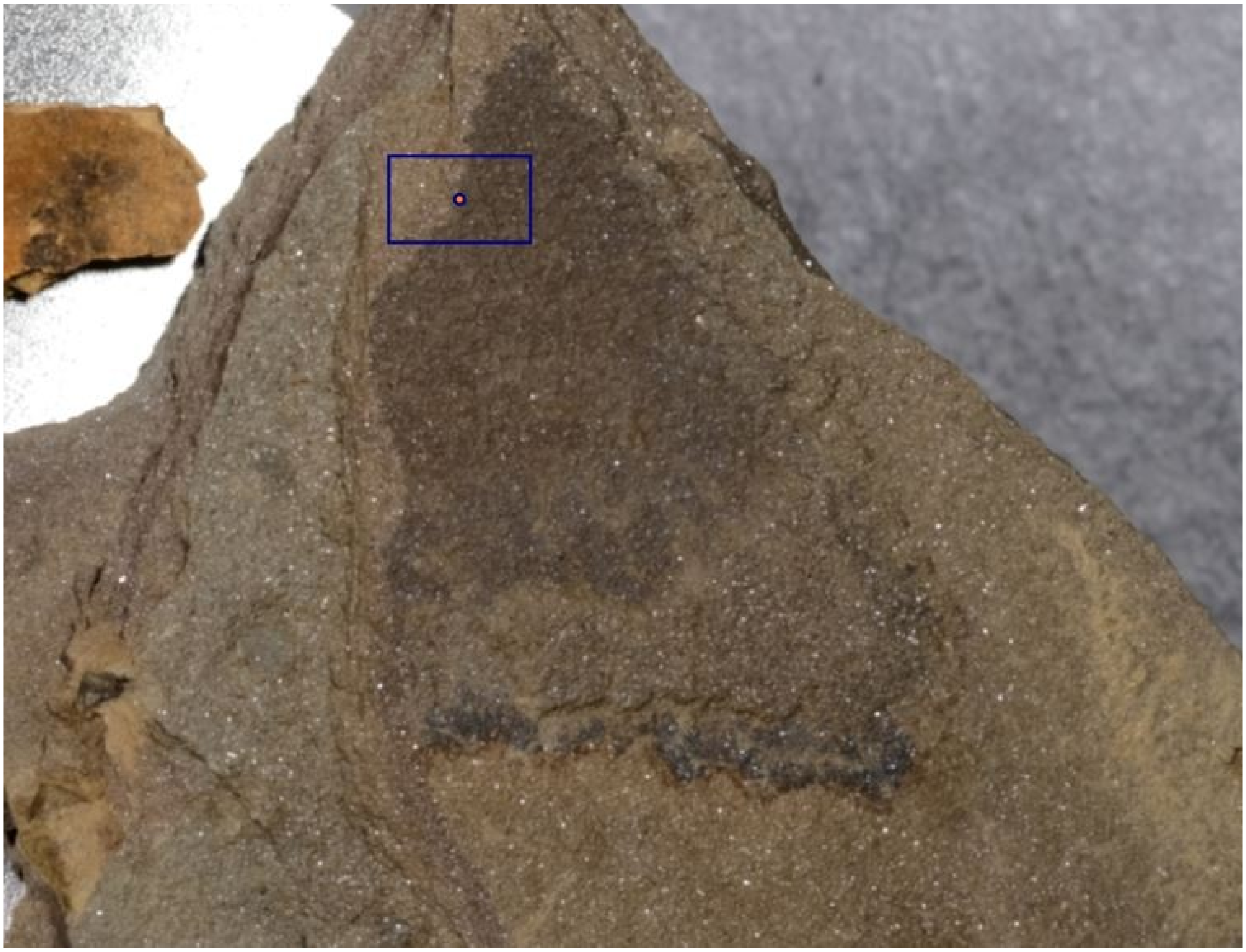
Site 2 detail image

Site 2 sp34 1000x

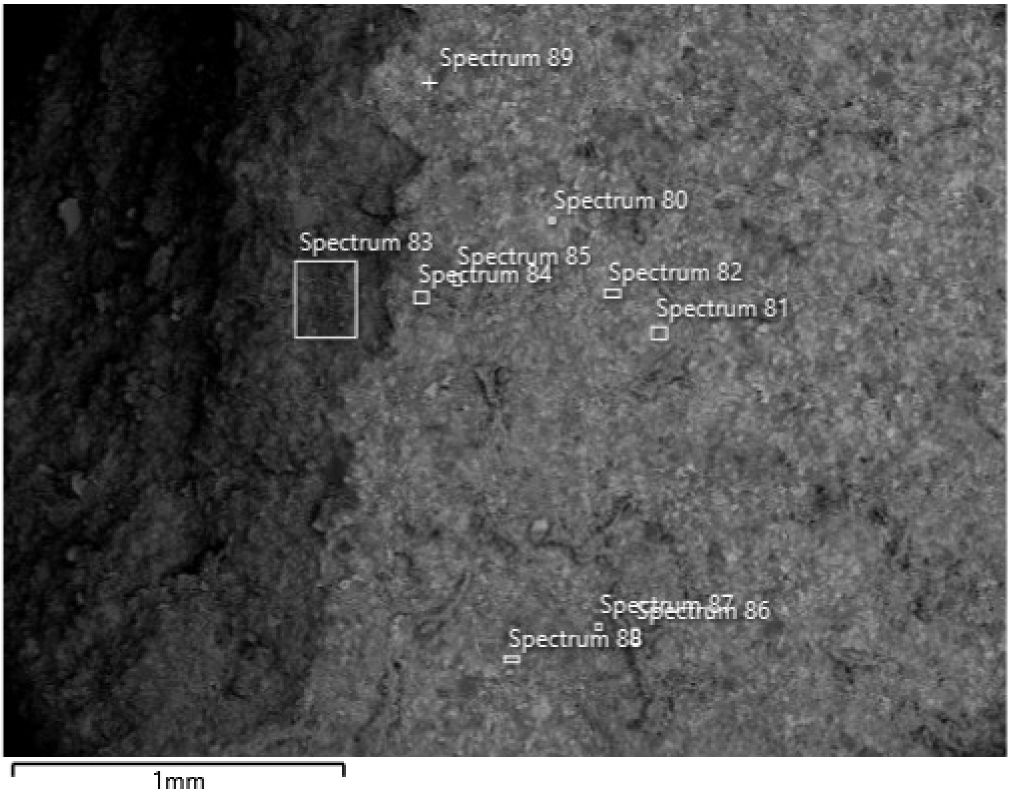


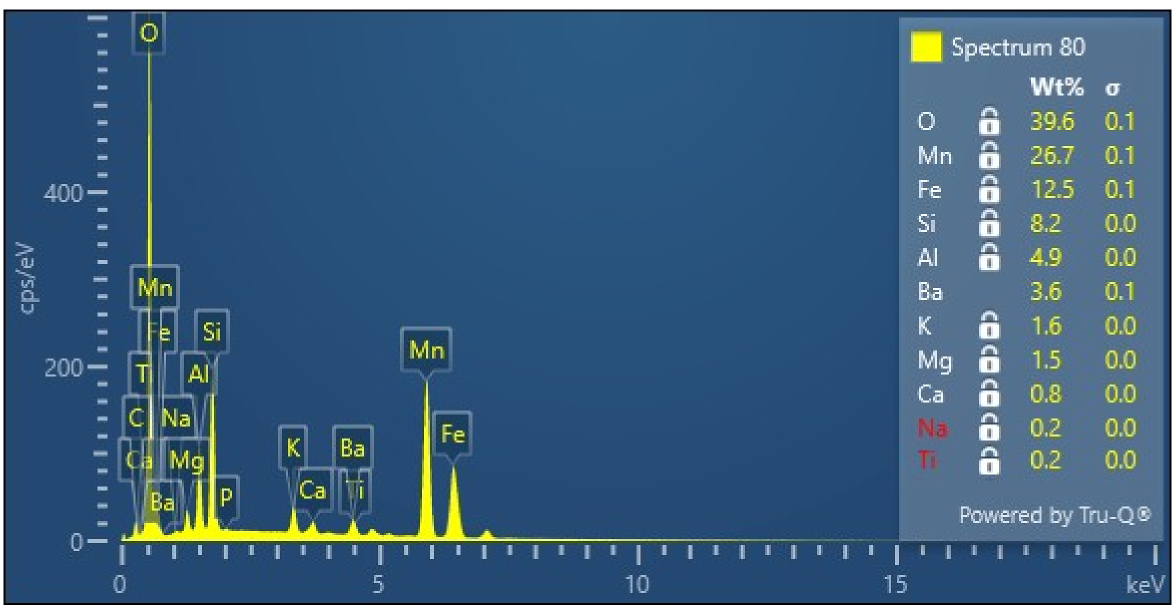
100µm

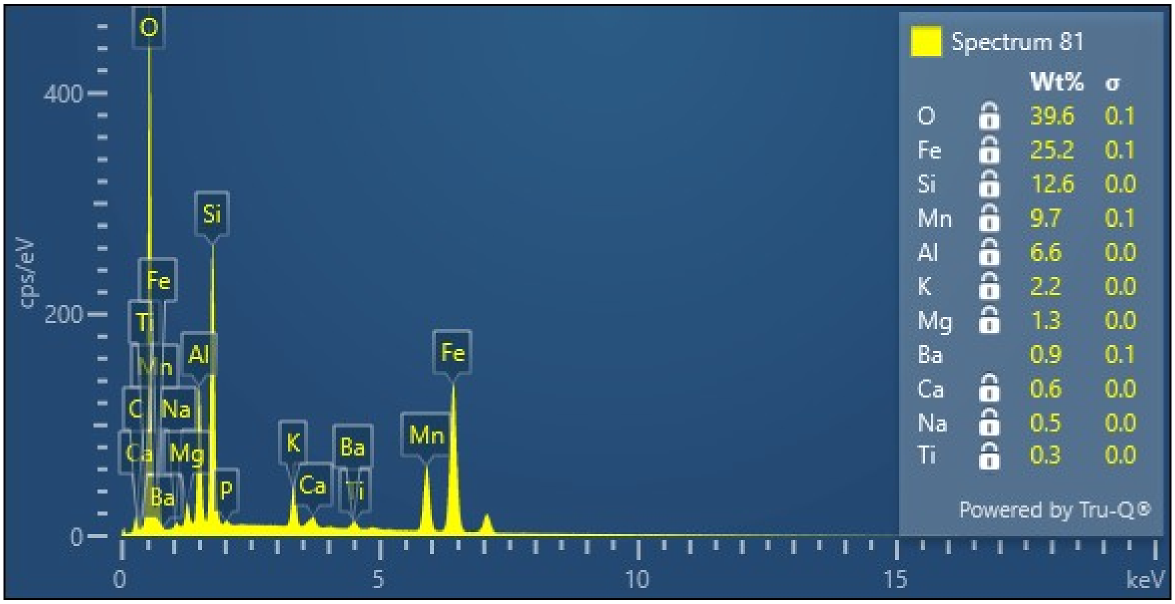
Site 1

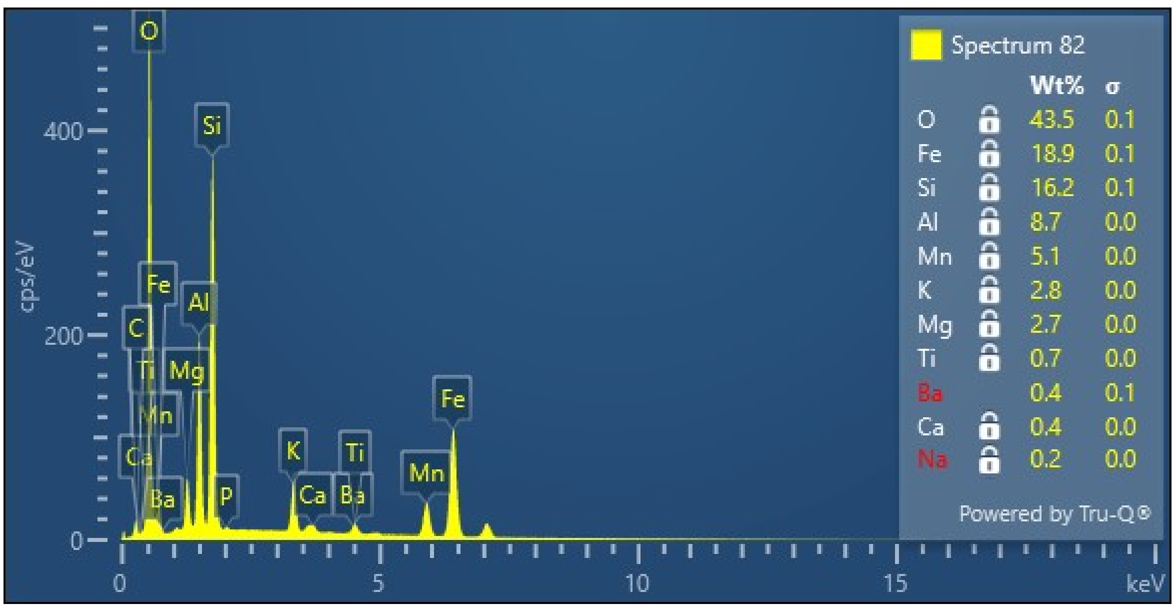


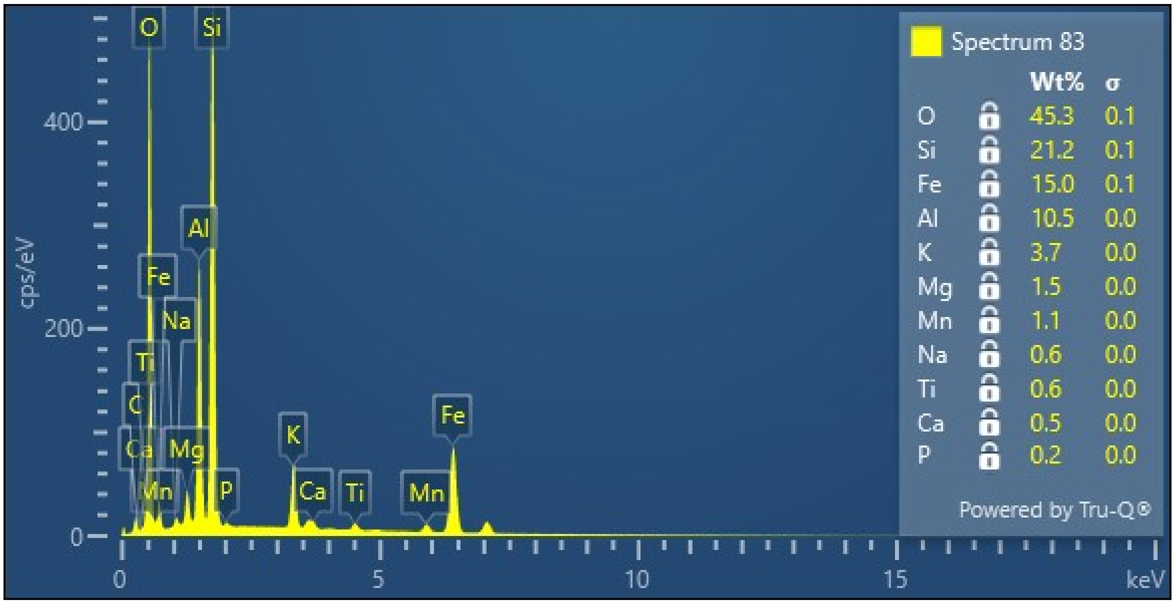
MR-AP-MW-2V_35-36 Site 1 100x

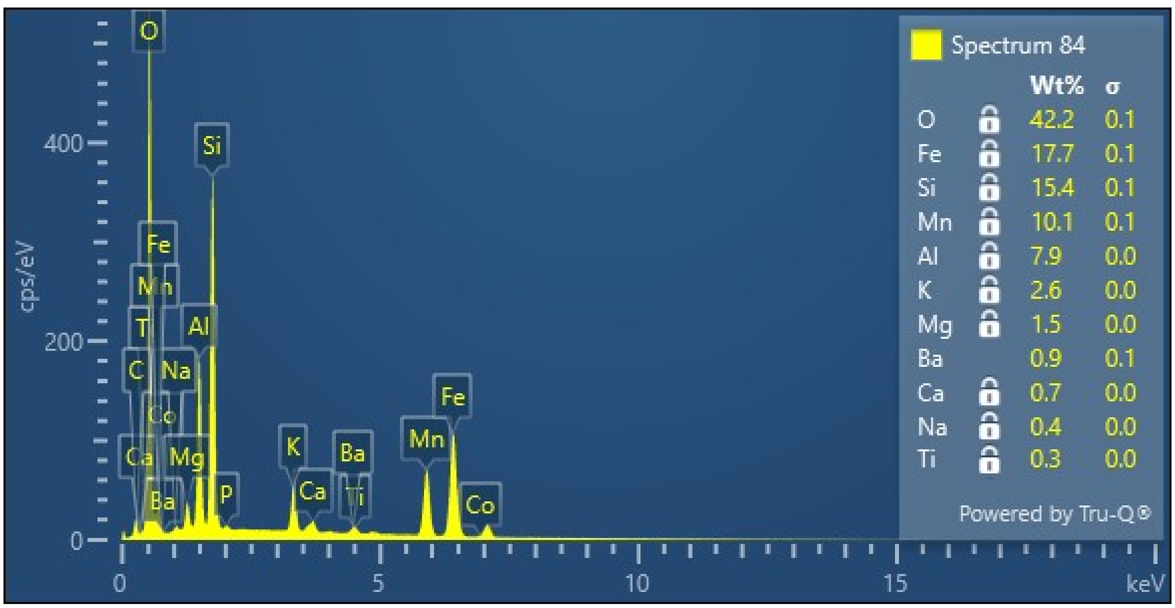





Spectrum 81
Wt% σ
O 39.6 0.1
Fe 25.2 0.1
Si 12.6 0.0
Mn 9.7 0.1
Al 6.6 0.0
K 2.2 0.0
Mg 1.3 0.0
Ba 0.9 0.1
Ca 0.6 0.0
Na 0.5 0.0
Ti 0.3 0.0
Powered by Tru-Q®
cps/eV
400
200
0
5
10
15
keV
O Si Fe Ti Mn Al C Na Ca Mg Ba P K Ca Ba Ti Mn Fe


Spectrum 82
Wt% σ
O 43.5 0.1
Fe 18.9 0.1
Si 16.2 0.1
Al 8.7 0.0
Mn 5.1 0.0
K 2.8 0.0
Mg 2.7 0.0
Ti 0.7 0.0
Ba 0.4 0.1
Ca 0.4 0.0
Na 0.2 0.0
Powered by Tru-Q®
cps/eV
400
200
0
5
10
15
keV
O Si Fe Al C Ti Mg Mn Ca Ba P K Ti Ca Ba Mn Fe





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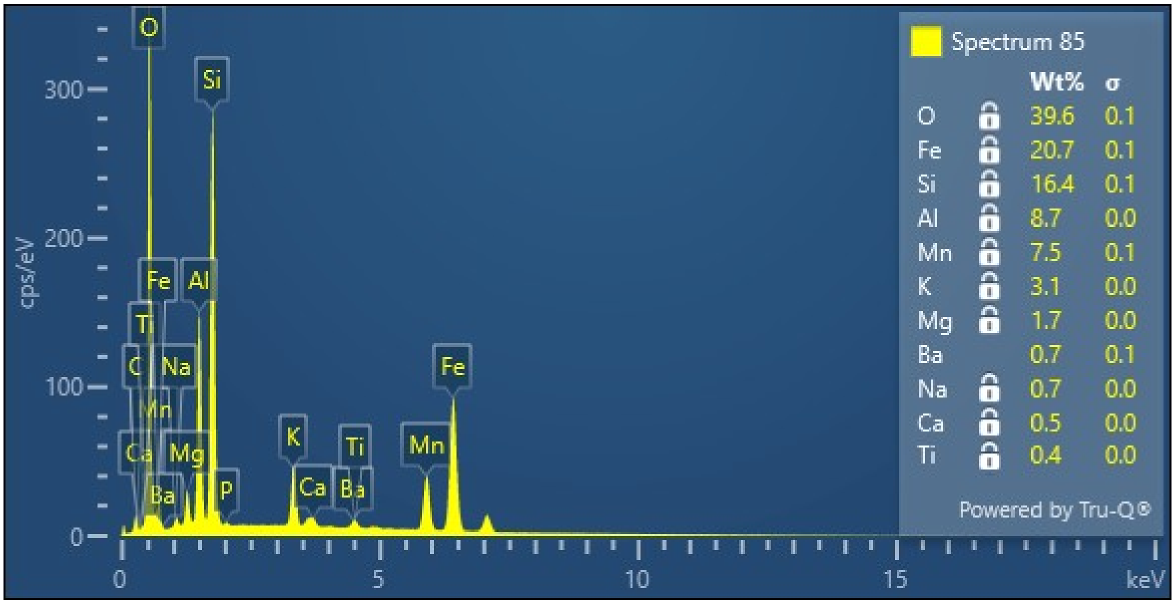

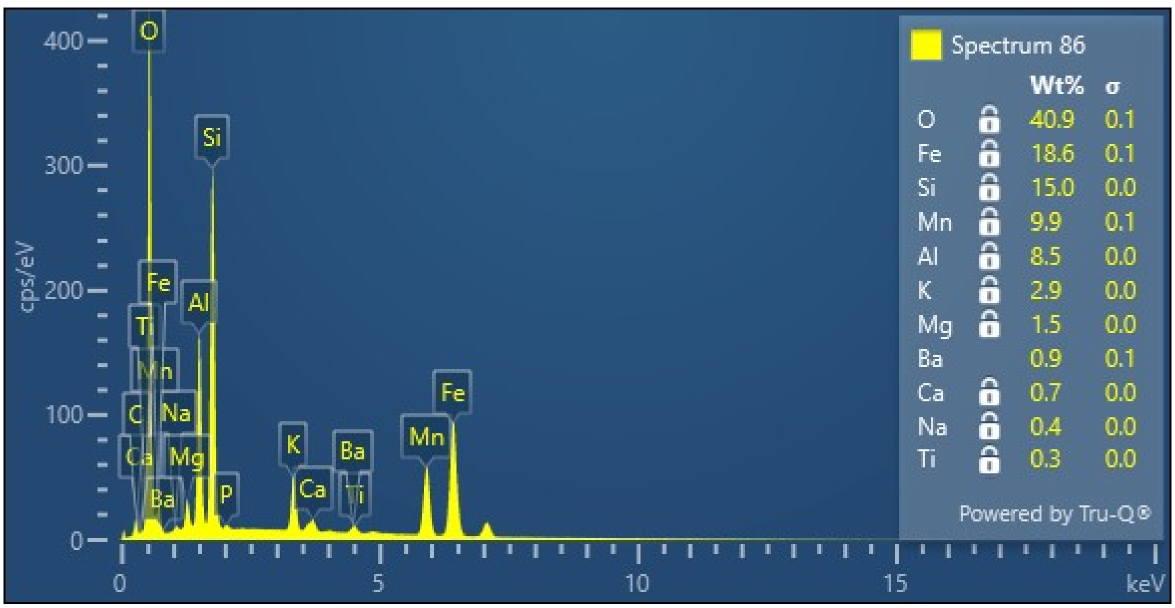

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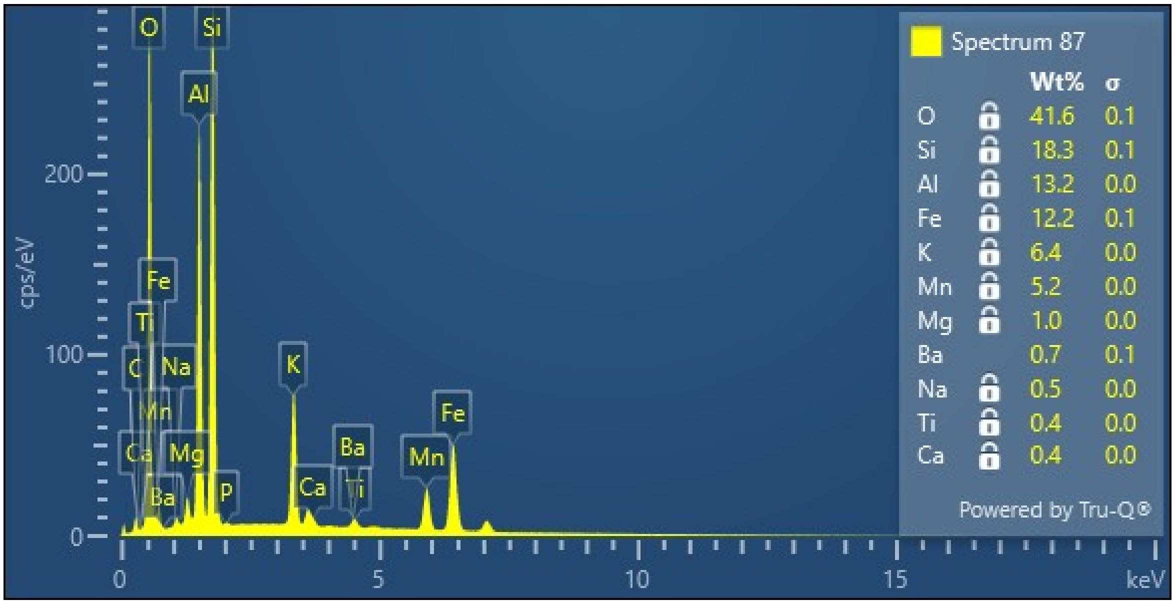
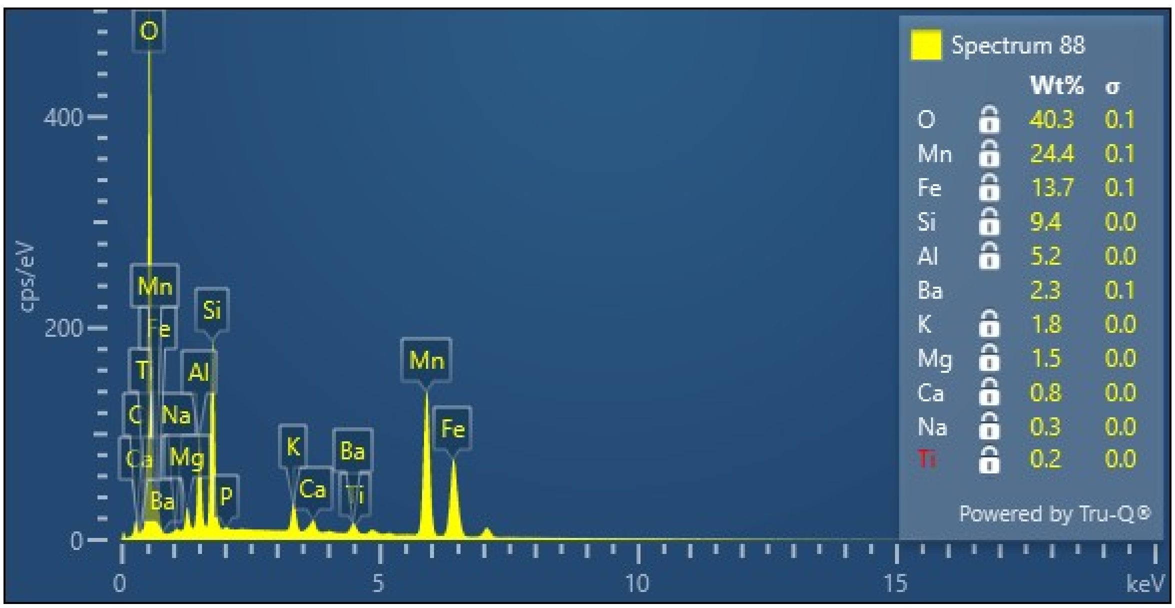
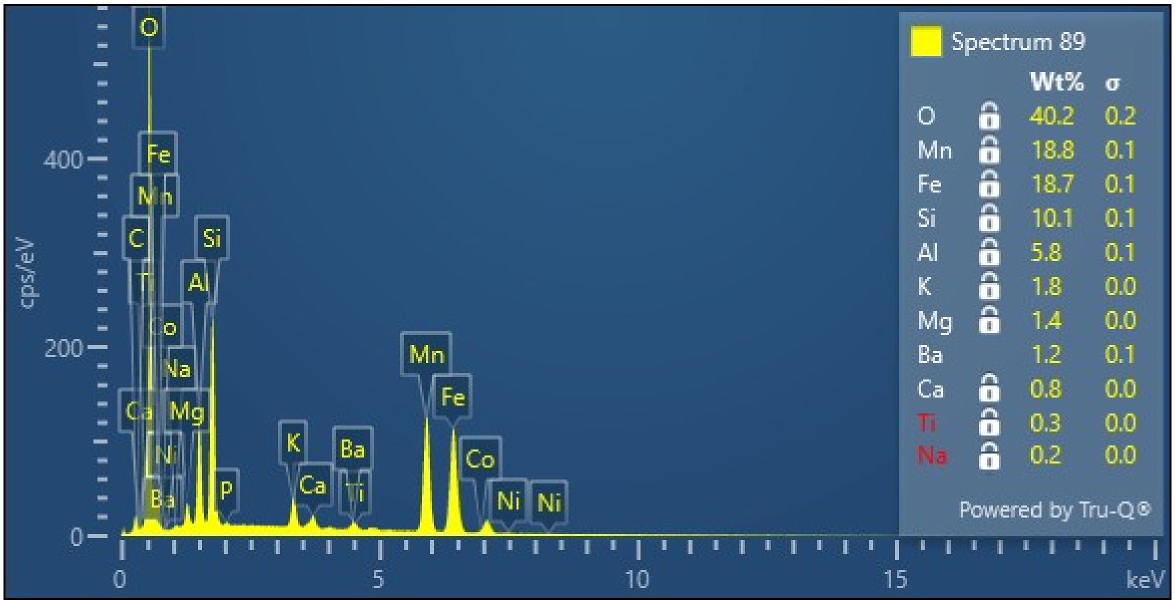


Spectrum 87
Wt% σ
O 41.6 0.1
Si 18.3 0.1
Al 13.2 0.0
Fe 12.2 0.1
K 6.4 0.0
Mn 5.2 0.0
Mg 1.0 0.0
Ba 0.7 0.1
Na 0.5 0.0
Ti 0.4 0.0
Ca 0.4 0.0
Powered by Tru-Q®
cps/eV
keV

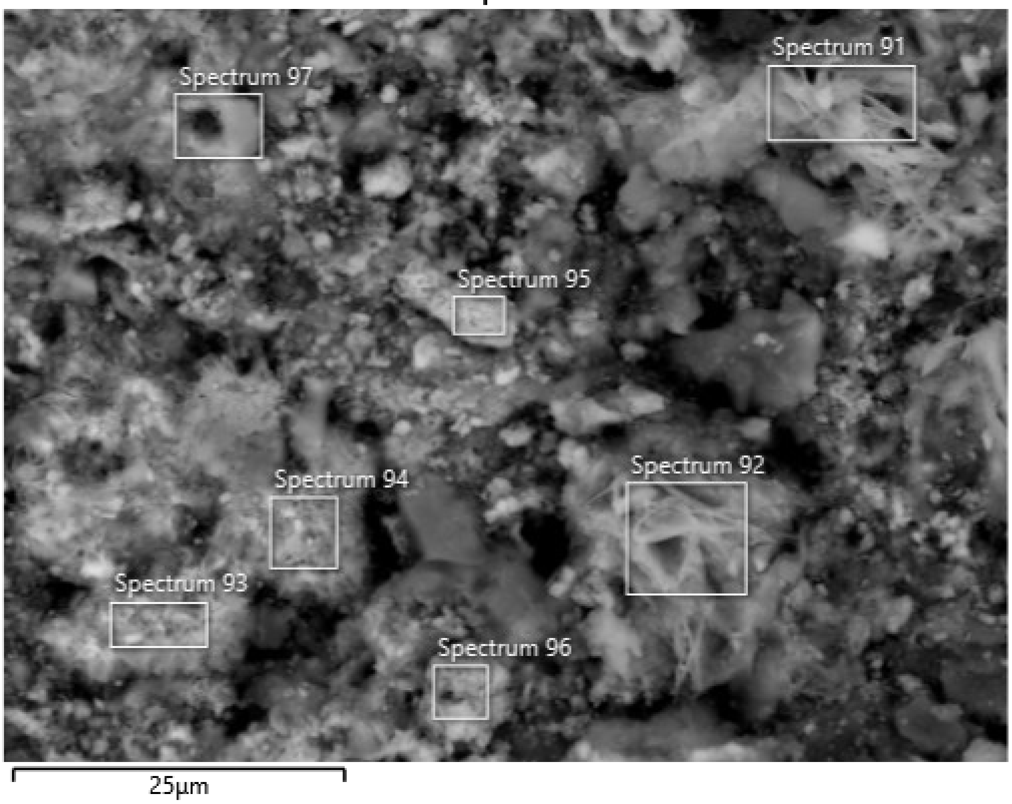


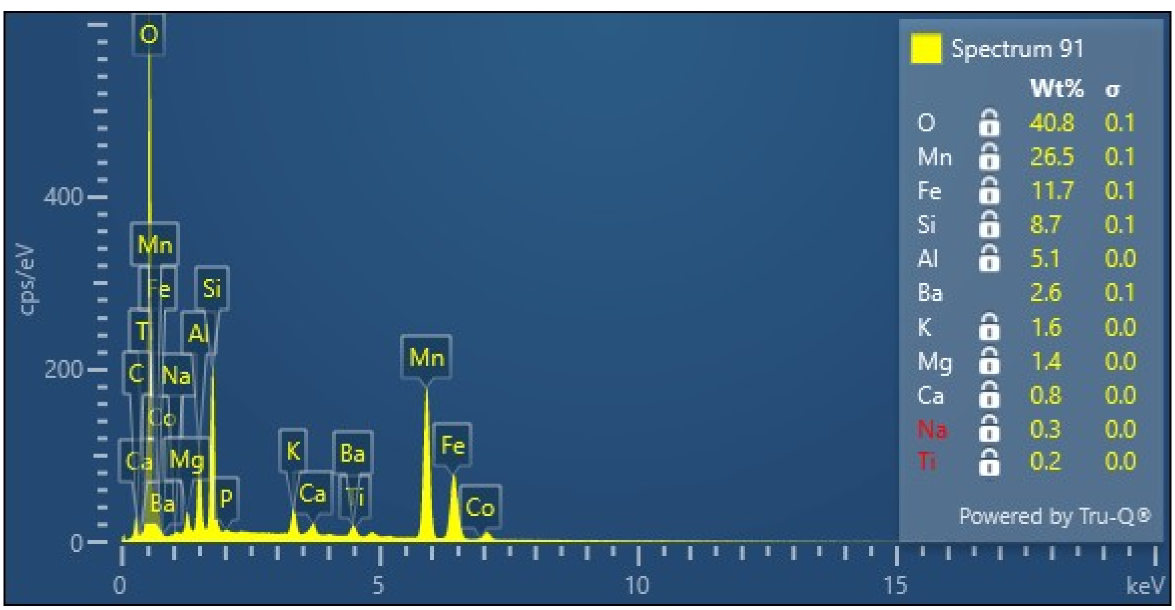
Spectrum 88
Wt% σ
O 40.3 0.1
Mn 24.4 0.1
Fe 13.7 0.1
Si 9.4 0.0
Al 5.2 0.0
Ba 2.3 0.1
K 1.8 0.0
Mg 1.5 0.0
Ca 0.8 0.0
Na 0.3 0.0
Ti 0.2 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 89
Wt% σ
O 40.2 0.2
Mn 18.8 0.1
Fe 18.7 0.1
Si 10.1 0.1
Al 5.8 0.1
K 1.8 0.0
Mg 1.4 0.0
Ba 1.2 0.1
Ca 0.8 0.0
Ti 0.3 0.0
Na 0.2 0.0
Powered by Tru-Q®
cps/eV
keV
0
5
10
15
200
400

Site 1 sp80 details

Site 1 sp80 4000x





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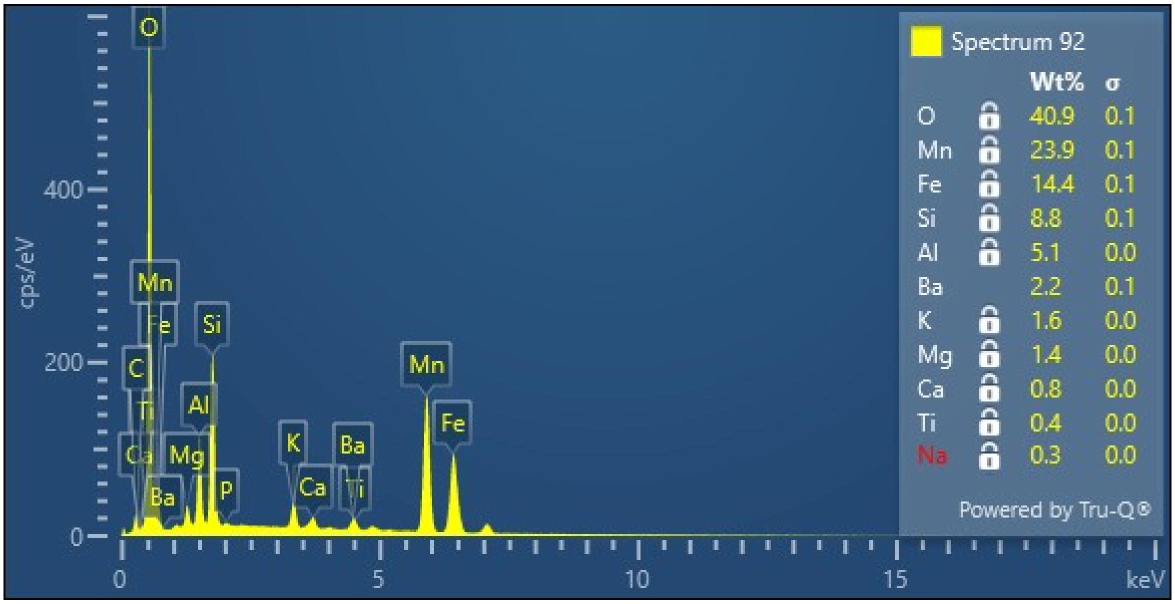
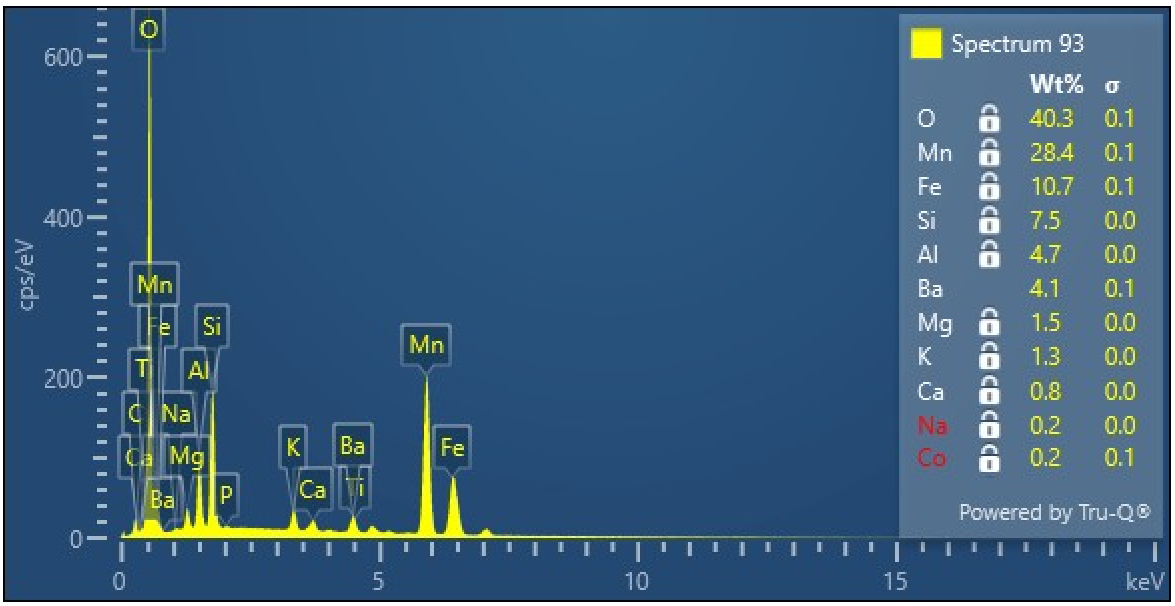
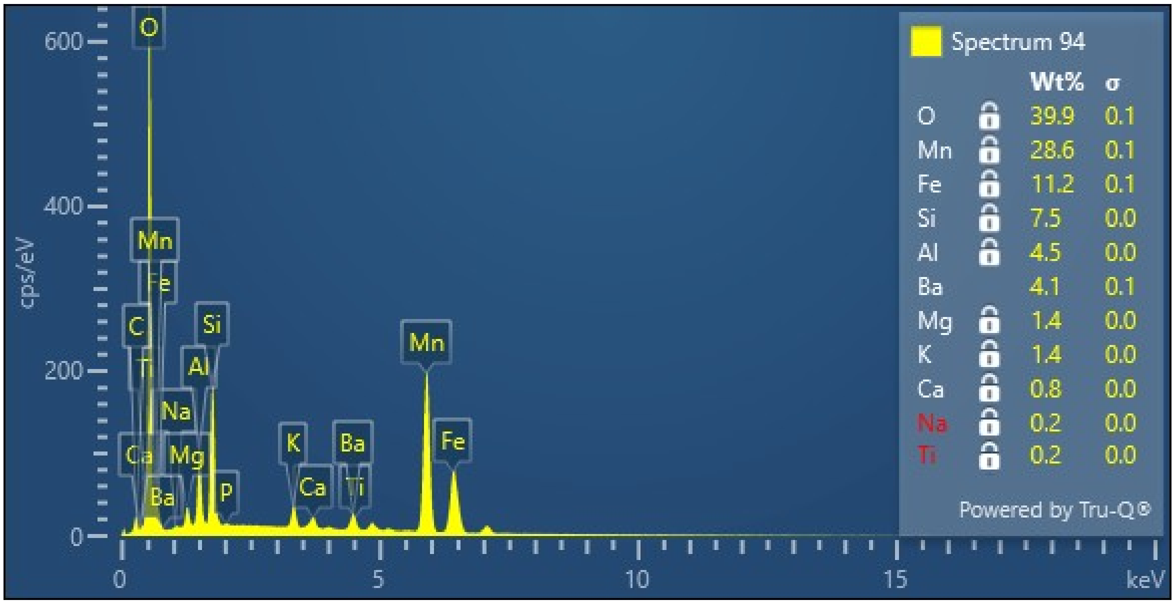
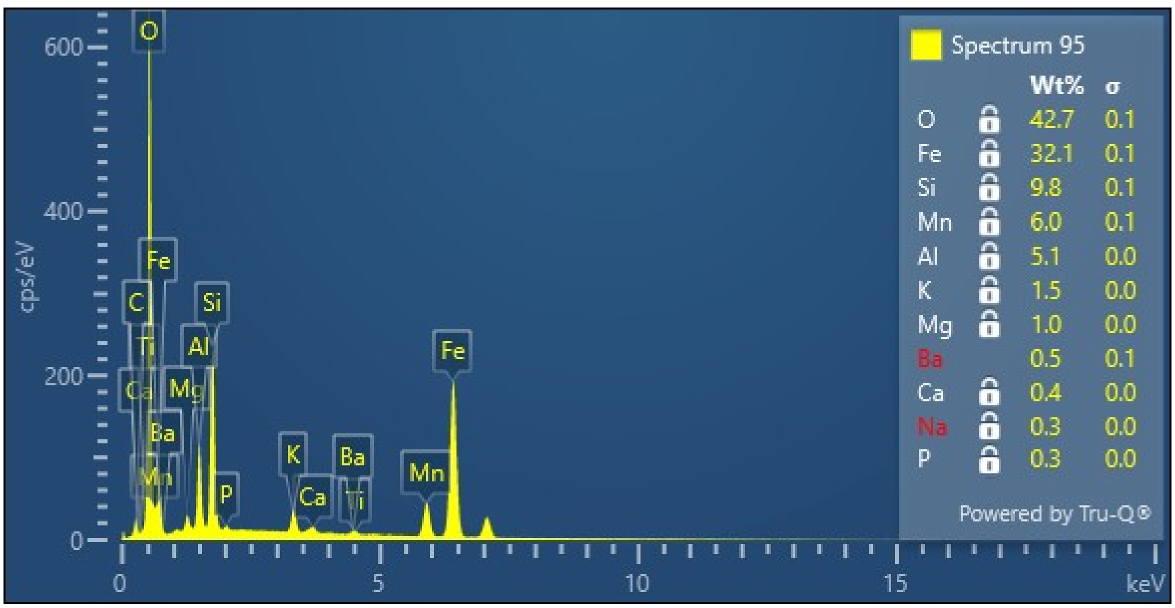

Spectrum 92
Wt% σ
O 40.9 0.1
Mn 23.9 0.1
Fe 14.4 0.1
Si 8.8 0.1
Al 5.1 0.0
Ba 2.2 0.1
K 1.6 0.0
Mg 1.4 0.0
Ca 0.8 0.0
Ti 0.4 0.0
Na 0.3 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 93
Wt% σ
O 40.3 0.1
Mn 28.4 0.1
Fe 10.7 0.1
Si 7.5 0.0
Al 4.7 0.0
Ba 4.1 0.1
Mg 1.5 0.0
K 1.3 0.0
Ca 0.8 0.0
Na 0.2 0.0
Co 0.2 0.1
Powered by Tru-Q®
cps/eV
keV





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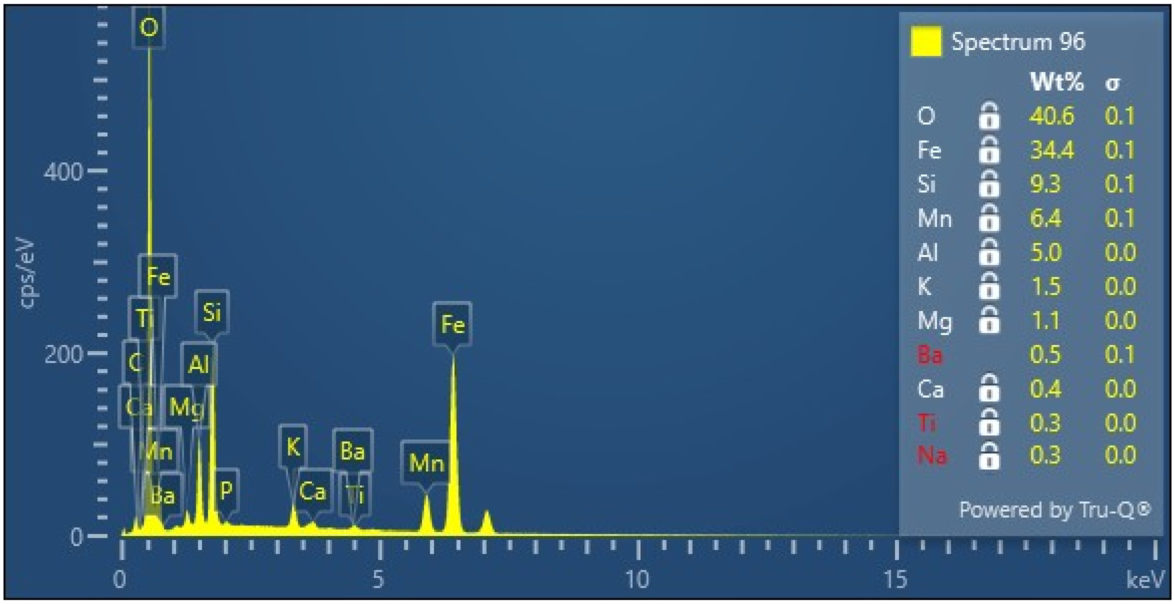

