Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234

May 29, 2024

Illinois Environmental Protection Agency
DWPC – Permits MC #15
Attn: Part 845 Coal Combustion Residual Rule Submittal
1021 N. Grand Avenue East
Springfield, IL 62794-9276

Re: Dynegy Midwest Generation, LLC – Vermilion Power Plant New East Ash Pond (ID No. W1838000002-04)

Dynegy Midwest Generation, LLC (DMG) is hereby submitting this assessment of groundwater corrective measures for Vermilion Power Plant New East Ash Pond to satisfy the following provisions:

- 35 I.A.C. 845.660 (Assessment of Corrective Measures), and
- 35 I.A.C. 845.650(d) (Characterization of Nature and Extent)

Along with this letter, these plans will be posted to Luminant's publicly accessible internet site: www.luminant.com/ccr/illinois-ccr/.

If you have any questions regarding this submittal, please contact Phil Morris at 618-343-7799 or phil.morris@vistracorp.com.

Sincerely,

Dianna Tickner, PE, PMP
Senior Director, Demolition and Decommission

Enclosure

Intended for
Dynegy Midwest Generation, LLC

Date
May 29, 2024

Project No.
1940103584-009

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT

NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS
IEPA ID: W1838000002-04

RAMBOLL Bright ideas. Sustainable change.

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT VERMILION POWER PLANT NEW EAST ASH POND

Project name	**Vermilion Power Plant New East Ash Pond**
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Recipient	**Dynegy Midwest Generation, LLC**
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ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
ASD	alternative source demonstration
BCU	bedrock confining unit
CAAA	Corrective Action Alternatives Analysis
CAP	Corrective Action Plan
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
cm/s	centimeters per second
CSM	conceptual site model
DMG	Dynegy Midwest Generation, LLC
EPRI	Electric Power Research Institute
E001	Event 1, quarter 2, 2023
E002	Event 2, quarter 3, 2023
E003	Event 3, quarter 4, 2023
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard(s)
ID	identification
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
ITRC	National Research Council, Interstate Technology & Regulatory Council
IX	ion exchange
LOE	lines of evidence
No.	number
NEAP	New East Ash Pond
NID	National Inventory of Dams
NPDES	National Pollutant Discharge Elimination System
PRB	Permeable Reactive Barrier
PMP	Potential Migration Pathway
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SI	surface impoundment
Site	Vermilion Power Plant
TDS	total dissolved solids
UCU	upper confining unit
USEPA	United States Environmental Protection Agency
VPP	Vermilion Power Plant
ZVI	zero-valent iron

1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll) has developed this assessment of groundwater corrective measures on behalf of Dynegy Midwest Generation, LLC (DMG) to assist in the compliance with the requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments. This assessment applies specifically to the coal combustion residuals (CCR) unit referred to as the New East Ash Pond (NEAP) at the Vermilion Power Plant (VPP), also referred to as CCR unit identification (ID) number (No.) 501, Illinois Environmental Protection Agency (IEPA) ID No. W1838000002-04, and National Inventory of Dams (NID) No. IL50291. This report addresses content requirements specific to 35 I.A.C. § 845.660 (Assessment of Corrective Measures) for exceedances of sulfate and total dissolved solids (TDS) at the NEAP.

1.1 Source Control and Residual Plume Management

DMG intends to initiate source removal and residual plume management efforts as part of the NEAP closure, as documented in the Construction Permit Application that was submitted to IEPA in January of 2022 (DMG, 2022). The NEAP will be closed by removal. This will include excavating approximately 376,000 cubic yards of CCR and underlying soils and disposing of them of in a new on-site landfill that will be constructed and will meet the requirements of 35 I.A.C. § 811 and 40 C.F.R. § 257. All areas affected by releases of CCR from the NEAP will be decontaminated. General fill will be placed to provide positive drainage following excavation of CCR from the NEAP and reduce the potential for future water impoundment within the NEAP. These source control activities will serve as the primary groundwater corrective measure at the NEAP. The potentially feasible corrective measures presented herein are intended to be supplementary to the primary source control and are intended to serve as management measures to address any residual plumes that remain after completion of source control.

Attachment A includes summary figures from the Construction Permit Application that show the proposed final source control and primary corrective action.

1.2 Adaptive Site Management

Adaptive site management strategies will be employed as an integral part of ongoing corrective action at the NEAP. The adaptive site management approach will allow timely incorporation of new site information over the closure and post-closure life cycle of the NEAP to ensure the achievement of the groundwater protection standard (GWPS). The adaptive site management approach is proposed to expedite progress toward meeting the GWPS while acknowledging uncertainties, such as the persistence of current groundwater flow directions and flux quantities and potential related changes in geochemical conditions. A structured decision-making process and explicitly planned iterations between the implemented corrective measures and monitoring results will ensure that remediation is occurring. System performance and the condition of the residual plume will be monitored as the corrective measure(s) selected through the 35 I.A.C. § 845.710 Corrective Action Plan (CAP) process are implemented to supplement the source control measures described above. The adaptive site management approach will facilitate timely modifications or enhancements to the corrective measure(s), as needed in accordance with 35 I.A.C. § 845.680(b). This approach will be employed in response to new site information and/or the performance of the selected corrective measure(s).

The planned adaptive site management strategies are generally consistent with National Research Council, Interstate Technology & Regulatory Council (ITRC) and United States Environmental Protection Agency (USEPA) methodologies developed to address sites with long remediation times and high levels of uncertainty regarding the remedial actions necessary to achieve final and protective remediation goals (USEPA, 2022). The elements of the proposed adaptive site management strategy at the NEAP will be responsive to the changing conditions associated with pond closure and performance of the selected corrective measure(s) and will include the following:

1. Implementing the groundwater corrective measure(s) selected as part of the CAP for the current conditions at the NEAP. The selected corrective measures may include a combination of the technologies presented in this Corrective Measures Assessment (CMA).

2. Establishing both the absolute remedial objective and functional (interim) goals to monitor progress toward the remedial objective. Achieving the GWPS for 35 I.A.C. § 845.600 constituents at the downgradient waste boundary is the remedial objective for the NEAP. Specific functional goals will be developed as part of the CAP process. The functional goals will be measurable thresholds for future action and may include short-term or technology-specific objectives and triggers. Functional goals may vary for different locations, CCR constituents or other site-specific considerations (ITRC, 2017) and will serve as benchmarks for comparison to ongoing groundwater monitoring at the NEAP.

3. Ongoing groundwater monitoring at the NEAP will continue throughout the implementation of source control and residual plume management activities. Post-closure monitoring will continue for a period of at least 30 years, in accordance I.A.C. § 845.780. A comprehensive groundwater monitoring plan (GMP) will be developed as part of the CAP process in accordance with 35 I.A.C. § 845.670 and 35 I.A.C. § 845.220(c)(4). The GMP will include the functional goals and proposed action levels.