Spectrum 96
Wt% σ
O 40.6 0.1
Fe 34.4 0.1
Si 9.3 0.1
Mn 6.4 0.1
Al 5.0 0.0
K 1.5 0.0
Mg 1.1 0.0
Ba 0.5 0.1
Ca 0.4 0.0
Ti 0.3 0.0
Na 0.3 0.0
Powered by Tru-Q®
cps/eV
400
200
0
0
5
10
15
keV
O
Fe
Ti
Si
C
Al
Ca
Mg
Mn
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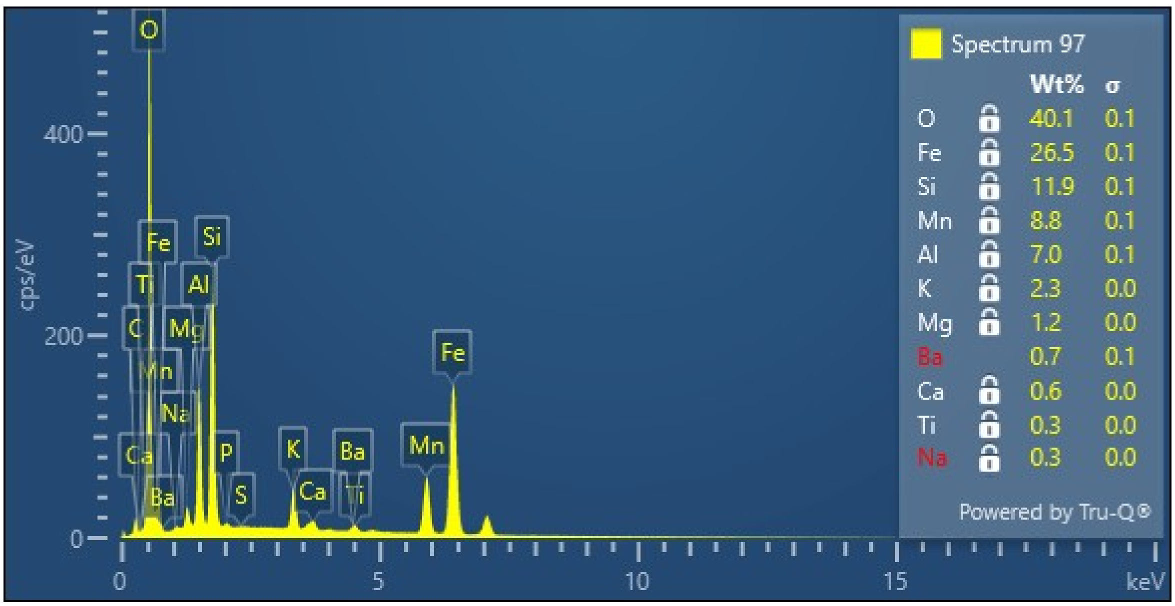
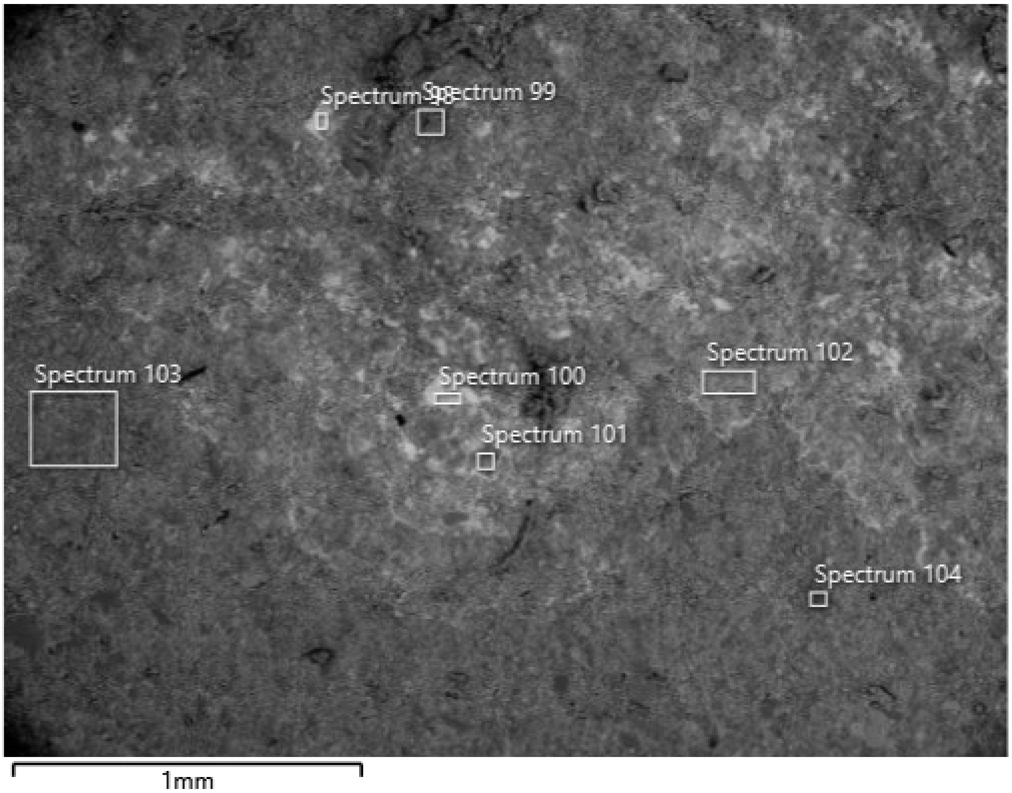
Ba
Mn
Ba
P
Ca
Ti

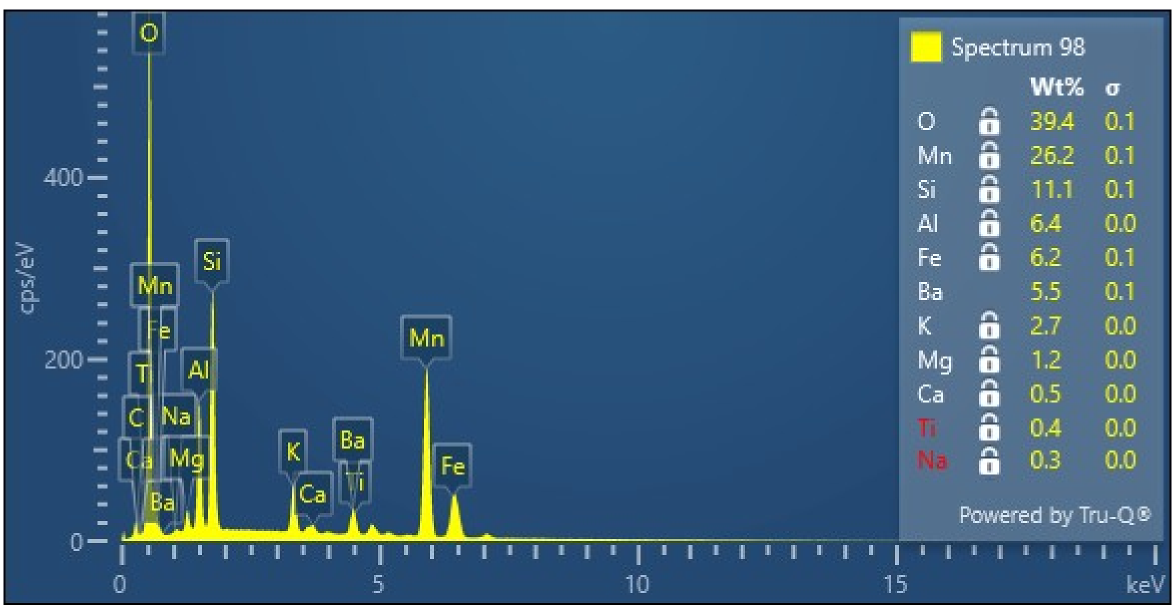


Spectrum 97
Wt% σ
O 40.1 0.1
Fe 26.5 0.1
Si 11.9 0.1
Mn 8.8 0.1
Al 7.0 0.1
K 2.3 0.0
Mg 1.2 0.0
Ba 0.7 0.1
Ca 0.6 0.0
Ti 0.3 0.0
Na 0.3 0.0
Powered by Tru-Q®
cps/eV
400
200
0
0
5
10
15
keV
O
Fe
Si
Ti
Al
C
Mg
Mn
Na
Ca
P
K
Ba
Mn
Ba
S
Ca
Ti

Site 2

MR-AP-MW-2V_35-36 Site 2 100x





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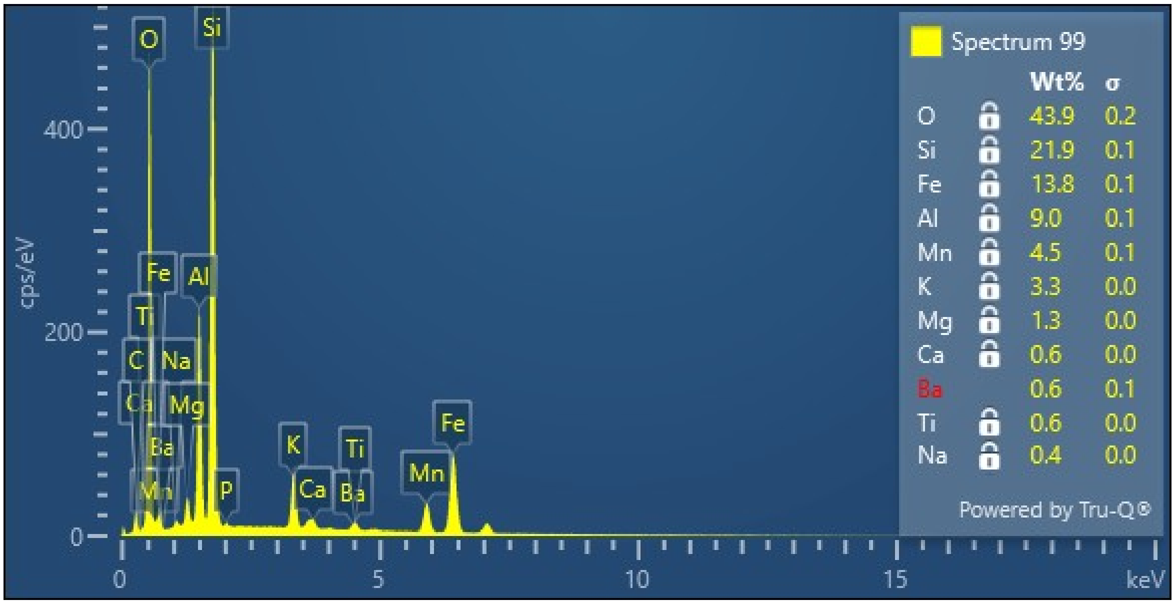
Spectrum 99
Wt% σ
O 43.9 0.2
Si 21.9 0.1
Fe 13.8 0.1
Al 9.0 0.1
Mn 4.5 0.1
K 3.3 0.0
Mg 1.3 0.0
Ca 0.6 0.0
Ba 0.6 0.1
Ti 0.6 0.0
Na 0.4 0.0
Powered by Tru-Q®
cps/eV
400
200
0
5
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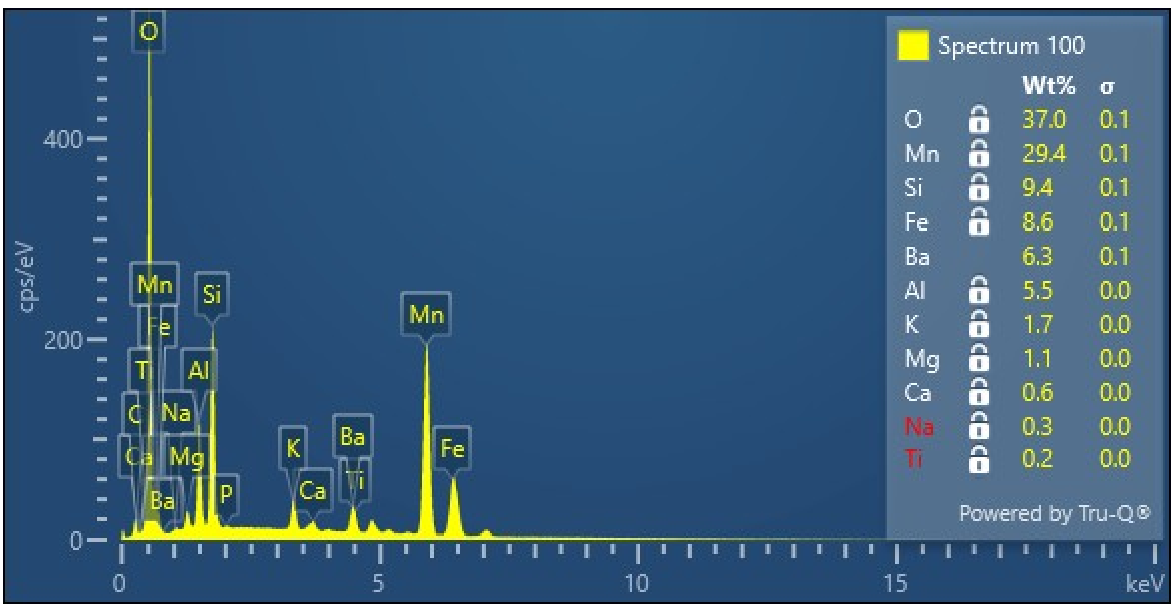
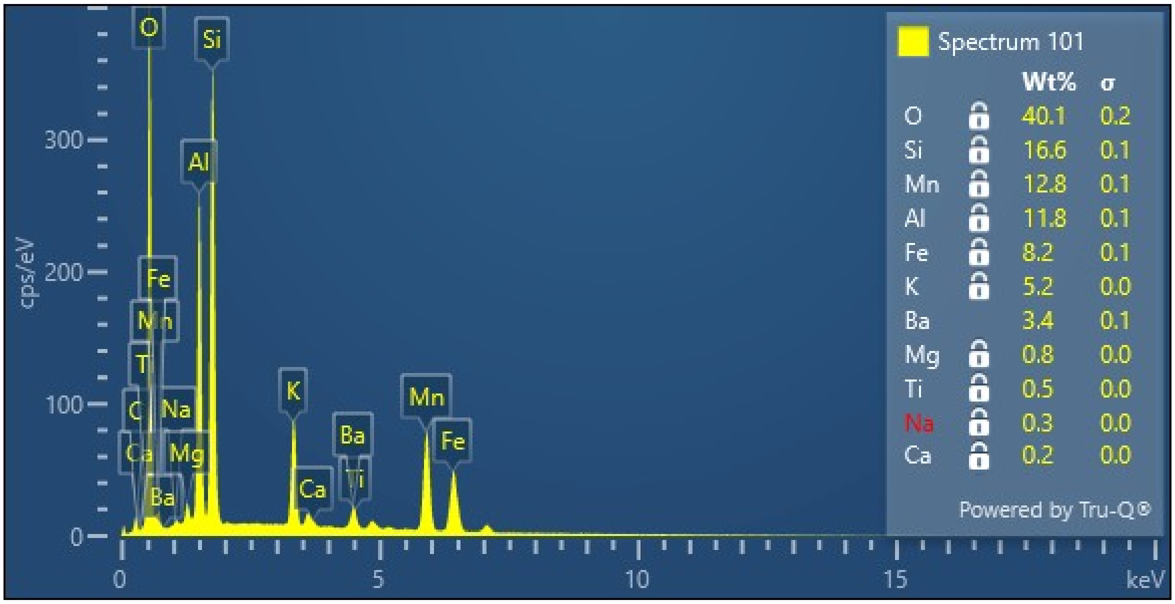
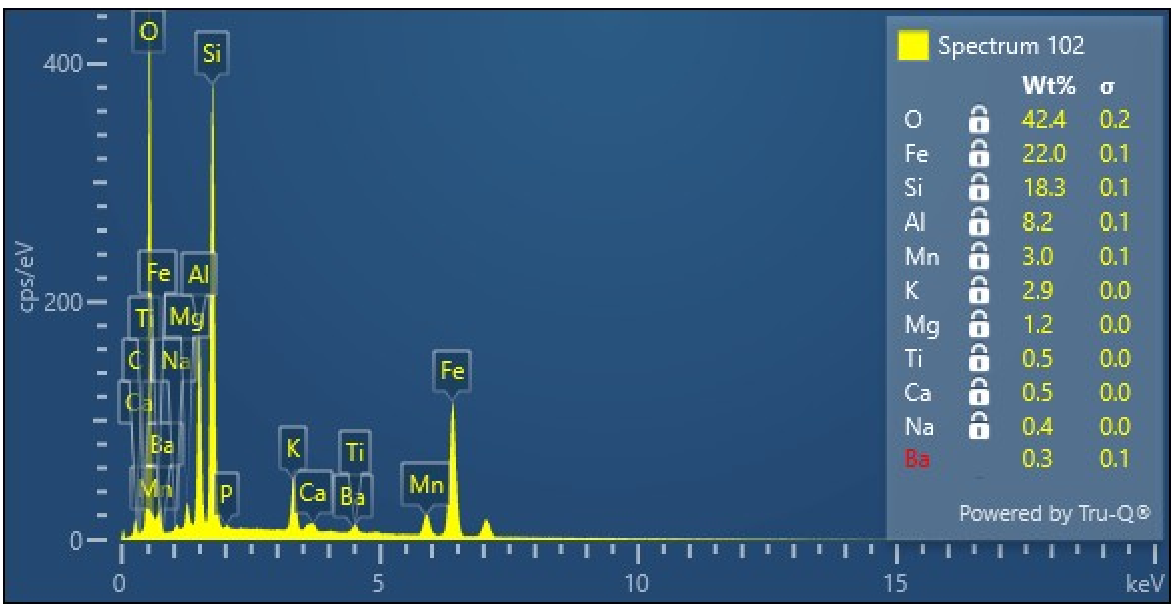
15
keV
O
Si
Fe
Al
Ti
C
Na
Ca
Mg
Ba
Mn
P
K
Ti
Ca
Ba
Mn
Fe


Spectrum 100
Wt% σ
O 37.0 0.1
Mn 29.4 0.1
Si 9.4 0.1
Fe 8.6 0.1
Ba 6.3 0.1
Al 5.5 0.0
K 1.7 0.0
Mg 1.1 0.0
Ca 0.6 0.0
Na 0.3 0.0
Ti 0.2 0.0
Powered by Tru-Q®
cps/eV
400
200
0
5
10
15
keV
O
Mn
Si
Fe
Ti
Al
C
Na
Ca
Mg
Ba
P
K
Ba
Ti
Ca
Mn
Fe





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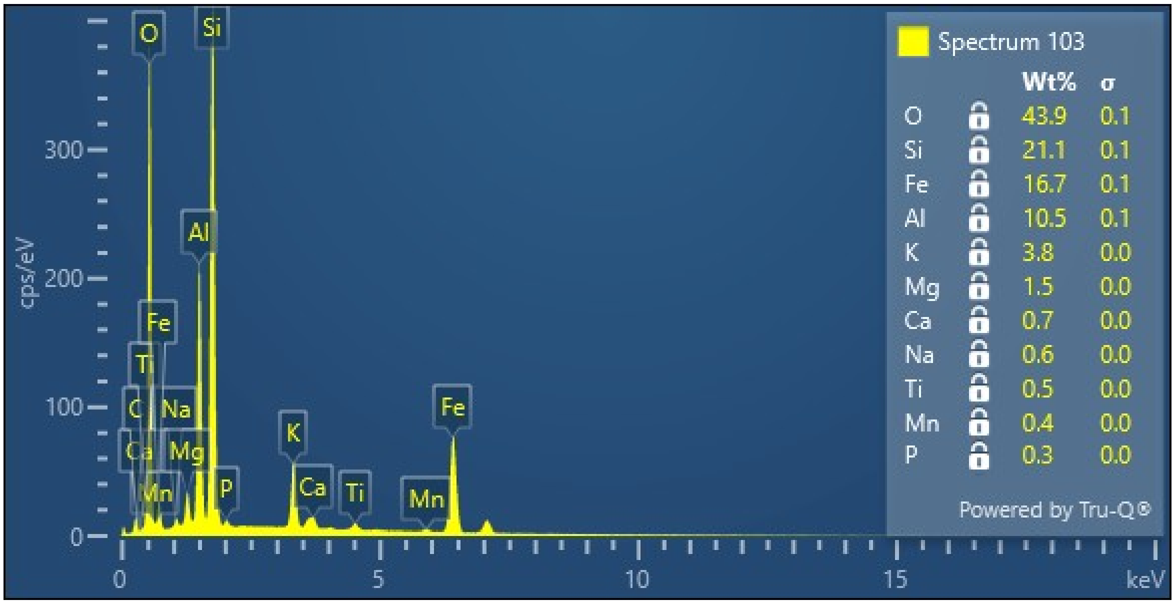
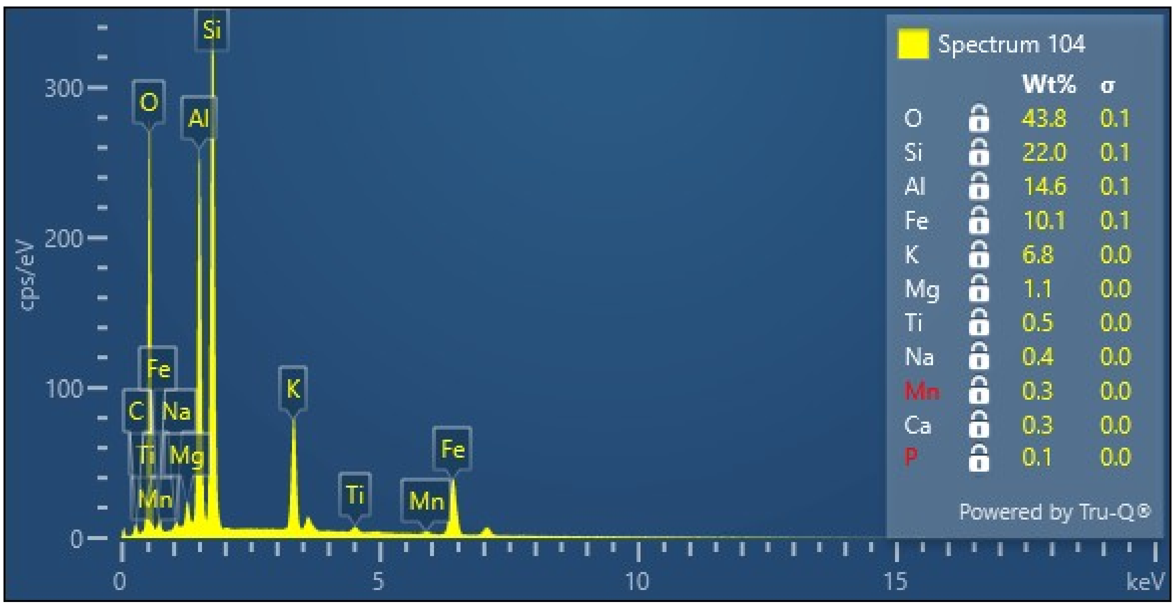
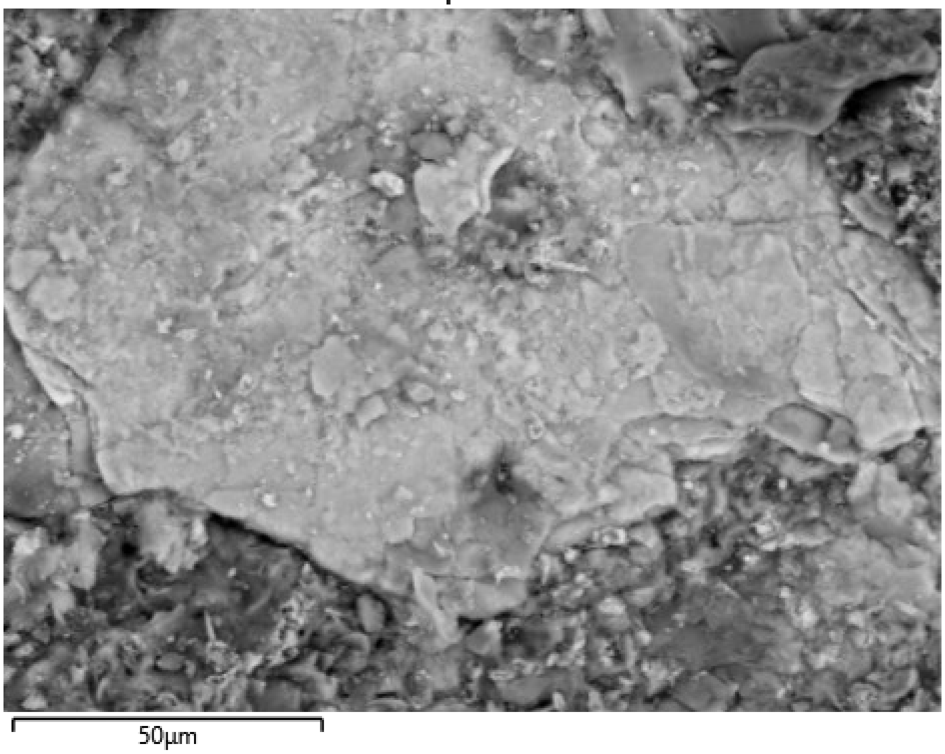

Spectrum 103
Wt% σ
O 43.9 0.1
Si 21.1 0.1
Fe 16.7 0.1
Al 10.5 0.1
K 3.8 0.0
Mg 1.5 0.0
Ca 0.7 0.0
Na 0.6 0.0
Ti 0.5 0.0
Mn 0.4 0.0
P 0.3 0.0
Powered by Tru-Q®
cps/eV
keV

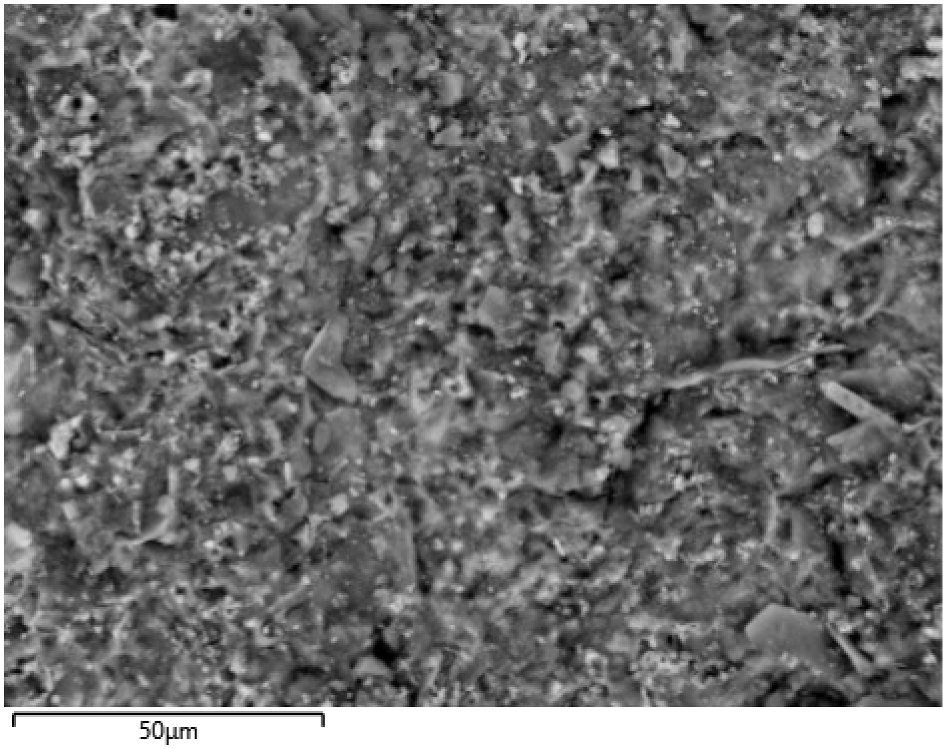

Spectrum 104
Wt% σ
O 43.8 0.1
Si 22.0 0.1
Al 14.6 0.1
Fe 10.1 0.1
K 6.8 0.0
Mg 1.1 0.0
Ti 0.5 0.0
Na 0.4 0.0
Mn 0.3 0.0
Ca 0.3 0.0
P 0.1 0.0
Powered by Tru-Q®
cps/eV
keV

Site 2 detail images

Site 2 sp100 2000x

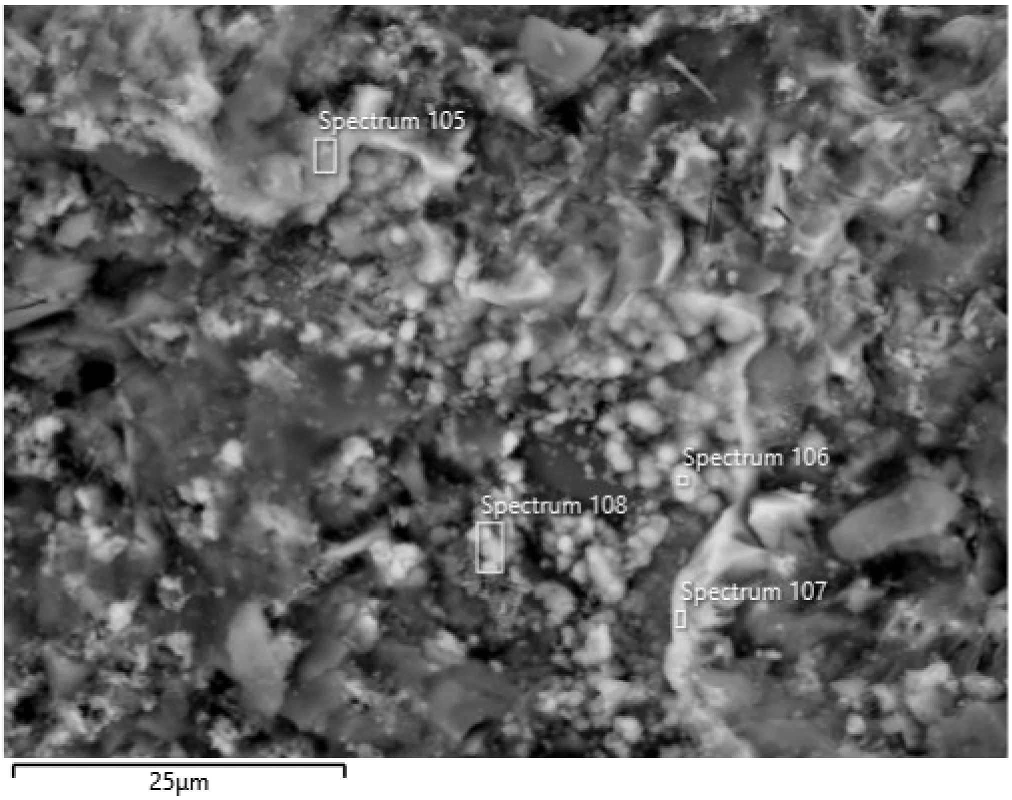


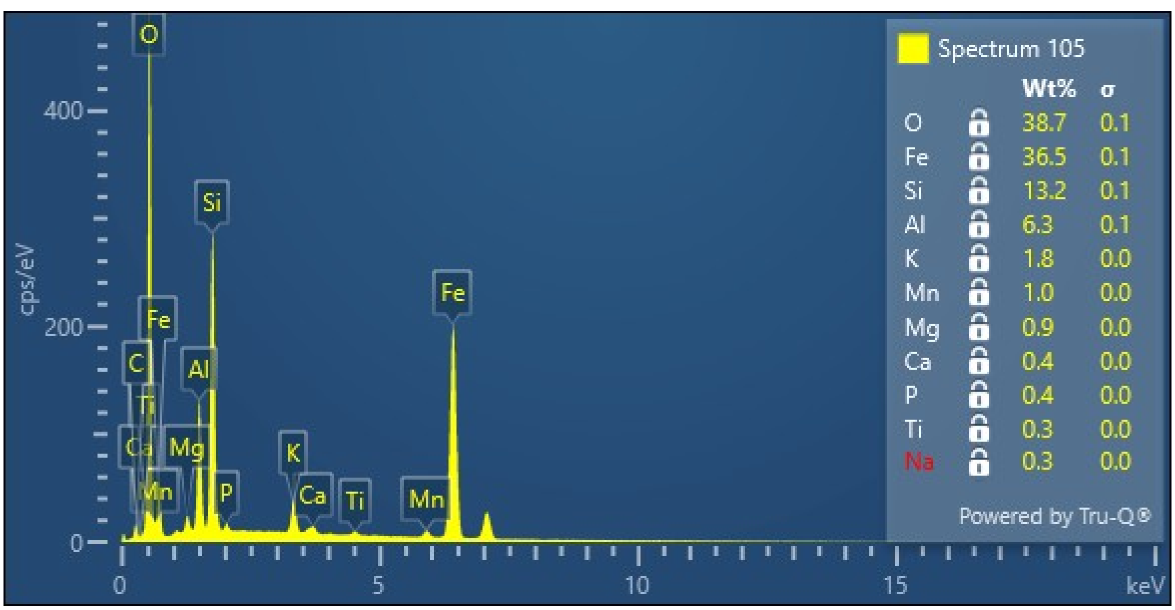
Site 2 sp102 2000x

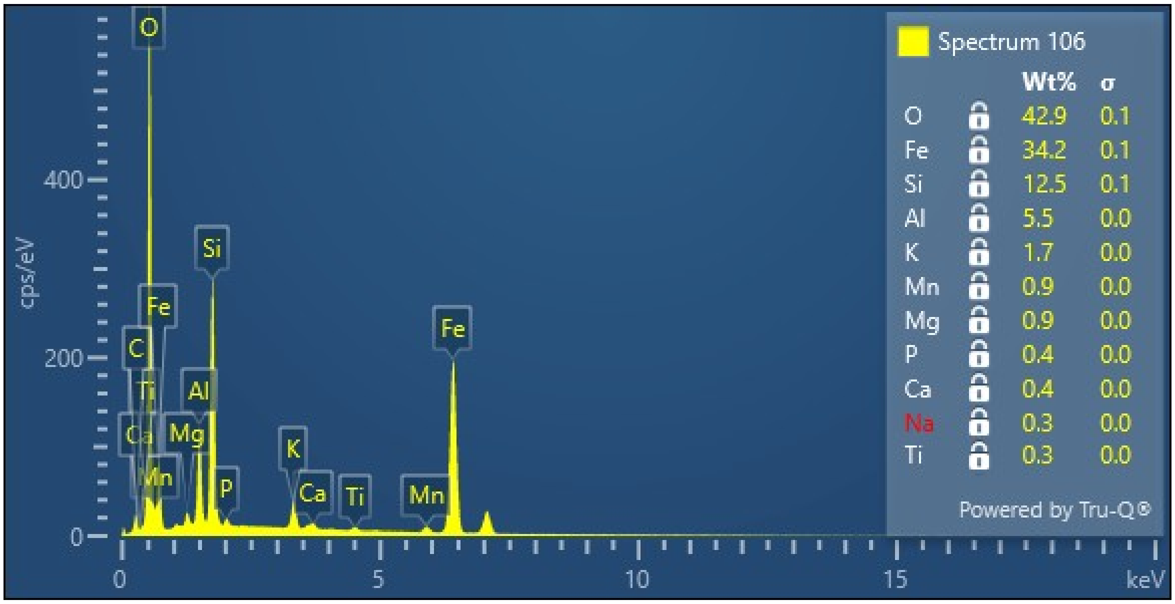


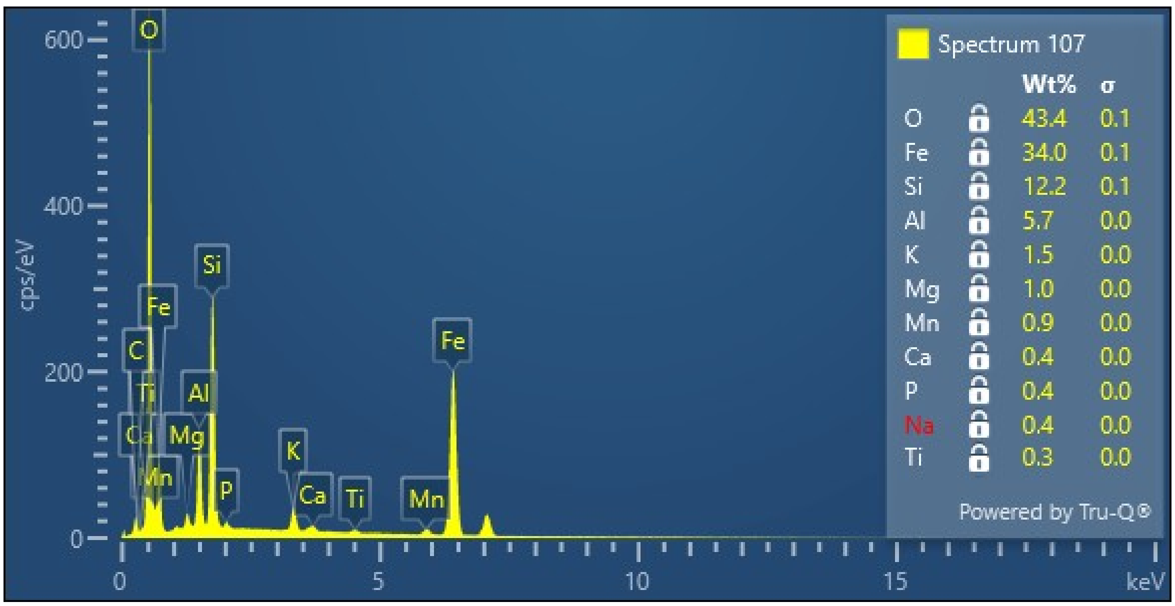
Site 2 sp102 (nearby) details

Site 2 border detail 4000x









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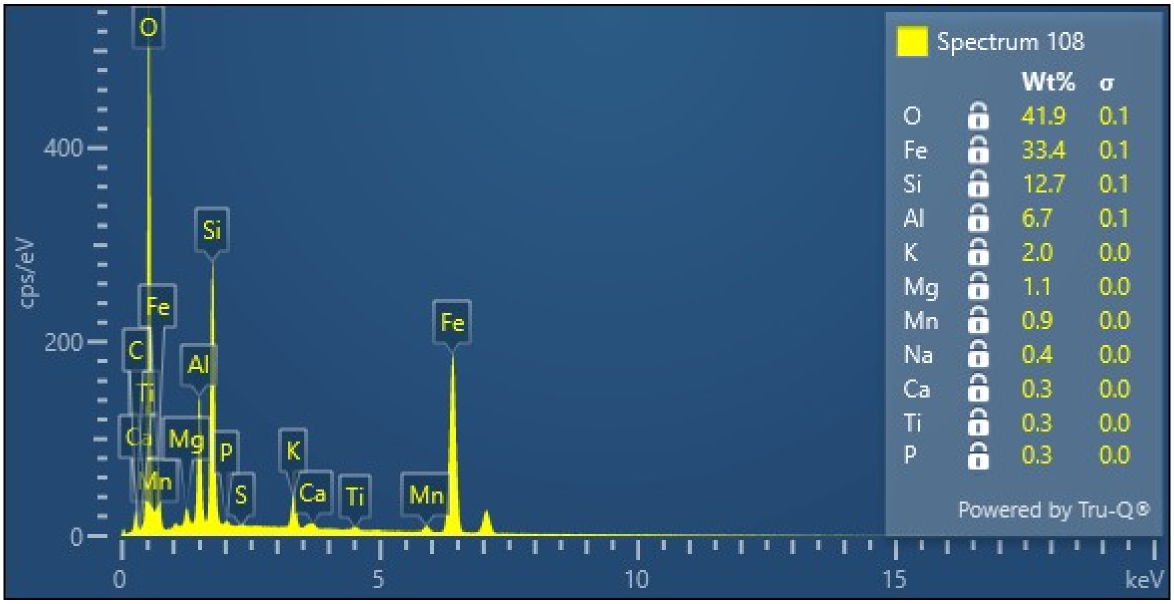
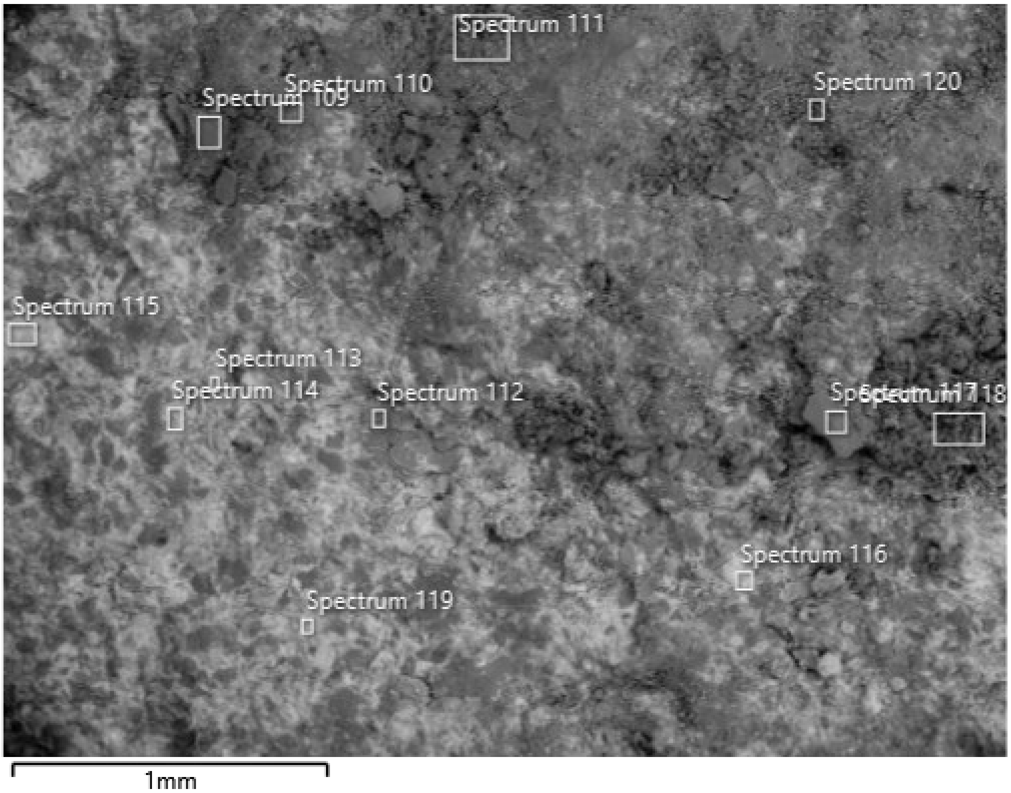

Spectrum 108
Wt% σ
O 41.9 0.1
Fe 33.4 0.1
Si 12.7 0.1
Al 6.7 0.1
K 2.0 0.0
Mg 1.1 0.0
Mn 0.9 0.0
Na 0.4 0.0
Ca 0.3 0.0
Ti 0.3 0.0
P 0.3 0.0
Powered by Tru-Q®
cps/eV
400
200
0
0
5
10
15
keV
O
Si
Fe
C
Ti
Al
Ca
Mg
P
K
Mn
S
Ca
Ti
Mn
Fe

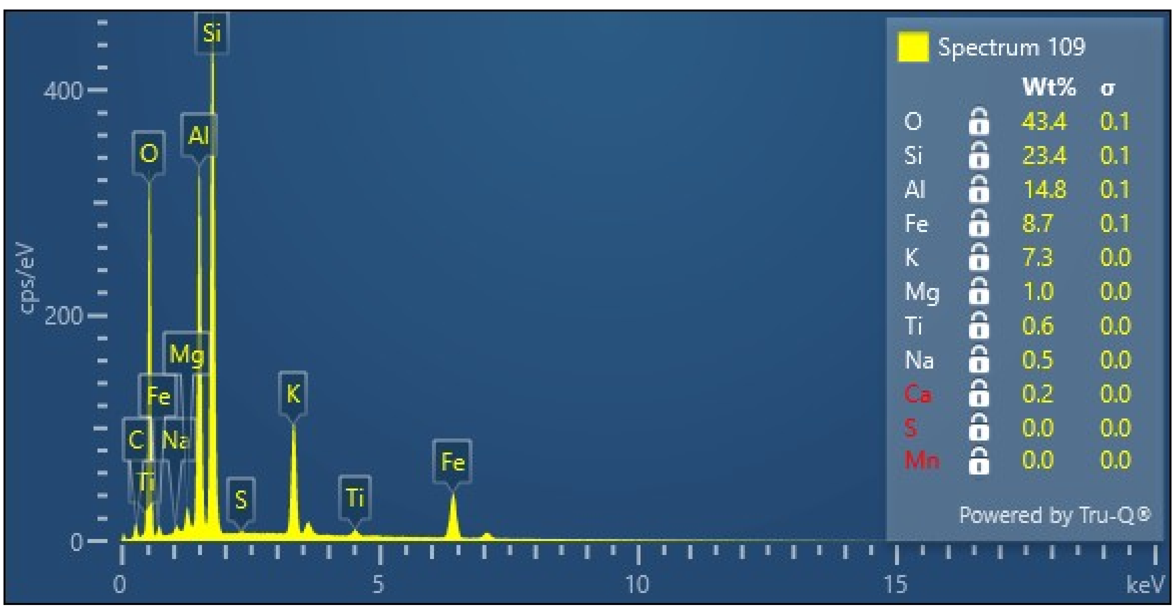
Site 1

MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021

MR-AP-MW-3V_16.25-16.5 Site 1 100x





	Wt%	σ
O	43.4	0.1
Si	23.4	0.1
Al	14.8	0.1
Fe	8.7	0.1
K	7.3	0.0
Mg	1.0	0.0
Ti	0.6	0.0
Na	0.5	0.0
Ca	0.2	0.0
S	0.0	0.0
Mn	0.0	0.0

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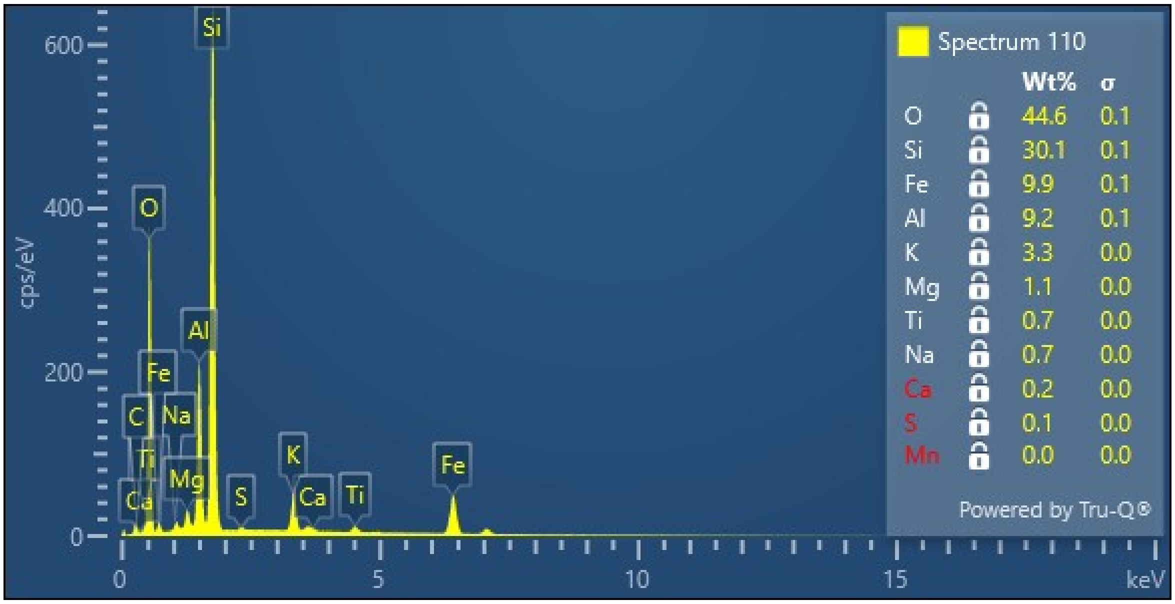
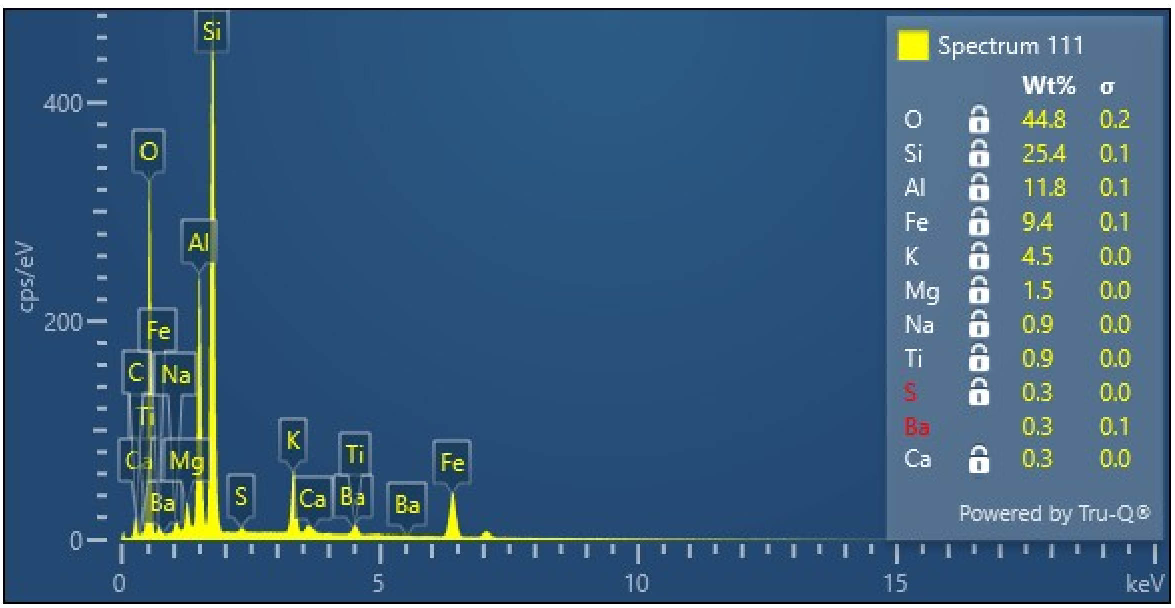
MR-AP-MW-3V_16.25-16.5 SEM analysis

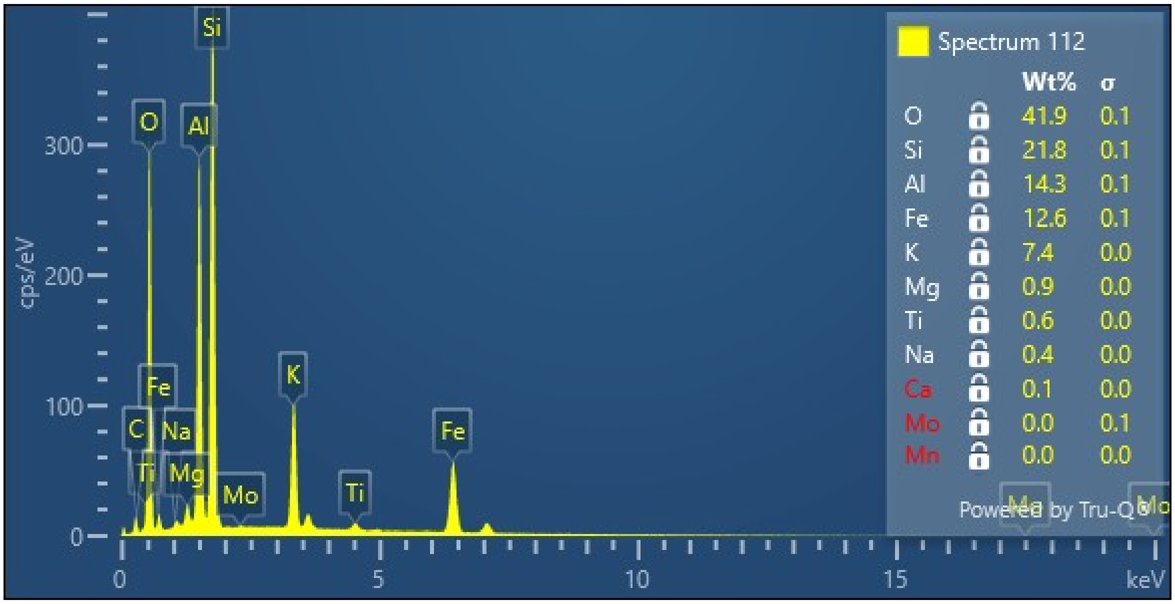
10/26/2021

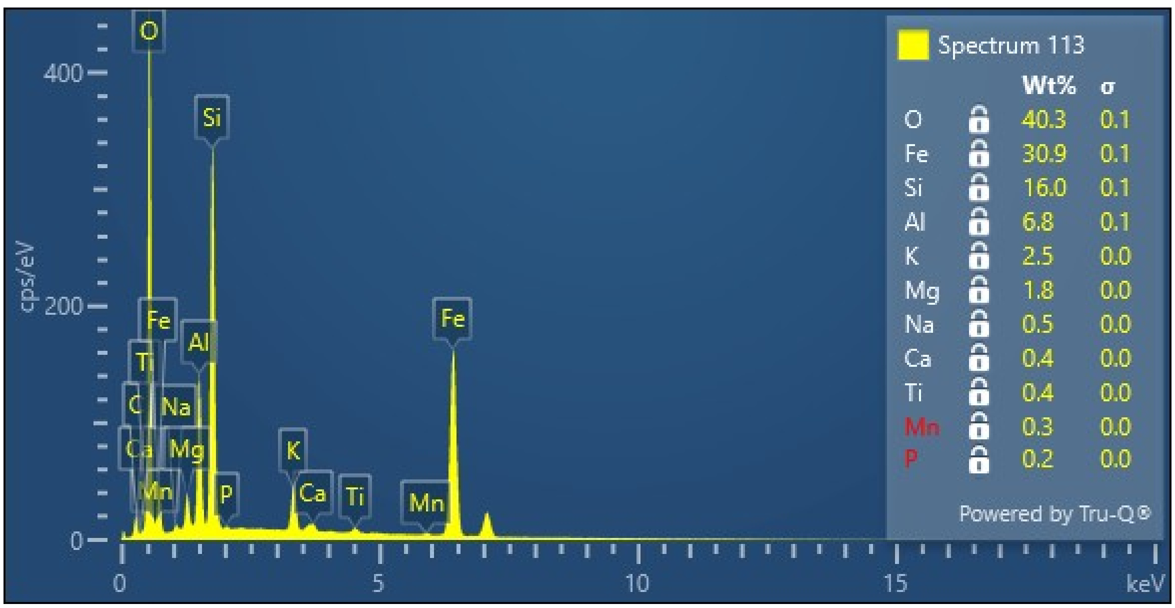




MR-AP-MW-3V_16.25-16.5 SEM analysis

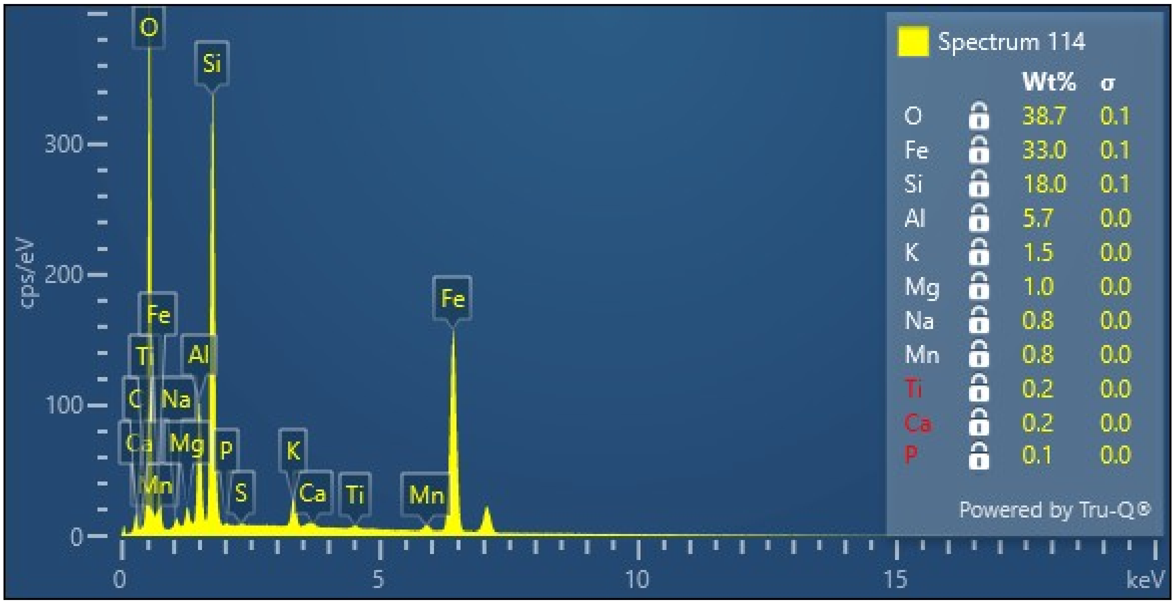
10/26/2021

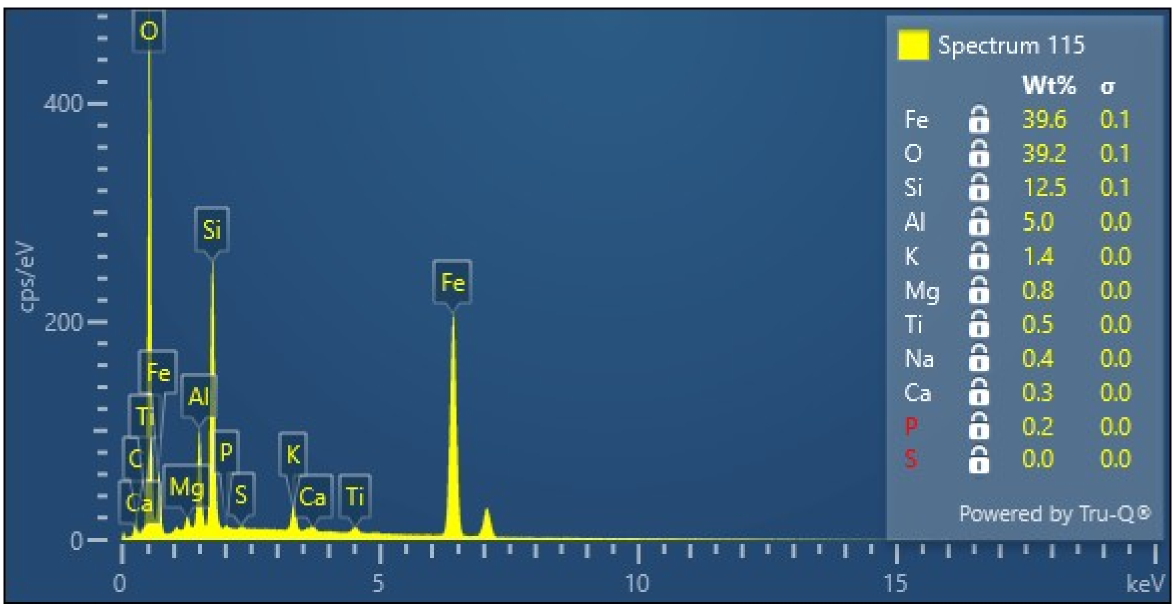




MR-AP-MW-3V_16.25-16.5 SEM analysis

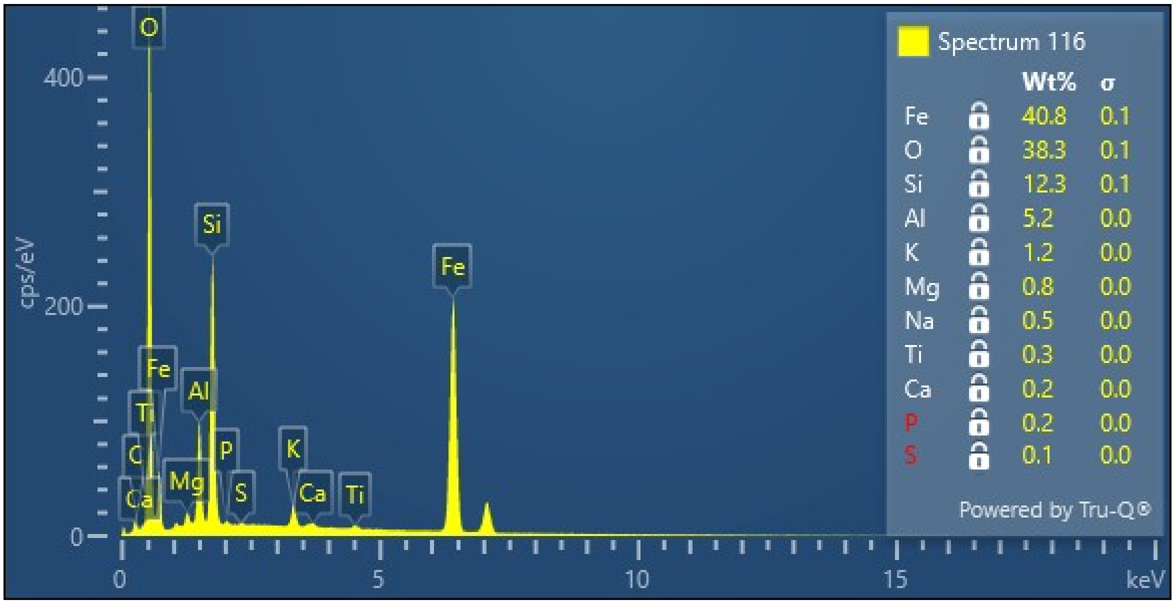
10/26/2021

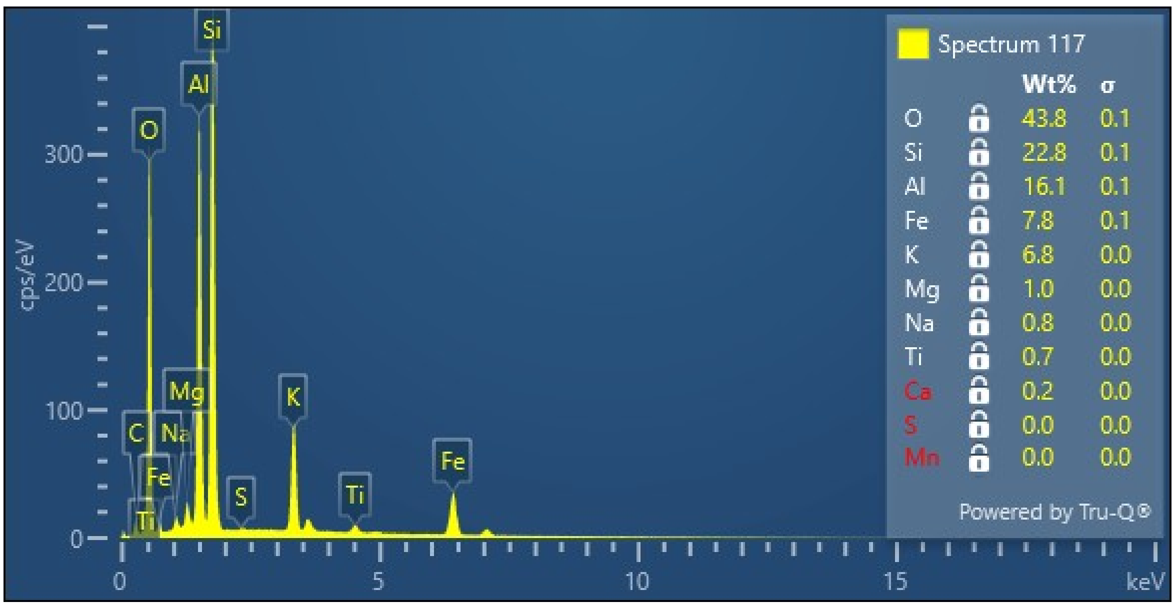




MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021





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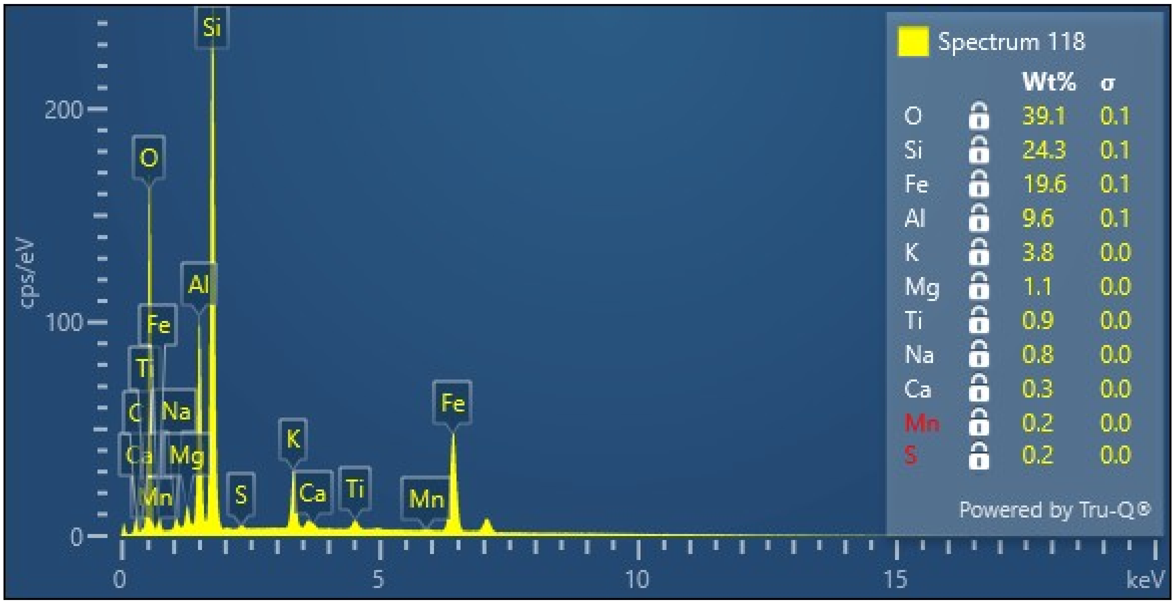
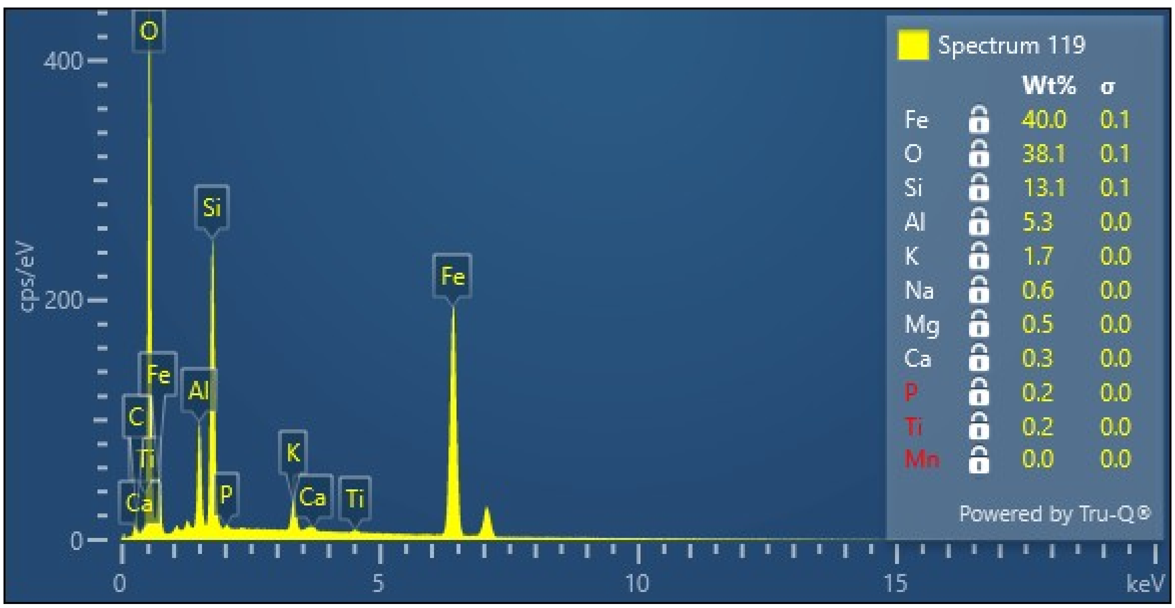
MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021





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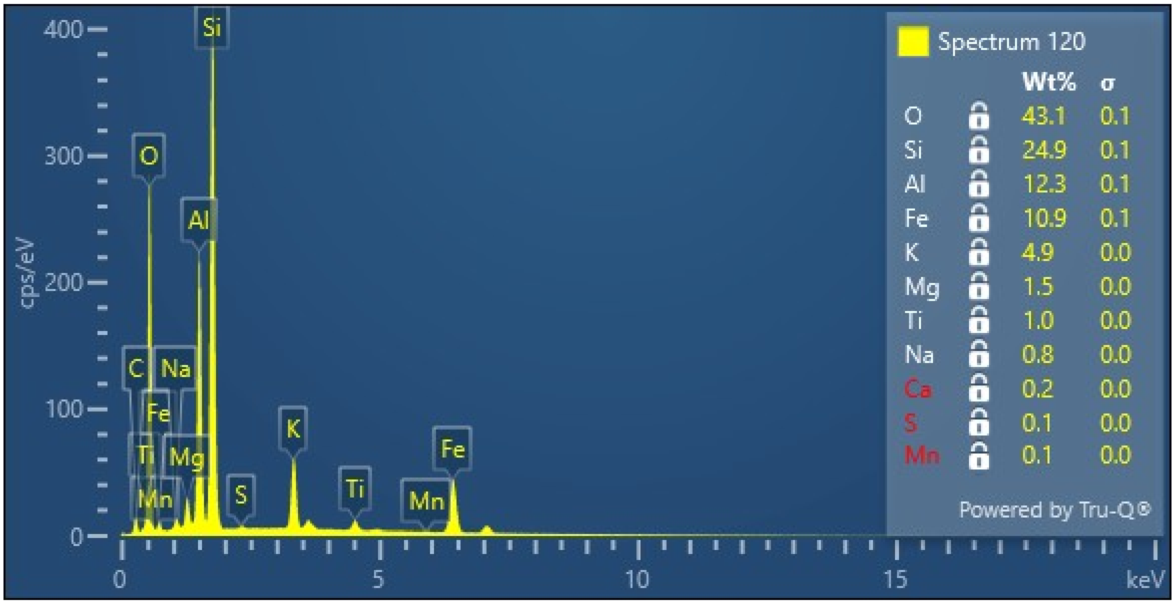
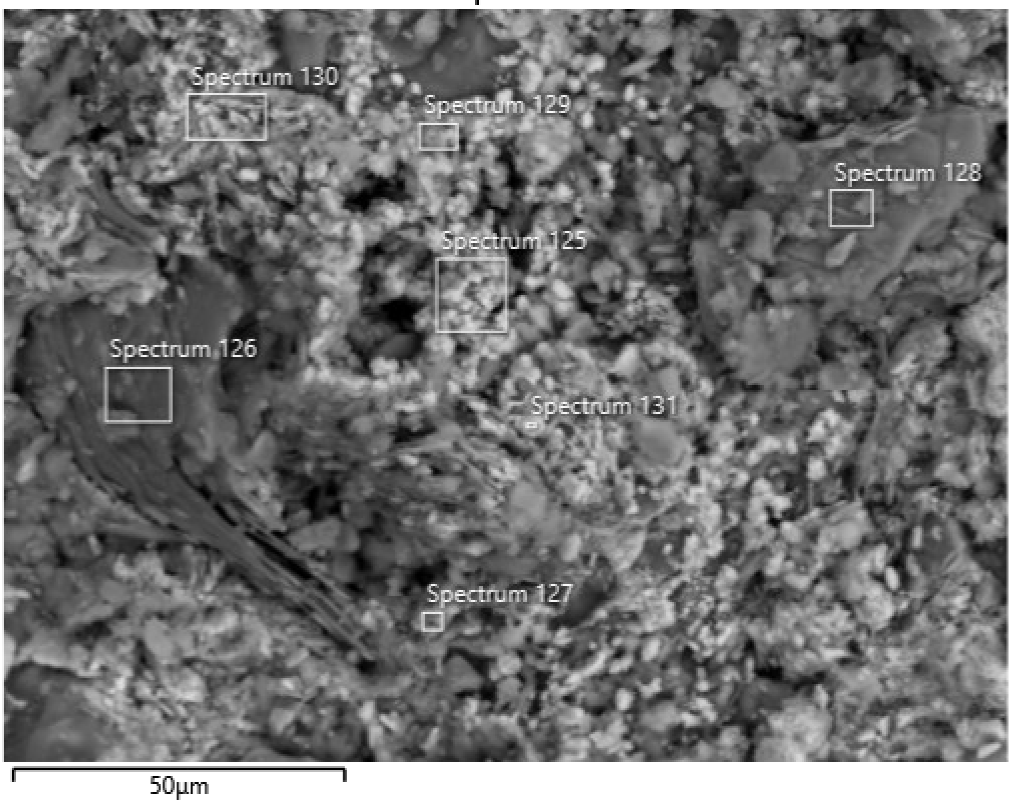
MR-AP-MW-3V_16.25-16.5 SEM analysis

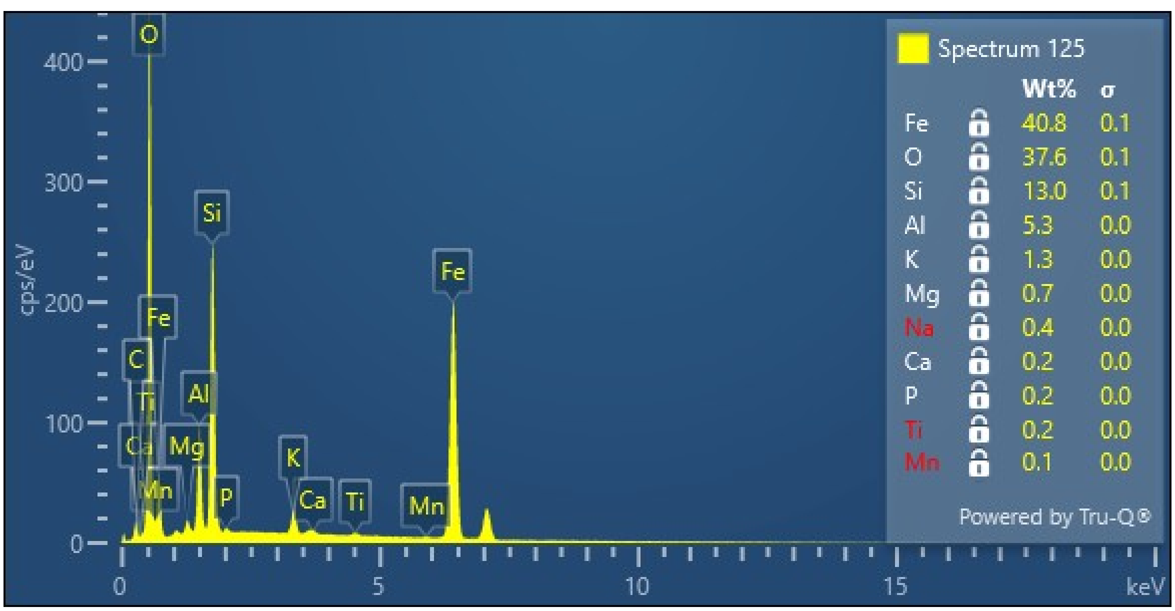
10/26/2021



Site 1 sp114 details

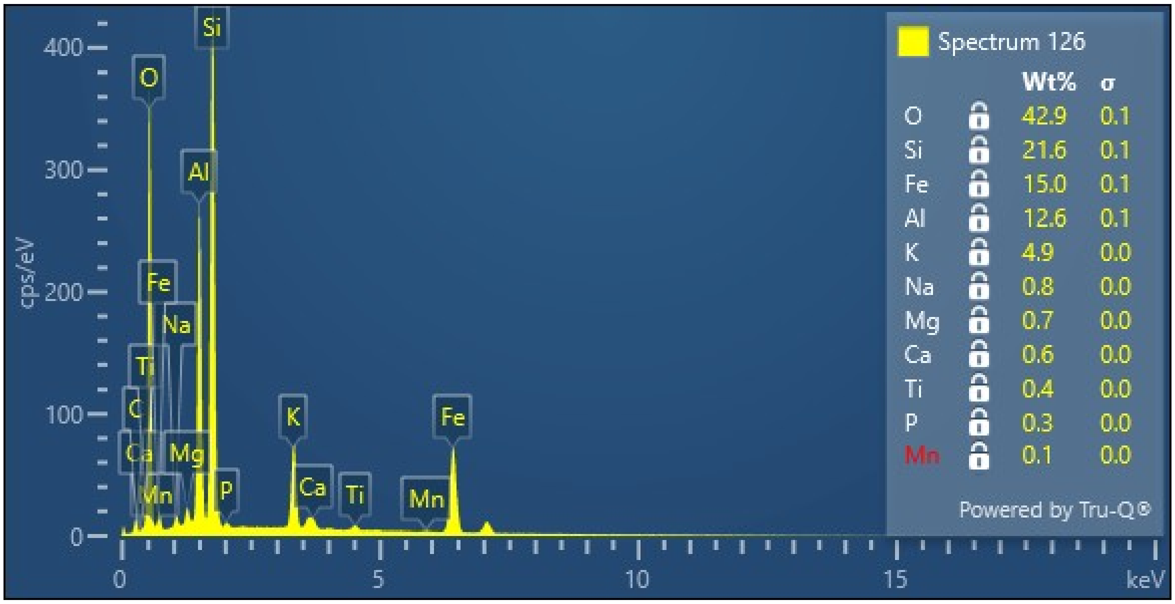
Site 1 sp114 2000x

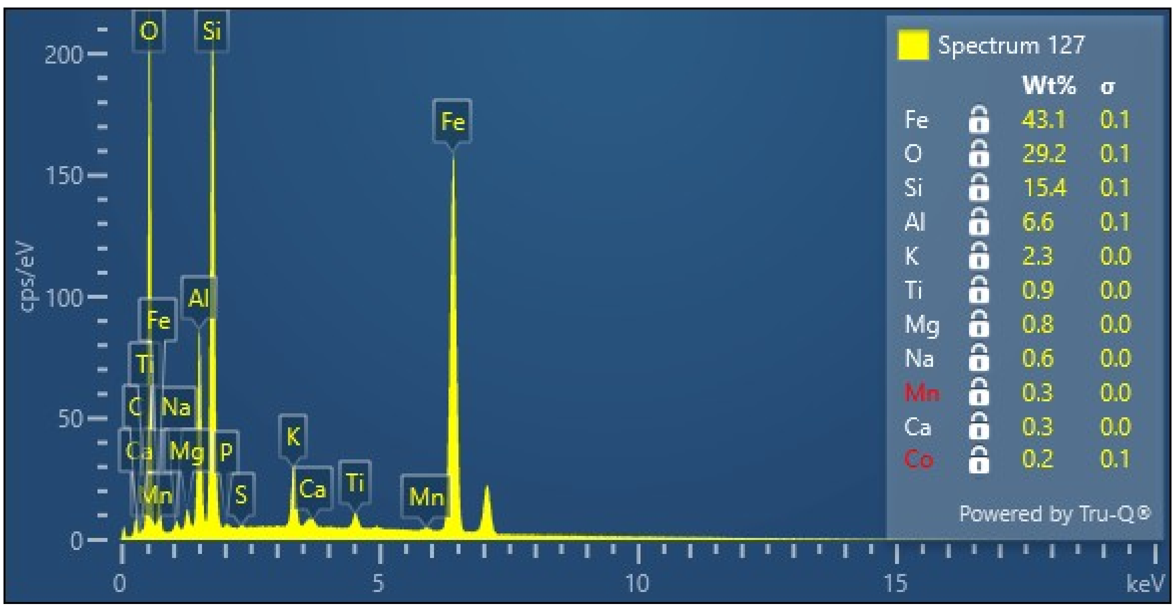




MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021





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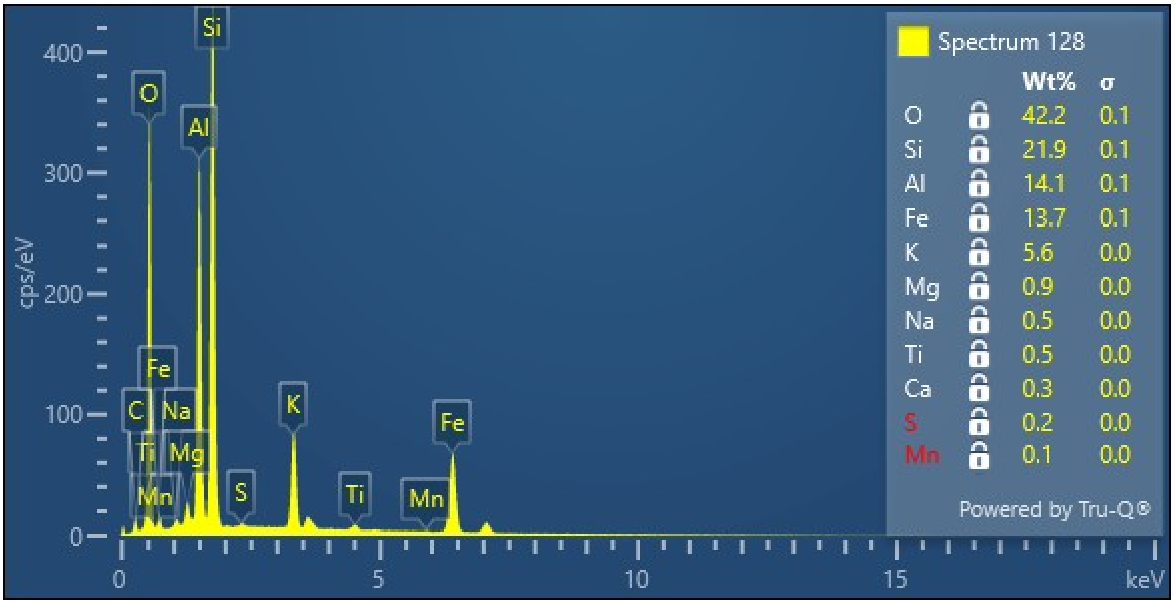
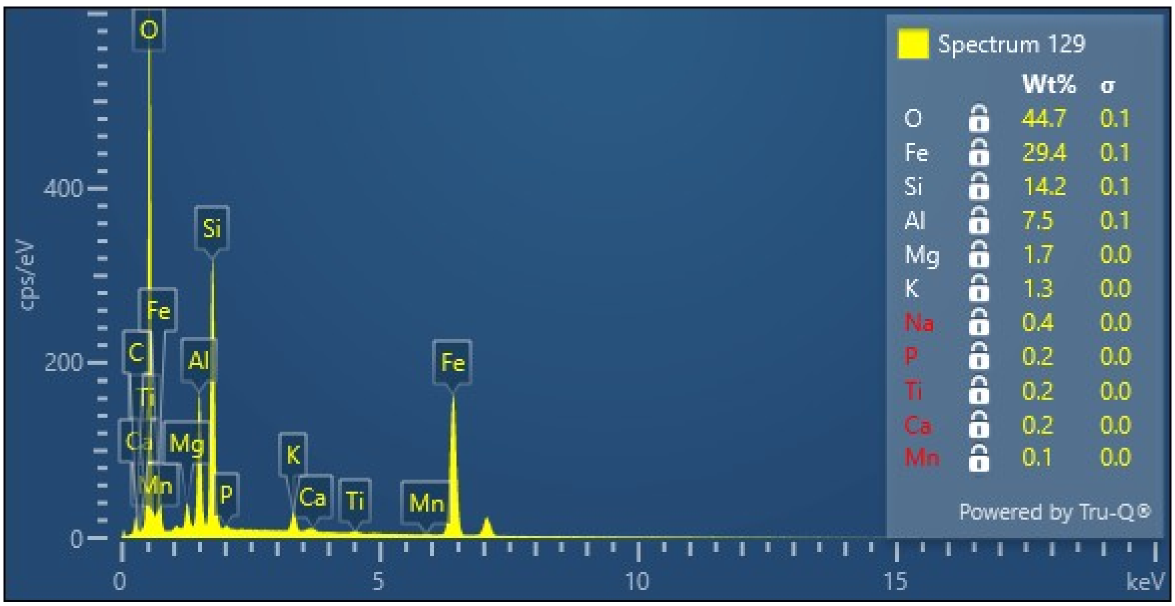
MR-AP-MW-3V_16.25-16.5 SEM analysis

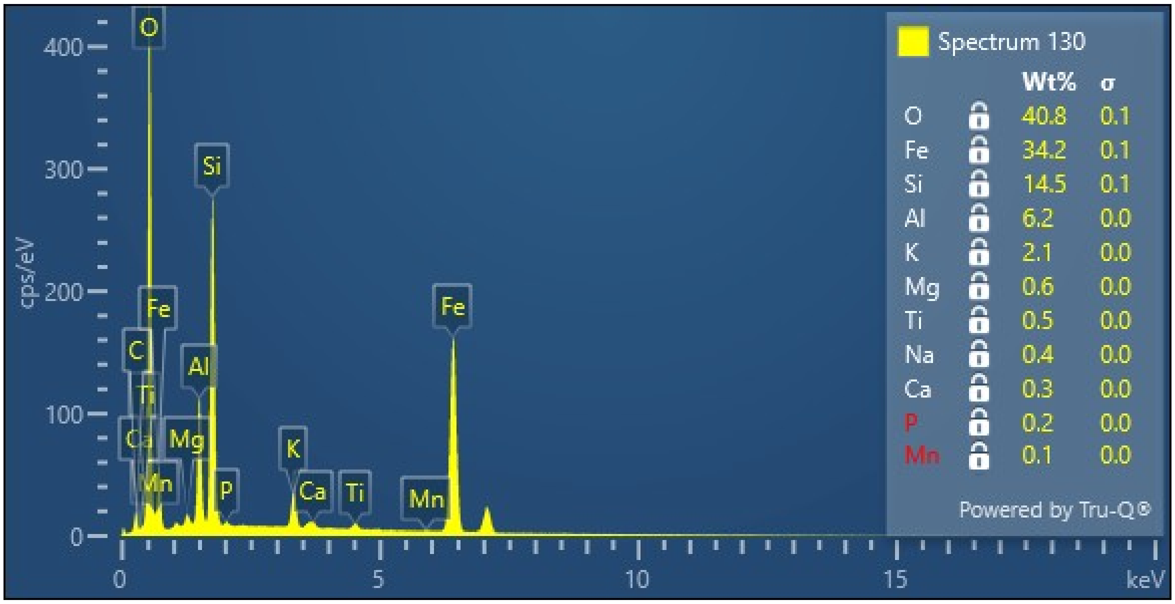
10/26/2021



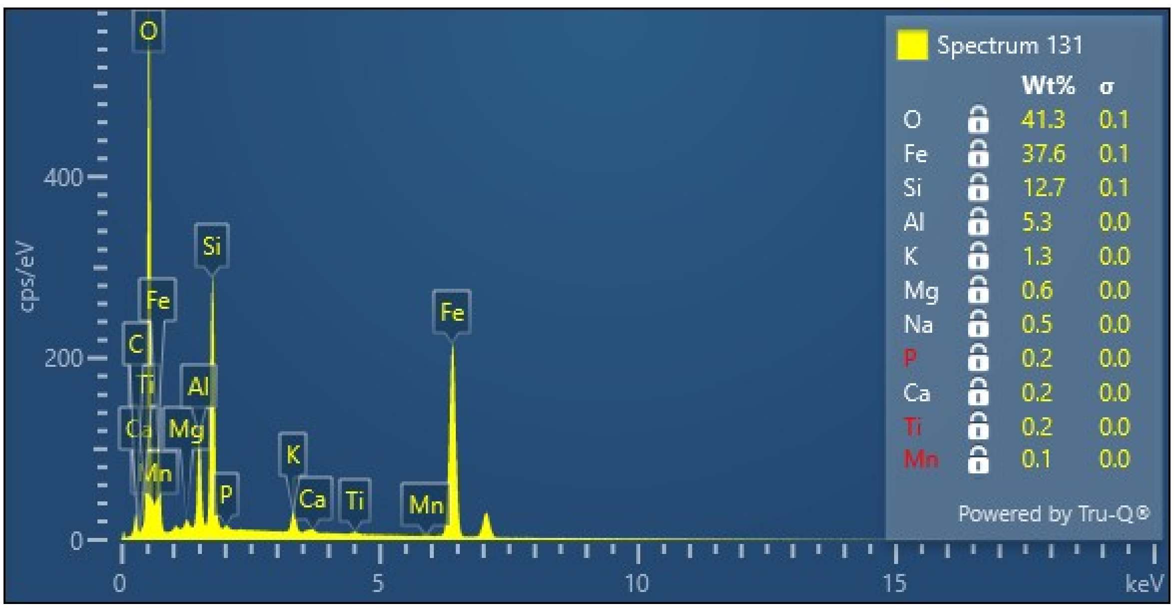


MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021



	Wt%	σ
O	40.8	0.1
Fe	34.2	0.1
Si	14.5	0.1
Al	6.2	0.0
K	2.1	0.0
Mg	0.6	0.0
Ti	0.5	0.0
Na	0.4	0.0
Ca	0.3	0.0
P	0.2	0.0
Mn	0.1	0.0



	Wt%	σ
O	41.3	0.1
Fe	37.6	0.1
Si	12.7	0.1
Al	5.3	0.0
K	1.3	0.0
Mg	0.6	0.0
Na	0.5	0.0
P	0.2	0.0
Ca	0.2	0.0
Ti	0.2	0.0
Mn	0.1	0.0

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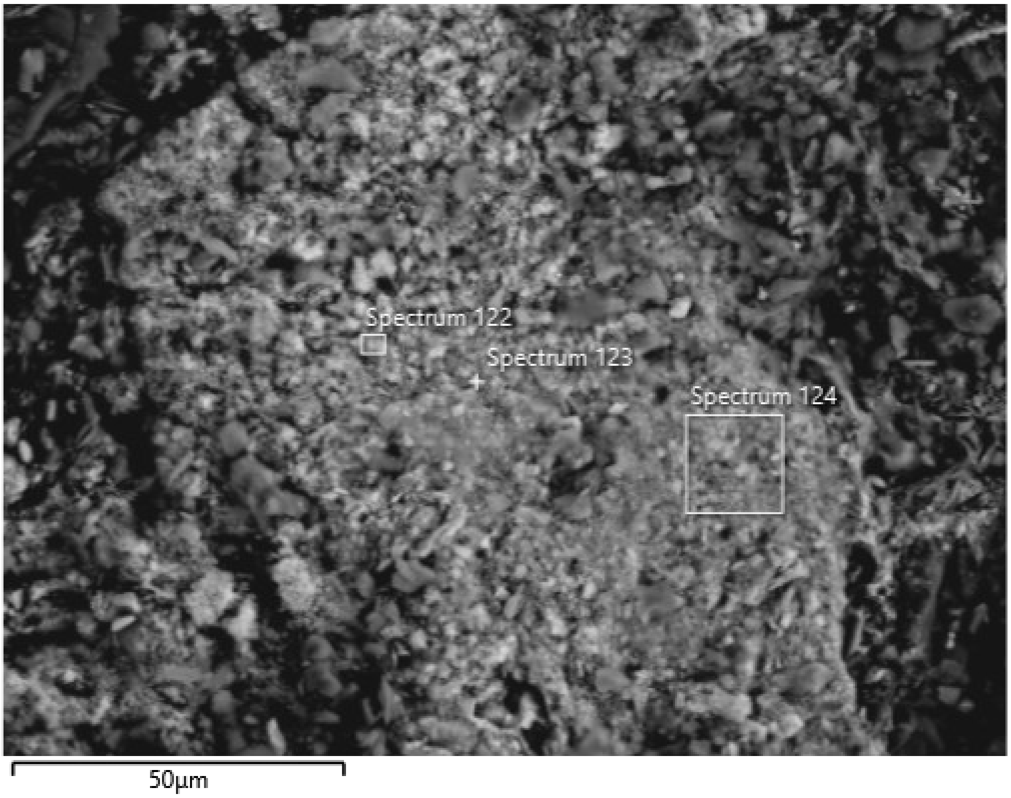
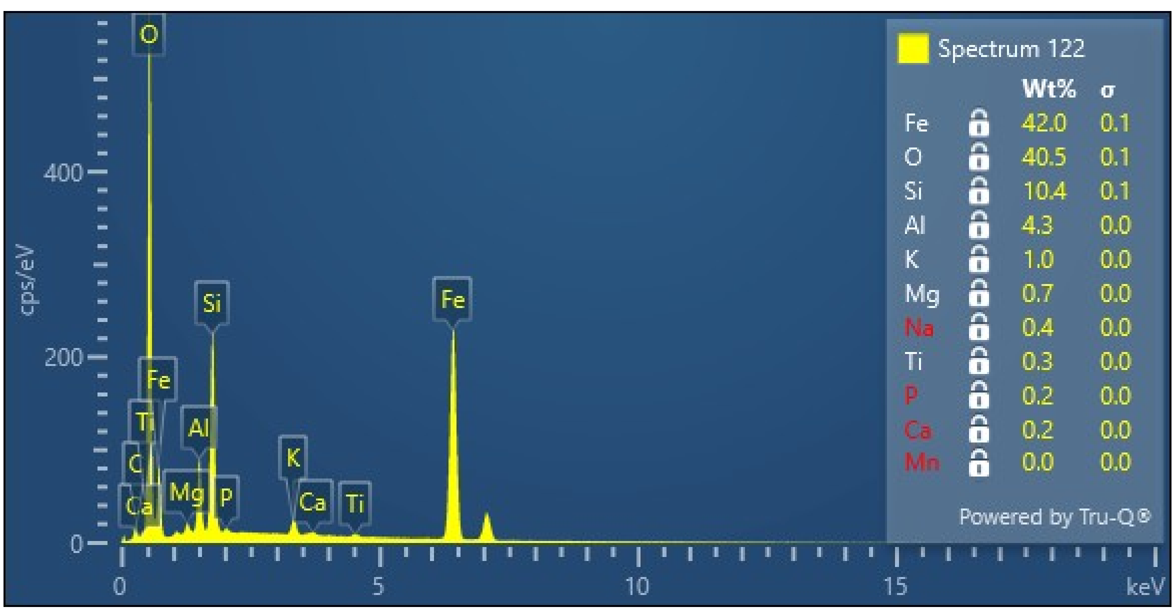
Site 1 sp11 details