4. Groundwater monitoring information will be used to guide decisions regarding whether progress toward the remedial goal is advancing as expected and/or whether additional actions may be needed to achieve the remedial objective, in conjunction with IEPA, as required by 35 I.A.C. § 845.680(b).

2. SITE INFORMATION

The VPP is located in Vermilion County in east central Illinois, approximately five miles northeast of the village of Oakwood. The NEAP is located within the east half of the northeast quarter of the southeast quarter of Section 20, Township 20 North, Range 12 West (**Figure 2-1**). The NEAP lies in the bottomlands of the Middle Fork of the Vermilion River and is bordered to the west by bluffs, to the south by unimproved DMG land, and to the north and east by the Middle Fork of the Vermilion River (**Figure 2-2**). The VPP ceased operations in 2011 when the power plant was retired.

The NEAP was initially constructed in 1989 with earthen berms keyed into the underlying shale formation with two four-foot-thick soil/bentonite slurry walls on the north, east, and south sides of the original 1989 footprint. New berms were constructed in 2002 to expand capacity. The NEAP is an inactive, unlined CCR SI with a surface area of 29 acres which was used to manage CCR and non-CCR waste streams and to clarify process water prior to discharge. The NEAP is operated per National Pollutant Discharge Elimination System (NPDES) Permit IL0004057 at the VPP. A construction permit application for the closure of the NEAP (*e.g.,* source control) was submitted to IEPA on January 28, 2022 (DMG, 2022); permit approval is pending at this time.

2.1 Conceptual Site Model

Significant site investigation has been completed at the VPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the NEAP has been well characterized and detailed in the Hydrogeologic Site Characterization Report (Ramboll, 2021), which was prepared to comply with the requirements specified in 35 I.A.C. § 845.620. The conceptual site model (CSM) is presented below.

In addition to the CCRs present in the NEAP, there are two different types of unlithified material present above the bedrock, which were categorized into three hydrostratigraphic units in this report as follows:

- **Upper Unit:** includes mixed alluvial deposits of the Cahokia Alluvium described as sand with occasional layers of silty clay. The alluvial sand is generally a fine to medium sand that contains silts, clays, and gravels in varying amounts. This unit is present outside of the NEAP and in the bottomlands of the Middle Fork of the Vermilion River.
- **Upper Confining Unit (UCU)**: consists of predominantly low permeability silty and clayey diamictons (glacial till) of the Wedron Formation with intermittent sand layers and lenses. This unit is present outside of the NEAP and along the western bluff of the Middle Fork of the Vermilion River.
- **Bedrock Confining Unit (BCU):** lowermost unit identified at the site and underlies all unlithified deposits. This unit occurs within Pennsylvanian shale which is the uppermost lithified unit at the Site.

None of the hydrostratigraphic units described above have been identified as an aquifer; however, the Upper Unit and BCU have been identified as potential migration pathways (PMPs). Groundwater flow direction and gradients are toward the Middle Fork of the Vermilion River. Groundwater elevations in the BCU and contours for the quarter 2, 2023 monitoring event (Event 1 [E001]) are presented in **Figure 2-3**.

2.2 Groundwater Quality

Groundwater monitoring in accordance with the proposed GMP and sampling methodologies provided in the operating permit application for the NEAP began in the second quarter of 2023. The 35 I.A.C § 845 groundwater monitoring system is displayed on **Figure 2-4** and consists of two background monitoring wells, one screened in the UCU and one screened in the BCU, four compliance wells screened in the Upper Unit, five compliance wells screened in the BCU, and one temporary water level only porewater well within the NEAP. The groundwater samples collected from the 11 wells are used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards listed in 35 I.A.C. § 845.600(a). The proposed monitoring wells yield groundwater samples that represent the quality of downgradient groundwater at the CCR boundary (as required in 35 I.A.C. § 845.630(a)(2)).

The E001 sampling event was completed on June 29, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C), statistically derived values were compared with the GWPSs summarized in 35 I.A.C. § 845.600 to determine exceedances of the GWPS (Ramboll, 2023a). The statistical determination identified the following GWPS exceedances at compliance groundwater monitoring wells:

- Chloride in BCU wells 35D and 70D;
- Lithium in BCU wells 35D and 70D;
- Sulfate in BCU well 35D and Upper Unit well 70S;
- TDS in Upper Unit well 70S.

Subsequent compliance sampling events for Quarter 3 and Quarter 4 2023 (Event 2 [E002] and Event 3 [E003]) were completed in September and November 2023 and groundwater samples were evaluated for exceedances of the GWPS as described in 35 I.A.C. § 845.600 (Ramboll, 2024a; Ramboll, 2024b). The following additional exceedance was identified during the E003 monitoring event:

- Chloride in BCU well 71D.

Pursuant to 35 I.A.C. § 845.650(e), an alternative source demonstration (ASD) was prepared and submitted to IEPA that presented evidence demonstrating that sources other than the NEAP were the cause of the chloride, lithium, sulfate, and TDS GWPS exceedances **in BCU wells 35D and 70D** (Ramboll, 2023b).

The IEPA did not concur with the ASD due to the following alleged data gaps:

1. Characterization that the draw water from the bedrock is completely isolated from local groundwater flow system.

2. No assessment of the interaction between bedrock groundwater and the old east pond. Based on Fig.1 shows to be upgradient of the NEAP.

3. Lack of analysis of the leachable metals from the CCR in the NEAP.

DMG filed a petition asking the Illinois Pollution Control Board (IPCB) to review IEPA's ASD denial. Implementing corrective actions to address naturally occurring compounds in groundwater will not be. The petition included a motion for a partial stay of the 35 I.A.C. § 845 requirements as they apply to the exceedance of the chloride, lithium, sulfate, and TDS GWPS in

BCU wells 35D and 70D. The IEPA had no objection to the requested stay, which was granted by IPCB on April 18, 2024. Although the ASD was prepared prior to the identification of the chloride exceedance in BCU well 71D, the lines of evidence (LOEs) presented in the ASD for BCU wells 35D and 70D would also apply to BCU well 71D. Therefore, the CMA will address identified GWPS exceedances of sulfate and TDS at **Upper Unit well 70S** in accordance with 35 I.A.C. § 845.660. The 35 I.A.C. § 845.650 groundwater monitoring requirements will continue to ensure that there will be timely detection of any additional changes in groundwater quality during the stay. The inclusion of the chloride, lithium, sulfate, and TDS GWPS exceedance in the CAP process will remain under review pending IPCB's final action on DMG's appeal of the IEPA ASD denial or until IPCB orders otherwise.

3. CORRECTIVE MEASURES ASSESSMENT METHODOLOGY

This section describes the CMA methodology initiated in response to the identification of exceedances of GWPSs for 35 I.A.C. § 845.600 constituents at the downgradient waste boundary of the NEAP during the E001 groundwater monitoring (Ramboll, 2023a). The CMA was initiated on December 31, 2023, within 90 days after the detection of exceedance(s) of GWPS. Under 35 I.A.C. § 845, owners and operators of existing CCR surface impoundments (SI) must initiate the assessment of corrective measures in accordance with 35 I.A.C. § 845.660 if one or more constituents are detected, and confirmed by an immediate resample, to be in exceedance of a GWPS in 35 I.A.C. § 845.600, and the owner or operator has not demonstrated that: a source other than the CCR SI caused the exceedance; or that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality or a change in the potentiometric surface and groundwater flow direction (an ASD).