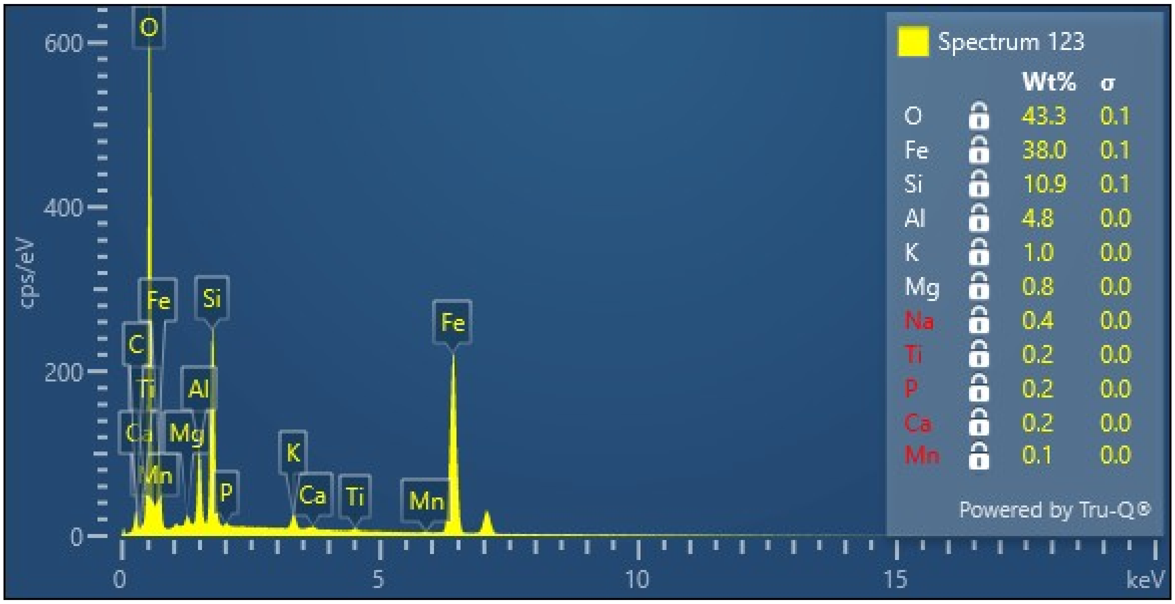
Site 1 sp116 2000x

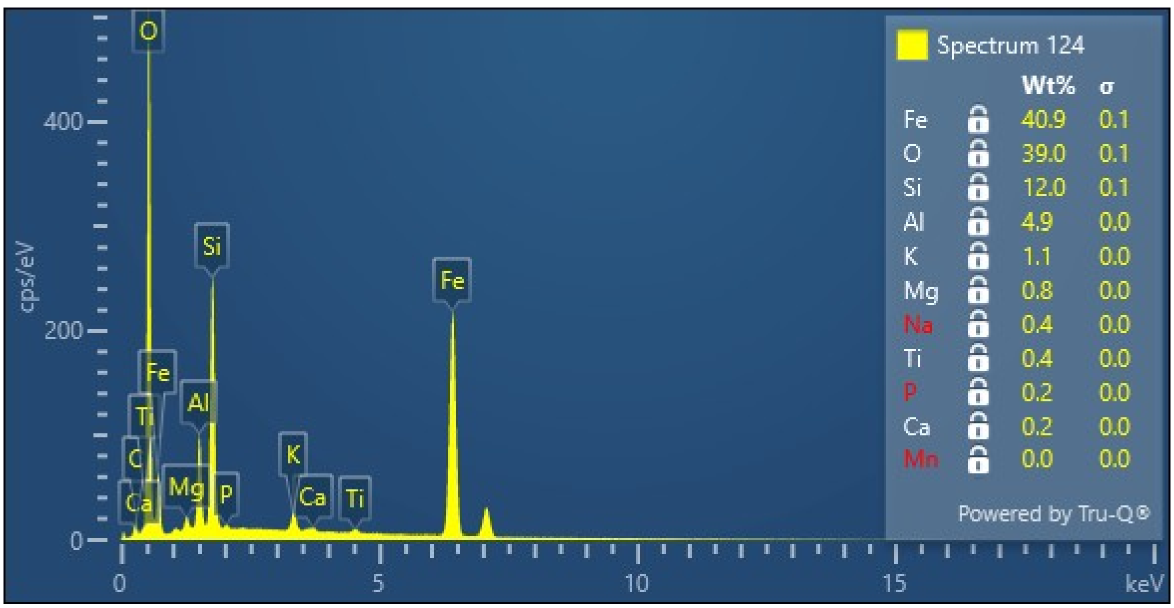




MR-AP-MW-3V_16.25-16.5 SEM analysis

10/26/2021





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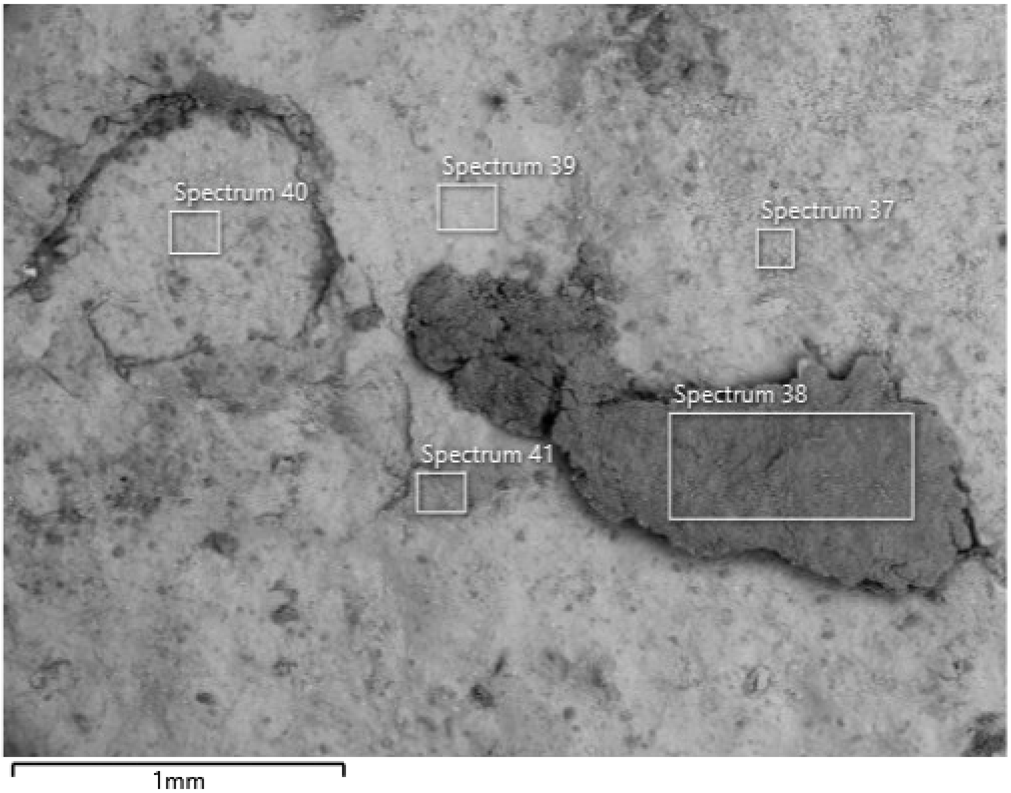
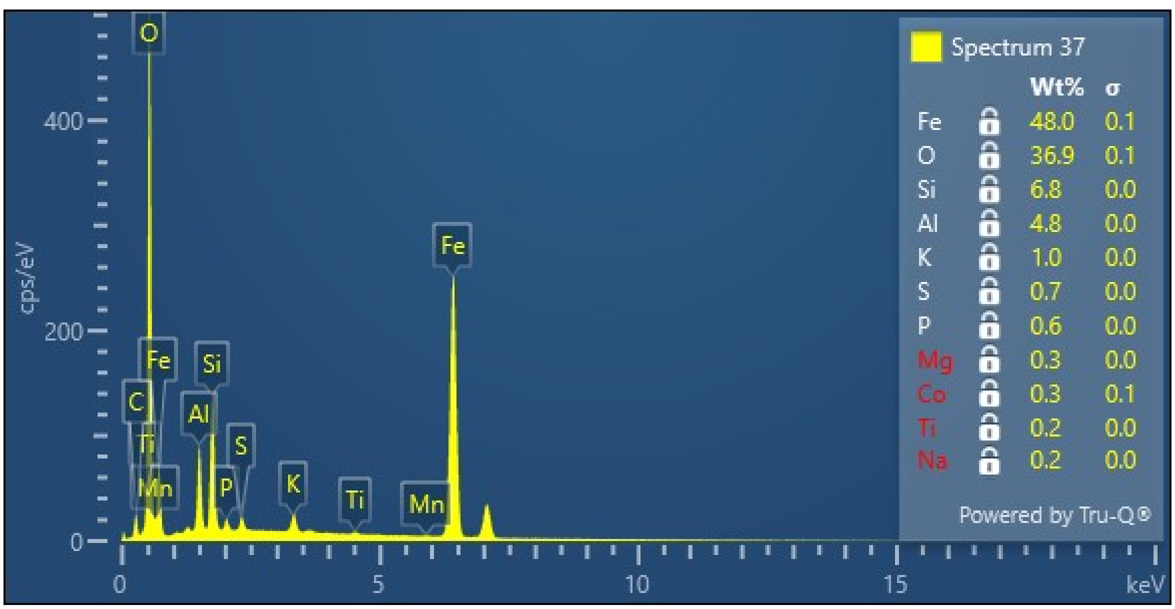
Site 1

MRMW3V-1 Site 1 100x





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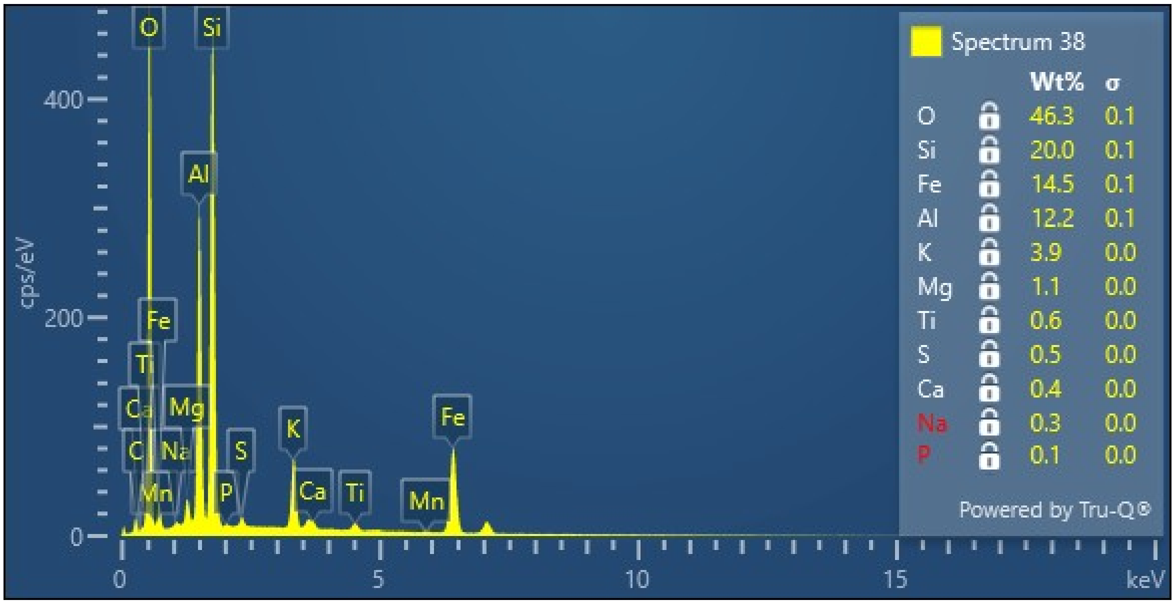
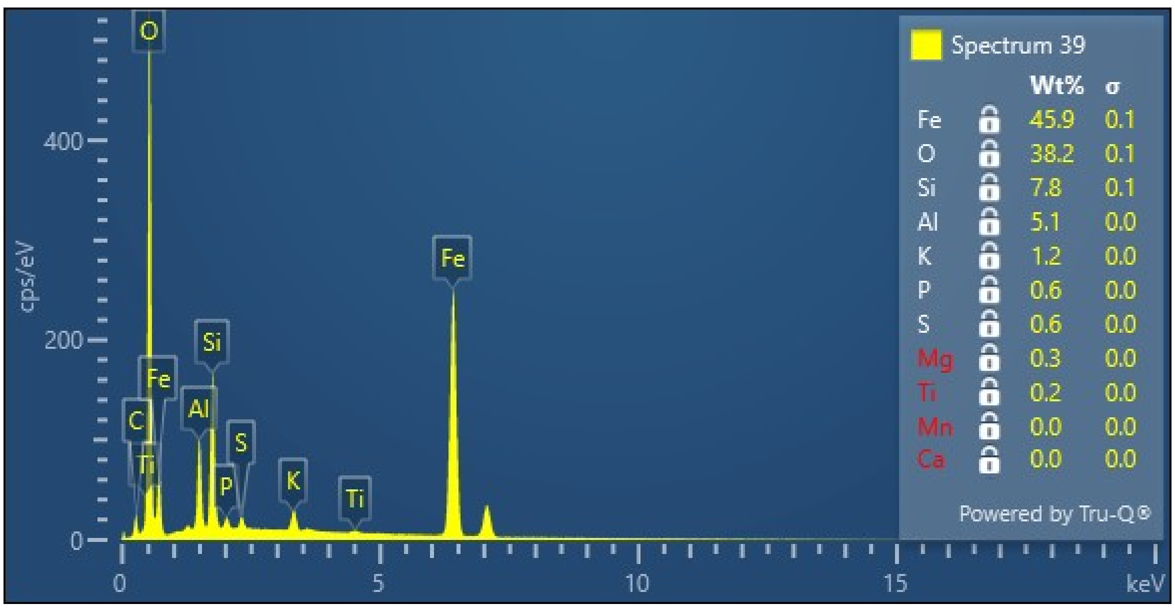
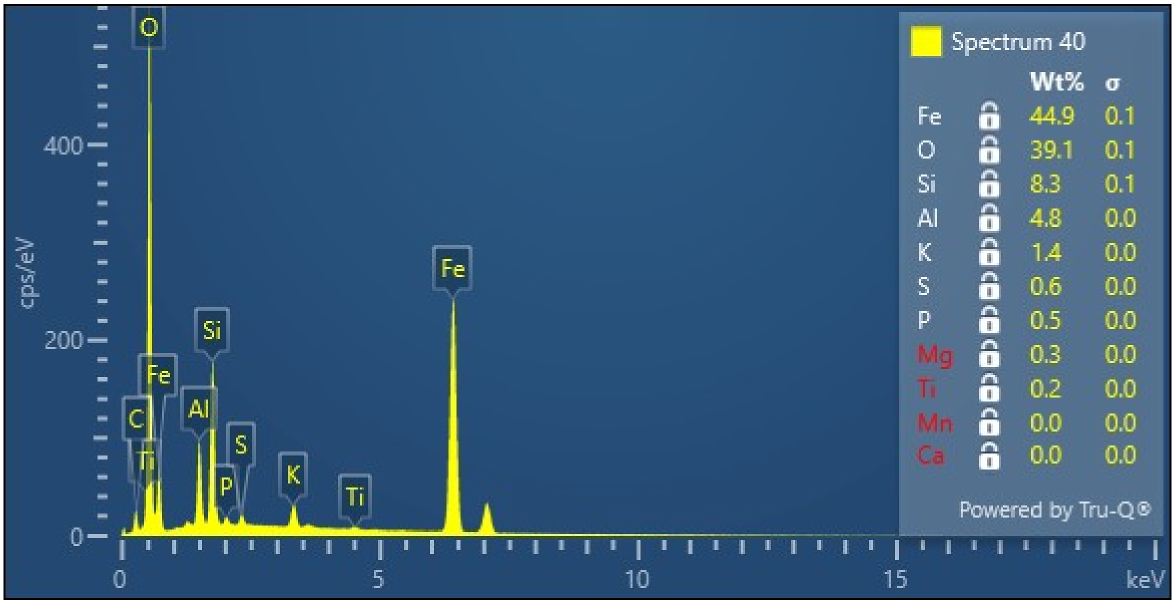
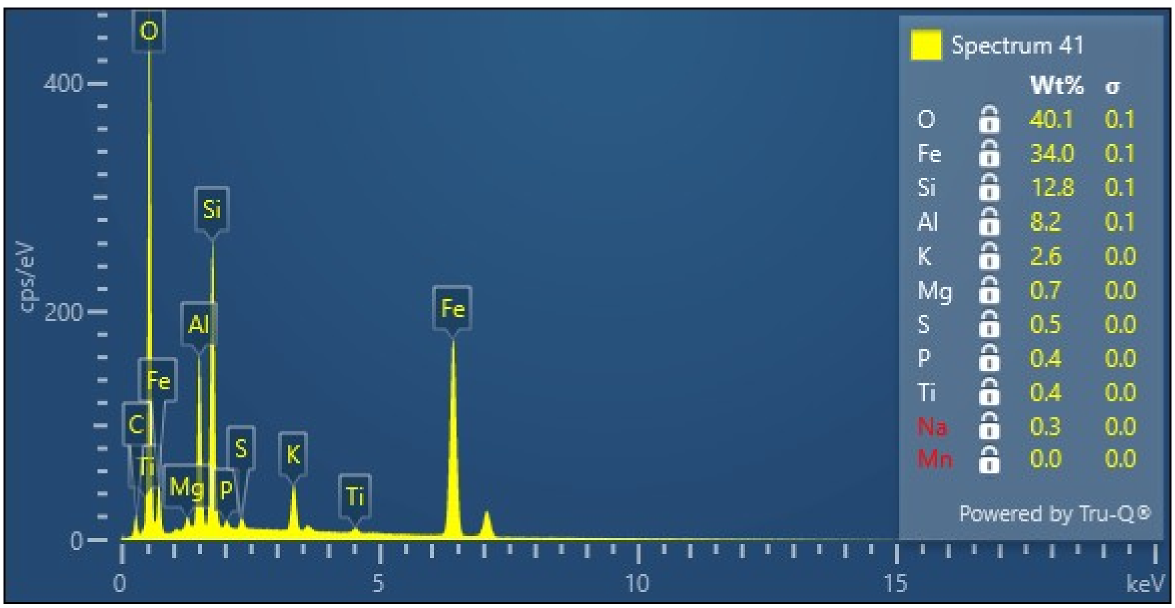

Spectrum 38
Wt% σ
O 46.3 0.1
Si 20.0 0.1
Fe 14.5 0.1
Al 12.2 0.1
K 3.9 0.0
Mg 1.1 0.0
Ti 0.6 0.0
S 0.5 0.0
Ca 0.4 0.0
Na 0.3 0.0
P 0.1 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 39
Wt% σ
Fe 45.9 0.1
O 38.2 0.1
Si 7.8 0.1
Al 5.1 0.0
K 1.2 0.0
P 0.6 0.0
S 0.6 0.0
Mg 0.3 0.0
Ti 0.2 0.0
Mn 0.0 0.0
Ca 0.0 0.0
Powered by Tru-Q®
cps/eV
keV





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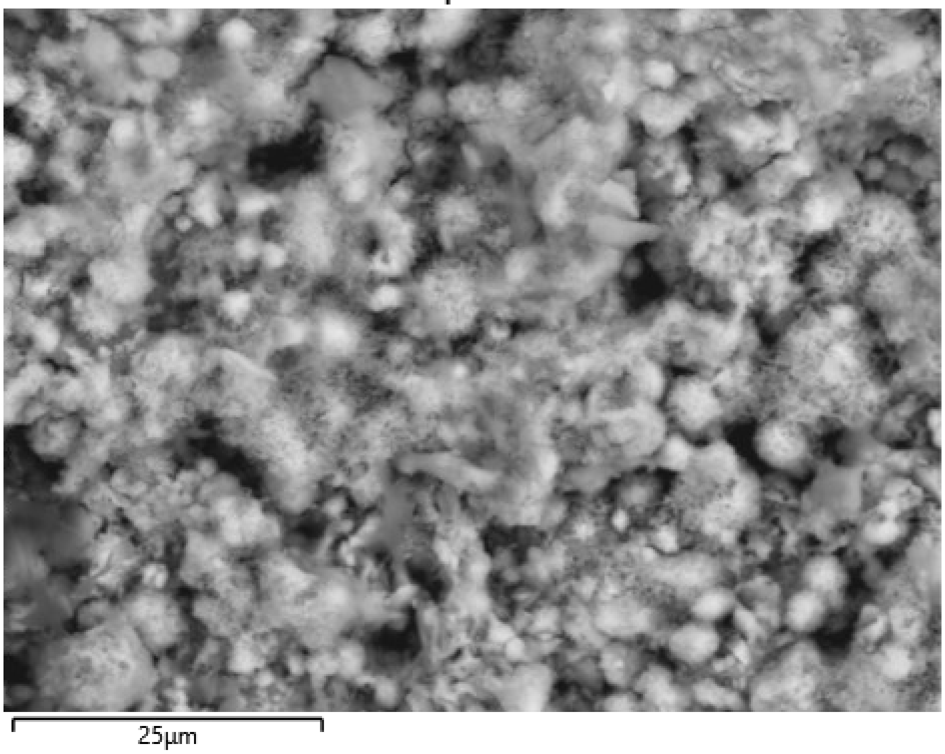
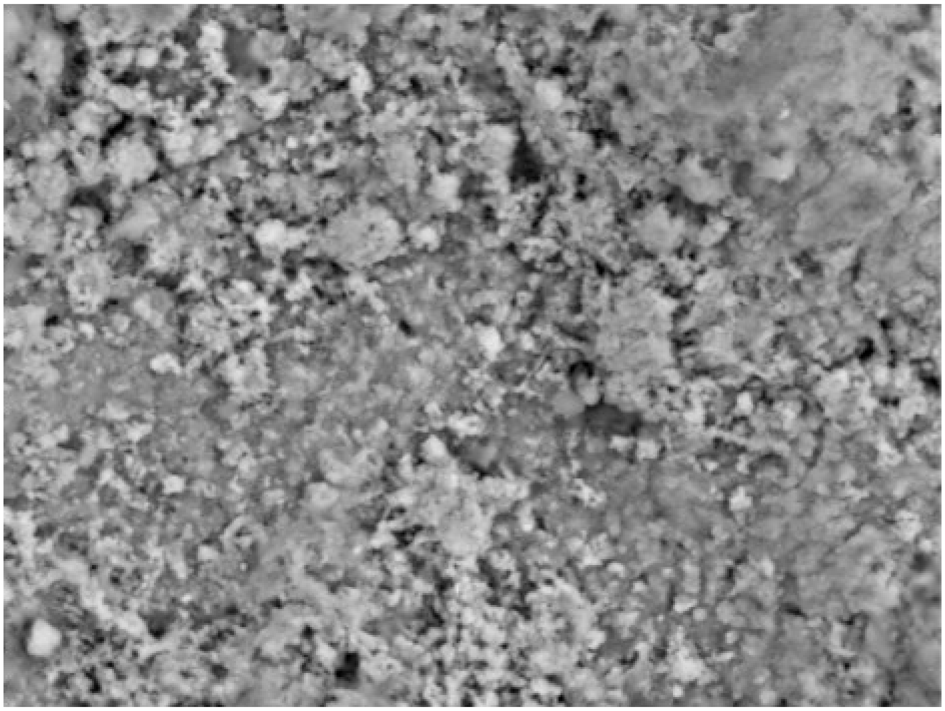
Site 1 detail images

Site1 sp37 4000x

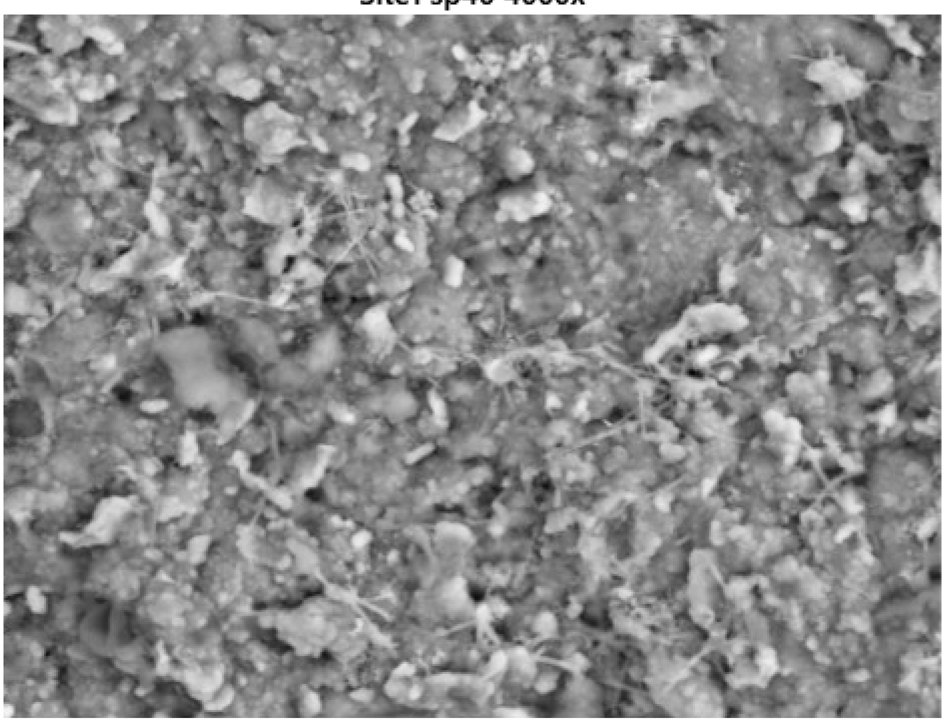


Site1 sp39 4000x



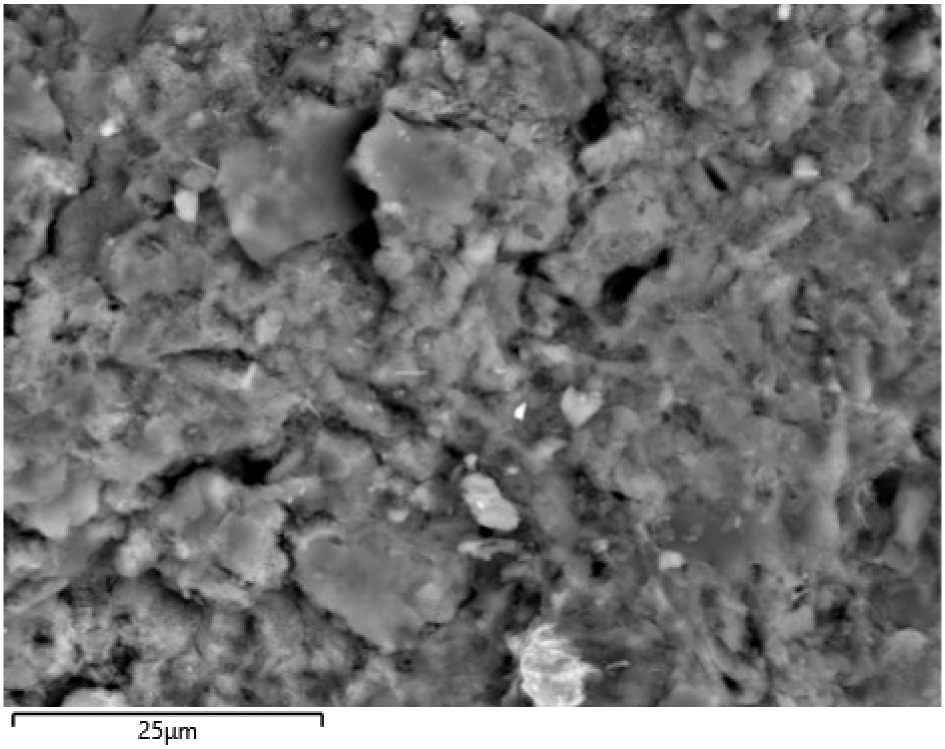
25μm

Site1 sp40 4000x

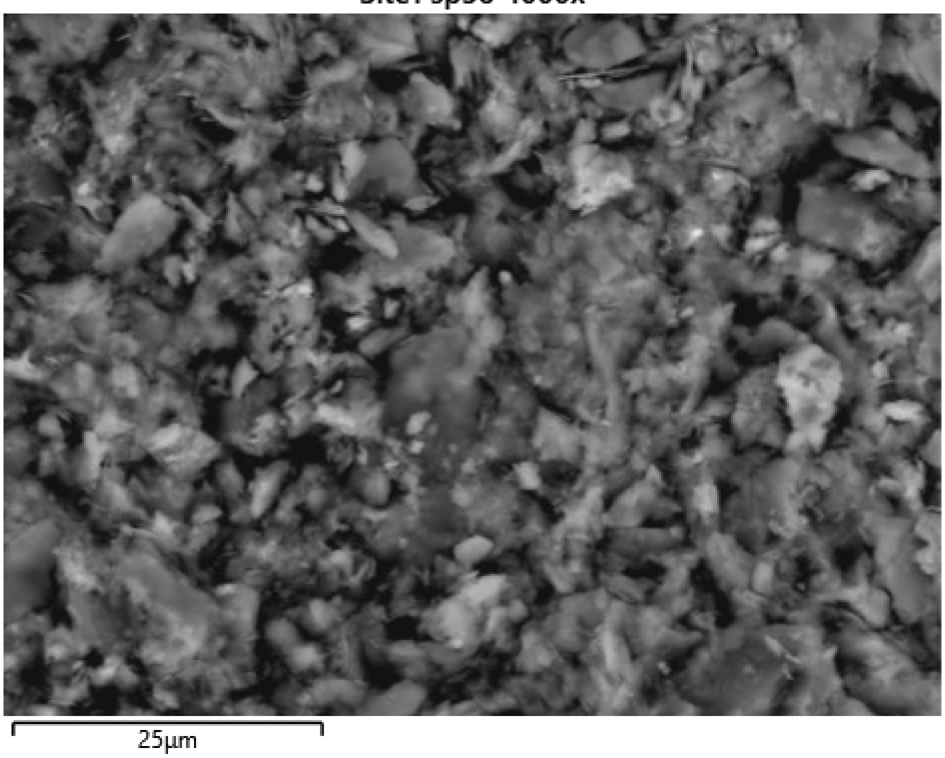


25μm

Site1 sp41 4000x

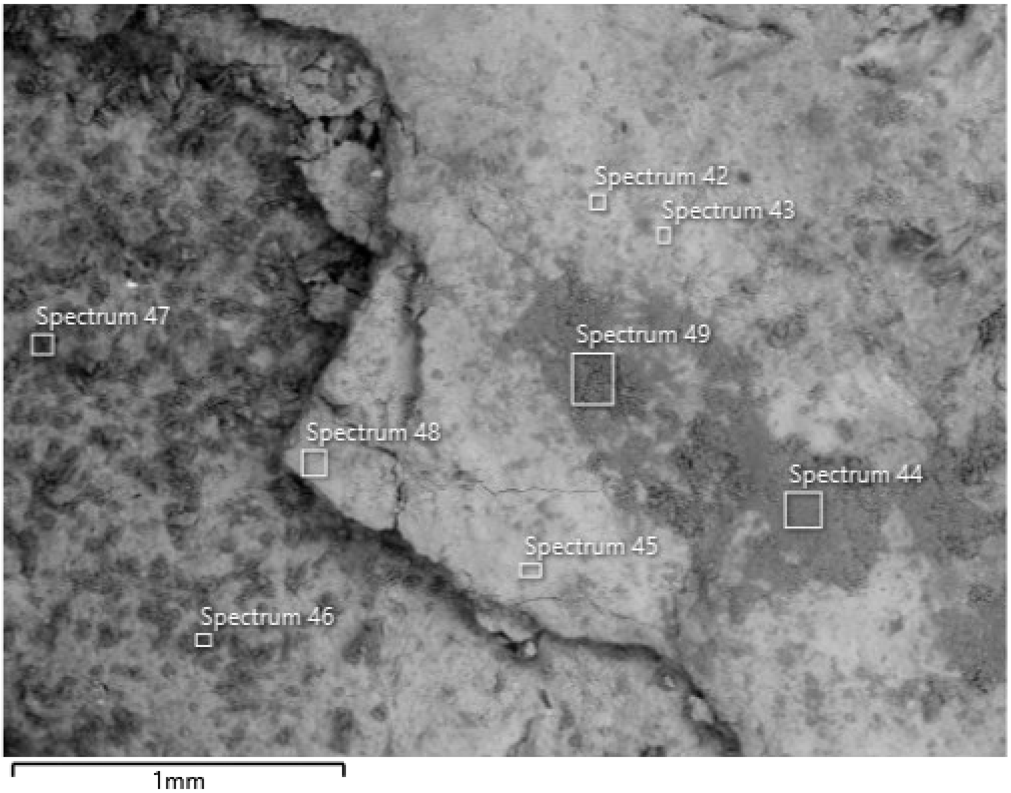


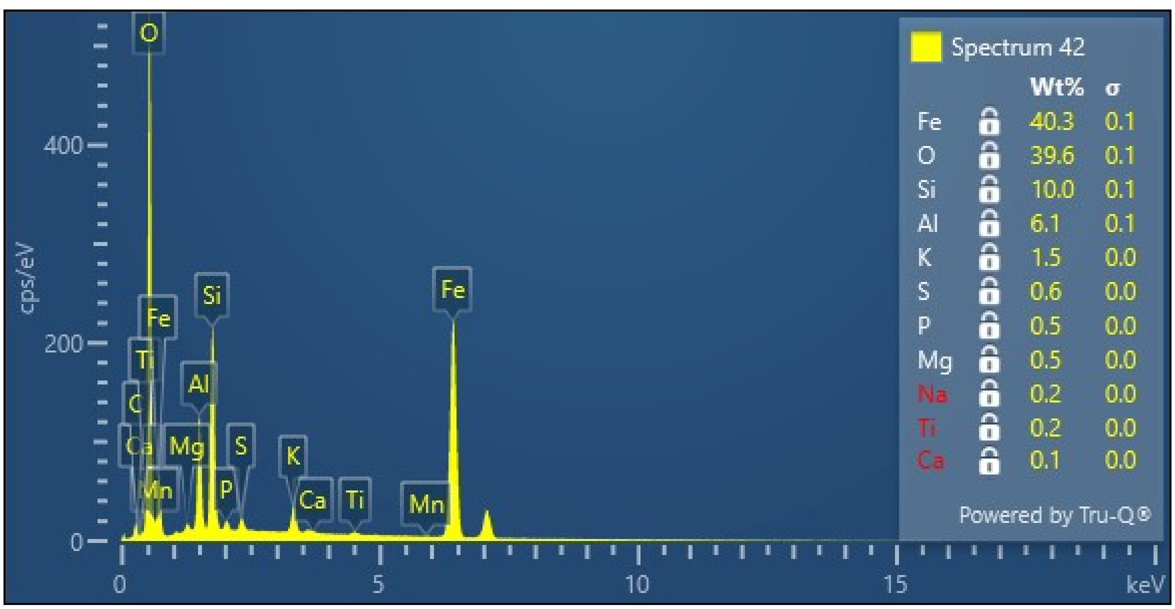
Site1 sp38 4000x



Site 2

MRMW3V-1 Site 2 100x





	Wt%	σ
Fe	40.3	0.1
O	39.6	0.1
Si	10.0	0.1
Al	6.1	0.1
K	1.5	0.0
S	0.6	0.0
P	0.5	0.0
Mg	0.5	0.0
Na	0.2	0.0
Ti	0.2	0.0
Ca	0.1	0.0

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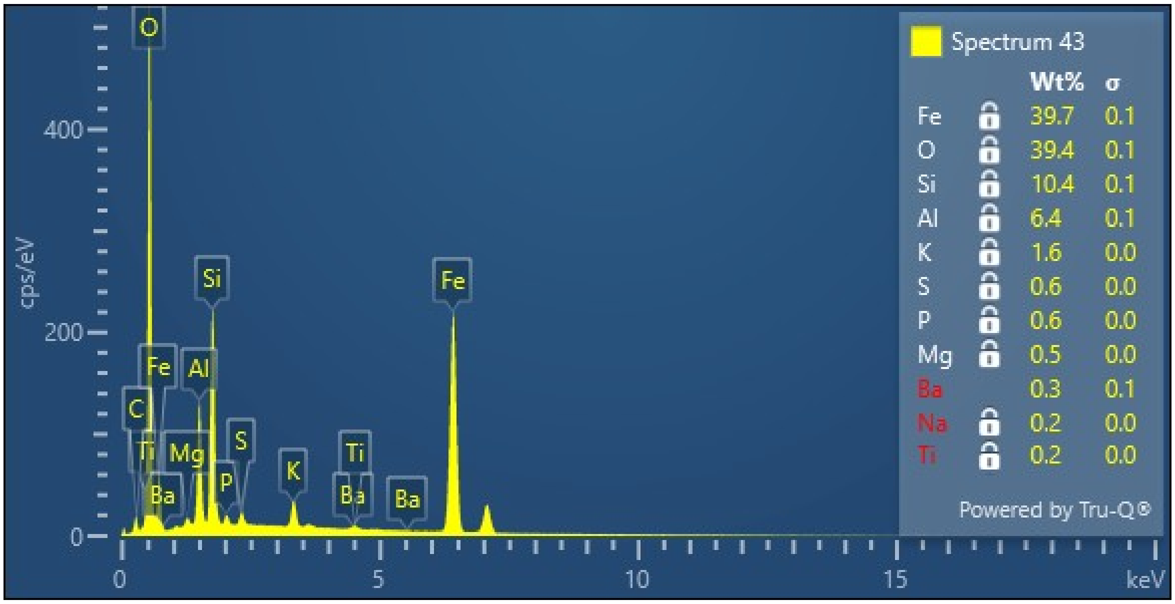
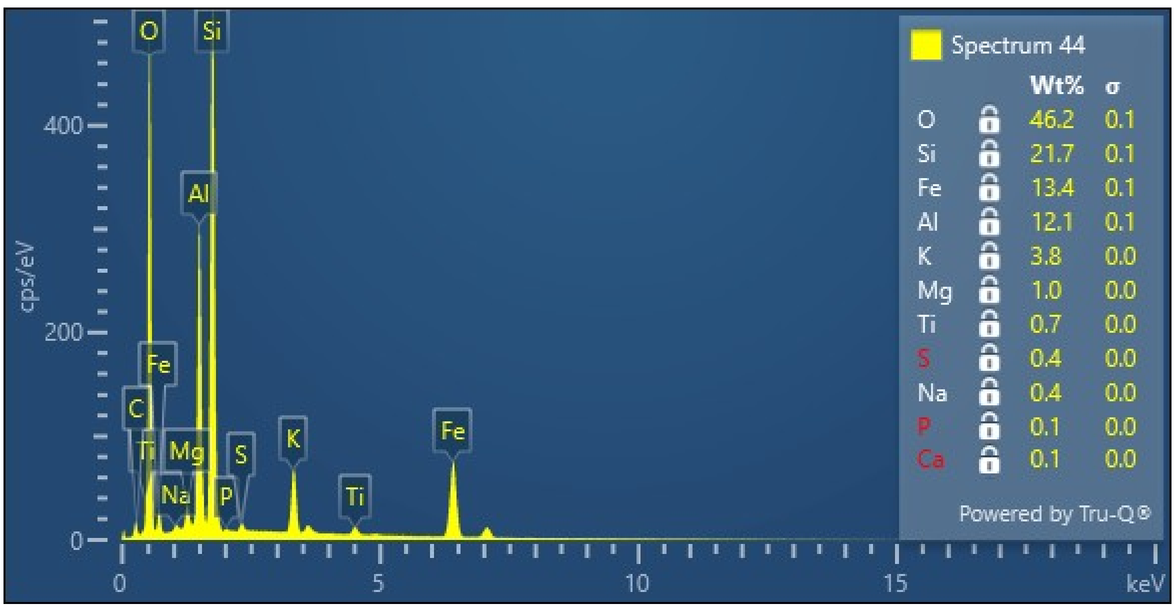
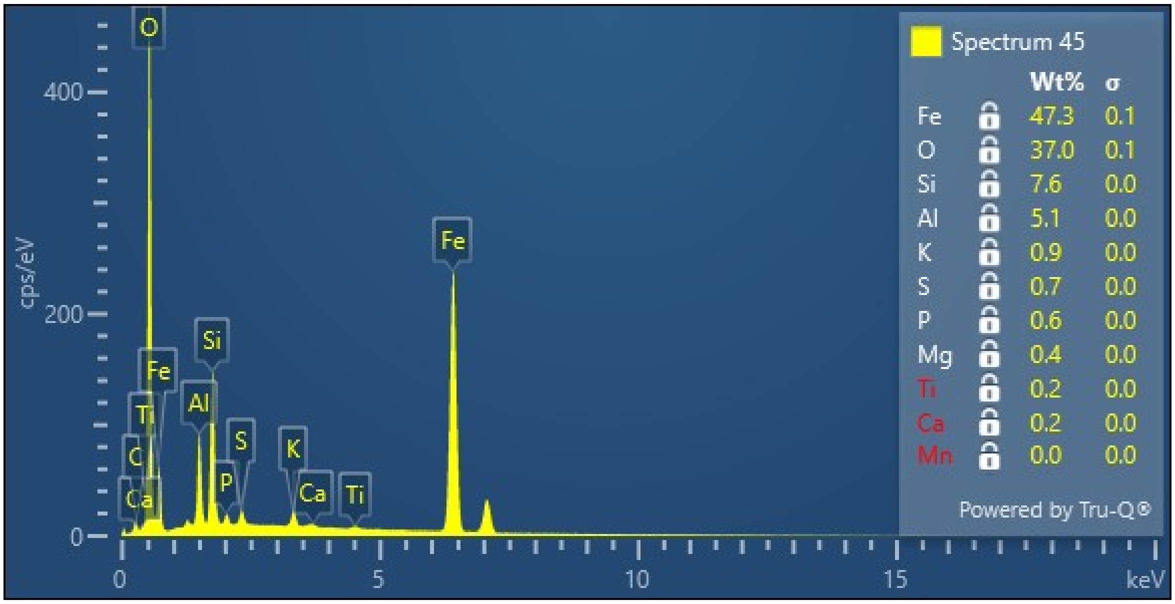
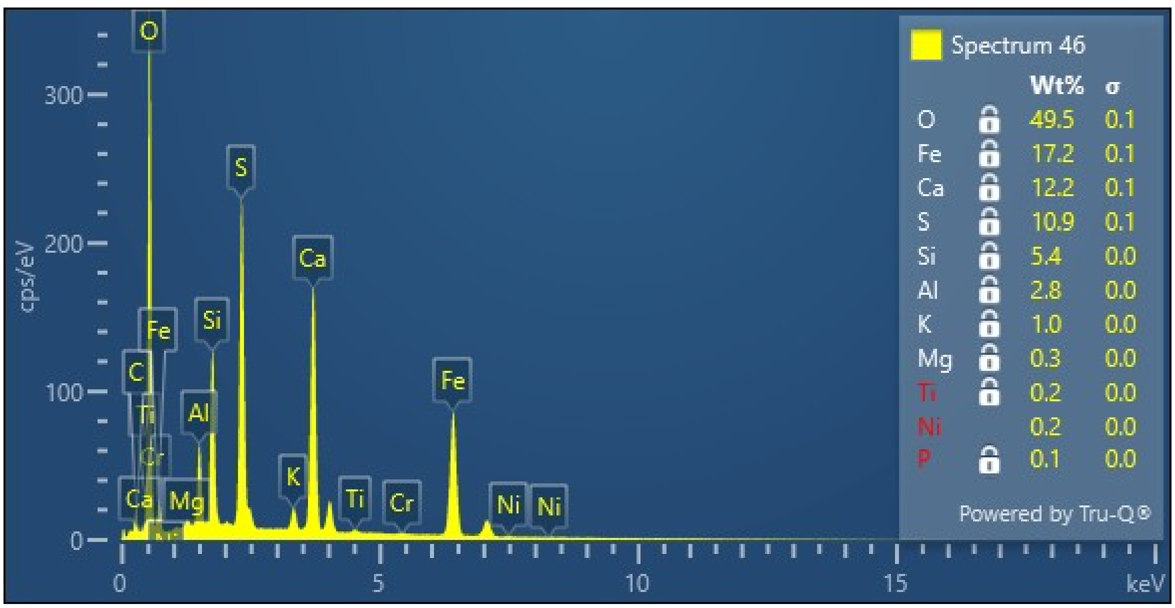

Spectrum 43
Wt% σ
Fe 39.7 0.1
O 39.4 0.1
Si 10.4 0.1
Al 6.4 0.1
K 1.6 0.0
S 0.6 0.0
P 0.6 0.0
Mg 0.5 0.0
Ba 0.3 0.1
Na 0.2 0.0
Ti 0.2 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 44
Wt% σ
O 46.2 0.1
Si 21.7 0.1
Fe 13.4 0.1
Al 12.1 0.1
K 3.8 0.0
Mg 1.0 0.0
Ti 0.7 0.0
S 0.4 0.0
Na 0.4 0.0
P 0.1 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
keV





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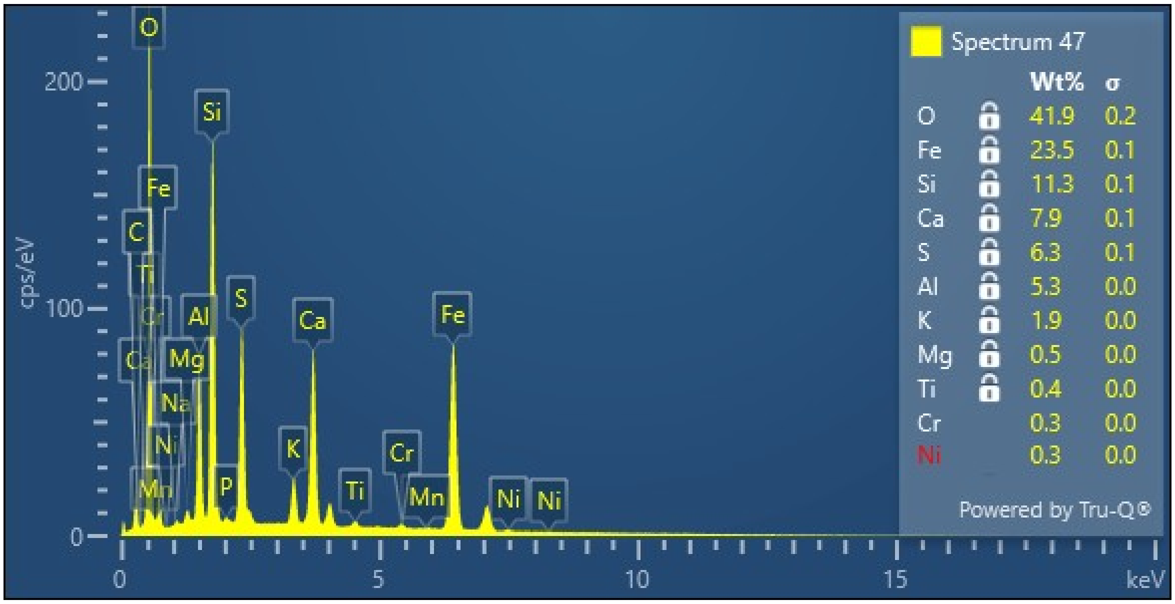
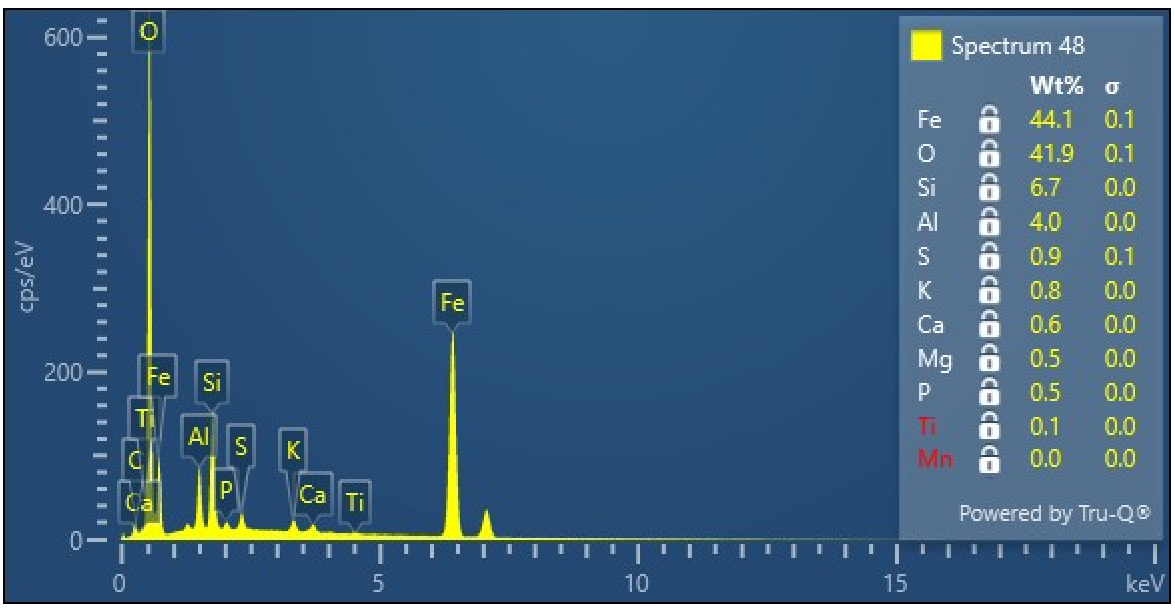


	Wt%	σ
O	41.9	0.2
Fe	23.5	0.1
Si	11.3	0.1
Ca	7.9	0.1
S	6.3	0.1
Al	5.3	0.0
K	1.9	0.0
Mg	0.5	0.0
Ti	0.4	0.0
Cr	0.3	0.0
Ni	0.3	0.0



	Wt%	σ
Fe	44.1	0.1
O	41.9	0.1
Si	6.7	0.0
Al	4.0	0.0
S	0.9	0.1
K	0.8	0.0
Ca	0.6	0.0
Mg	0.5	0.0
P	0.5	0.0
Ti	0.1	0.0
Mn	0.0	0.0

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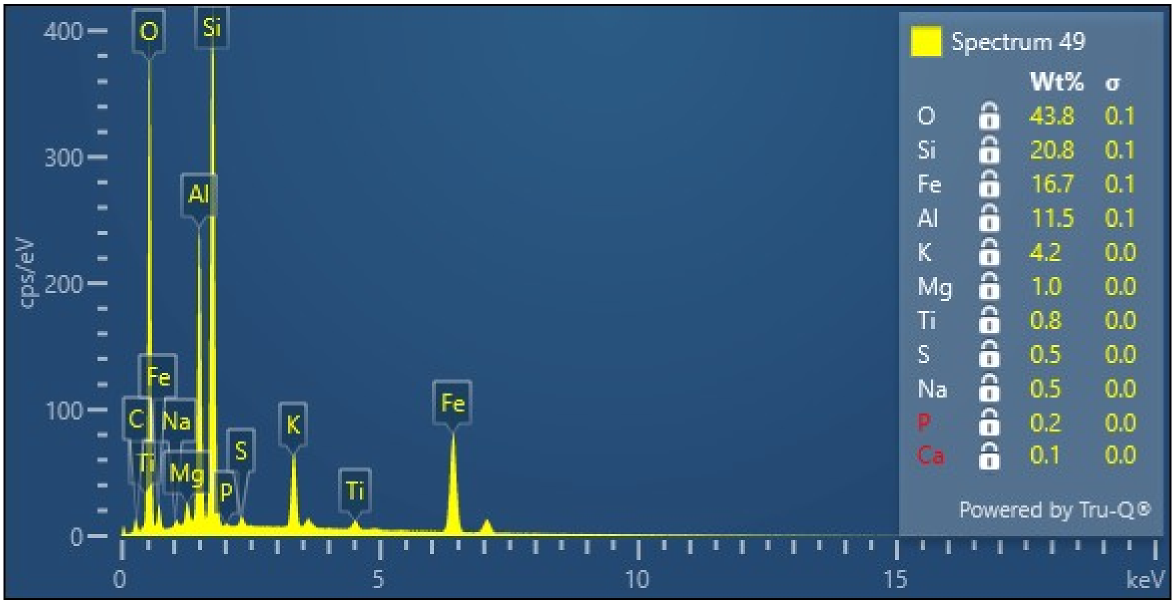
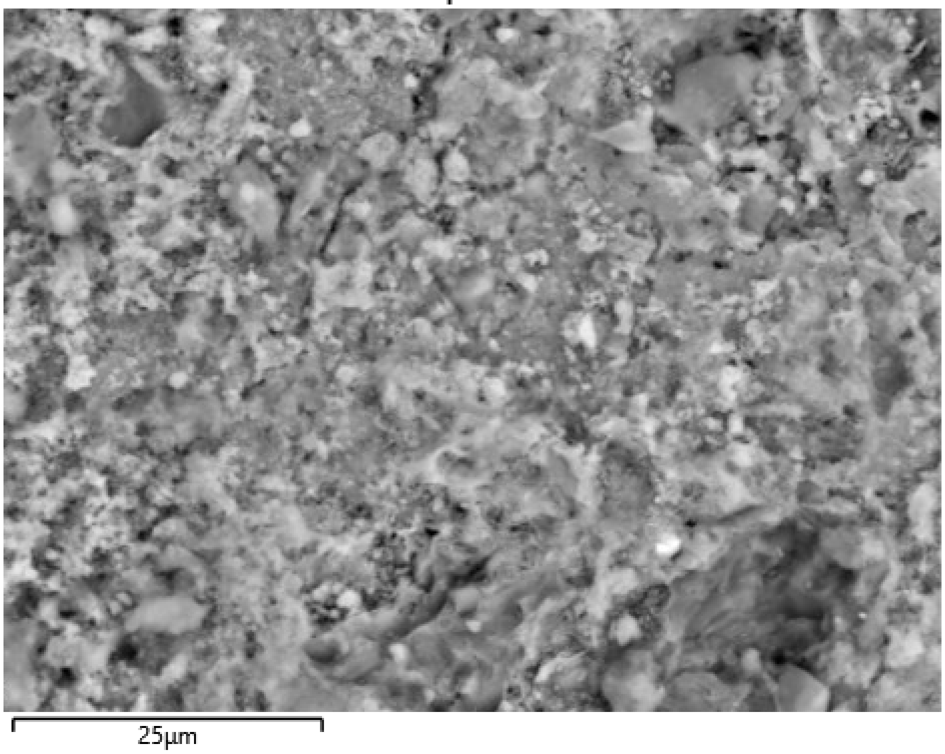


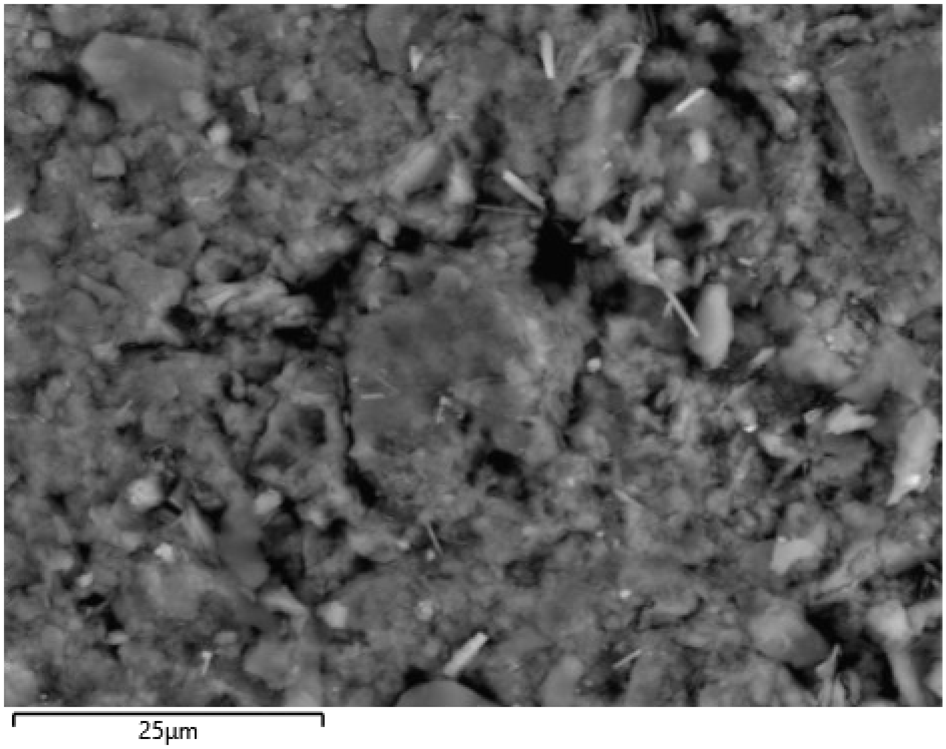
Spectrum 49
Wt% σ
O 43.8 0.1
Si 20.8 0.1
Fe 16.7 0.1
Al 11.5 0.1
K 4.2 0.0
Mg 1.0 0.0
Ti 0.8 0.0
S 0.5 0.0
Na 0.5 0.0
P 0.2 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
400
300
200
100
0
5
10
15
keV
O
Si
Al
Fe
C
Na
Ti
Mg
S
P
K
Ti
Fe

Site 2 detail images

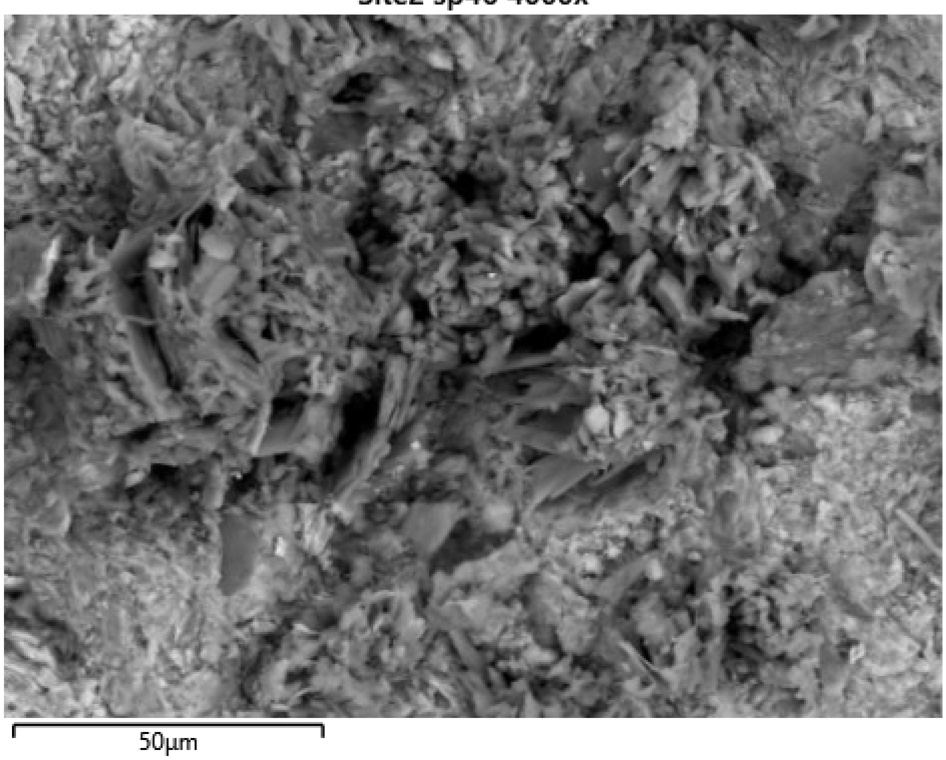
Site2 sp42 4000x



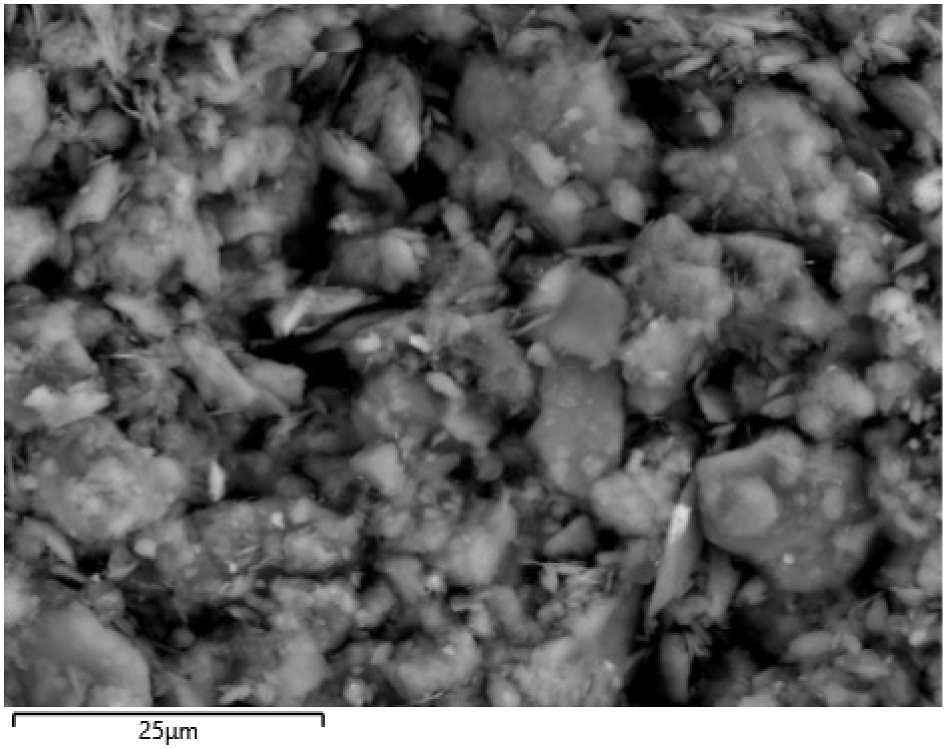
Site2 sp44 4000x



Site2 sp46 4000x

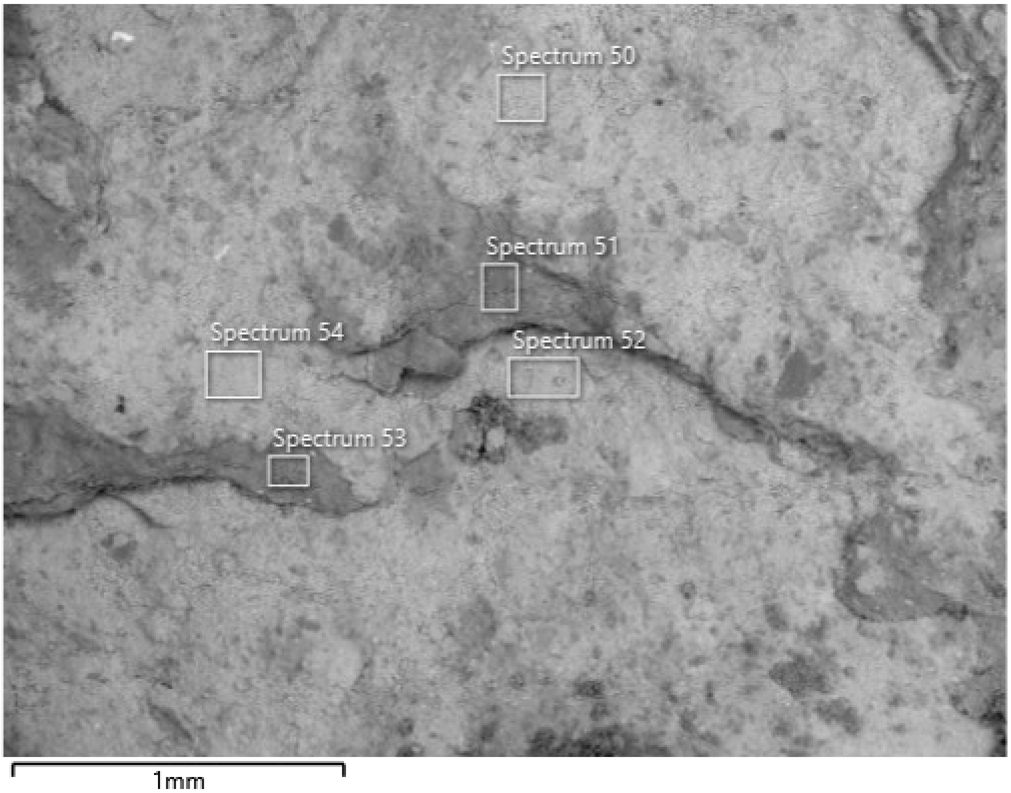


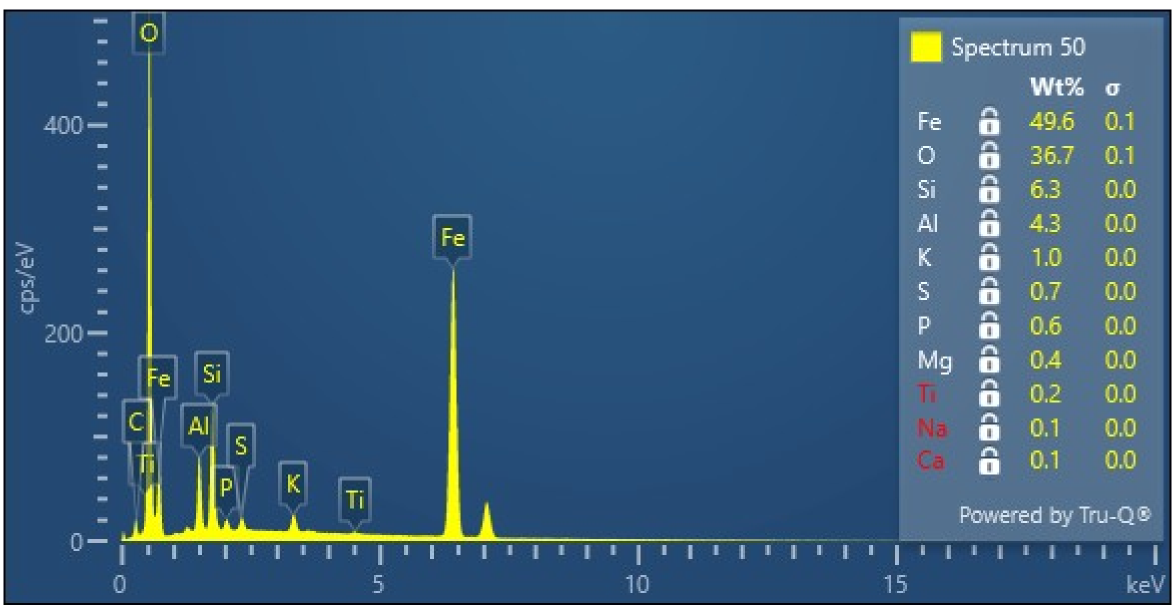
Site2 sp49 4000x

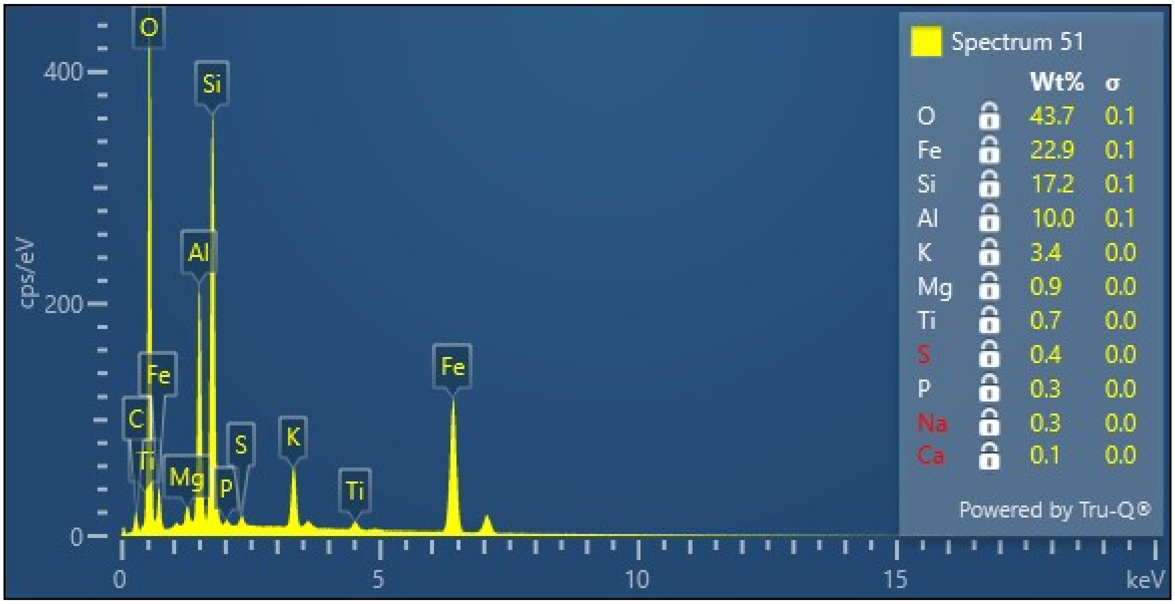


Site 3

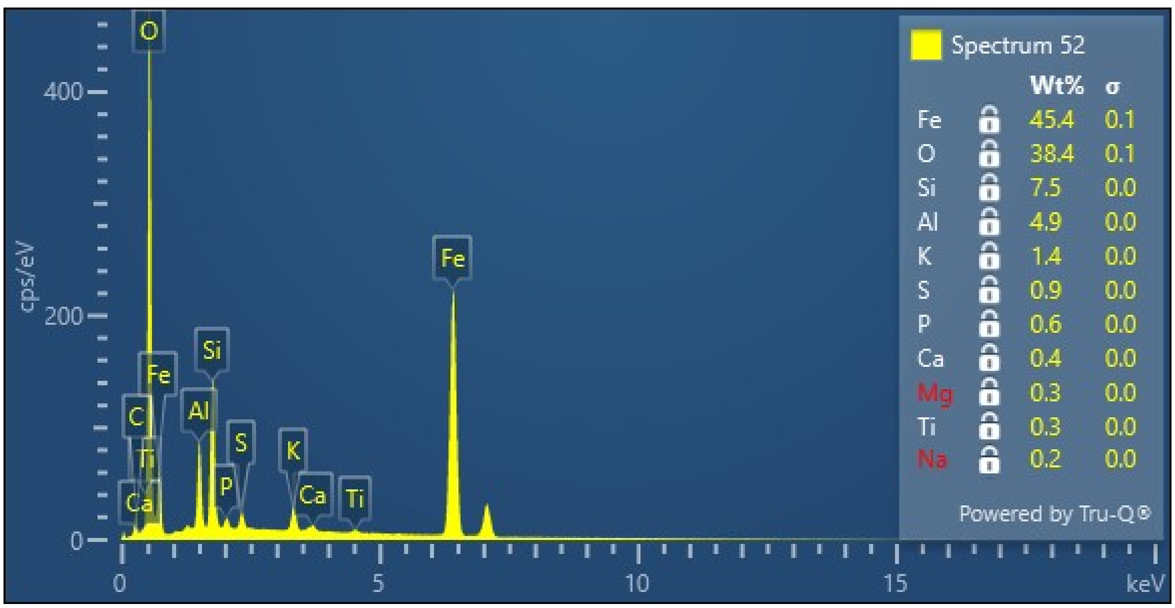
MRMW3V-1 Site 3 100x



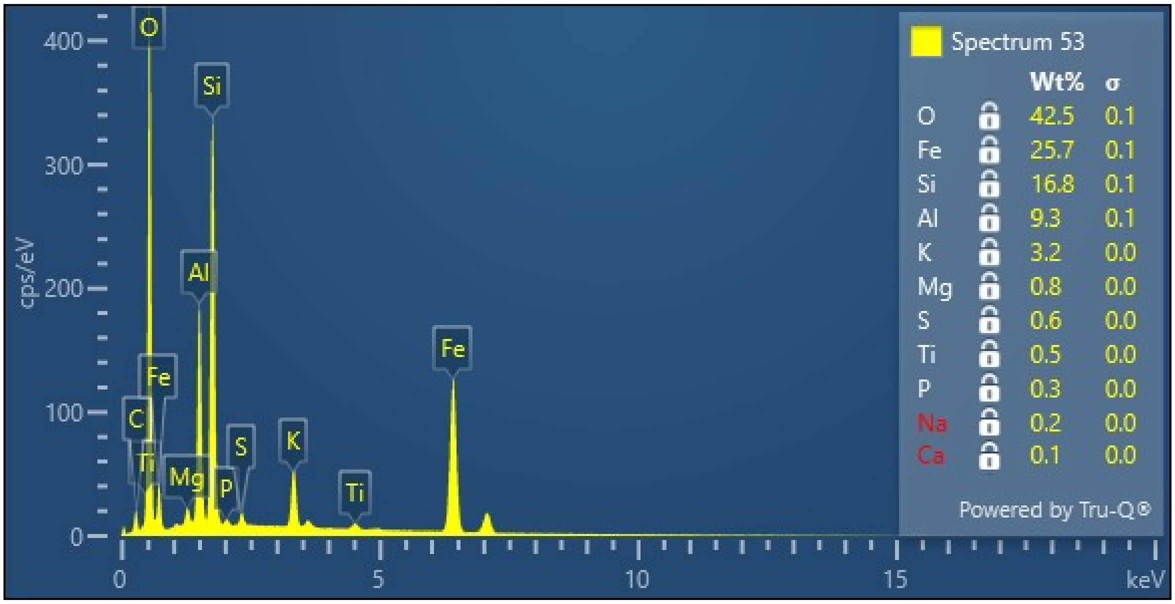


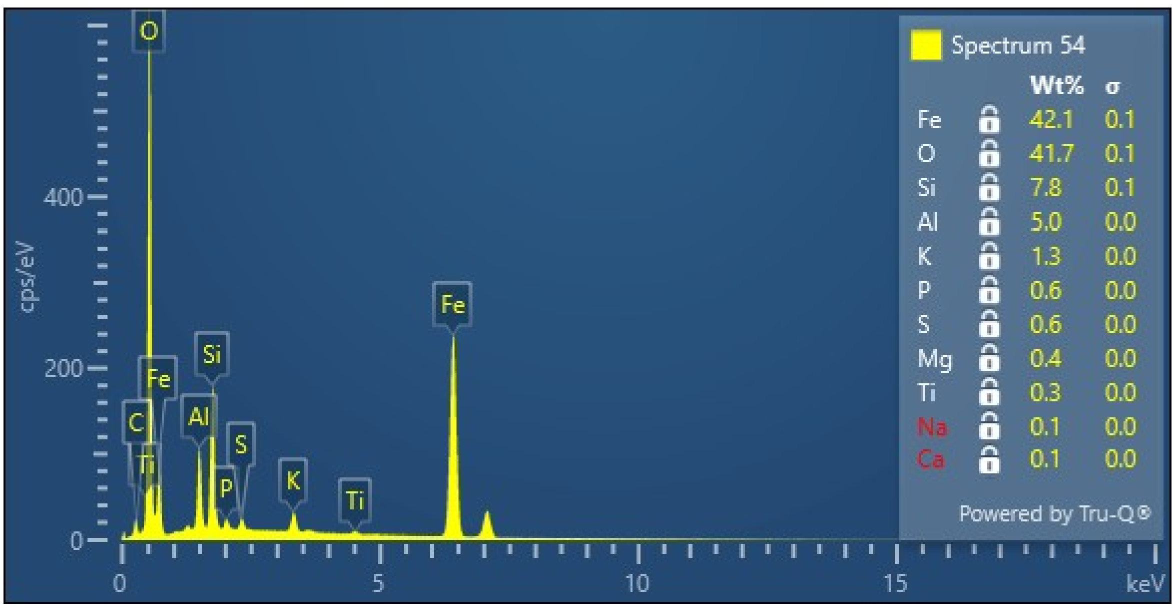


Spectrum 51
Wt% σ
O 43.7 0.1
Fe 22.9 0.1
Si 17.2 0.1
Al 10.0 0.1
K 3.4 0.0
Mg 0.9 0.0
Ti 0.7 0.0
S 0.4 0.0
P 0.3 0.0
Na 0.3 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
400
200
0
O
Si
Al
Fe
C
Ti
Mg
P
S
K
Ti
Fe
0
5
10
15
keV

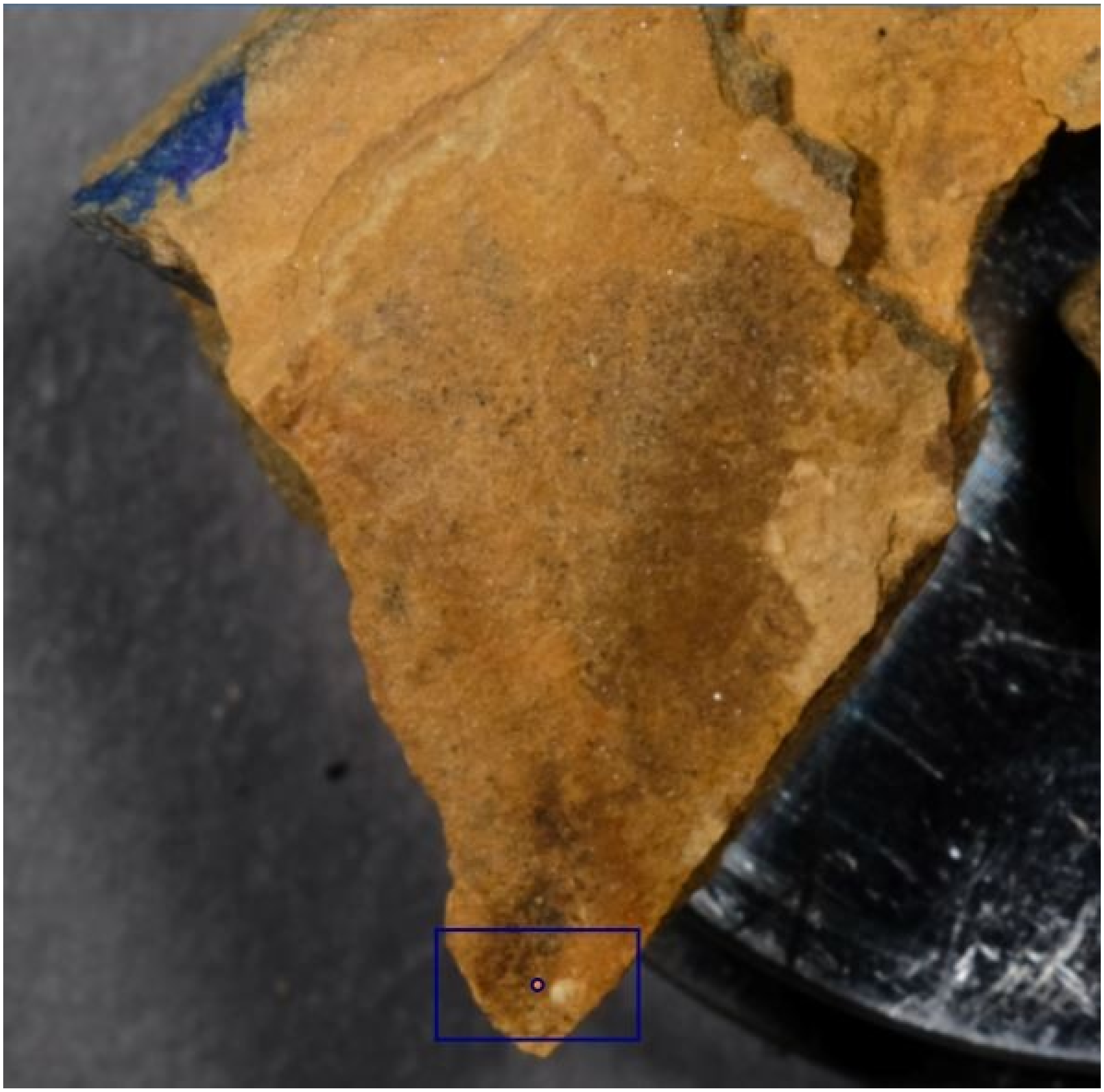


Spectrum 52
Wt% σ
Fe 45.4 0.1
O 38.4 0.1
Si 7.5 0.0
Al 4.9 0.0
K 1.4 0.0
S 0.9 0.0
P 0.6 0.0
Ca 0.4 0.0
Mg 0.3 0.0
Ti 0.3 0.0
Na 0.2 0.0
Powered by Tru-Q®
cps/eV
400
200
0
O
Fe
Si
Fe
C
Al
S
K
Ti
P
Ca
Ca
Ti
0
5
10
15
keV

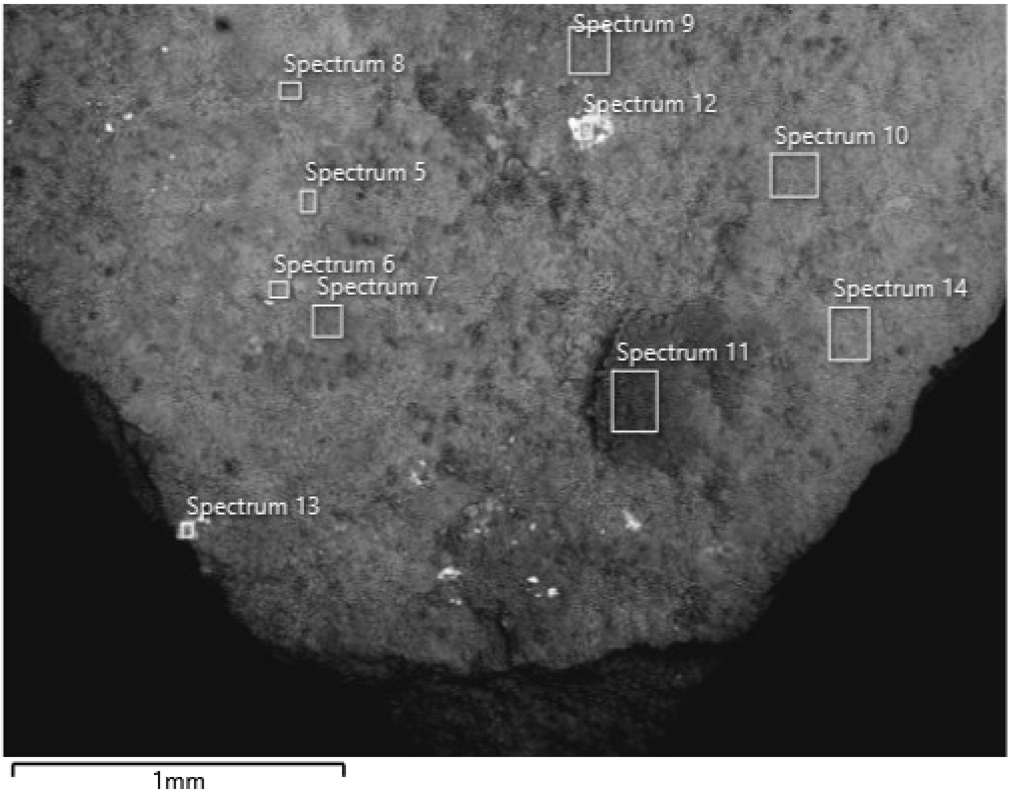

Spectrum 53
Wt% σ
O 42.5 0.1
Fe 25.7 0.1
Si 16.8 0.1
Al 9.3 0.1
K 3.2 0.0
Mg 0.8 0.0
S 0.6 0.0
Ti 0.5 0.0
P 0.3 0.0
Na 0.2 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
keV
O
Si
Al
Fe
C
Ti
Mg
P
S
K

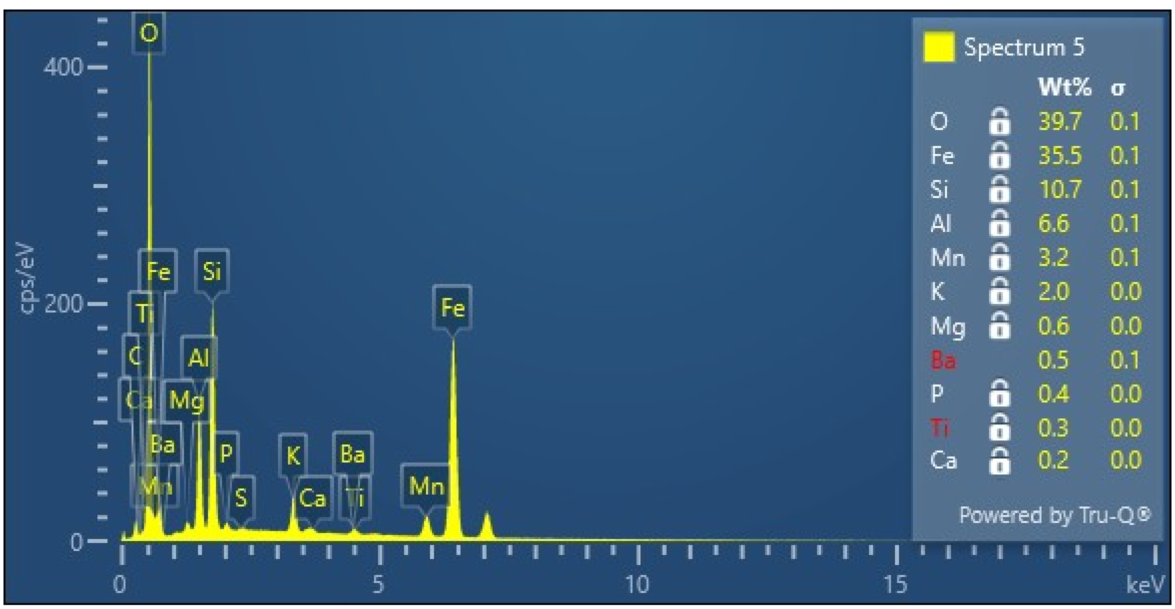

Spectrum 54
Wt% σ
Fe 42.1 0.1
O 41.7 0.1
Si 7.8 0.1
Al 5.0 0.0
K 1.3 0.0
P 0.6 0.0
S 0.6 0.0
Mg 0.4 0.0
Ti 0.3 0.0
Na 0.1 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
keV
O
Si
Al
Fe
C
Ti
P
S
K

Site 1



MRMW3V-2 Site 1 overview 100x





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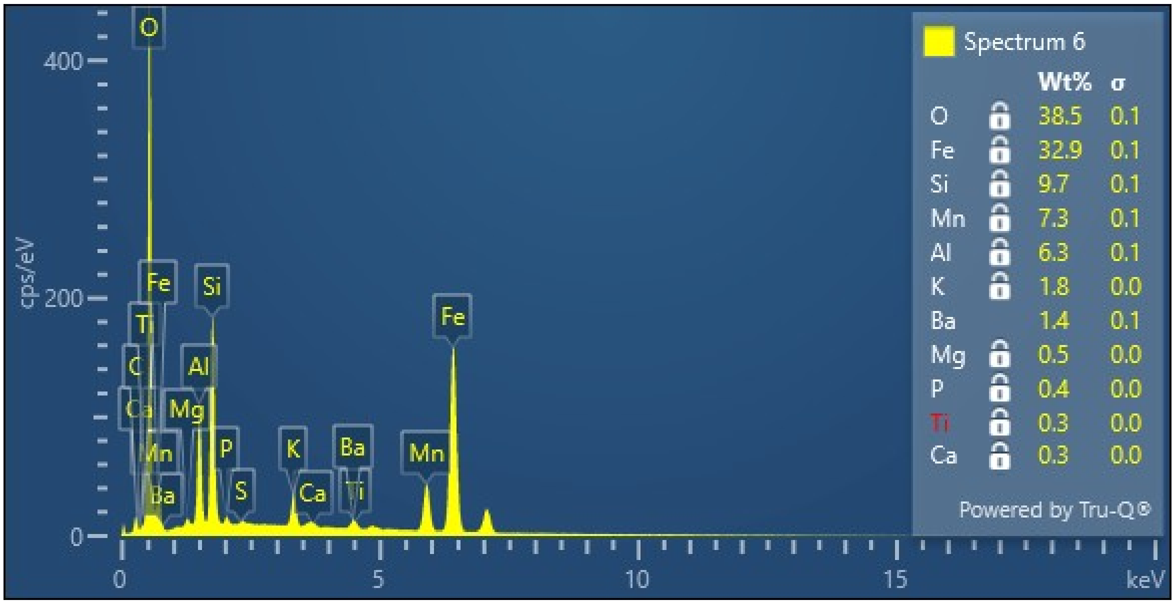
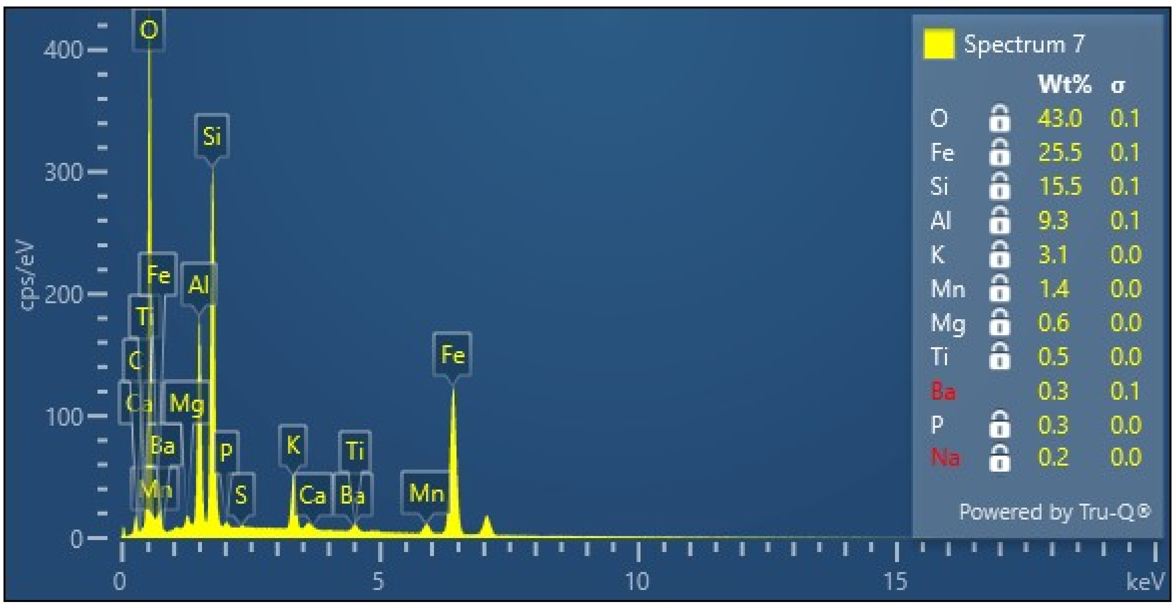
MRMW3V-2 SEM analysis 10/26/2021





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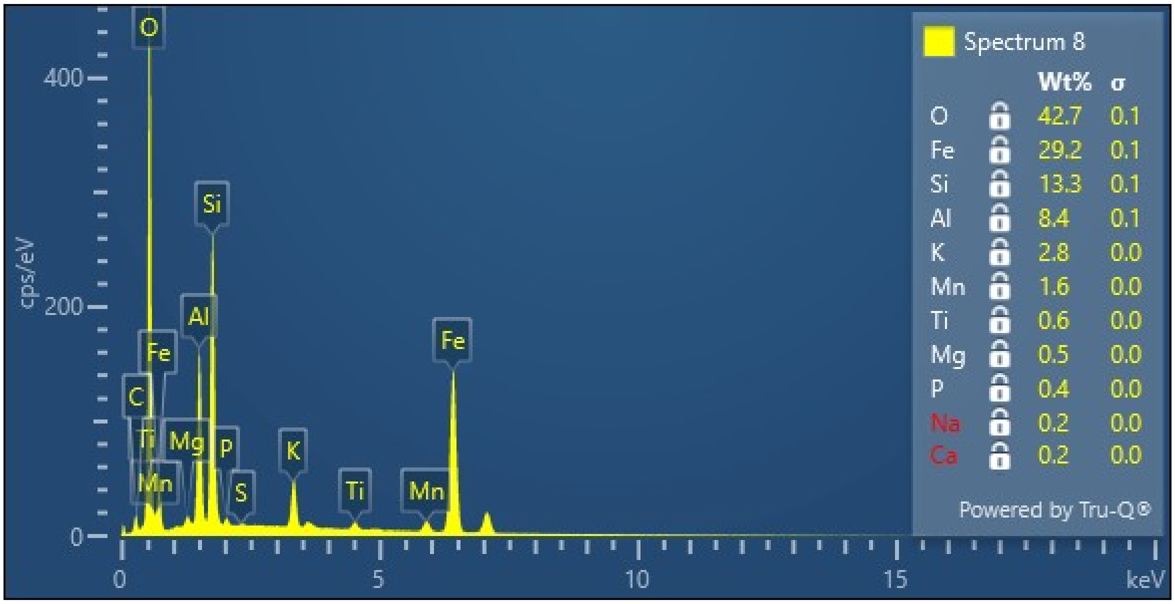
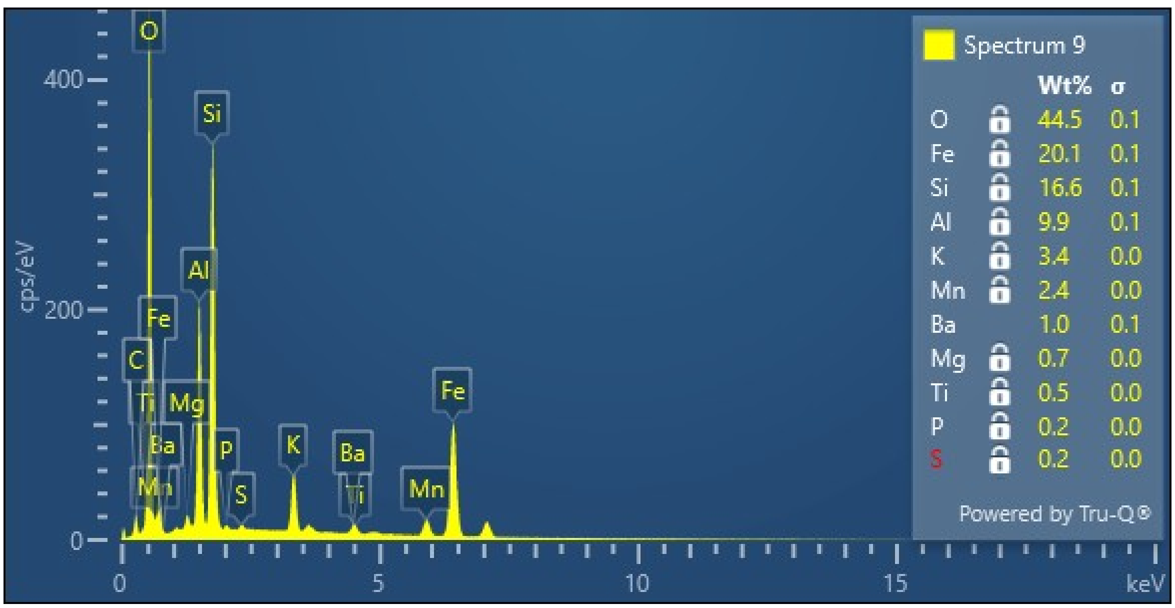
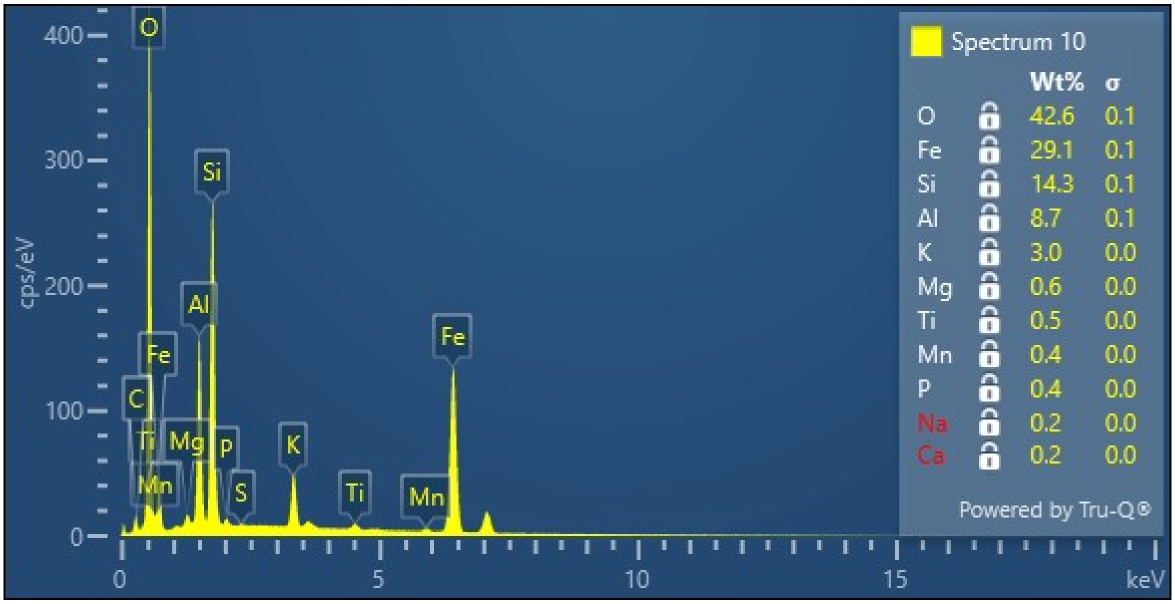
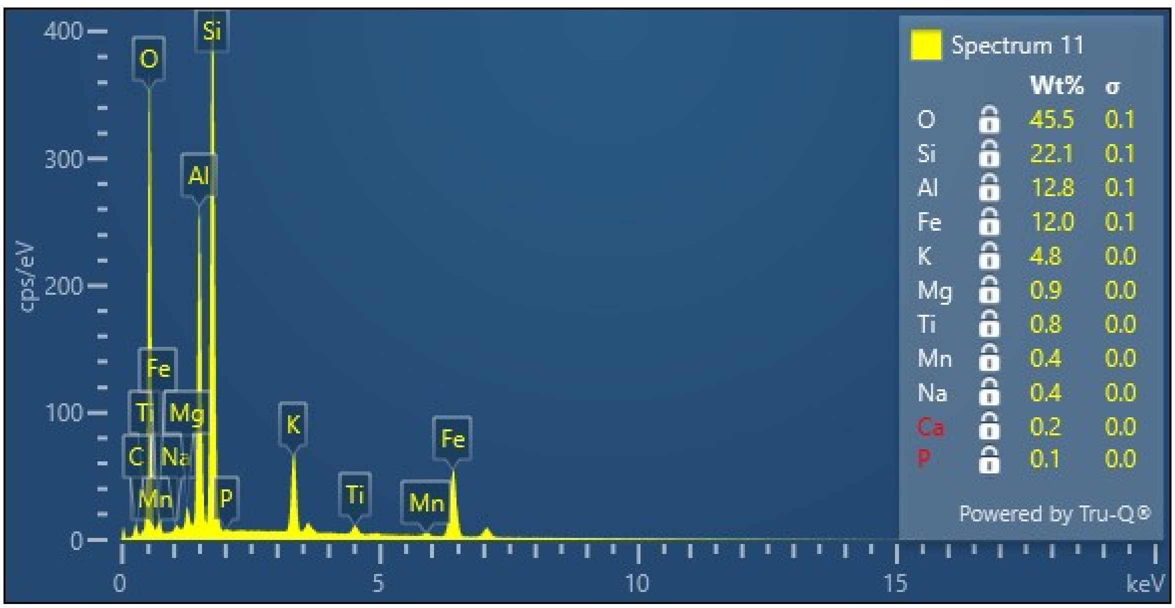