The CMA is the first step in developing a long-term CAP to address the GWPS exceedances at CCR SIs. The process provides a systematic, rational method for evaluating potential corrective measures by first identifying potentially viable technologies and assessing them using qualitative information to eliminate from consideration infeasible or otherwise unacceptable remedial technologies (*i.e.,* the 35 I.A.C. § 845.660 CMA). The remaining technologies will be evaluated individually, or assembled into combined alternatives, and further evaluated under the 35 I.A.C. § 845.670 CAP process.

This CMA identified applicable corrective measure technologies and evaluated them for viability, given the site specific conditions and considerations at the NEAP, by addressing the following 35 I.A.C § 845.660 evaluation criteria:

- Performance, reliability, ease of implementation and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- Time required to begin and complete the CAP; and
- Institutional requirements, such as State or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the CAP.

The evaluation included qualitative and/or semi-quantitative screening of the potential corrective measures (technologies) relative to their general performance, reliability, and ease of implementation characteristics and their potential impacts, timeframes, and institutional requirements to assess the viability of each technology to address the GWPS exceedances at the NEAP. This approach provided a reasoned set of corrective measures that could be used, either individually or in combination, to supplement the primary source control measures described in **Section 1.1**. This set of corrective measures will be further evaluated in the Corrective Action Alternatives Analysis (CAAA).

4. DESCRIPTION OF POTENTIAL CORRECTIVE MEASURE TECHNOLOGIES

The potential groundwater corrective measures summarized below are applicable to the NEAP and were included in the CMA development and analysis. Site-specific considerations provided in **Section 2** were used to evaluate potential groundwater corrective measures. Each of the corrective measures evaluated may be capable of satisfying the requirements and objectives, listed in **Section 3**, to varying degrees of effectiveness. The corrective measure review process was intended to yield a set of applicable corrective measures that could be used to supplement the primary corrective action, which will be the source control activities described in **Section 1.1** (closure-by-removal). The source control is expected to reduce downgradient concentrations in the UA to less than the GWPS via naturally occurring physical and chemical processes over time. Ongoing monitoring will be an integral part of all corrective measures to verify and document the remedial process. The corrective measures ultimately advanced to the CAAA and selected in the CAP will be used to enhance the effectiveness of the source control and may be used independently or combined into specific remedial alternatives to leverage the advantages of multiple corrective measures to attain GWPSs.

Source control measures will be initiated for the NEAP, as described in **Section 1.1**; all of the evaluated additional corrective measure technologies are proposed to be supplemental and complementary to source control activities. The following potential corrective measures, commonly used to mitigate groundwater impacts, were considered as a part of the CMA process:

- Source Control with Groundwater Polishing;
- Source Control with Groundwater Extraction (groundwater pumping wells or collection trenches);
- Source Control with a Cutoff Wall; and
- Source Control with In-Situ Treatment (Permeable Reactive Barrier [PRB] or In-Situ Chemical Treatment).

4.1 Source Control with Groundwater Polishing

Both federal and state regulators have long recognized that natural geochemical processes can be an acceptable component of a remedial action when it can achieve remedial action objectives in a reasonable timeframe. In 1999, the USEPA published a final policy directive (USEPA, 1999) for groundwater remediation and described the process as follows:

- *"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. The natural attenuation processes that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants."*

The USEPA has stated that source control is the most effective means of ensuring the timely attainment of remediation objectives (USEPA, 1999). Natural geochemical processes may be appropriate as a "finishing step" after effective source control implementation (*i.e.*, groundwater polishing), to reduce the residual mass remaining in the groundwater after closure, if there are no risks to receptors and/or the contaminant plume is not expanding. Thus, groundwater polishing would be used in conjunction with source control effort at the site, described in **Section 1.1**.

In 2015, USEPA addressed remediation of inorganic compounds in groundwater and noted that the use of natural geochemical processes to address inorganic contaminants: (1) is not intended to constitute a treatment process for inorganic contaminants; (2) when appropriately implemented, can help to restore an aquifer to beneficial uses by immobilizing contaminants onto aquifer solids and providing the primary means for attenuation of contaminants in groundwater; and (3) is not intended to be a "do nothing" response (USEPA, 2015). Rather, documenting the applicability of natural geochemical processes for groundwater remediation should be thoroughly and adequately supported with site-specific characterization data and analysis (USEPA, 1999; USEPA, 2007; USEPA, 2015).

Both physical and chemical processes can contribute to the reduction of the small amount of residual mass remaining after closure of the NEAP, and the toxicity, mobility, volume, or concentration of contaminants in groundwater. Physical processes applicable to CCR constituents in groundwater include dilution, dispersion, and flushing. Chemical processes applicable to CCR constituents in groundwater include precipitation and coprecipitation (*e.g.,* incorporation into sulfide minerals), sorption (*e.g.,* to iron, manganese, aluminum; to other metal oxides or oxyhydroxides; or to sulfide minerals or organic matter), and ion exchange (IX).

All inorganic compounds are subject to physical processes and under typical environmental conditions, physical mechanisms most often exert the dominant control on the CCR constituents of interest. Chemical mechanisms are also likely to be active, though not often dominant, such as adsorption, IX, and organic complexation. In combination with source control, these natural controls can provide an effective means to polish residual loading and achieve the GWPS in a reasonable timeframe. Additional data collection and analysis may be required to support the USEPA's evaluation framework (USEPA, 2015) and obtain regulatory approval.

4.2 Source Control with Groundwater Extraction

Groundwater extraction is one of the most widely used groundwater corrective technologies and has a long history of performance. This corrective measure includes installation of one or more groundwater pumping wells or an extraction trench to control and extract impacted groundwater. Groundwater extraction captures and contains impacted groundwater and can limit plume expansion and/or off-site migration. Construction of a groundwater extraction system typically includes, but is not limited to, the following primary components:

- Designing and constructing a groundwater extraction system consisting of one or more extraction wells or trenches and operating at a rate to allow capture of CCR impacted groundwater.
- Management of extracted groundwater, which may include modification to the existing NPDES permit.
- Ongoing inspection and maintenance of the groundwater extraction system.

Remediation of inorganics by groundwater extraction can be effective, but systems do not always perform as expected. A combination of factors, including geologic heterogeneities, difficulty in flushing low-permeability zones, and rates of contaminant desorption from aquifer solids can limit effectiveness. Groundwater extraction systems require ongoing operation and maintenance to address issues such as iron bacteria and well fouling and to ensure optimal performance. The extracted groundwater must be managed, either by ex-situ treatment or disposal.

Groundwater extraction may reduce the timeframe to achieve GWPS and limit the off-site migration of constituents that exceed the GWPS. Extraction could be accomplished using a groundwater pumping well system or an extraction trench.