Spectrum 8
Wt% σ
O 42.7 0.1
Fe 29.2 0.1
Si 13.3 0.1
Al 8.4 0.1
K 2.8 0.0
Mn 1.6 0.0
Ti 0.6 0.0
Mg 0.5 0.0
P 0.4 0.0
Na 0.2 0.0
Ca 0.2 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 9
Wt% σ
O 44.5 0.1
Fe 20.1 0.1
Si 16.6 0.1
Al 9.9 0.1
K 3.4 0.0
Mn 2.4 0.0
Ba 1.0 0.1
Mg 0.7 0.0
Ti 0.5 0.0
P 0.2 0.0
S 0.2 0.0
Powered by Tru-Q®
cps/eV
keV





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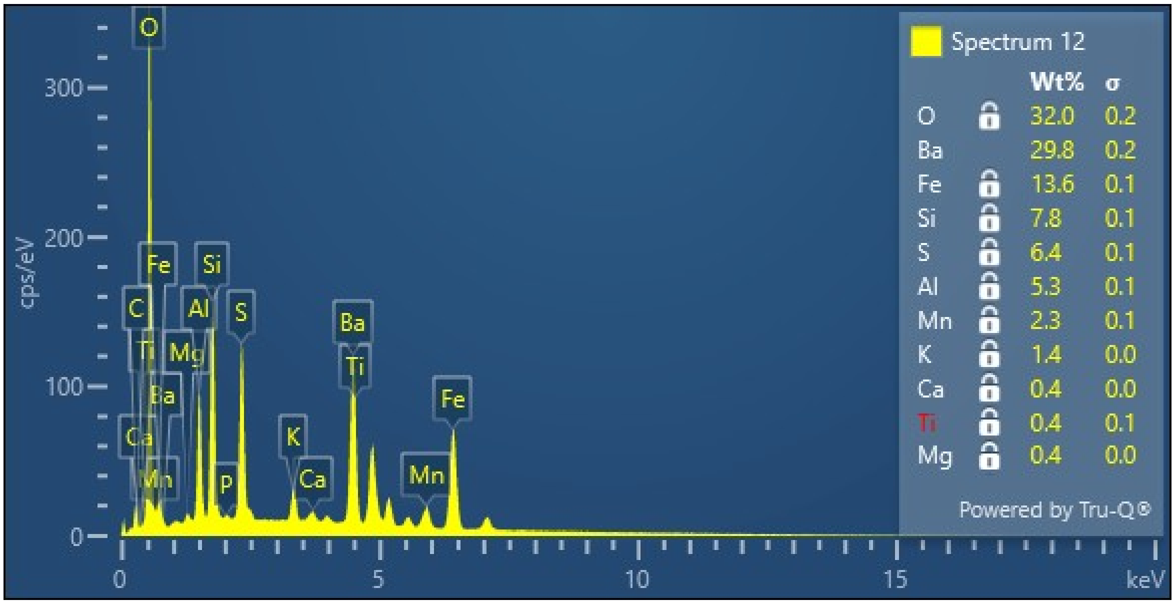
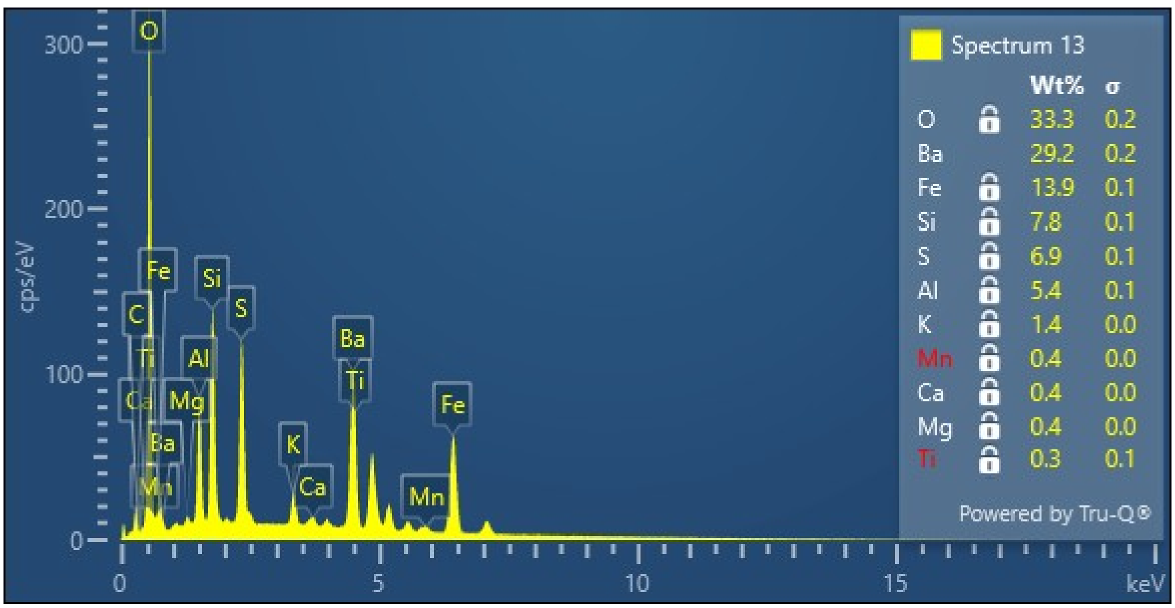
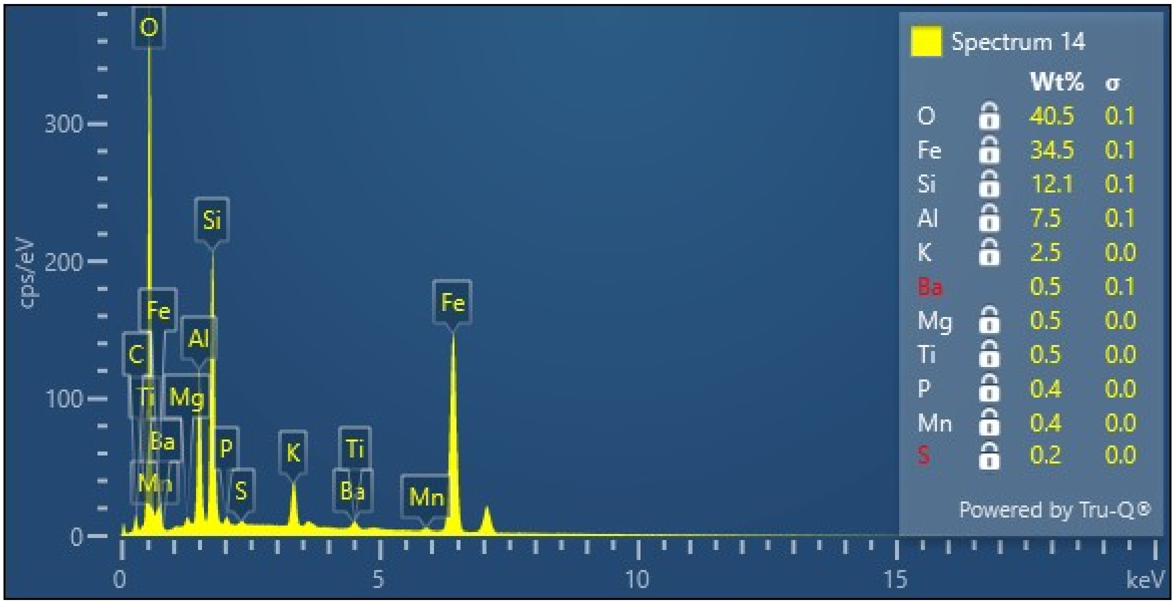

Spectrum 12
Wt% σ
O 32.0 0.2
Ba 29.8 0.2
Fe 13.6 0.1
Si 7.8 0.1
S 6.4 0.1
Al 5.3 0.1
Mn 2.3 0.1
K 1.4 0.0
Ca 0.4 0.0
Ti 0.4 0.1
Mg 0.4 0.0
Powered by Tru-Q®
cps/eV
keV

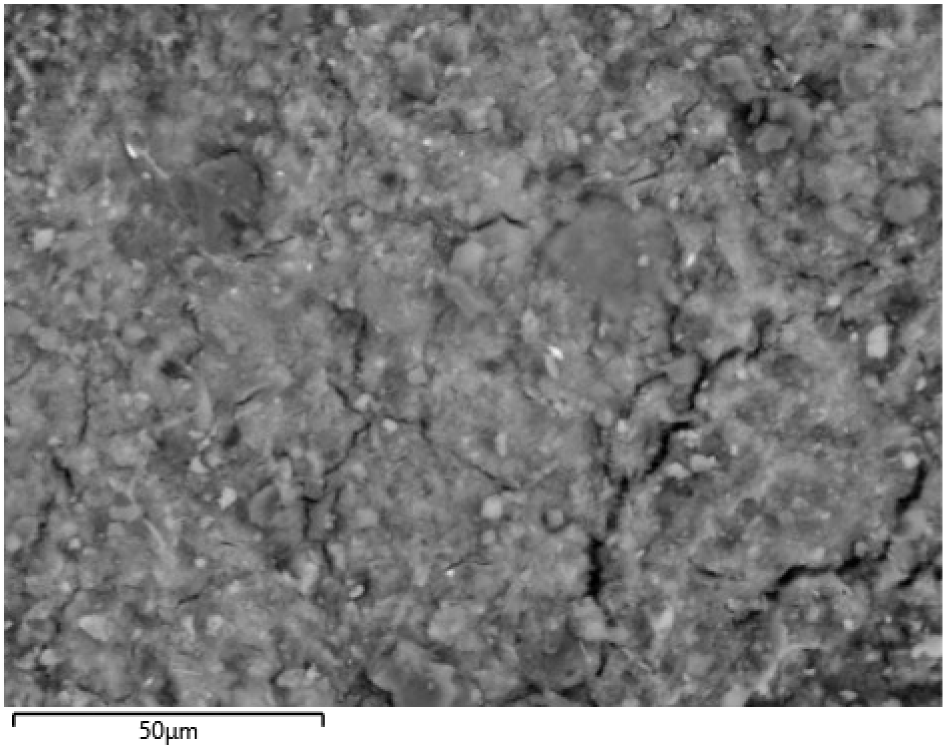

Spectrum 13
Wt% σ
O 33.3 0.2
Ba 29.2 0.2
Fe 13.9 0.1
Si 7.8 0.1
S 6.9 0.1
Al 5.4 0.1
K 1.4 0.0
Mn 0.4 0.0
Ca 0.4 0.0
Mg 0.4 0.0
Ti 0.3 0.1
Powered by Tru-Q®
cps/eV
keV



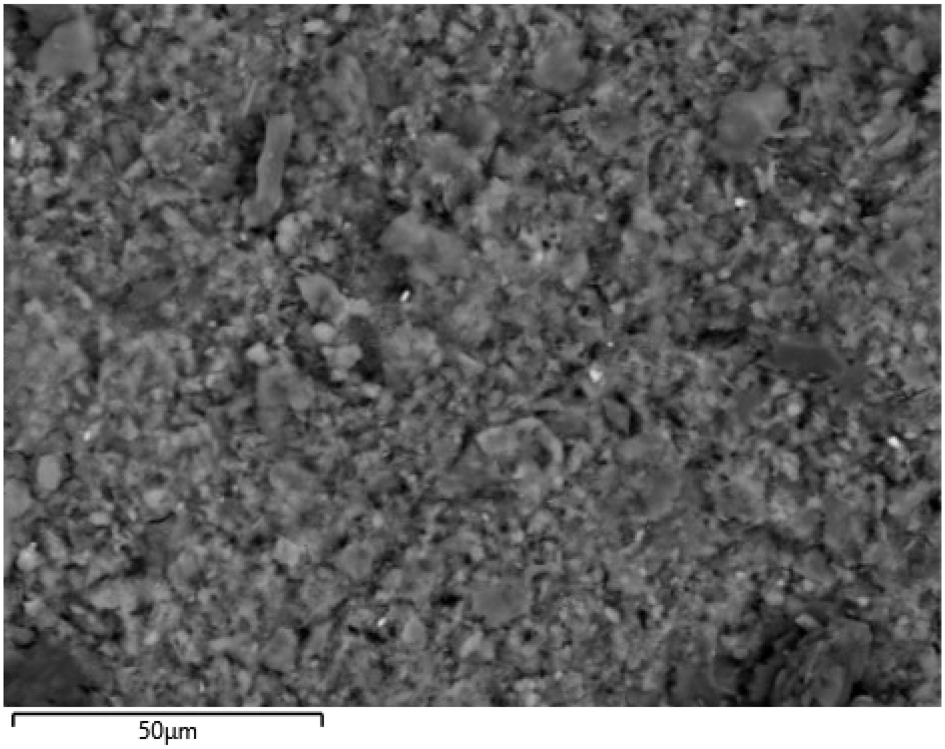
Spectrum 14
Wt% σ
O 40.5 0.1
Fe 34.5 0.1
Si 12.1 0.1
Al 7.5 0.1
K 2.5 0.0
Ba 0.5 0.1
Mg 0.5 0.0
Ti 0.5 0.0
P 0.4 0.0
Mn 0.4 0.0
S 0.2 0.0
Powered by Tru-Q®
cps/eV
keV
O
Si
Fe
Al
C
Ti
Mg
Ba
Mn
P
S
K

Site 1 detail images

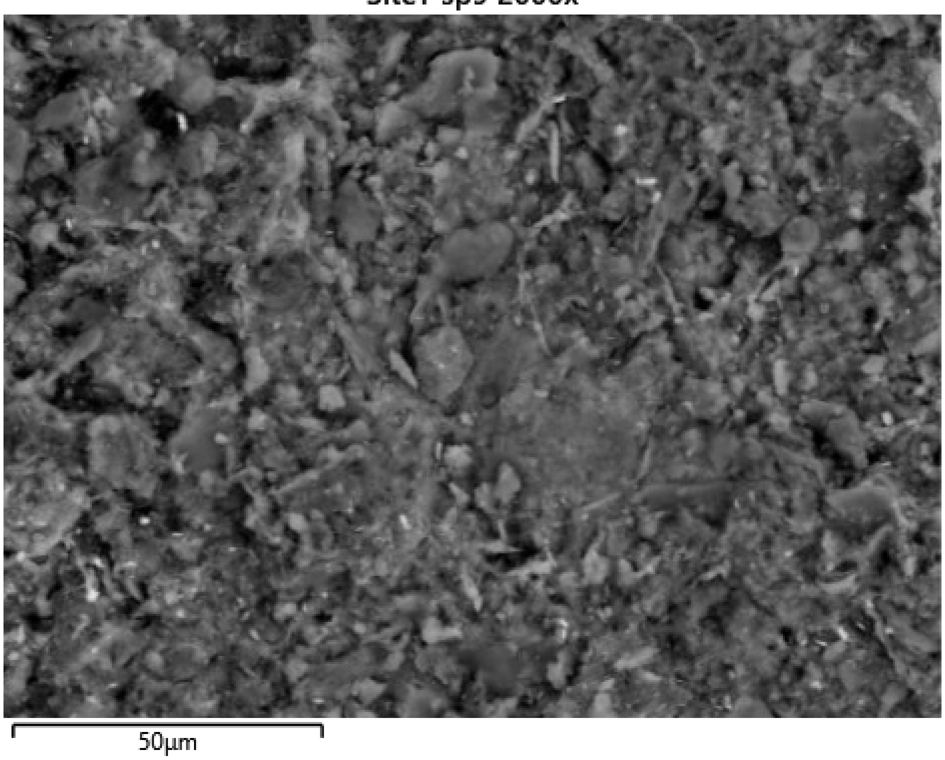
Site1-sp5 2000x



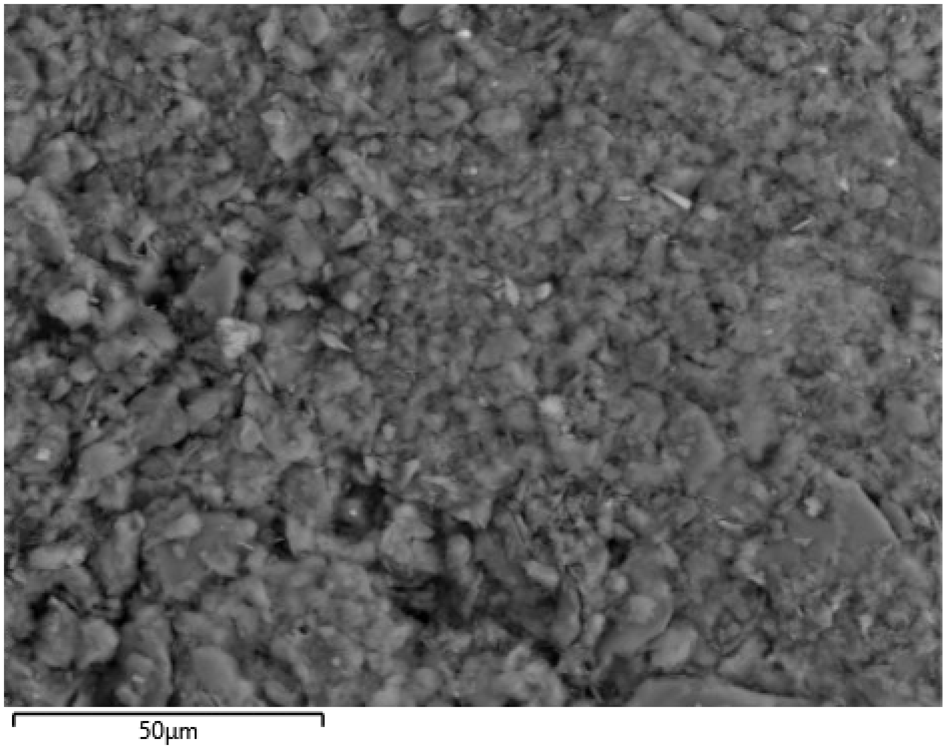
Site1-sp7 2000x



Site1-sp9 2000x

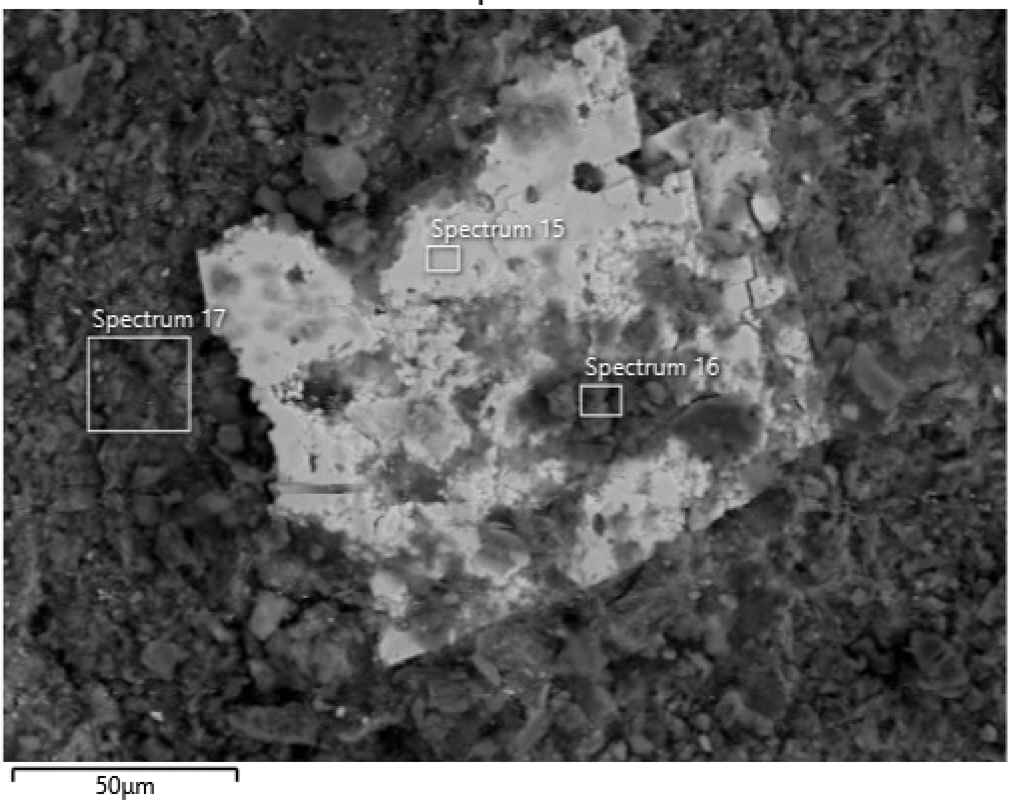


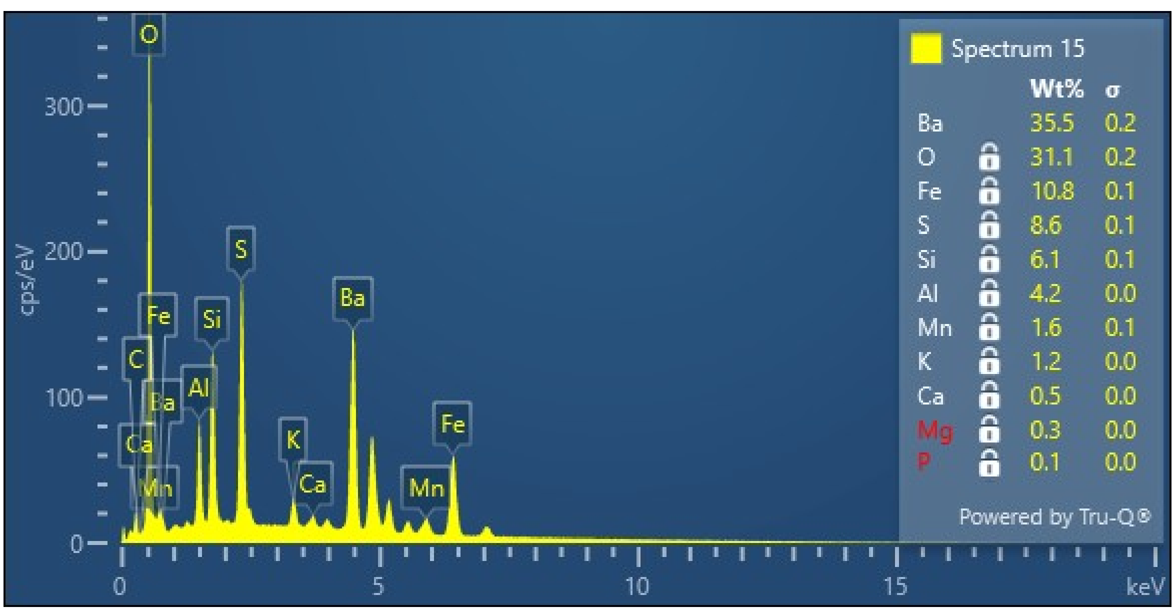
Site1-sp11 2000x



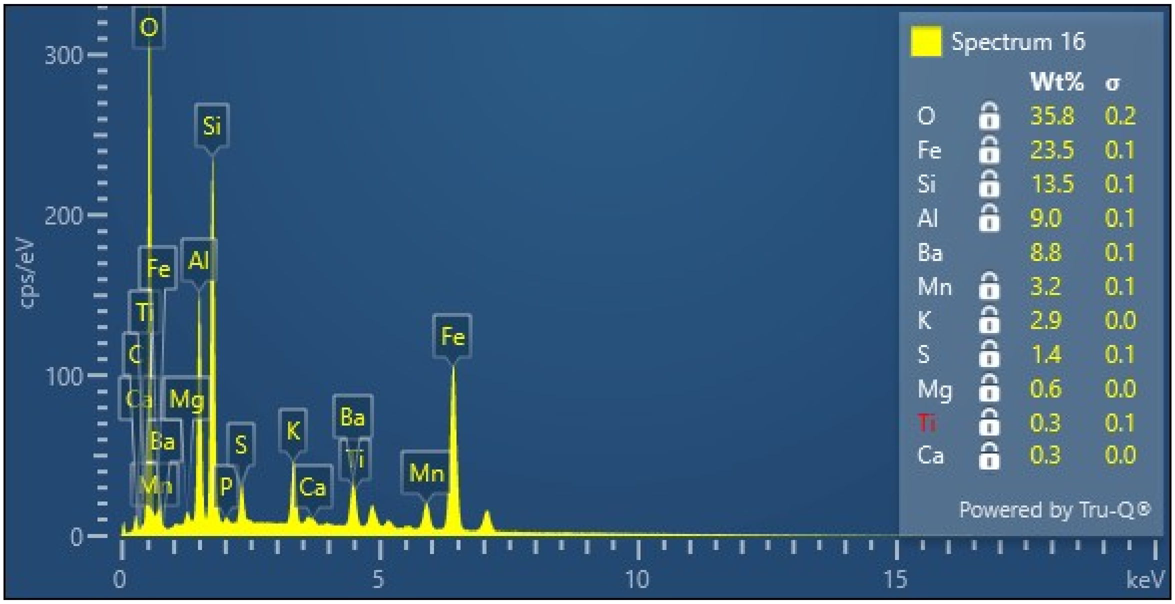
Site 1 sp12 details (Ba sulf*te particle)

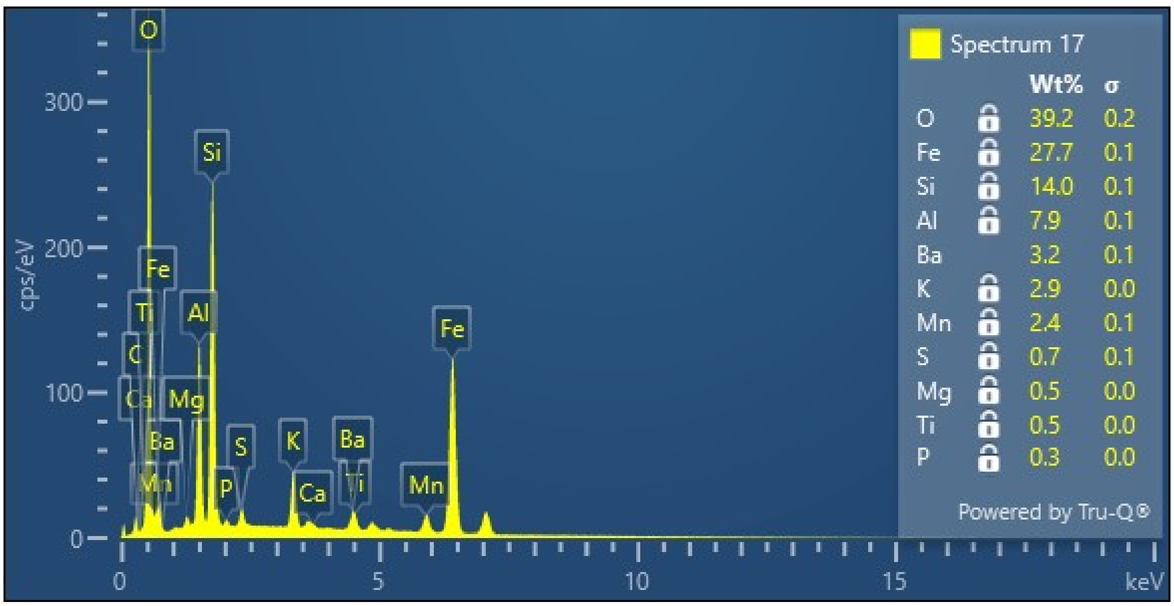
Site1-sp12 2000x





MRMW3V-2 SEM analysis 10/26/2021





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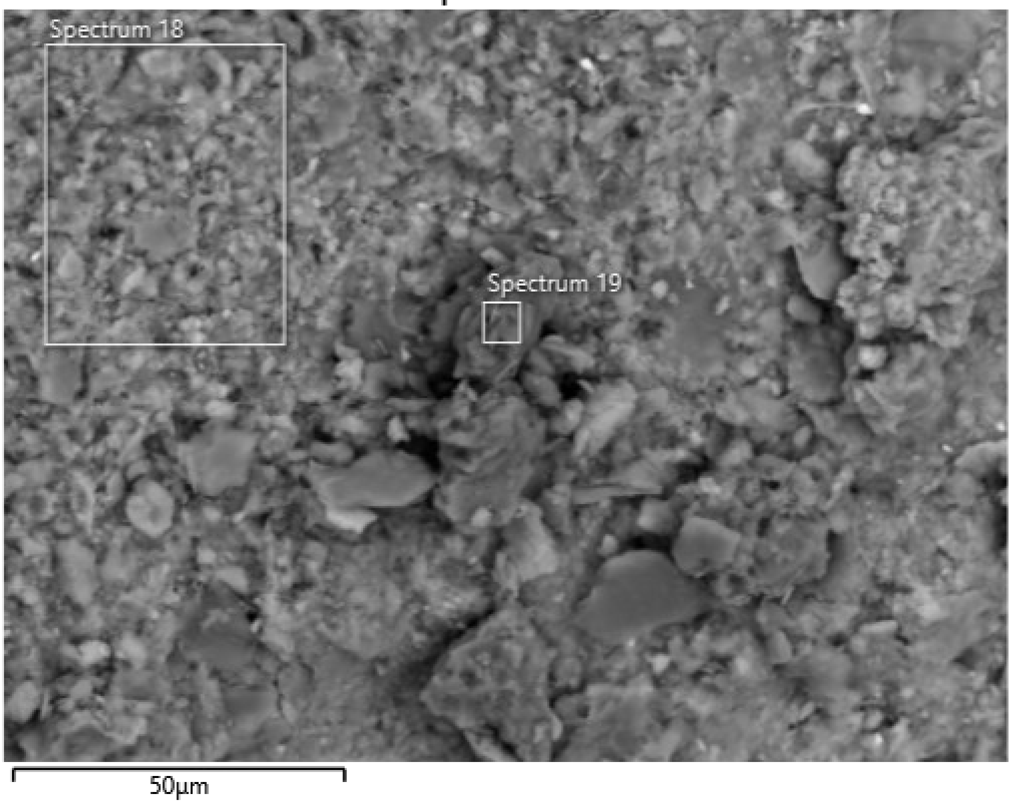
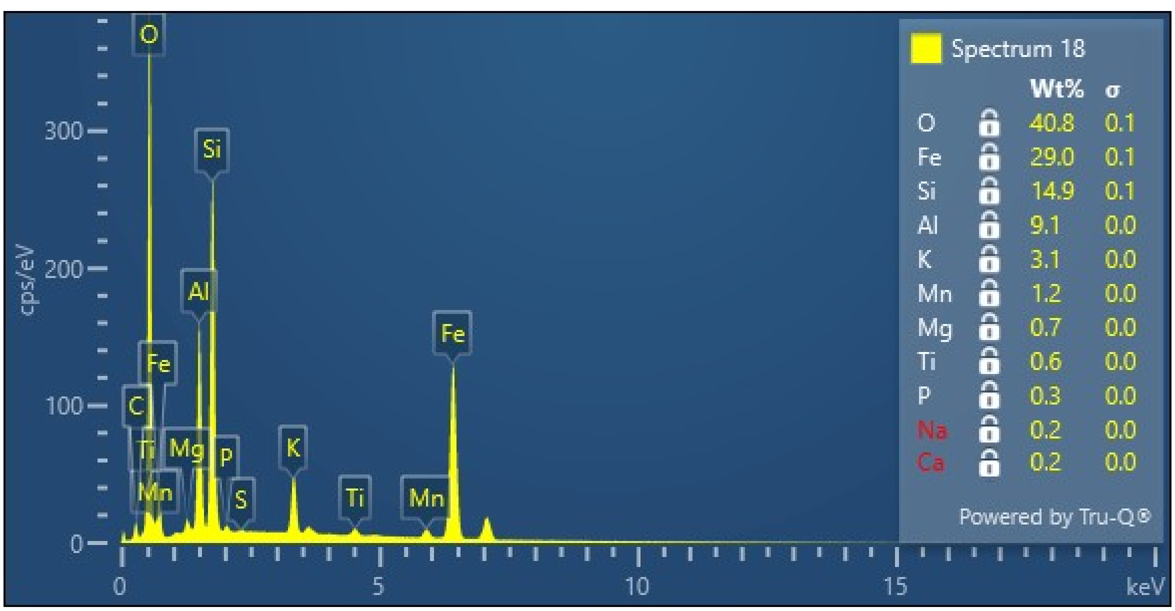
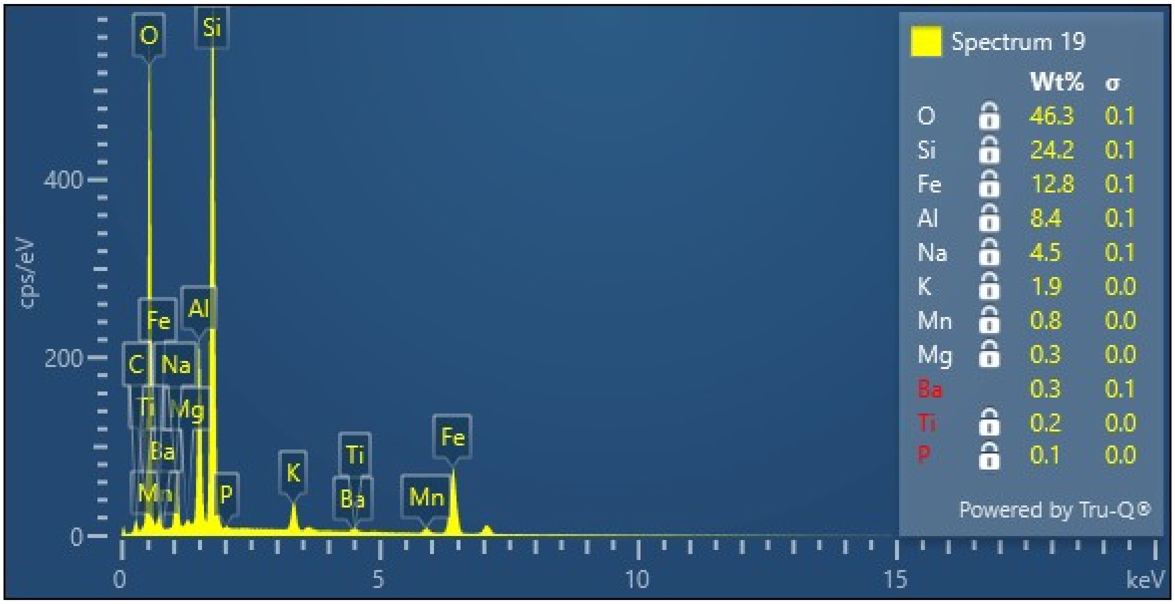
Site 1 sp7a (mica / clay particles?) details

Site 1 sp7a detail 2000x

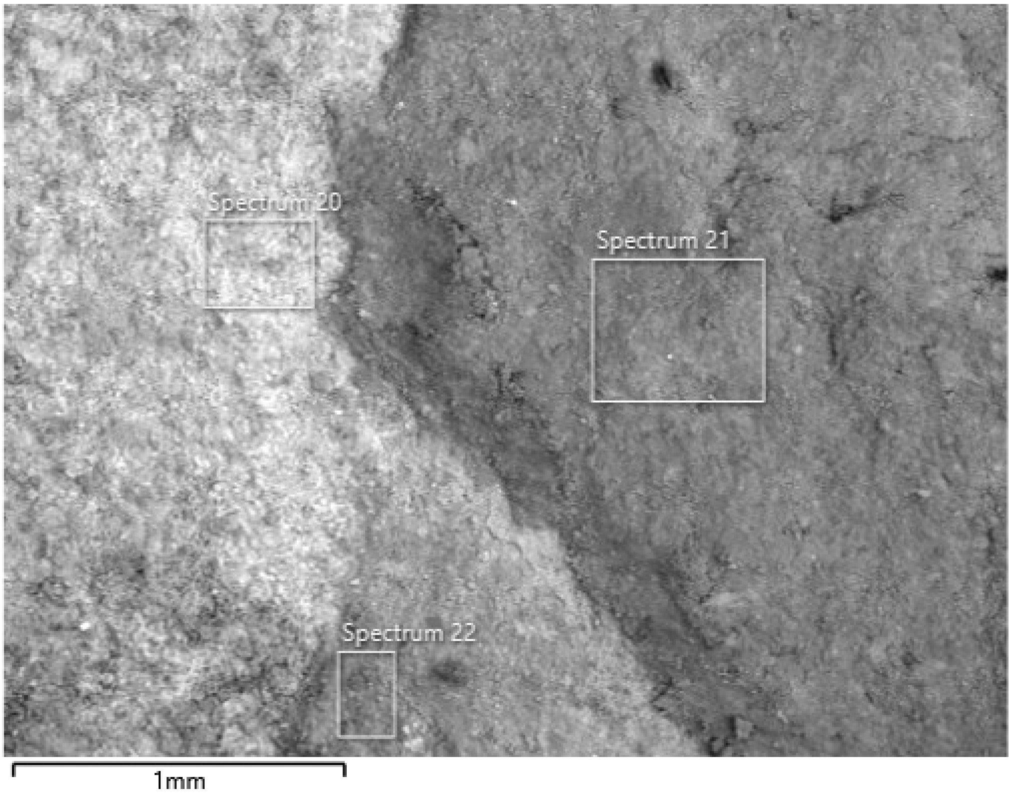


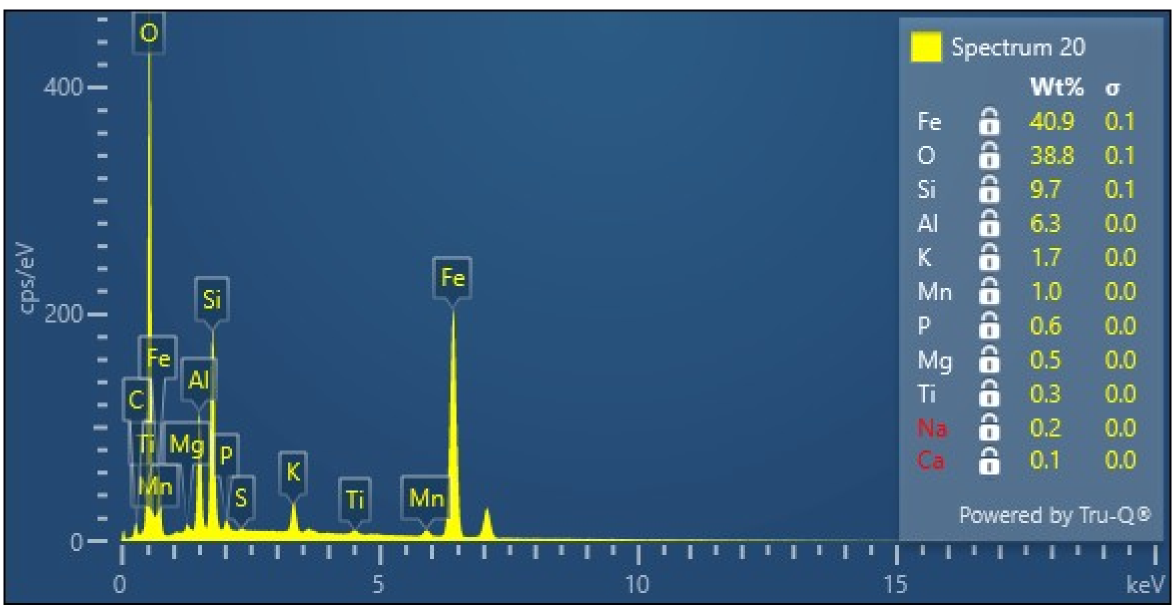



Spectrum 19
Wt% σ
O 46.3 0.1
Si 24.2 0.1
Fe 12.8 0.1
Al 8.4 0.1
Na 4.5 0.1
K 1.9 0.0
Mn 0.8 0.0
Mg 0.3 0.0
Ba 0.3 0.1
Ti 0.2 0.0
P 0.1 0.0
Powered by Tru-Q®
cps/eV
400
200
0
0
5
10
15
keV
O
Si
Fe
Al
C
Na
Ti
Mg
Ba
Mn
P
K
Ti
Ba
Mn
Fe

Site 2

Site 2 overview 100x





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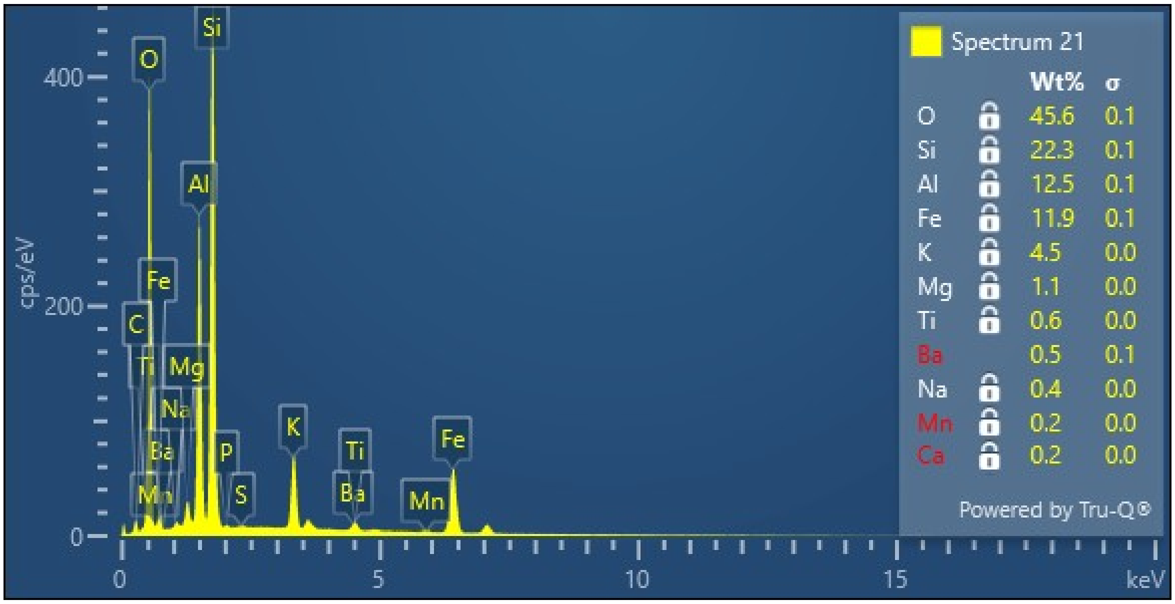

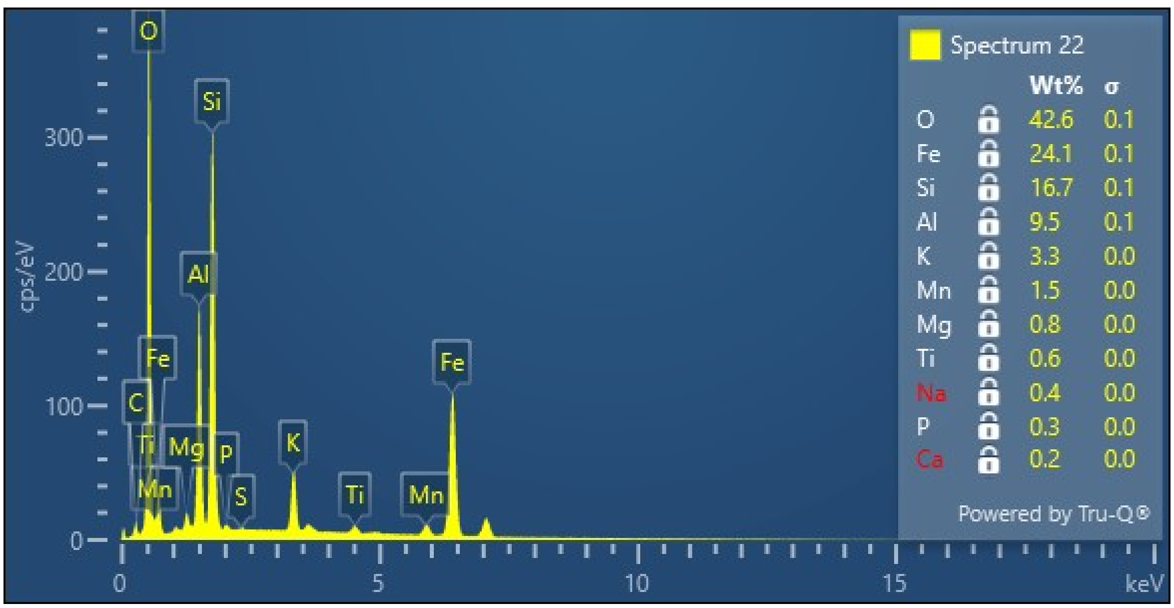

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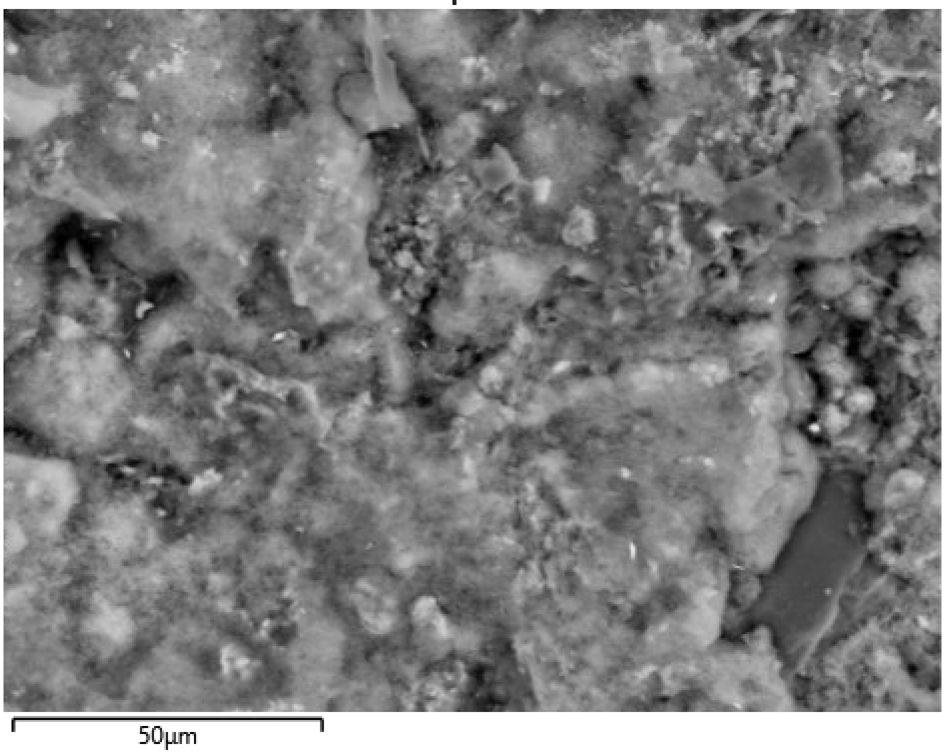
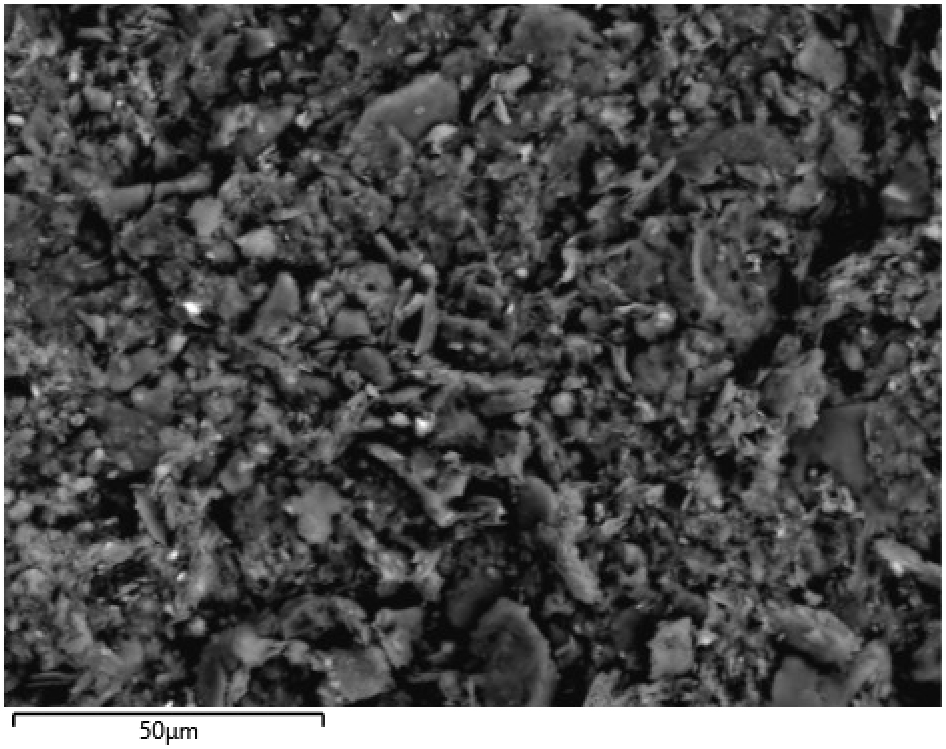
Site 2 detail images

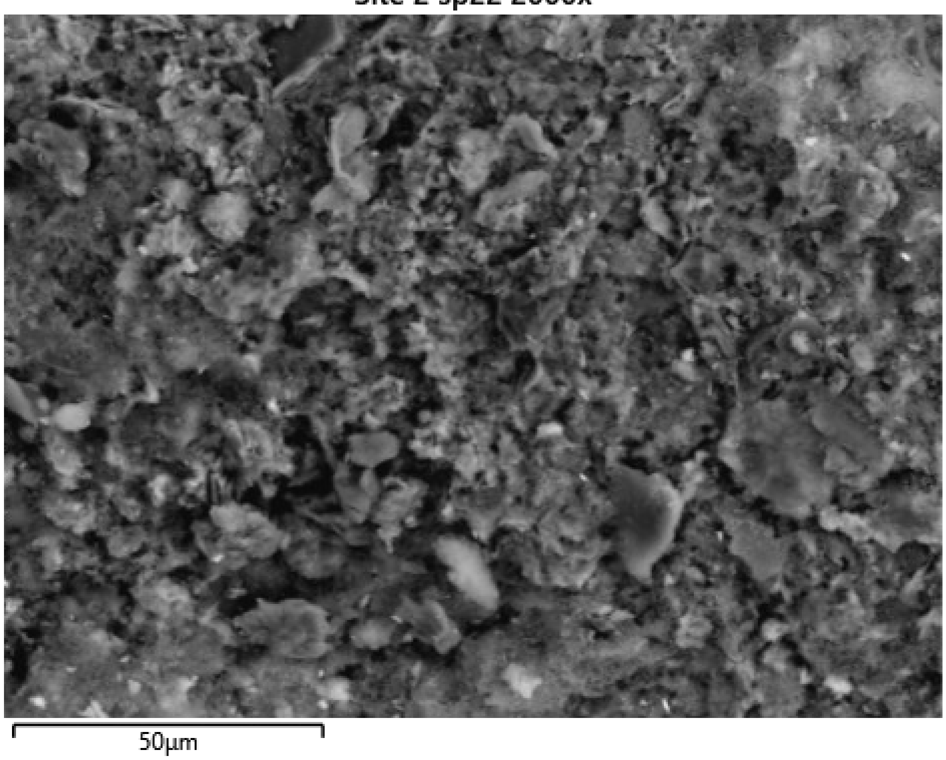
Site 2 sp20 2000x



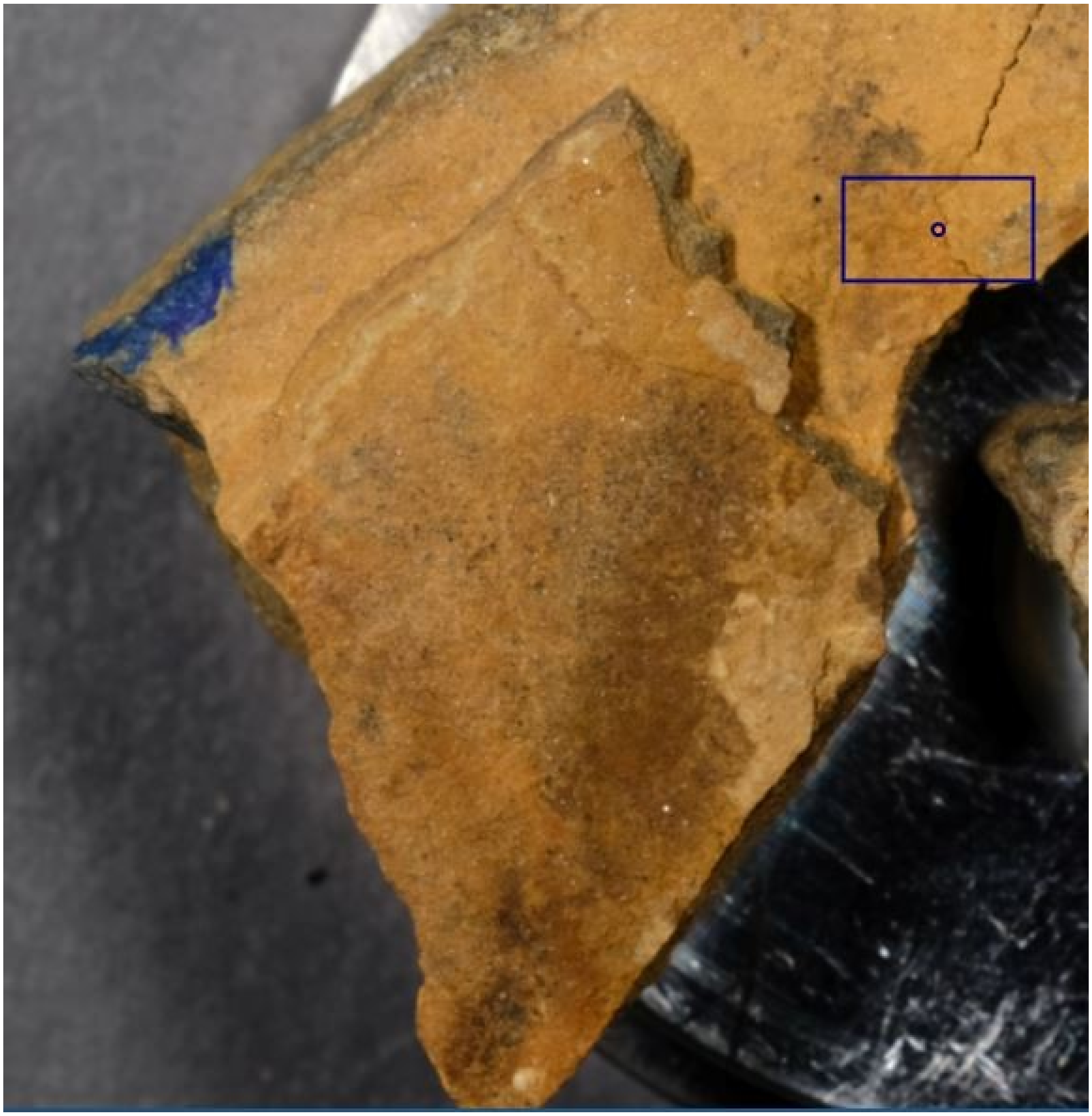
Site 2 sp21 2000x



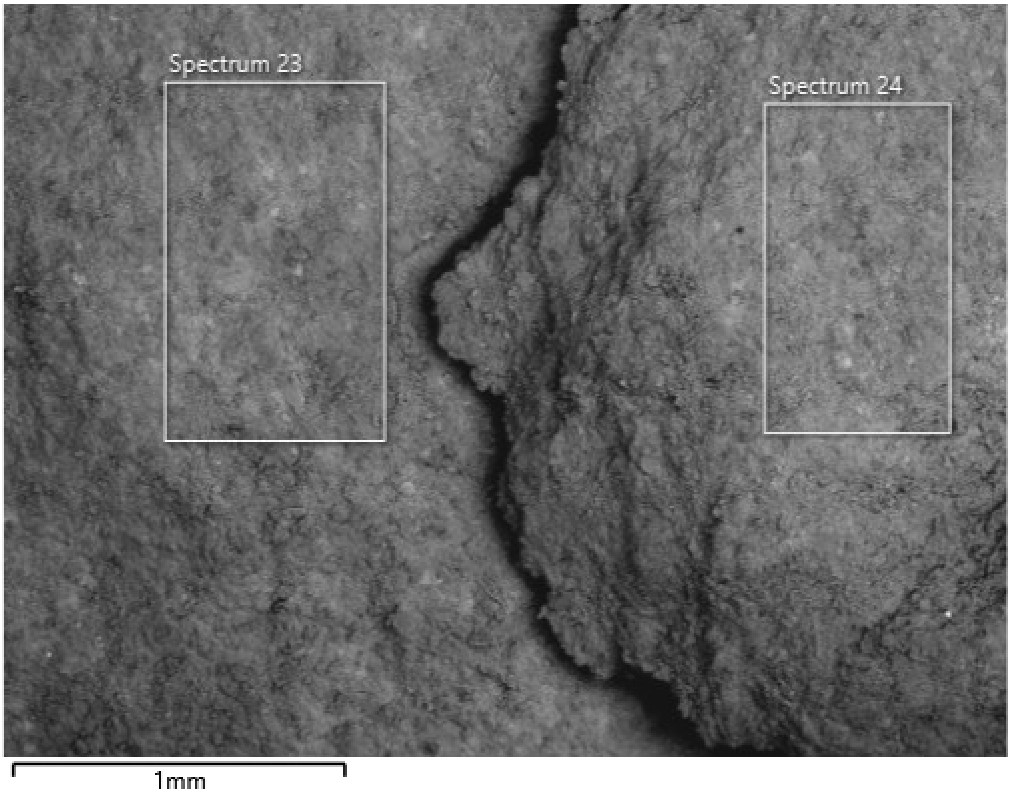
Site 2 sp22 2000x

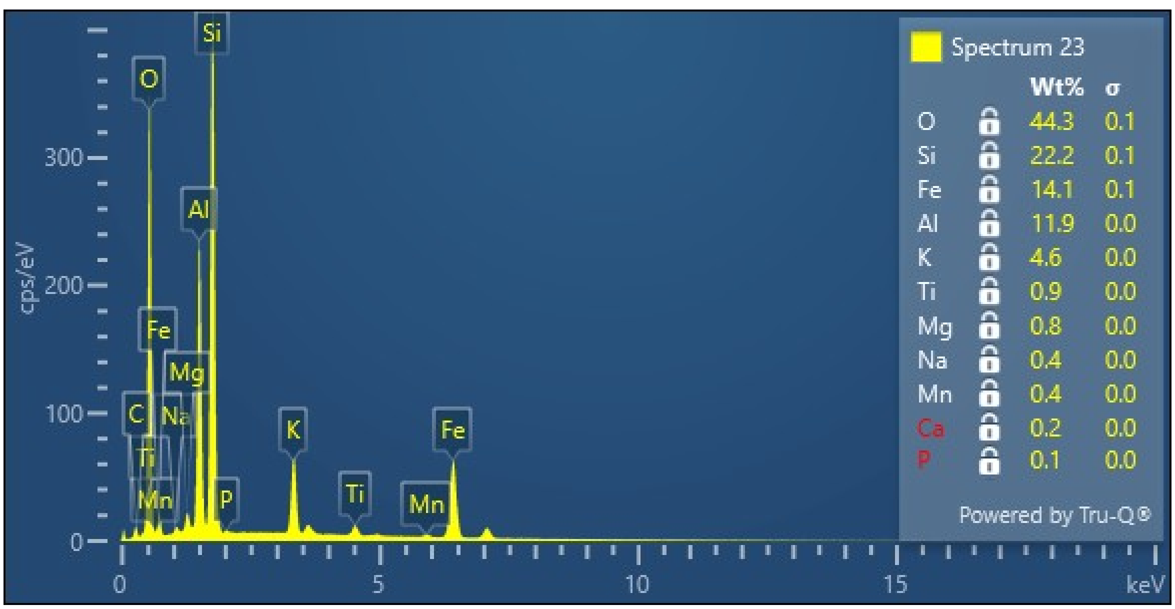


Site 3



Site 3 overview 100x





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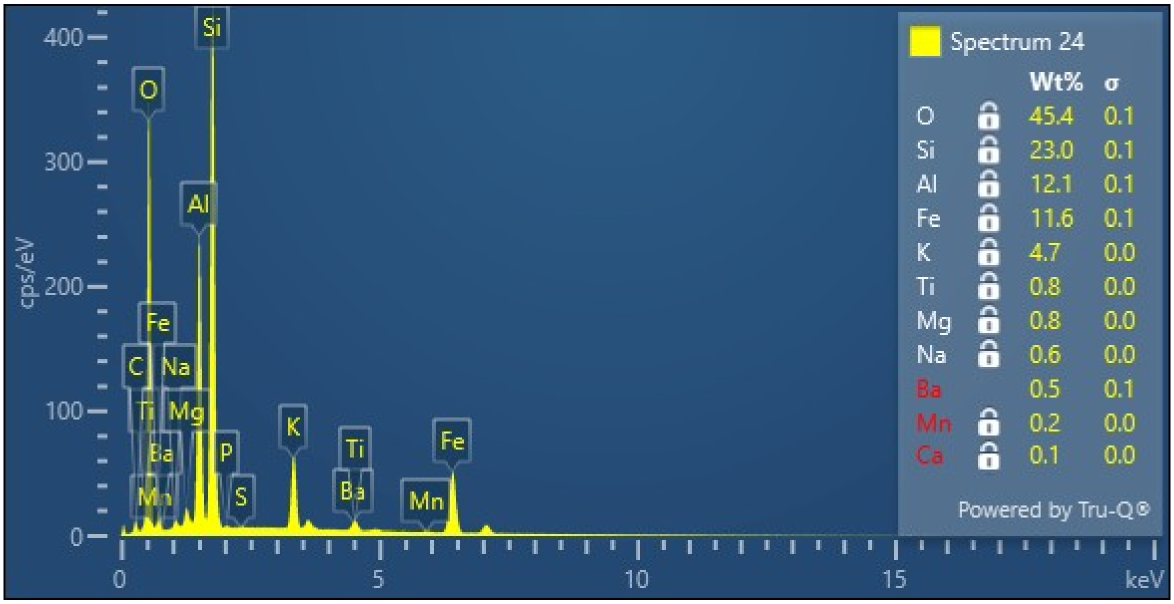
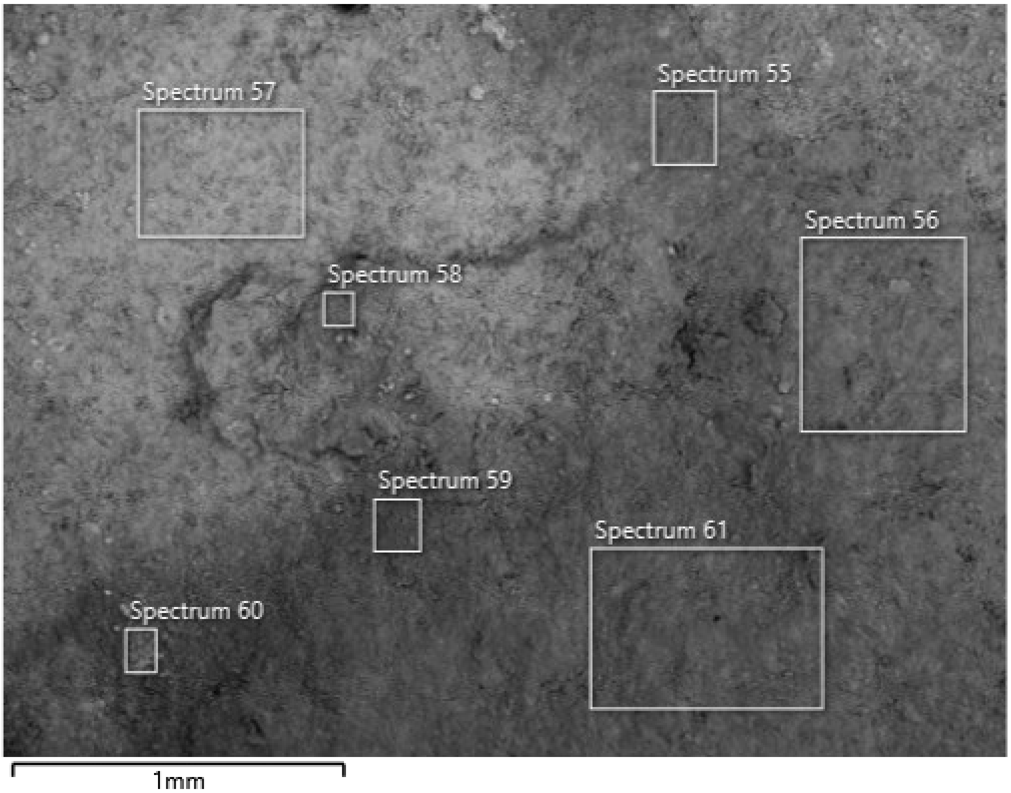
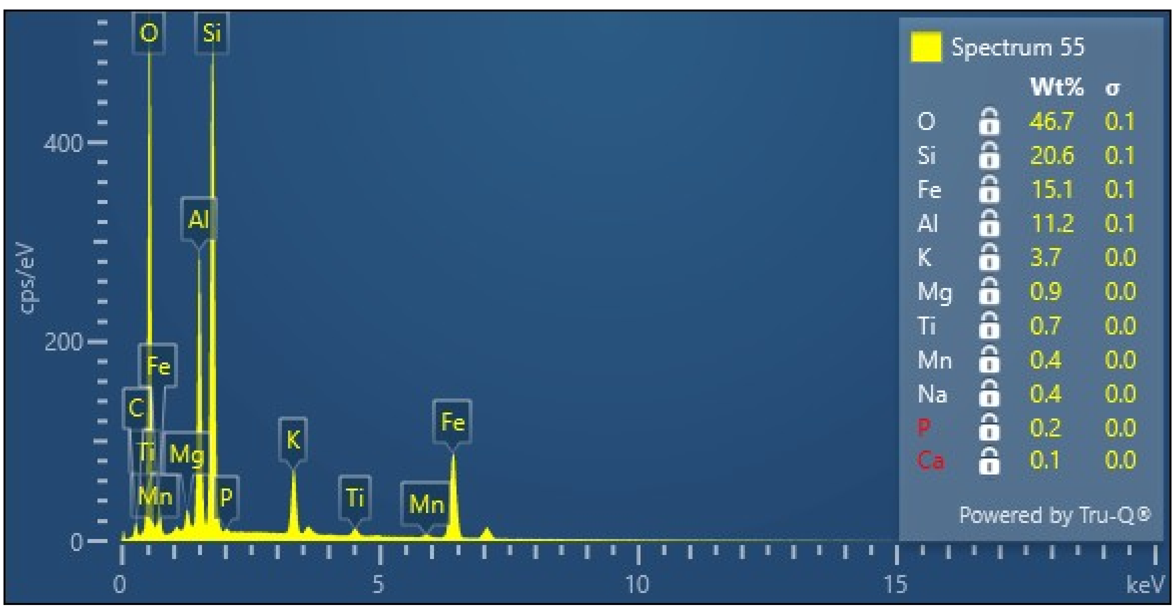


Spectrum 24
Wt% σ
O 45.4 0.1
Si 23.0 0.1
Al 12.1 0.1
Fe 11.6 0.1
K 4.7 0.0
Ti 0.8 0.0
Mg 0.8 0.0
Na 0.6 0.0
Ba 0.5 0.1
Mn 0.2 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
400
300
200
100
0
0
5
10
15
keV
Si
O
Al
Fe
C
Na
Ti
Mg
Ba
P
K
Ti
Fe
Mn
S
Ba
Mn

Site 1

MRMW3V-3 Site 1 100x





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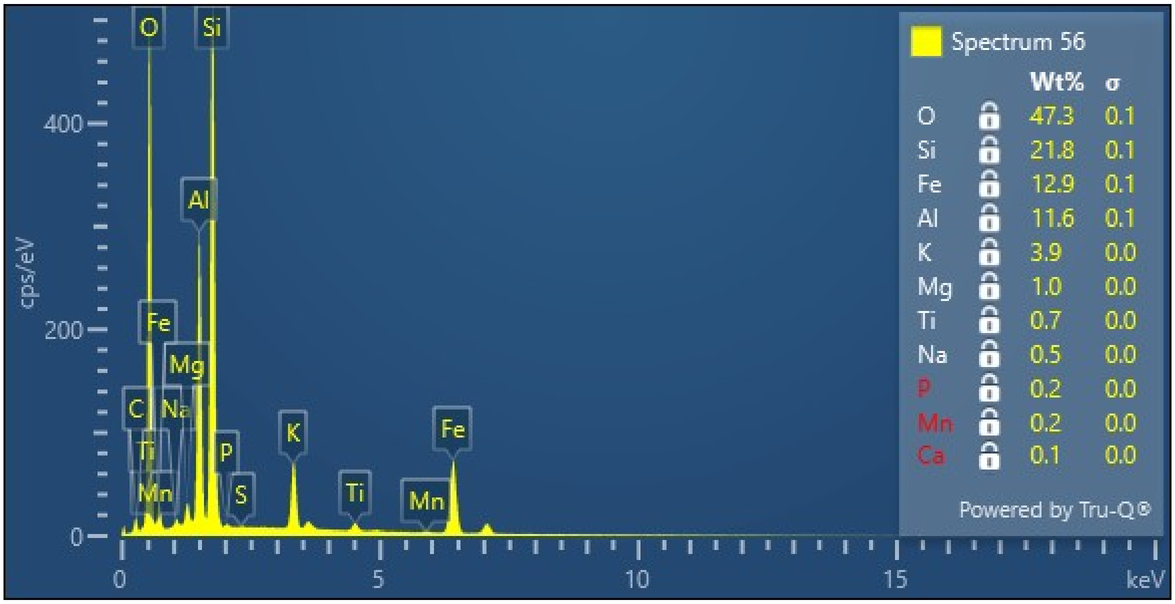

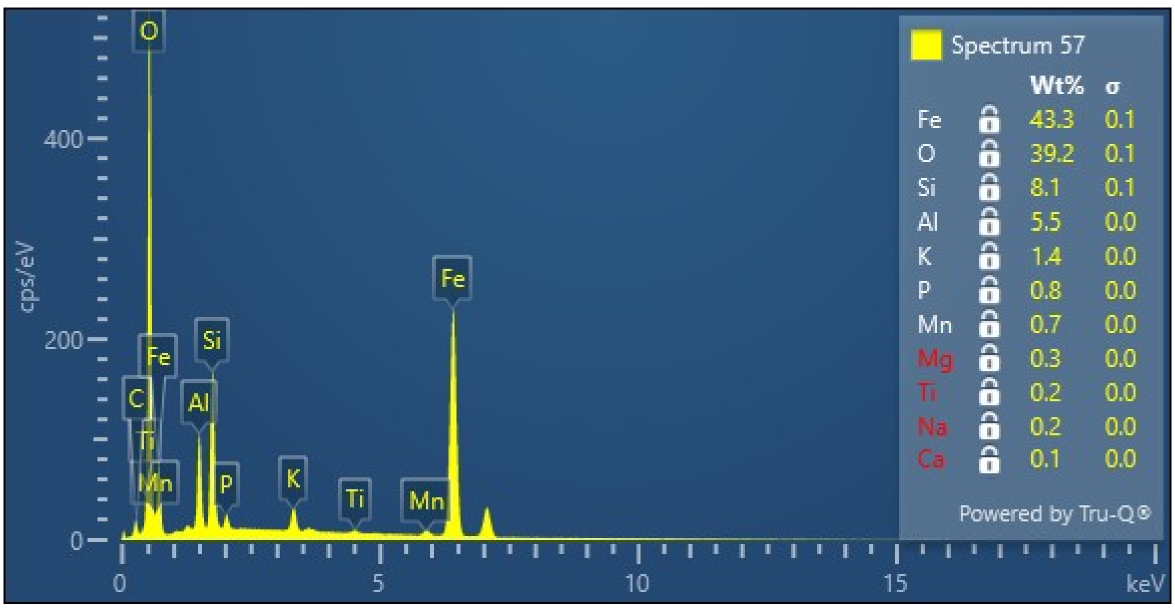

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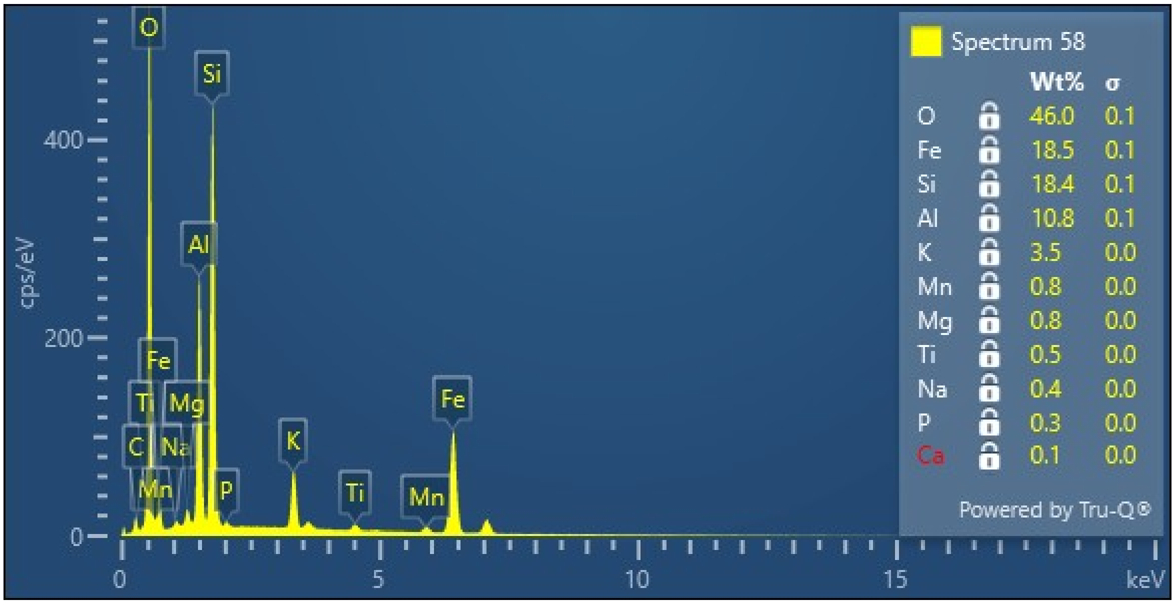
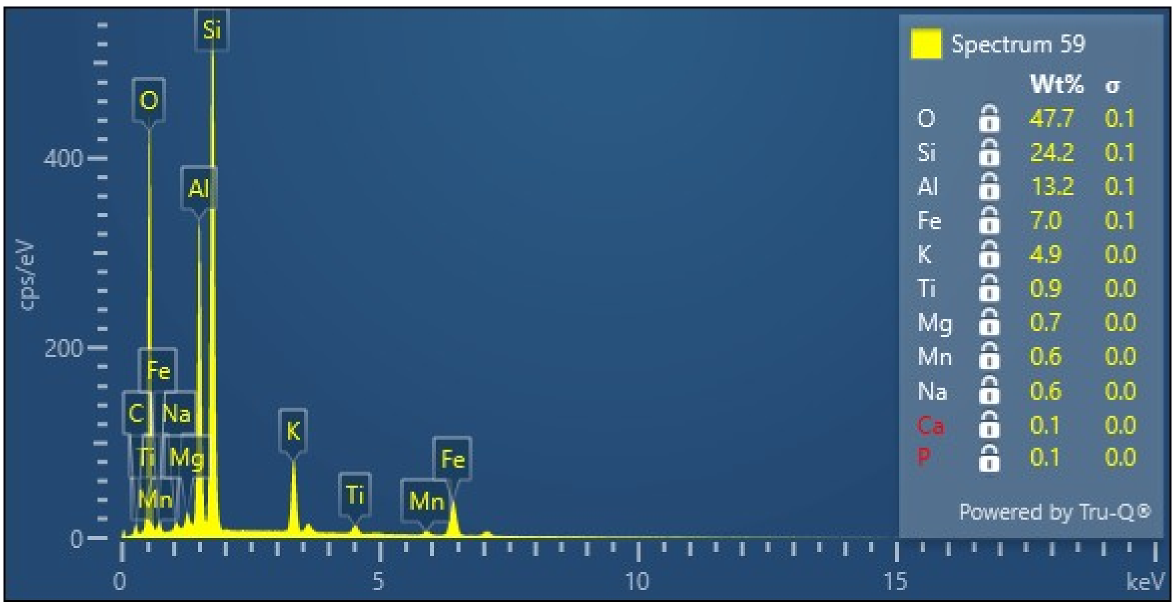
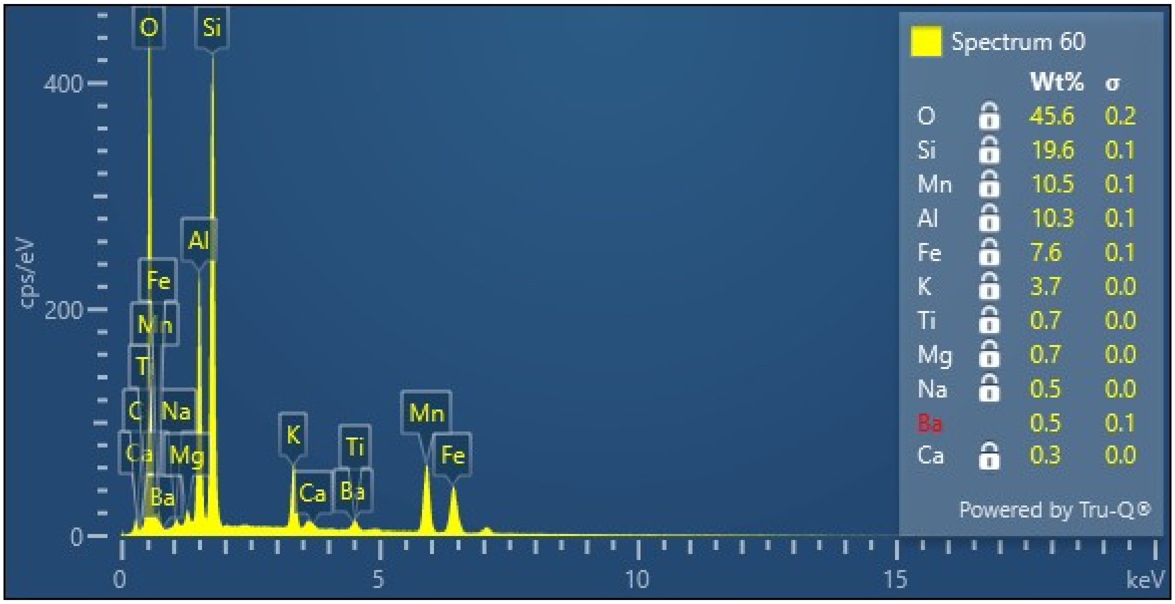
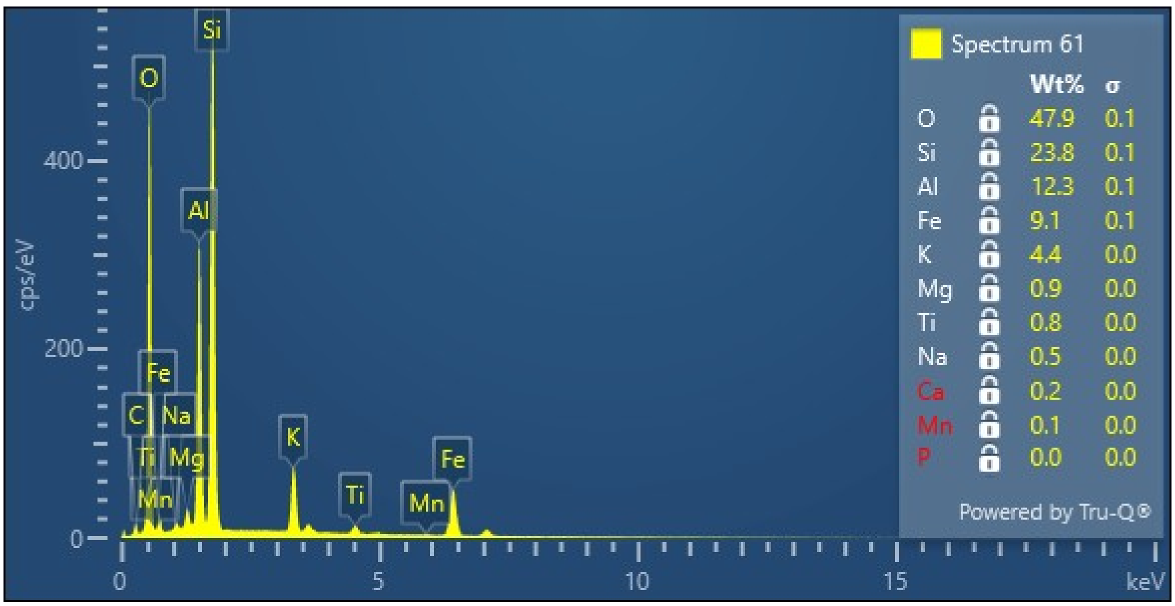


Spectrum 58
Wt% σ
O 46.0 0.1
Fe 18.5 0.1
Si 18.4 0.1
Al 10.8 0.1
K 3.5 0.0
Mn 0.8 0.0
Mg 0.8 0.0
Ti 0.5 0.0
Na 0.4 0.0
P 0.3 0.0
Ca 0.1 0.0
Powered by Tru-Q®
cps/eV
keV



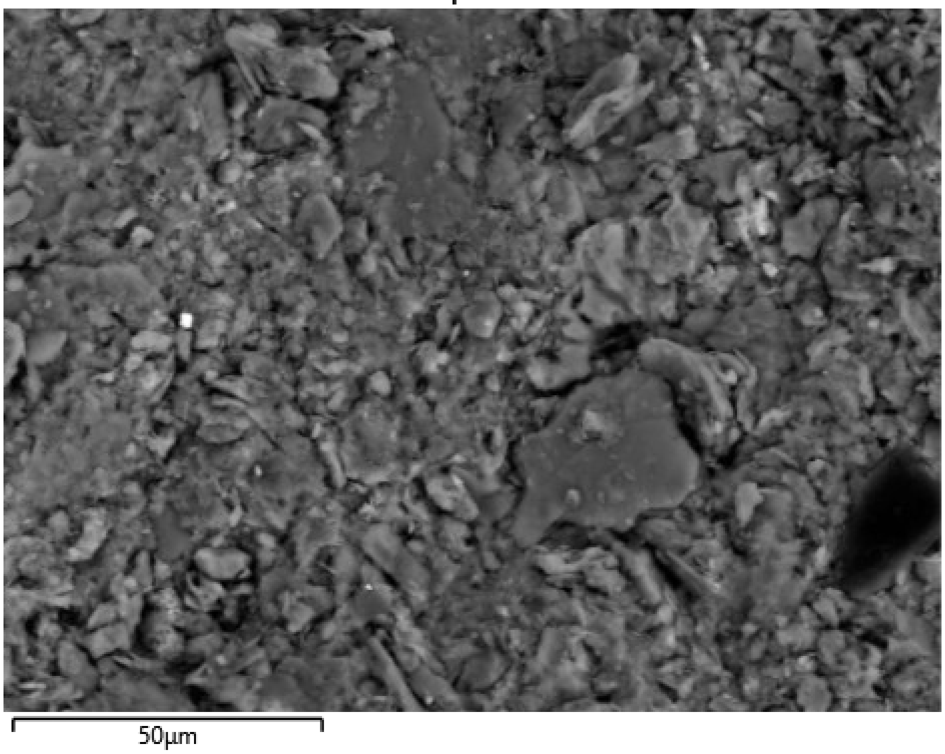
Spectrum 59
Wt% σ
O 47.7 0.1
Si 24.2 0.1
Al 13.2 0.1
Fe 7.0 0.1
K 4.9 0.0
Ti 0.9 0.0
Mg 0.7 0.0
Mn 0.6 0.0
Na 0.6 0.0
Ca 0.1 0.0
P 0.1 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 60
Wt% σ
O 45.6 0.2
Si 19.6 0.1
Mn 10.5 0.1
Al 10.3 0.1
Fe 7.6 0.1
K 3.7 0.0
Ti 0.7 0.0
Mg 0.7 0.0
Na 0.5 0.0
Ba 0.5 0.1
Ca 0.3 0.0
Powered by Tru-Q®
cps/eV
keV
0 5 10 15
0 200 400
O Si Al Fe Mn Ti C Na Ca Mg Ba K Ca Ba Ti Mn Fe

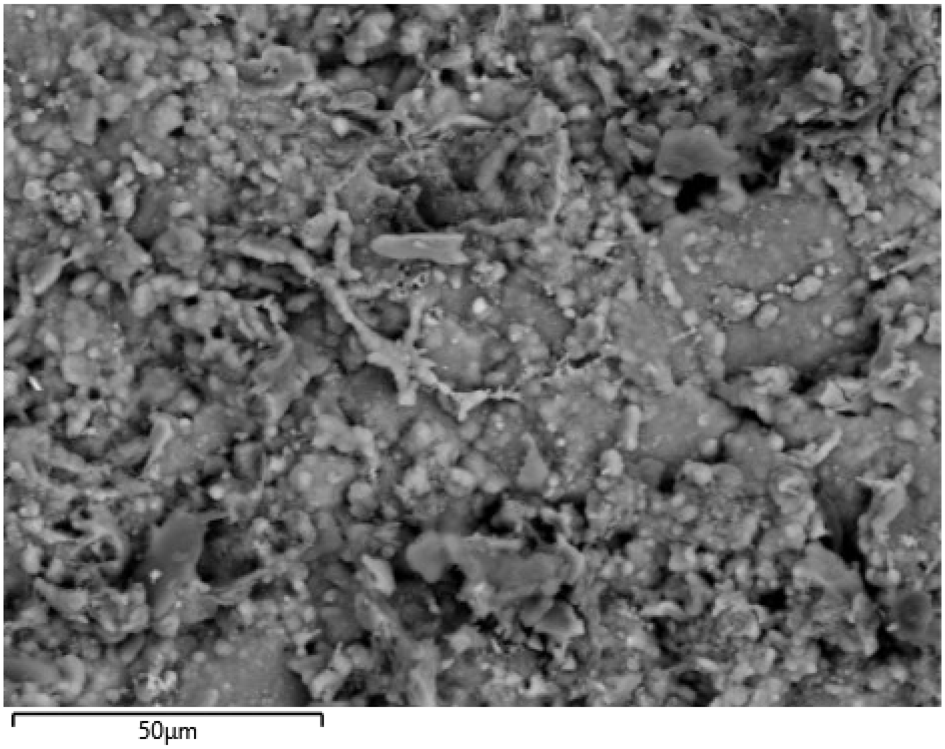

Spectrum 61
Wt% σ
O 47.9 0.1
Si 23.8 0.1
Al 12.3 0.1
Fe 9.1 0.1
K 4.4 0.0
Mg 0.9 0.0
Ti 0.8 0.0
Na 0.5 0.0
Ca 0.2 0.0
Mn 0.1 0.0
P 0.0 0.0
Powered by Tru-Q®
cps/eV
keV
0 5 10 15
0 200 400
Si O Al Fe C Na Ti Mg Mn K Ti Mn Fe

Site 1 detail images

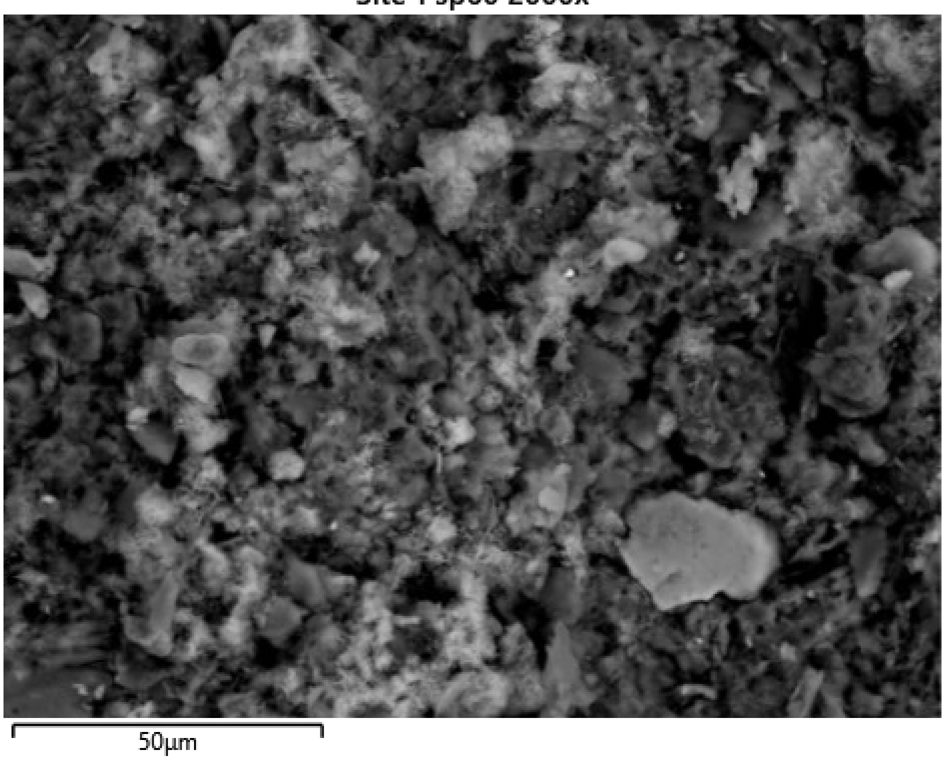
Site 1 sp61 2000x



Site 1 sp55 2000x

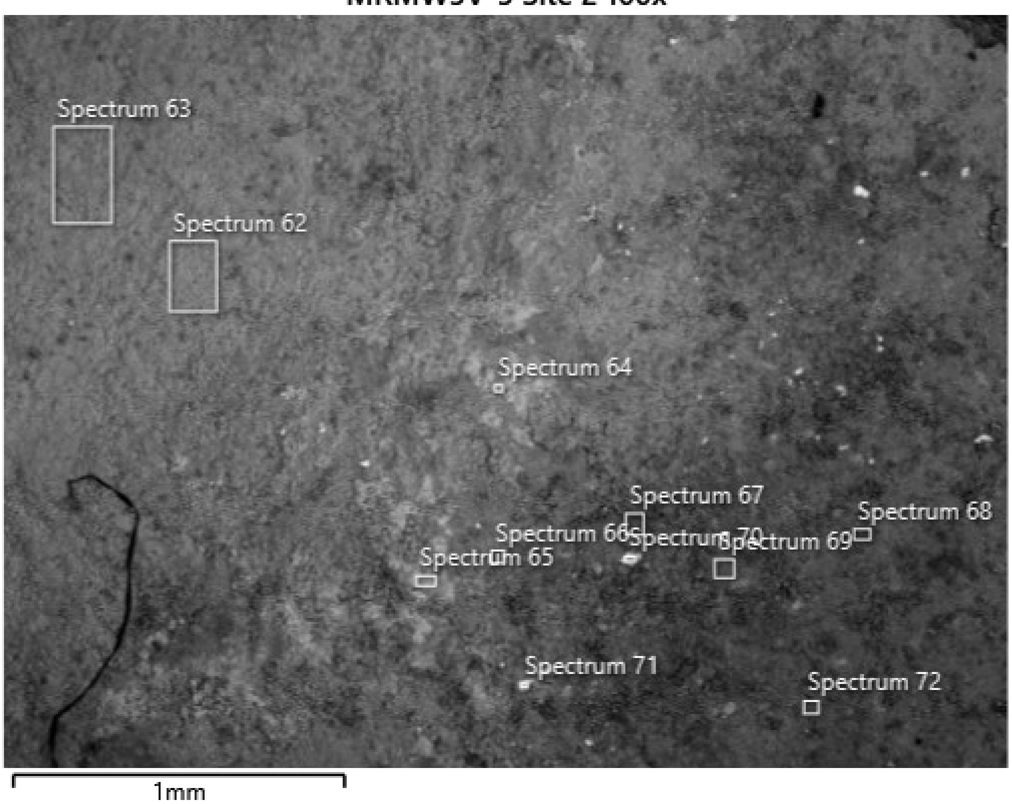


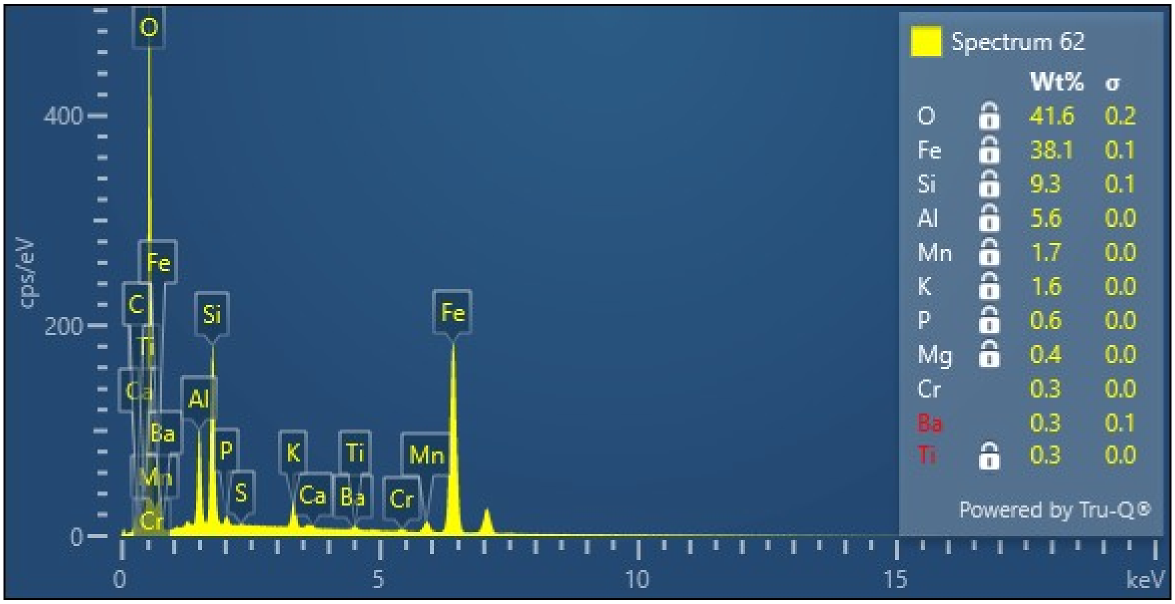
Site 1 sp60 2000x

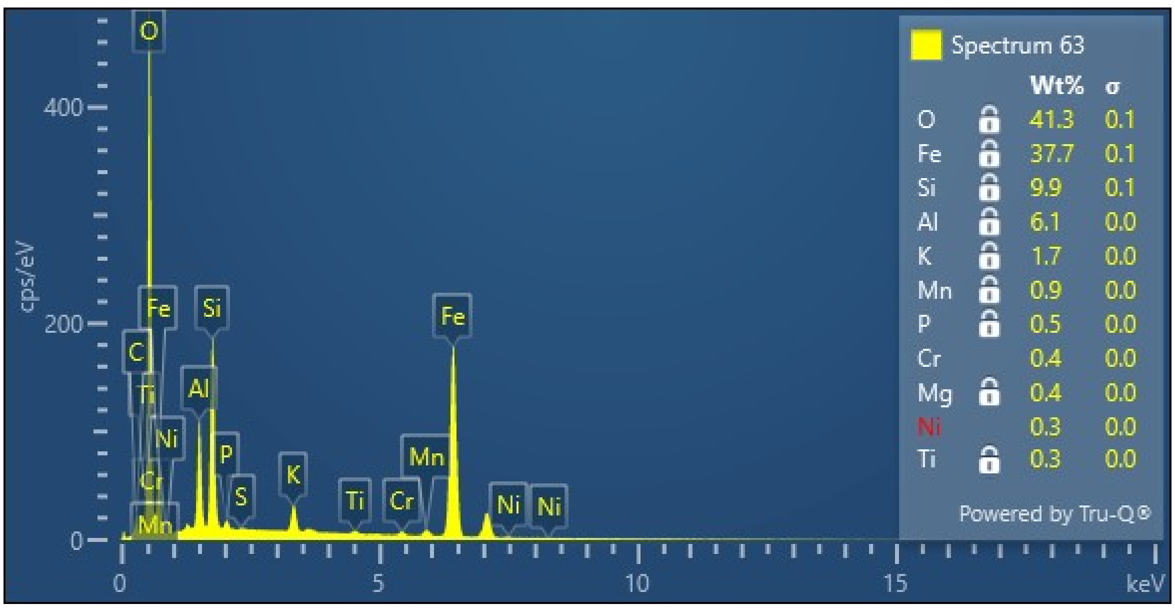


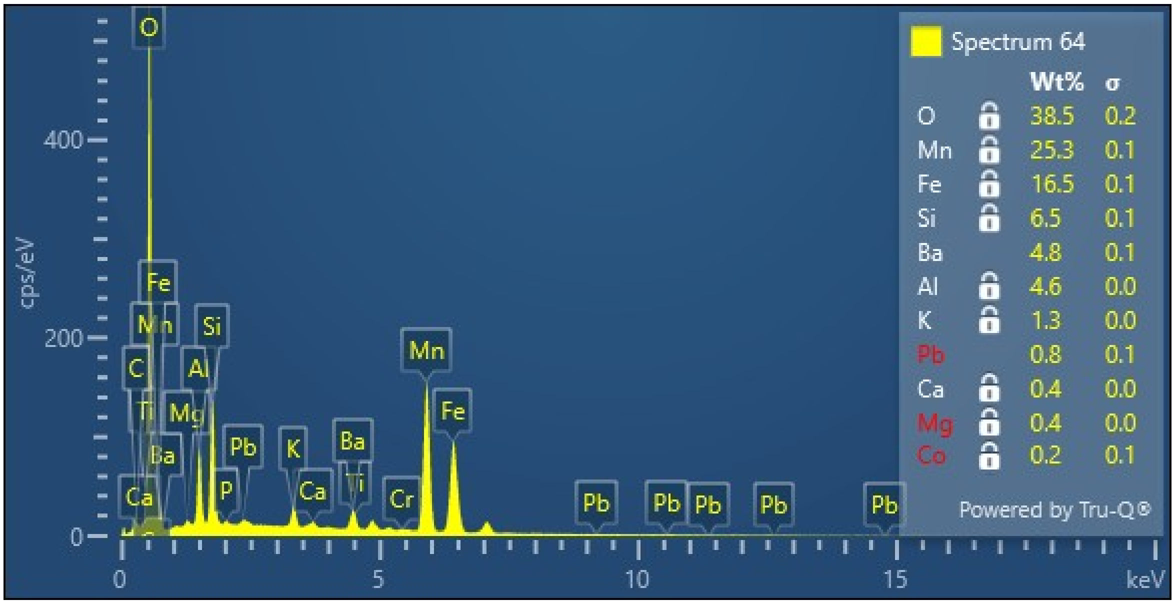
Site 2

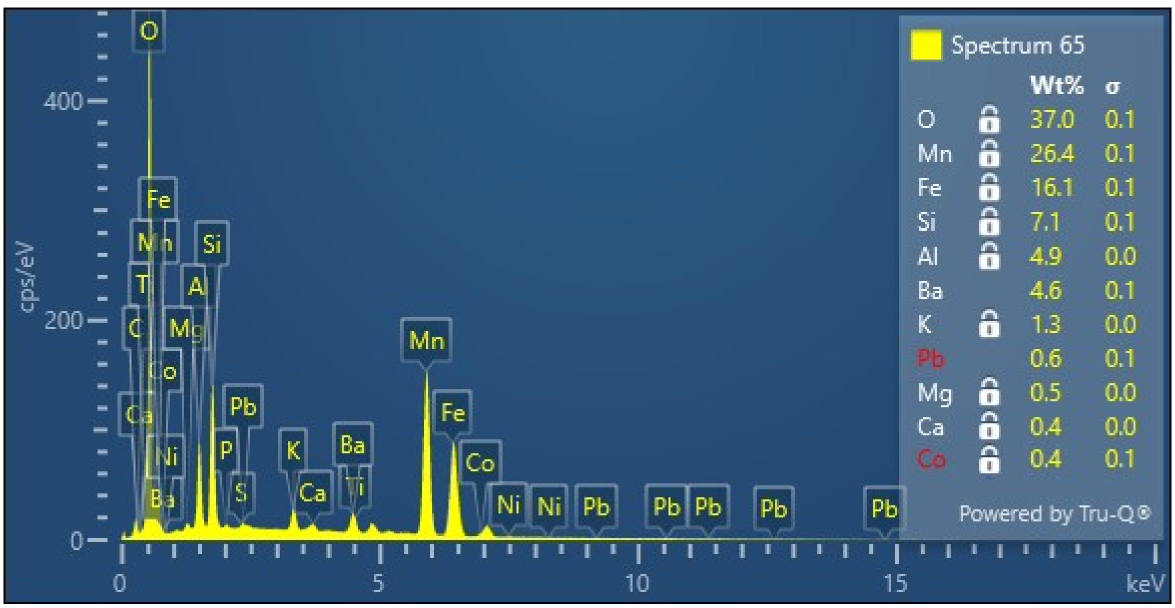
MRMW3V-3 Site 2 100x




Spectrum 62
Wt% σ
O 41.6 0.2
Fe 38.1 0.1
Si 9.3 0.1
Al 5.6 0.0
Mn 1.7 0.0
K 1.6 0.0
P 0.6 0.0
Mg 0.4 0.0
Cr 0.3 0.0
Ba 0.3 0.1
Ti 0.3 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 63
Wt% σ
O 41.3 0.1
Fe 37.7 0.1
Si 9.9 0.1
Al 6.1 0.0
K 1.7 0.0
Mn 0.9 0.0
P 0.5 0.0
Cr 0.4 0.0
Mg 0.4 0.0
Ni 0.3 0.0
Ti 0.3 0.0
Powered by Tru-Q®
cps/eV
keV