4.3 Source Control with Groundwater Cutoff Wall

Since the late 1970s and early 1980s, vertical cutoff walls have been used to control and/or isolate impacted groundwater. Low-permeability cutoff walls can be used to prevent horizontal off-site migration of potentially impacted groundwater. Cutoff walls act as barriers to lateral transport of impacted groundwater and can isolate soils that have been impacted by CCR to prevent flow between unimpacted groundwater. Cutoff walls are often used in conjunction with an interior pumping system to establish an inward gradient within the cutoff wall. The gradient imparted by the pumping system maintains an inward flow through the wall, keeping it from acting as a groundwater dam and controlling potential end-around or breakout flow of contaminated groundwater. Constructing the cutoff wall such that it intersects a low-permeability material at its base, referred to as "keying", greatly increases its effectiveness.

A commonly used cutoff wall construction technology is the slurry trench method, which consists of excavating a trench and backfilling it with a soil-bentonite mixture, often created with the excavated soils, or, for deeper walls, a cement-bentonite mixture that is produced at an onsite batch plant. The trench is temporarily supported with bentonite slurry pumped into the trench during excavation (D'Appolonia & Ryan, 1979). Cutoff wall excavation uses conventional hydraulic excavators, hydraulic excavators equipped with specialized booms to extend their reach (*i.e.,* long-stick excavators), clamshells, or more specialized equipment such as hydromills, secant-pile drill rigs, or one-pass machines, depending upon trench depth, material excavated, and type of material that the wall is keyed into.

Cutoff walls are a widely accepted technology for containing impacted groundwater. Combining groundwater polishing with a limited cutoff wall and groundwater extraction in specific areas may provide advantages over independent use of these potential corrective technologies. Cutoff walls can be used in combination with groundwater extraction or as part of a PRB system (as the "funnel" in a funnel-and-gate system; **Section 4.4**).

4.4 Source Control with In-Situ Chemical Treatment

The use of in-situ treatment, either by injection or PRBs is a widely used technology for treating impacted groundwater. However, in-situ treatment techniques for sulfate and TDS are not well established, therefore performance is unknown.

Chemical treatment could consist of injection of reactive materials into the subsurface to treat contaminants at specific, targeted locations. Alternatively, treatment could be accomplished via PRB, where subsurface barriers (*i.e.,* cutoff walls) are placed at locations designed to direct the contaminant plume along a flow path through the reactive media. In either system, the

contaminants are transformed or otherwise rendered into environmentally-acceptable forms to attain remediation concentration goals downgradient of the barrier (Electric Power Research Institute [EPRI], 2006).

As groundwater passes through the PRB under natural gradients, dissolved constituents in the groundwater react with the reactive media and are transformed or immobilized. A variety of media have been used or proposed for use in PRBs. Zero-valent iron (ZVI) has been shown to effectively immobilize some CCR constituents, including arsenic, chromium, cobalt, molybdenum, selenium, and sulfate. Use of a combination media consisting of ZVI and a boron-selective IX resin to treat boron has been documented in a pilot-scale test (EPRI, 2006).

System configurations include continuous PRBs, in which the reactive media extends across the entire path of the contaminant plume; and funnel-and-gate systems, where low-permeability barriers are installed to control groundwater flow through a permeable gate containing the reactive media. Continuous PRBs intersect the entire contaminant plume and do not materially impact the groundwater flow system. Design may or may not include keying the PRB into a low-permeability unit at depth. Funnel-and-gate systems utilize a system of barriers to groundwater flow (funnels) to direct the contaminant plume through the reactive gate. The barriers, typically some form of cutoff wall, are keyed into a low-permeability unit at depth to prevent short circuiting of the plume. Funnel-and-gate design must consider the residence time to allow chemical reactions to occur. Directing the contaminant plume through the reactive gate can significantly increase the flow velocity, thus reducing residence time.

Design of in-situ treatment systems requires rigorous site investigation to characterize the site hydrogeology and to delineate the contaminant plume. A thorough understanding of the geochemical and redox characteristics of the plume is critical to assess the feasibility of the process and select appropriate reactive media. Laboratory studies, including batch studies and column studies using samples of site groundwater, are needed to determine the effectiveness of the selected reactive media at the site (EPRI, 2006). The main considerations in selecting reactive media are as follows (Gavaskar et al., 1998; cited by EPRI, 2006):

- Reactivity - The media should be of adequate reactivity to immobilize a contaminant within the residence time of the design.
- Hydraulic performance - The media should provide adequate flow through the PRB, meaning a greater particle size than the surrounding aquifer materials. Alternatively, gravel beds have been emplaced in front of barriers to direct flow through the barrier.
- Stability - The media should remain reactive for an amount of time that makes its use economically advantageous over other technologies.
- Environmentally compatible by-products - Any by-products of media reaction should be environmentally acceptable. For example, iron released by zero-valent iron corrosion should not occur at levels exceeding regulatory acceptance levels.
- Availability and price - The media should be easy to obtain in large quantities at a price that does not negate the economic feasibility of using a PRB.

5. ASSESSMENT OF CORRECTIVE MEASURE TECHNOLOGIES

This CMA was initiated to address exceedances of the 35 I.A.C. § 845.600 GWPS for sulfate and TDS at the downgradient waste boundary of the NEAP identified during the E001, E002, and E003 groundwater monitoring events (**Section 2.2**).

5.1 Requirements

The potential groundwater corrective technologies described in the previous section were evaluated relative to the requirements presented in **Section 3** and reiterated below:

- Performance, reliability, ease of implementation and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- Time required to begin and complete the corrective action plan; and
- Institutional requirements, such as State or local permit requirement or other environmental or public health requirements that may substantially affect implementation of the corrective action plan.

Table 5-1 presents the qualitative CMA evaluation of each corrective technology relative to these requirements, as well as their ability to address sulfate and TDS GWPS exceedances at Upper Unit well 70S. The following sections provide a summary of these evaluations and a discussion of the potential groundwater corrective measure technologies that may be viable, either independently or in combination, to address GWPS exceedances. This section also provides a summary of corrective measure technologies that have been retained and advanced for evaluation as part of the 35 I.A.C. § 845.670 CAAA process for selecting the final remedy for the NEAP.

5.2 Groundwater Corrective Technology Assessment

Source control, consisting of closure-by-removal, will be the primary groundwater corrective measure for the NEAP. Closure is expected to be completed in 2033 and each of the potential groundwater corrective measure technologies would supplement the positive impact of the closure activities. The following sections evaluate groundwater corrective measure technologies that, when combined with site closure, may be viable to address the sulfate and TDS GWPS exceedances at Upper Unit well 70S. Technologies that are not viable for addressing the GWPS at the NEAP will be eliminated from further evaluation and viable technologies will be advanced for further evaluation as part of the 35 I.A.C. § 845.600 CAAA process.

5.2.1 Source Control with Groundwater Polishing

Source control corrective measures (**Section 1.1**) will eliminate the mass loading to the groundwater system and the groundwater polishing process could decrease the timeframe for attainment of GWPS. Physical processes are expected to perform well in the UA, as discussed below.

Groundwater polishing by natural geochemical processes is a widely accepted component of groundwater remediation and is routinely approved by the IEPA when paired with source control. The performance of groundwater polishing as a groundwater corrective measure varies based on

site-specific conditions and additional data collection may be needed to support the design and regulatory approval. Good performance by physical processes would be expected in addressing the sulfate and TDS in the PMP (Upper Unit well 70S). The chemical processes require further evaluation.

Naturally occurring geochemical processes are ongoing at the NEAP and will continue to affect groundwater constituent concentrations during and after NEAP closure. Ongoing monitoring of groundwater conditions is needed to better understand the mechanisms and efficacy of the groundwater polishing process and to confirm the effectiveness over time. Thus, additional groundwater sample collection and analyses would be required to characterize potential mechanisms, as discussed above, and to provide monitoring of the remedial progress. The reliability of groundwater polishing as a groundwater corrective measure is high because operation and maintenance requirements are limited. However, the reliability can also vary based on site-specific hydrogeologic and geochemical conditions.

Following characterization and approval of the CAP, monitoring of the groundwater polishing processes and comparison to functional goals established to monitor progress toward the remedial objective could begin concurrently with site closure activities.

No potential safety impacts or exposure to human health or environmental receptors are expected to result from the groundwater polishing processes. Timeframes to achieve GWPS are dependent on site-specific conditions but are expected to be relatively short due to the limited extent of the PMP. Detailed technical analyses are ongoing and will be evaluated in connection with the CAAA. Selecting groundwater polishing as a corrective measure for the NEAP will require approval of the closure and CAP permits by the IEPA.

Monitoring the groundwater polishing to track progress toward achievement of the GWPS, in conjunction with source control at the NEAP, would require maintenance and monitoring of the groundwater monitoring system to confirm source control and verify the effectiveness in reducing groundwater concentrations to levels below the GWPS. System design could begin immediately after approval of the CAP permit. Additional investigations to characterize site conditions and installation of the final monitoring system could be performed concurrently with the source control (unit closure) activities, which are currently expected to be completed in 2033.

Groundwater polishing processes will continue before, during, and after source control implementation and may be a viable corrective measure for the sulfate and TDS exceedances in Upper Unit well 70S. Therefore, these processes are being advanced to the CAAA for further evaluation.

5.2.2 Source Control with Groundwater Extraction

Source control will eliminate the mass loading to the groundwater system, and implementing a groundwater extraction system may reduce the time required to attain the GWPS. However, the groundwater impacts already present in the low permeability PMP may limit the reduction in time to attain the GWPS that can be achieved by a groundwater extraction system.

Groundwater extraction is a widely accepted corrective measure with a long track record of performance and reliability. It is routinely approved by the IEPA. For a corrective measure using groundwater extraction to effectively control off-site flow and/or to remove potentially contaminated groundwater, horizontal and vertical capture zone(s) must be created. However,

the low permeability PMP would restrict the ability to pump at rates high enough to establish the required capture zone(s) or would require a high density of wells or a trench drainage system. A groundwater pumping system in the PMP would be limited by its low permeability; however, a low volume extraction trench in the PMP could be used to enhance groundwater capture from the PMP. The performance of a fully penetrating extraction trench in the PMP would be expected to be effective in fully capturing impacted groundwater.

Implementation of a groundwater extraction system presents design challenges due to the limited saturated thickness of the PMP. Construction of an extraction system may be challenging due to the physical site constraints, such as proximity to protected areas. Extracted groundwater would need to be managed, which may include modification to the existing NPDES permit and treatment prior to discharge to the Middle Fork of the Vermilion River, if necessary. Specialized treatment equipment may be required, and ongoing operations and maintenance activities would be necessary.

There could be some impacts associated with constructing and operating a groundwater extraction system, including the potential for negative aesthetic impacts, continued permitted discharges to the Middle Fork of the Vermilion River, and some limited exposure to extracted groundwater. Additional data collection and analyses would be required to design an extraction system. Construction could be completed within 1 year following completion of a final design. Time of implementation is approximately 3 to 4 years after approval of the CAP permit, including characterization, design, permitting, and construction. Timeframes to achieve GWPS are dependent on site-specific conditions. An extraction system may reduce the time to attain GWPS, however, accelerated attainment of the GWPS is expected to be limited.

Implementing a groundwater extraction system at the NEAP would require IEPA approval of the CAP permit and discharge of extracted groundwater may require a modification to the NPDES permit. Depending upon the location of the extraction system, additional permitting may be required due to the proximity to the Middle Fork of the Vermilion River, designated a National Wild and Scenic River by the United States Department of the Interior. Other water quality or wetland permitting may be required, depending upon the location of the extraction system.

Groundwater extraction could be viable corrective measure for the sulfate and TDS exceedances in Upper Unit well 70S. Therefore, groundwater extraction is being advanced to the CAAA for further evaluation.

5.2.3 Source Control with Groundwater Cutoff Wall

Source control will eliminate the mass loading to the groundwater system and implementing additional groundwater corrective measures may reduce the time required to attain the GWPS. A cutoff wall could reduce the water management and treatment requirements for an extraction system.

Groundwater cutoff walls are a widely accepted corrective measure used to control and/or isolate impacted groundwater and are routinely approved by the IEPA. Cutoff walls have a long history of reliable performance as hydraulic barriers, provided they are properly designed and constructed. However, if not coupled with a groundwater extraction system, a cutoff wall will provide directional groundwater control only and may result in redistribution of contaminants and potentially GWPS exceedances at new locations.

Cutoff walls are designed to act as hydraulic barriers; as a result, cutoff walls inherently alter the existing groundwater flow system. Changes to the existing groundwater flow system may need to be controlled to maximize the effectiveness of the remedy by, for example, combining a cutoff wall with groundwater extraction to control build-up of hydraulic head upgradient and around the cutoff walls. The effectiveness of a cutoff wall as a hydraulic barrier also relies on the contrast between the hydraulic conductivity of the aquifer and the cutoff wall. The most effective barriers have hydraulic conductivity values that are several orders of magnitude lower than the geologic materials they are in contact with. The low permeability of the PMP would limit the performance of a cutoff wall which would typically be designed with hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s).

Constructing a cutoff wall may be challenging due to the physical site constraints (proximity to the Middle Fork of the Vermilion River), particularly if used in combination with an extraction system. Construction could have a negative aesthetic impact on the river, depending upon the location of the cutoff wall.

Additional data collection and analyses would be required to design a cutoff wall. Construction could be completed within 1 year. Time of implementation is approximately 5 to 8 years, including characterization, design, permitting and construction. Construction would be accelerated by combining with site closure activities. To attain GWPS, cutoff walls require a separate groundwater corrective measure to operate in concert with the cutoff wall(s). Cutoff walls are commonly coupled with groundwater polishing and/or groundwater extraction as groundwater corrective measures. The time to attain GWPS is dependent on the selected groundwater corrective measure or measures that are coupled with the cutoff walls. However, the time to achieve GWPS is expected to be relatively short due to the limited extent of the PMP.