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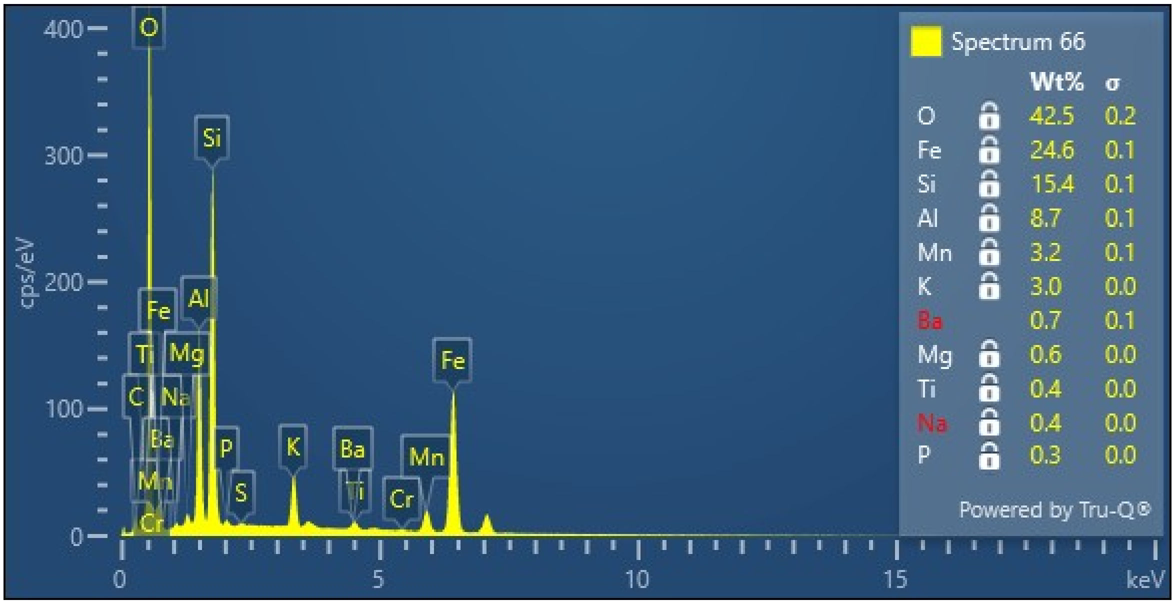
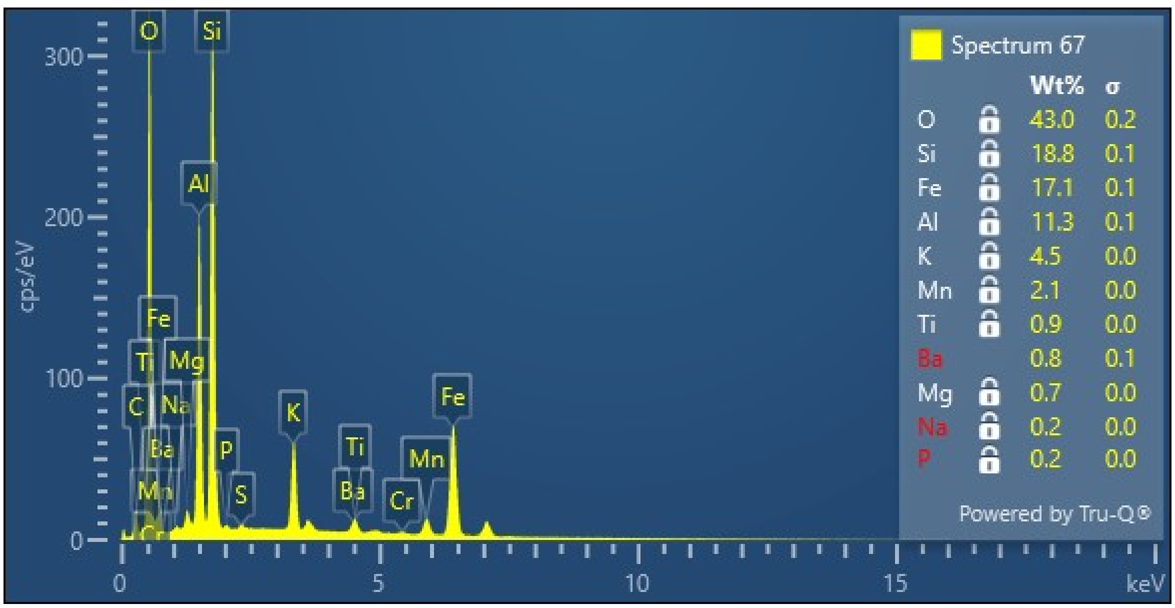
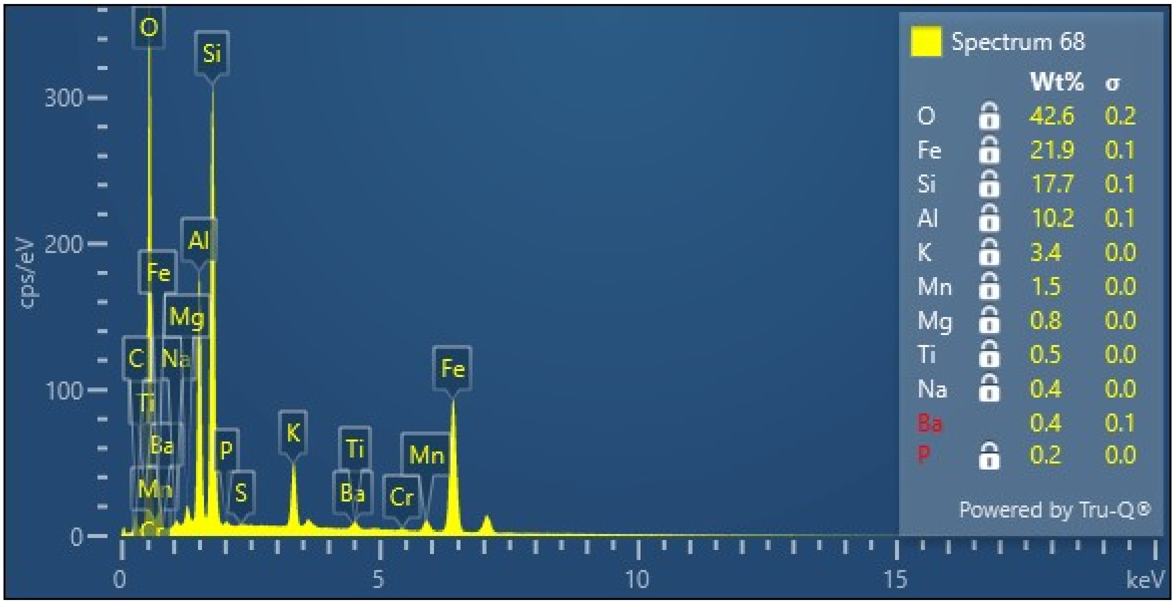
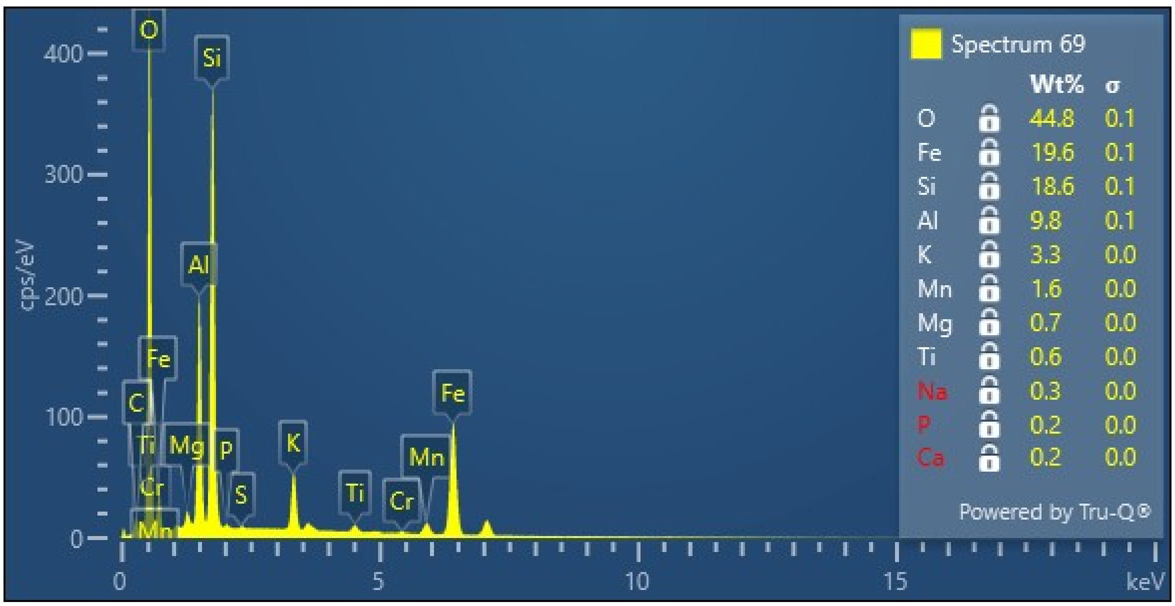

Spectrum 66
Wt% σ
O 42.5 0.2
Fe 24.6 0.1
Si 15.4 0.1
Al 8.7 0.1
Mn 3.2 0.1
K 3.0 0.0
Ba 0.7 0.1
Mg 0.6 0.0
Ti 0.4 0.0
Na 0.4 0.0
P 0.3 0.0
Powered by Tru-Q®
cps/eV
keV


Spectrum 67
Wt% σ
O 43.0 0.2
Si 18.8 0.1
Fe 17.1 0.1
Al 11.3 0.1
K 4.5 0.0
Mn 2.1 0.0
Ti 0.9 0.0
Ba 0.8 0.1
Mg 0.7 0.0
Na 0.2 0.0
P 0.2 0.0
Powered by Tru-Q®
cps/eV
keV





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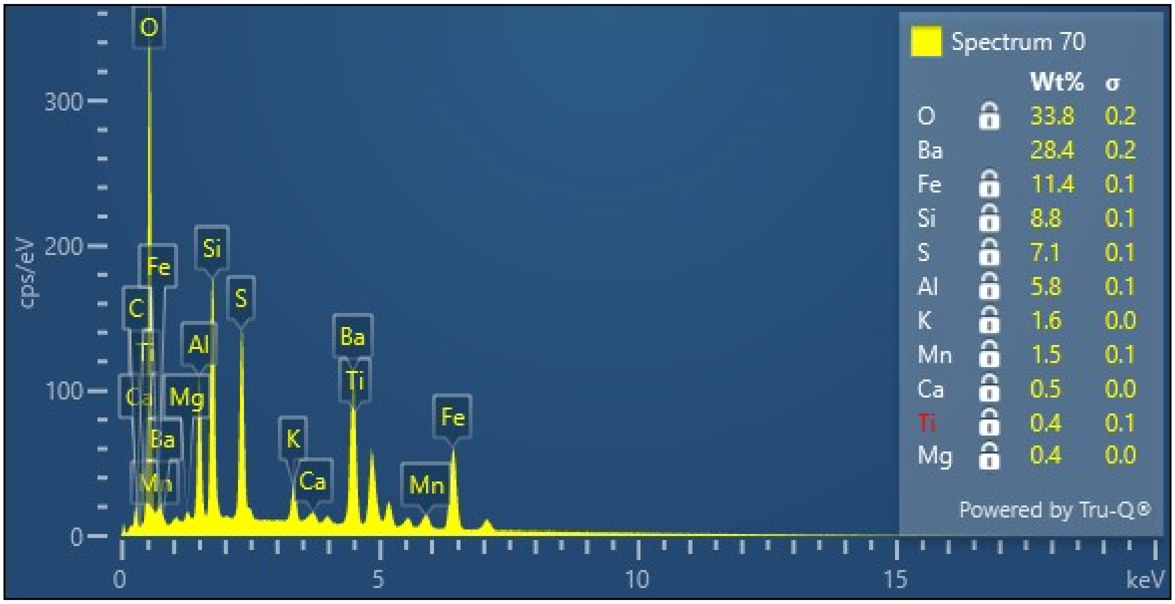

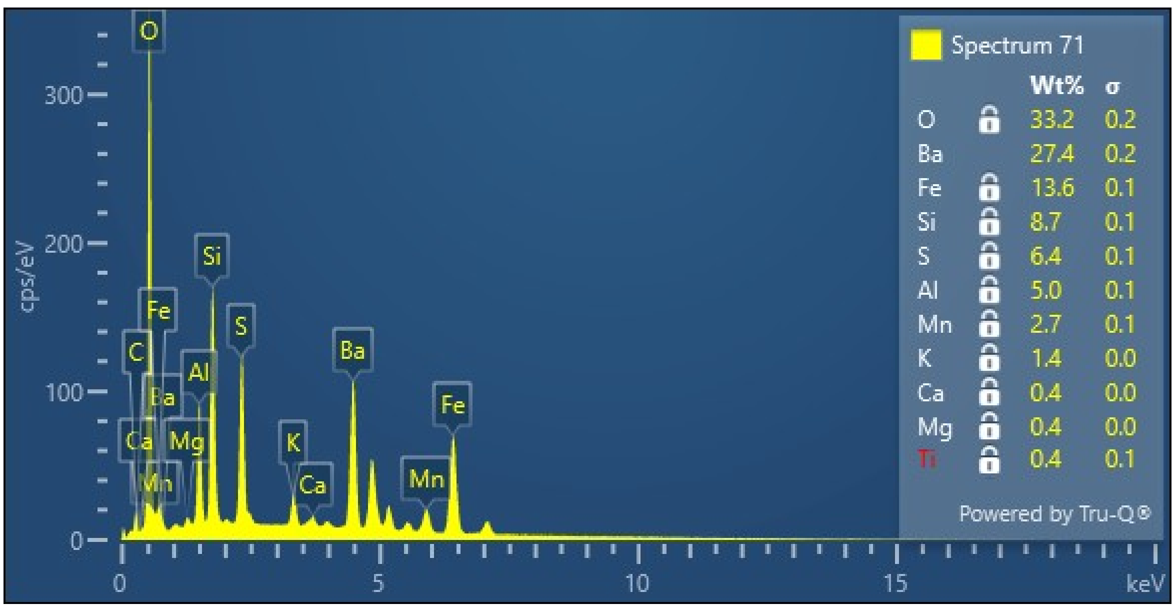

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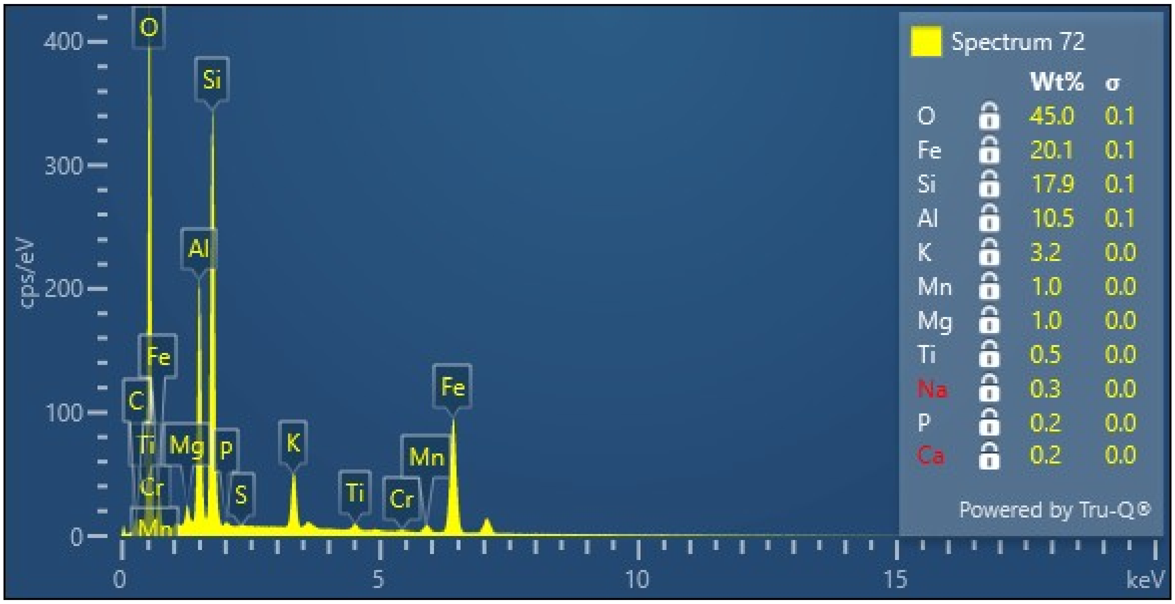

Spectrum 72
Wt% σ
O 45.0 0.1
Fe 20.1 0.1
Si 17.9 0.1
Al 10.5 0.1
K 3.2 0.0
Mn 1.0 0.0
Mg 1.0 0.0
Ti 0.5 0.0
Na 0.3 0.0
P 0.2 0.0
Ca 0.2 0.0
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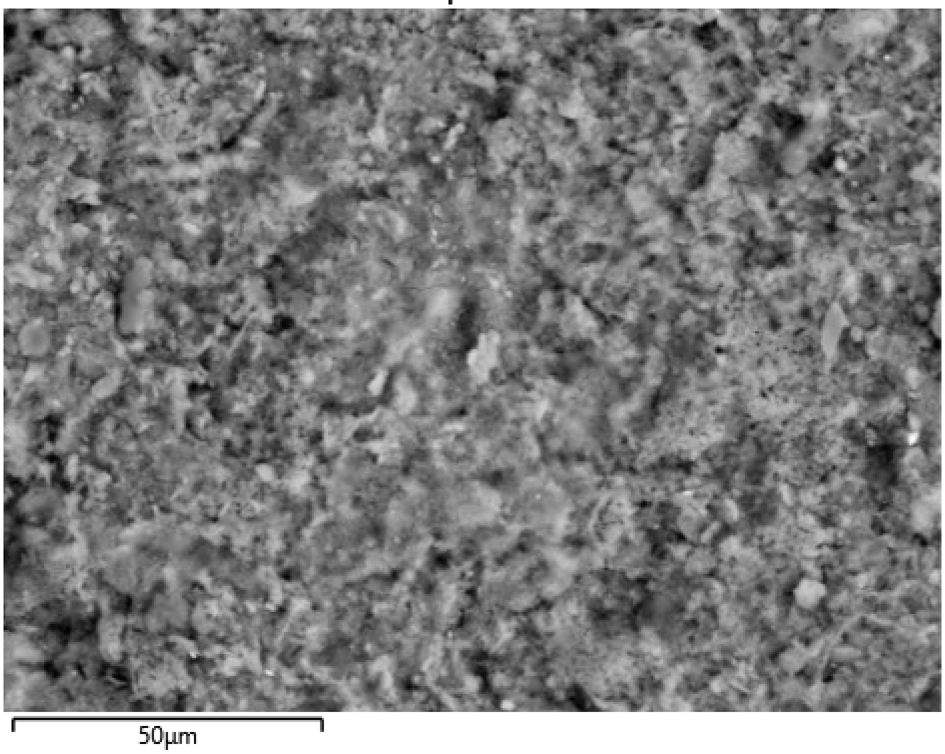
cps/eV
400
300
200
100
0
0
5
10
15
keV
O
Si
Al
Fe
C
Ti
Mg
P
Cr
S
Mn
K
Ti
Cr
Mn
Fe

Site 2 detail images

Site 2 sp 62 2000x



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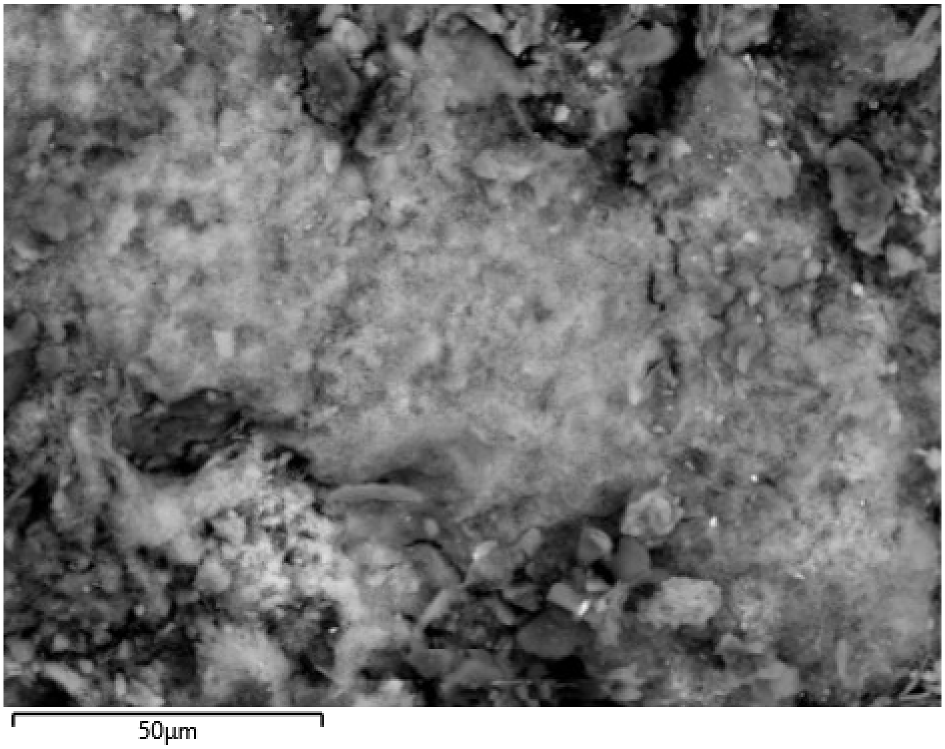

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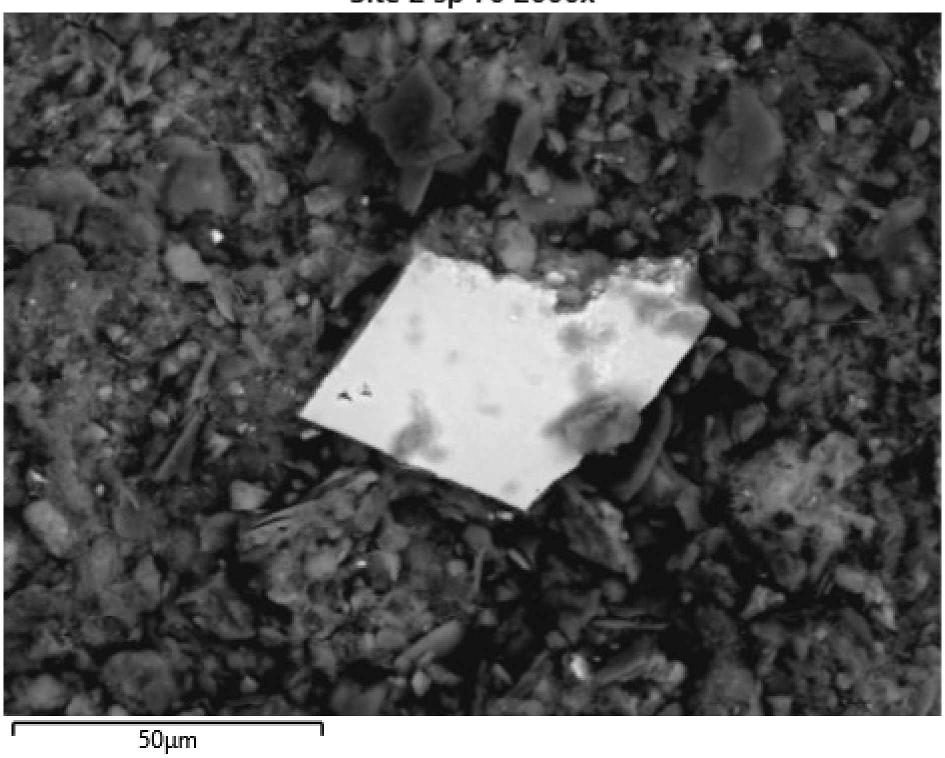
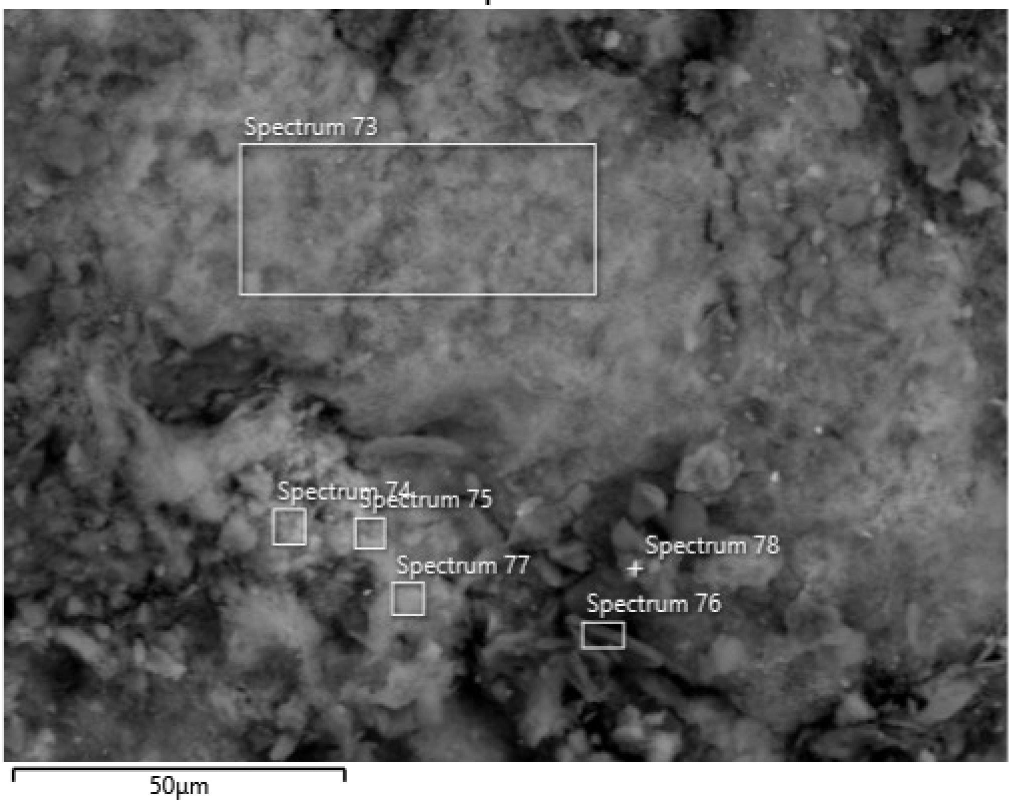
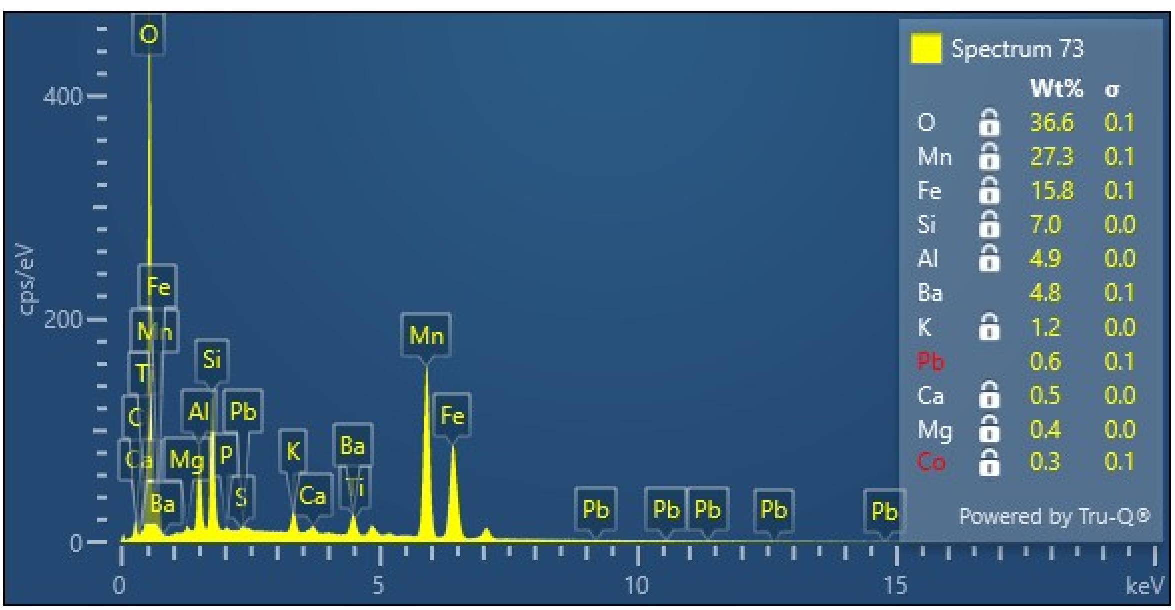


Site 2 sp65 details

Site 2 sp65 2000x





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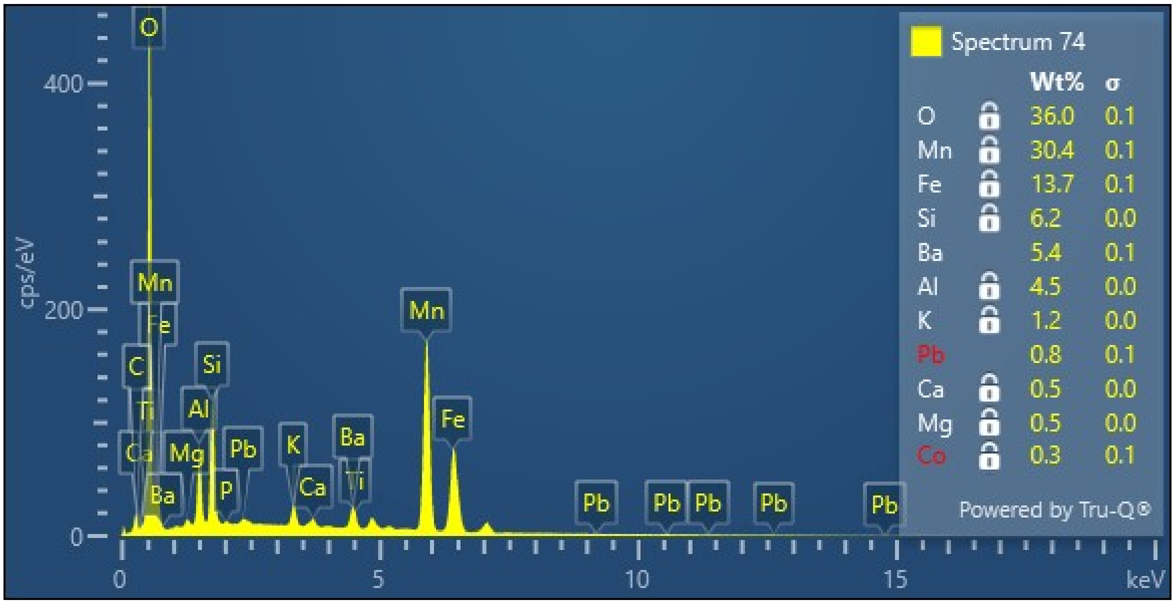
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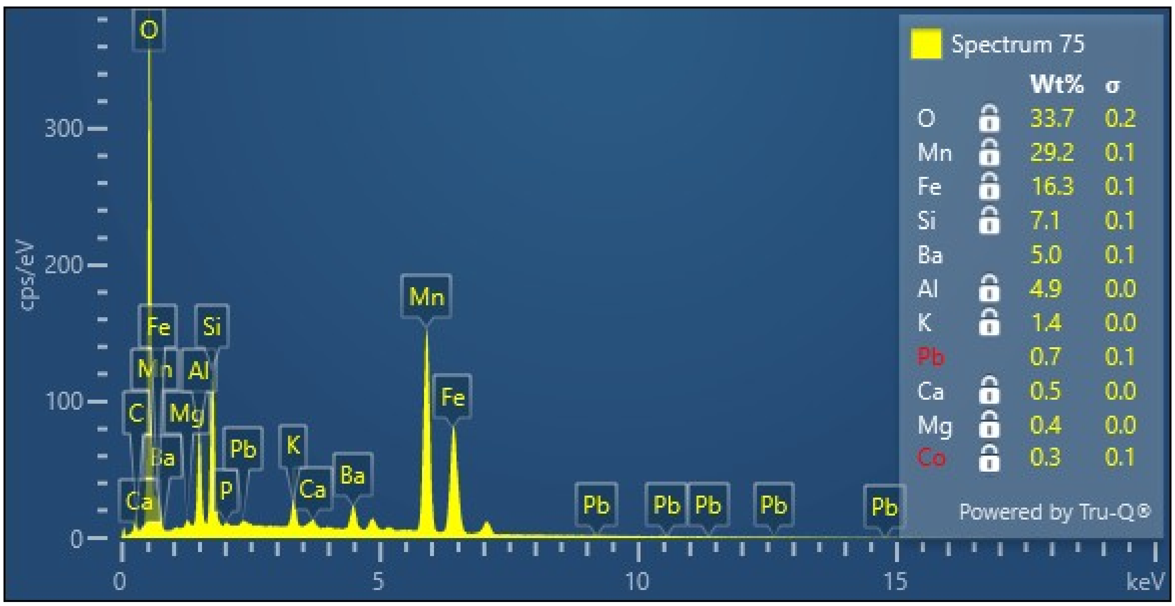
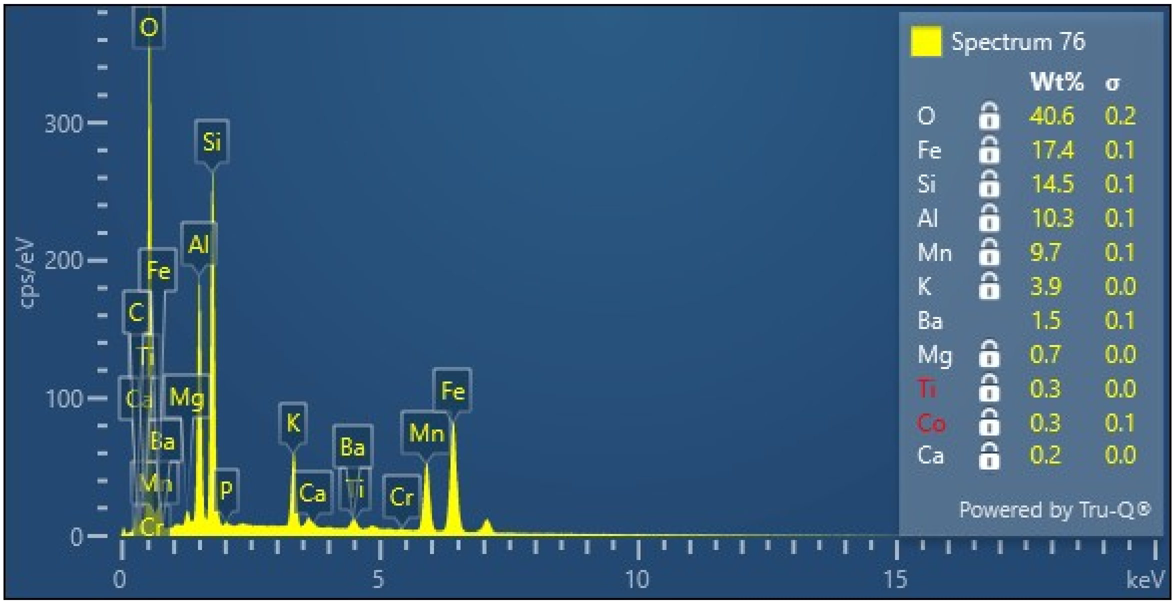
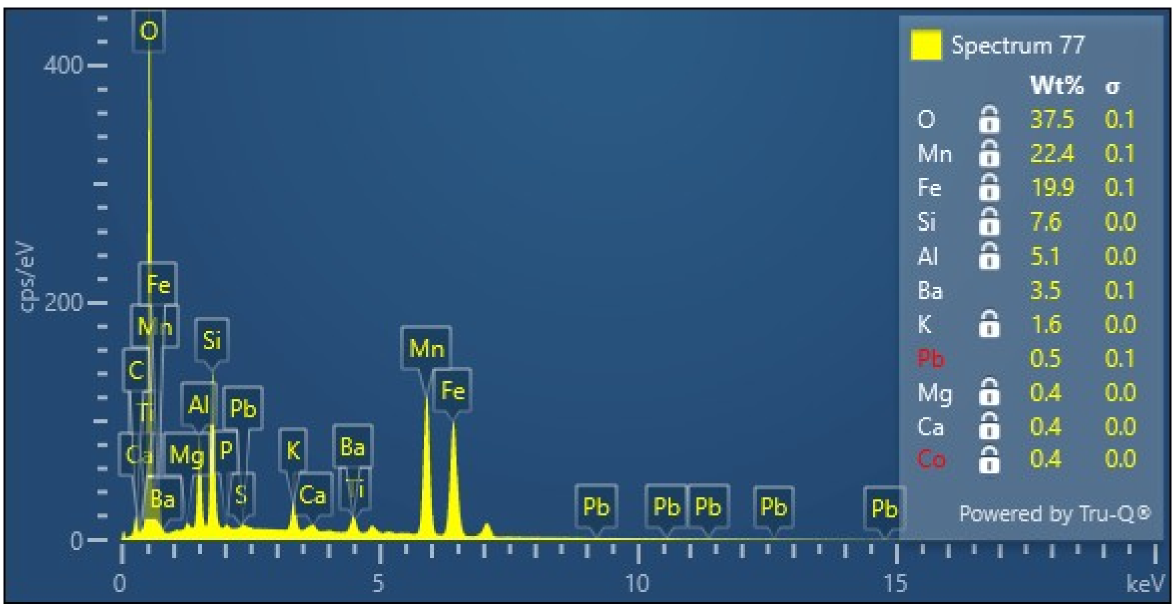
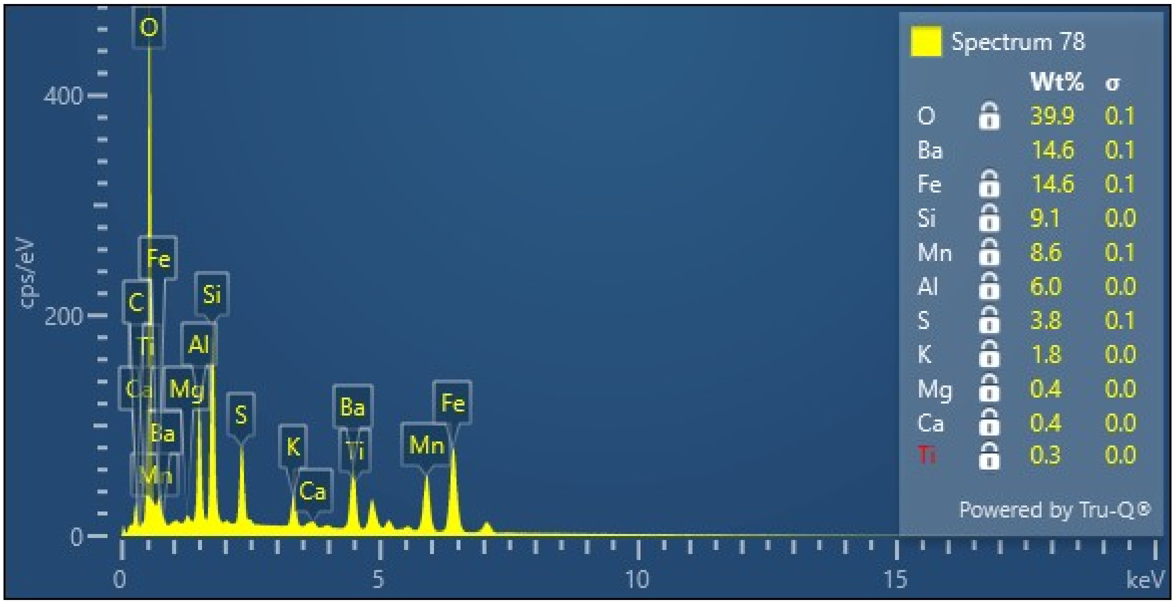
Wt% σ
O 36.0 0.1
Mn 30.4 0.1
Fe 13.7 0.1
Si 6.2 0.0
Ba 5.4 0.1
Al 4.5 0.0
K 1.2 0.0
Pb 0.8 0.1
Ca 0.5 0.0
Mg 0.5 0.0
Co 0.3 0.1
Powered by Tru-Q®
cps/eV
keV


Spectrum 75
Wt% σ
O 33.7 0.2
Mn 29.2 0.1
Fe 16.3 0.1
Si 7.1 0.1
Ba 5.0 0.1
Al 4.9 0.0
K 1.4 0.0
Pb 0.7 0.1
Ca 0.5 0.0
Mg 0.4 0.0
Co 0.3 0.1
Powered by Tru-Q®
cps/eV
keV


Spectrum 76
Wt% σ
O 40.6 0.2
Fe 17.4 0.1
Si 14.5 0.1
Al 10.3 0.1
Mn 9.7 0.1
K 3.9 0.0
Ba 1.5 0.1
Mg 0.7 0.0
Ti 0.3 0.0
Co 0.3 0.1
Ca 0.2 0.0
Powered by Tru-Q®
cps/eV
keV
O
Si
Al
Fe
C
Ti
Ca
Mg
Ba
Mn
Cr
P
K
Ca
Ba
Ti
Cr
Mn
Fe


Spectrum 77
Wt% σ
O 37.5 0.1
Mn 22.4 0.1
Fe 19.9 0.1
Si 7.6 0.0
Al 5.1 0.0
Ba 3.5 0.1
K 1.6 0.0
Pb 0.5 0.1
Mg 0.4 0.0
Ca 0.4 0.0
Co 0.4 0.0
Powered by Tru-Q®
cps/eV
keV
O
Fe
Mn
Si
C
Ti
Al
Pb
Ca
Mg
P
Ba
S
K
Ba
Ca
Ti
Mn
Fe
Pb
Pb
Pb
Pb
Pb



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