Implementing a groundwater extraction system at the NEAP would require IEPA approval of the CAP permit and discharge of extracted groundwater may require a modification to the NPDES permit. Depending upon the location of the cutoff wall, additional permitting may be required due to the proximity to the Middle Fork of the Vermilion River. Other water quality or wetland permitting may be required, depending upon the location of the cutoff wall.

A cutoff wall alone would not be a viable corrective measure for the sulfate and TDS exceedances in Upper Unit well 70S and the performance of a cutoff wall is expected to be limited due to the low permeability of the PMP. Given that, and the uncertainties and potential aesthetic impacts from construction in close proximity to the Middle Fork of the Vermilion River, the cutoff wall is not being advanced to the CAAA for further evaluation.

5.2.4 Source Control with In-Situ Chemical Treatment

Source control will eliminate the mass loading to the groundwater system and implementing additional groundwater corrective measures may reduce the time required to attain the GWPS. Use of in-situ treatment, either through targeted injection of reactive media or in PRB systems, to transform contaminants into environmentally acceptable forms to attain the GWPS was considered.

In-situ treatment using IX to address sulfate and TDS exceedances in groundwater is not an established or widely accepted groundwater corrective measure; therefore, its performance and reliability are unknown. Regulatory acceptance of this innovative approach to achieving the GWPS is uncertain.

In-situ treatment presents design and construction challenges, including targeted reactive media delivery via injection to the low permeability PMP and the complicated construction that would be required for a PRB system in close proximity to the Middle Fork of the Vermilion River. Periodic change-outs of IX resin media may be required.

Additional data collection and analyses would be required to design an in-situ treatment system and bench scale and/or pilot scale testing may be required to demonstrate performance and reliability. Time of implementation is approximately 4 to 6 years after approval of the CAP permit, including characterization, design, permitting, and construction. Timeframes to achieve GWPS are dependent on demonstrations of performance and reliability and on ultimate regulatory acceptance. It is not known whether in-situ treatment would reduce the time to attain GWPS relative to the relatively short post-closure timeframe anticipated due to the limited extent of the PMP.

Due to the uncertain performance, reliability and potential for regulatory acceptance, in-situ chemical treatment is not a viable corrective measure for the sulfate and TDS exceedances in Upper Unit well 70S and is not being advanced to the CAAA for further evaluation.

5.3 Technologies Advanced to CAAA

Based on the evaluations presented above, the following potential corrective technologies are being advanced to the CAAA, individually or in combination, for more detailed evaluations:

- Source control with groundwater polishing; and
- Source control with groundwater extraction.

6. REFERENCES

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TABLES

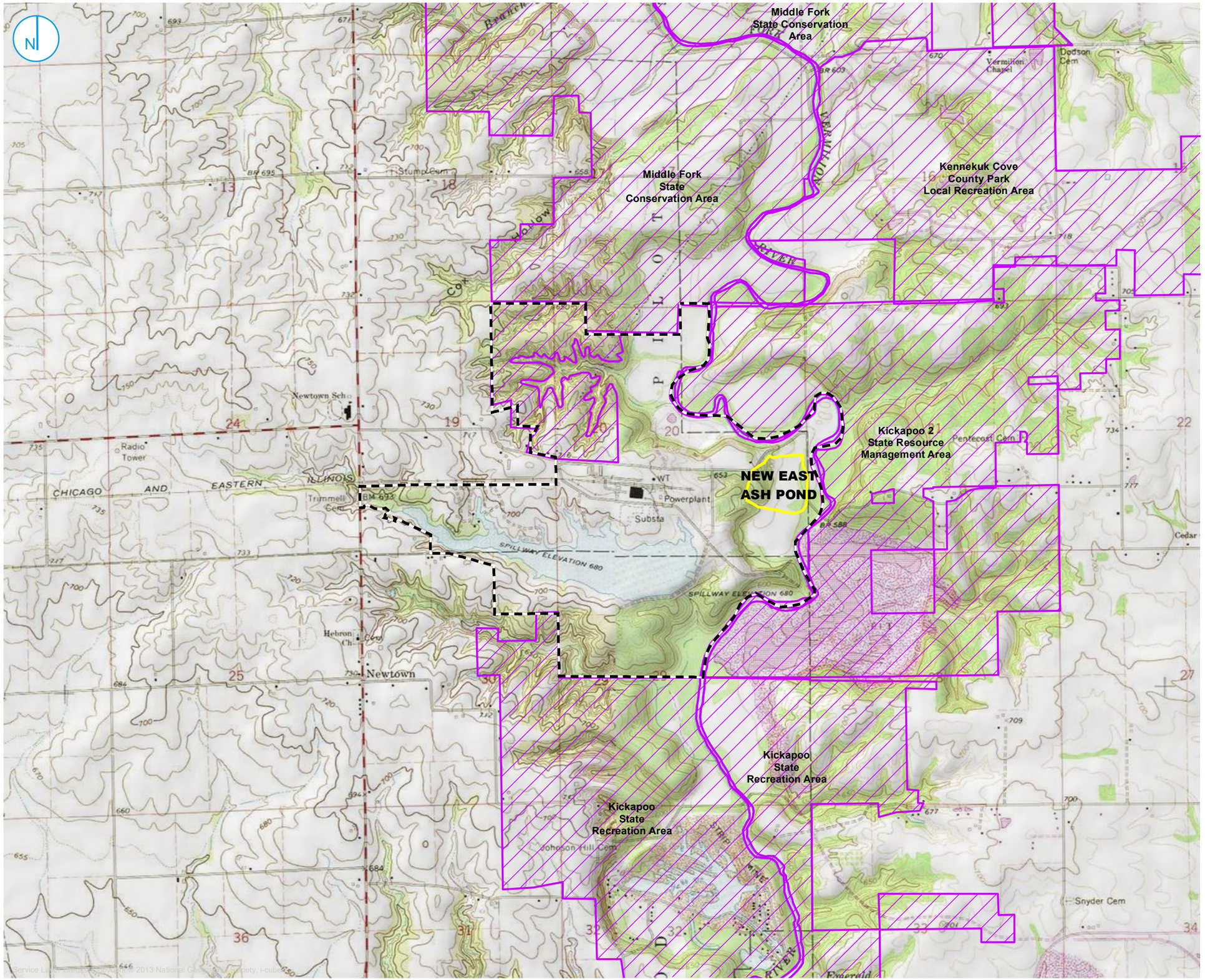
Table 5-1. CORRECTIVE MEASURES ASSESSMENT MATRIX
NEW EAST ASH POND
VERMILION POWER PLANT
OADWOOD, ILLINOIS
May 29, 2024

Remedy	Evaluation Factors						
	Performance	**Reliability**	**Ease of Implementation**	**Potential Impacts of Remedy** (safety impacts, cross-media impacts, control of exposure to any residual contamination)	**Time Required to Begin and Implement Remedy[1]**	**Time to Attain Groundwater Protection Standards**	**Institutional Requirements** (state/local permit requirements, environmental/public health requirements that affect implementation of remedy)
Source Control with Groundwater Polishing	Performs best paired with source control (closure-by-removal), which is expected to be completed at the site in 2033. Site conditions are favorable for physical degradation of sulfate (and TDS) while geochemical degradation may limited under normal aquifer conditions.	Ongoing analysis will evaluate whether the geochemical mechanisms have low reversibility, the Upper Unit has sufficient capacity, and the hydrogeology is favorable for sulfate (and TDS) dilution/dispersion.	Monitoring would be required. Implementing would not require extensive specialized equipment or contractors.	None identified.	Approximately 90 days after CAP permit approval.	Dependent on site specific conditions. Attainment of GWPS is anticipated to a relatively short time after site closure due to the limited extent of the PMP.	IEPA approval of the closure and CAP permits is required. Additional approvals may be required due to the proximity to the Wild and Scenic River (*e.g.,* to install or replace monitoring wells).
Source Control with Groundwater Extraction	A widely accepted, routinely approved technology. Performance would be best using an extraction trench that fully penetrates the PMP. Some lower permeability zones may have a negative impact on performance.	Reliable if properly designed, constructed, and maintained. Potentially complete groundwater capture by a fully penetrating trench would have high reliability. Extraction well reliability would be low due to heterogeneity.	The limited saturated thickness of the PMP would make an extraction well system difficult to implement. Site constraints could make trench construction difficult to implement due to proximity to protected areas. Specialized contractors may be necessary for construction of the groundwater extraction system. The extraction system would require ongoing routine operation and maintenance activities. Extracted groundwater would require management, possibly including treatment. Groundwater treatment, if needed, may require specialized equipment/contractors.	Alters groundwater flow system. Potential for some limited exposure to extracted groundwater. Could have a negative aesthetic impact on the Middle Fork of the Vermilion River if construction is required near the river, and potentially result in long term NPDES discharges into the river.	Design, permitting and construction is expected to take 3 to 4 years after CAP permit approval. Implementation could be accelerated by combining with closure construction activities.	Dependent on site specific conditions. Attainment of GWPS is anticipated to a relatively short time after site closure due to the limited extent of the PMP.	IEPA approval of the closure and CAP permits is required. Extracted groundwater may require NPDES permit modification. Additional approvals may be required due to the proximity to the Wild and Scenic River. USACE Section 404 and/or other Waters of the US and/or wetland permitting may be required, depending on the location of the remedy.
Source Control with Groundwater Cutoff Wall	Widely accepted and routinely approved technology with good performance if properly designed and constructed. If not combined with groundwater extraction, a cutoff wall will provide directional control only, thus redirecting flow to other areas where GWPS may be exceeded.	Reliable if properly designed, constructed, and maintained.	Widely used, established technology. Site constraints could make construction difficult to implement. Specialized contractors would likely not be necessary for construction.	Alters groundwater flow system but does not provide any treatment. Can result in unintended consequences resulting from redirecting contaminants to areas where they are not currently present. Could have a negative aesthetic impact on the Middle Fork of the Vermilion River if construction is required near the river.	Design, permitting and construction is expected to take 5 to 8 years after CAP permit approval. Implementation could be accelerated by combining with closure construction activities.	Provides groundwater directional control only. Combination with another groundwater corrective measure, such as groundwater extraction or a permeable reactive barrier, would reduce time to achieve and maintain GWPS after closure, which is anticipated to be relatively short due to the limited extent of the PMP.	IEPA approval of the closure and CAP permits is required. Additional approvals may be required due to the proximity to the Wild and Scenic River. USACE Section 404 and/or other Waters of the US and/or wetland permitting may be required, depending on the location of the remedy.
Source Control with In-Situ Treatment	In-situ treatment using IX not well established for sulfate (or TDS), therefore performance is unknown.	Unknown reliability for sulfate (and TDS).	Design challenges related to reactive material delivery due to heterogenous nature of the PMP. Could require periodic change-outs of resin media.	Alters groundwater flow system. Could have a negative aesthetic impact on the Middle Fork of the Vermilion River if construction is required near the river.	May require bench scale and/or pilot scale testing as part of design. Design, permitting and construction is expected to take 4 to 6 years after CAP permit approval.	There is uncertainty regarding whether a permeable reactive barrier would reduce sulfate and TDS concentrations to achieve the GWPS. Dependent on conditions specific to the reactive media used and the site. Treatment technology not well understood.	IEPA approval of the CAP permit is required. IEPA approval of this innovative and relatively unproven solution may be challenging. Additional approvals may be required due to the proximity to the Wild and Scenic River. USACE Section 404 and/or other Waters of the US and/or wetland permitting may be required, depending on the location of the remedy.

Notes:
[1] Time required to begin and implement remedy includes design, permitting and construction.

CAP - Corrective Action Plan
GWPS - Groundwater Protection Standards
IEPA - Illinois Environmental Protection Agency
IX - Ion Exchange
NPDES - National Pollutant Discharge and Elimination System
PMP - Potential Migration Pathway
TDS - total dissolved solids
USACE - United States Army Corps of Engineers

FIGURES



PART 845 REGULATED UNIT (SUBJECT UNIT)

PROPERTY BOUNDARY

PROTECTED AREA

0 1,000 2,000 Feet

SITE LOCATION MAP

CORRECTIVE MEASURES ASSESSMENT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed

PROJECT: 169000XXXX | DATED: 10/7/2021 | DESIGNER: STOLZSD

Y:\Mapping\Projects\22\22285\MXD\845_Operating_Permit\Vermilion\NEAP\GMP\Figure 1-1_Site Location Map.mxd



COAL MINE SHAFT
UNDERGROUND OR SURFACE COAL MINE
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

SITE MAP

CORRECTIVE MEASURES ASSESSMENT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\2212285\MXD\845_Operating_Permit\Vermilion\NEAP\GMP\Figure 1-2_Site Map.mxd

PROJECT: 1690000XXXX | DATED: 10/12/2021 | DESIGNER: STOLZSD



- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- PORE WATER WELL
- MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- PROPERTY BOUNDARY

NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24 HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.
3. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988

0 150 300
Feet

BEDROCK CONFINING UNIT POTENTIOMETRIC SURFACE MAP JUNE 19, 2023

CORRECTIVE MEASURES ASSESSMENT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Vermilion\VER 912 NEAP Pot Surface 20230619.mxd
PROJECT: 169000XXXX | DATED: 11/13/2023 | DESIGNER: GALARNMC



COMPLIANCE WELL
BACKGROUND WELL
SOURCE SAMPLE LOCATION
MONITORING WELL TO BE ABANDONED
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

MONITORING WELL LOCATION MAP

CORRECTIVE MEASURES ASSESSMENT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Vermilion\NEAP\GMP\Figure 2-1_Proposed 845 GW Monitoring Well Network.mxd

PROJECT: 169000XXXX | DATED: 10/8/2021 | DESIGNER: HOTCALD

ATTACHMENTS

ATTACHMENT A
Selected Construction Permit Application Plans

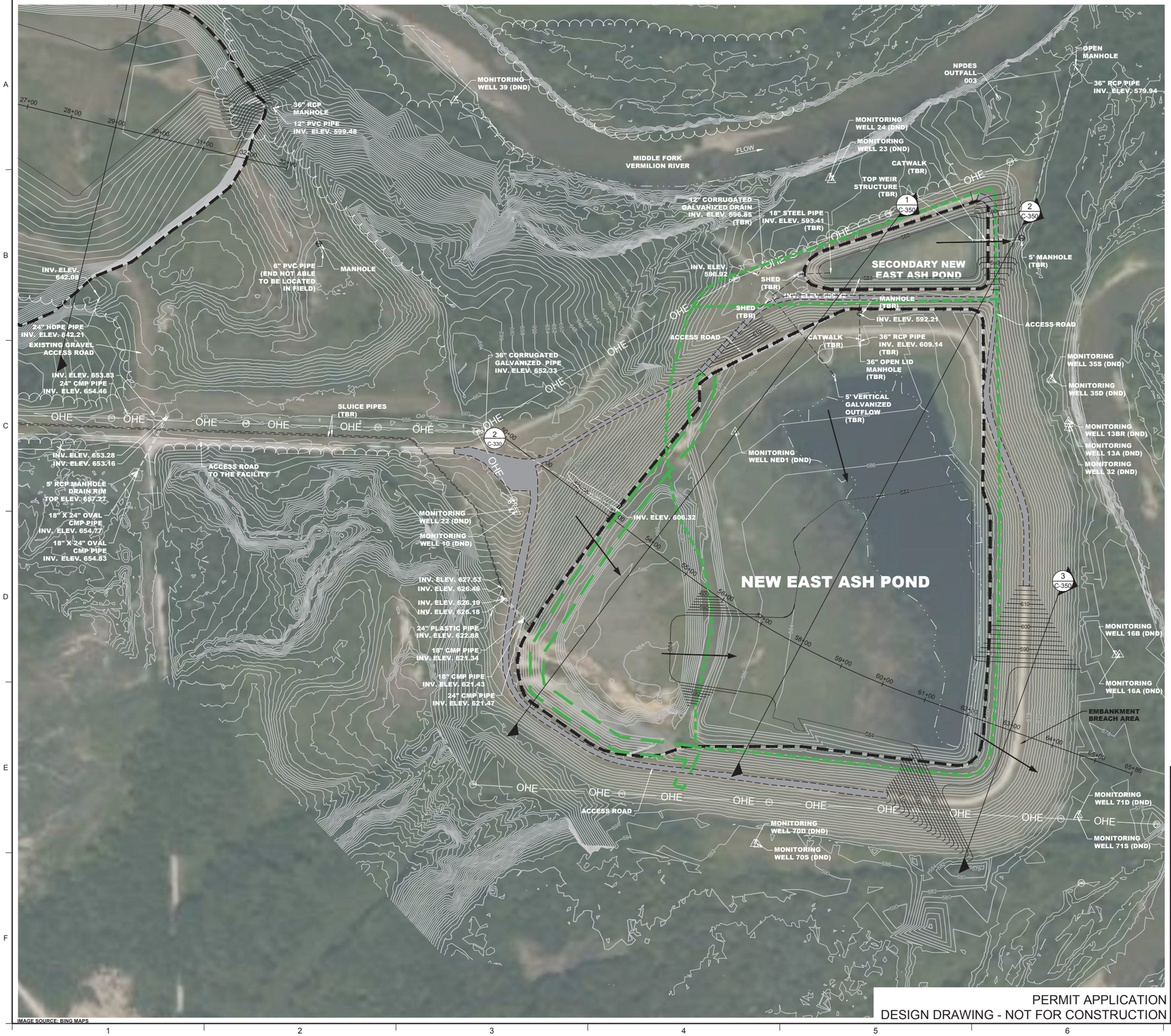


IMAGE SOURCE: BING MAPS

LEGEND

- EXISTING OVERHEAD ELECTRIC
- EXISTING TREE LINE
- EXISTING FENCE
- EXISTING POWER POLE
- EXISTING GUY WIRE
- EXISTING MANHOLE
- EXISTING MONITORING WELL
- APPROXIMATE LIMITS OF CCR
- EXISTING TOPO (MAJOR CONTOUR)
- EXISTING TOPO (MINOR CONTOUR)
- PROPOSED GRADING (MAJOR CONTOUR)
- PROPOSED GRADING (MINOR CONTOUR)
- SITE SECTION ALIGNMENT
- POST CONSTRUCTION ACCESS ROADS
- EXISTING CUTOFF WALL
- EXISTING CUTOFF TRENCH
- SURFACE WATER FLOW DIRECTION

NOTES:

1. FOLLOWING ASH REMOVAL, ADDITIONAL EXCAVATION OF THE IMPOUNDMENT BERMS WILL BE PERFORMED WHERE SHOWN. EXCAVATED MATERIALS FROM BERMS WILL BE USED AS BACKFILL TO ACHIEVE FINAL GRADES. ADDITIONAL MATERIALS MAY BE USED AS BACKFILL MATERIAL TO AUGMENT BERM MATERIALS.
2. ENGINEERING ANALYSES WILL BE PERFORMED TO FINALIZE THE SIZE AND DIMENSIONS OF STORMWATER CONVEYANCE FEATURES AND PERMANENT EROSION CONTROL MEASURES. ENGINEERING ANALYSES WILL BE PERFORMED AS PART OF CONSTRUCTION BID DOCUMENTS.
3. THE CONTRACTOR WILL MANAGE DEWATERING OPERATIONS AND EQUIPMENT DURING BACKFILL ACTIVITIES TO ENSURE BACKFILL IS PLACED IN UNSATURATED CONDITIONS AND THE SUBGRADE IS SUITABLE FOR BACKFILL.
4. BACKFILL PLACEMENT AND COMPACTION WILL BE MONITORED AND TESTED AS NECESSARY ACCORDING TO THE CQA PLAN DURING CONSTRUCTION.
5. PERMANENT ACCESS ROADS FOR LIGHT-DUTY VEHICLES WILL BE CONSTRUCTED WITH SLOPES NO GREATER THAN 5H:1V.
6. FINAL GRADING AND FINAL SLOPE TIE-INS TO THE PERIMETER WILL BE COMPLETED WITH CONSTRUCTION DOCUMENTS.

N

0 100 200
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS 60602 USA
TELEPHONE: 312.658.0500

DYNEGY MIDWEST GENERATION, LLC
1500 EASTPORT PLAZA DRIVE
COLLINSVILLE, IL 62234 USA

TITLE: NEAP FINAL GRADING PLAN

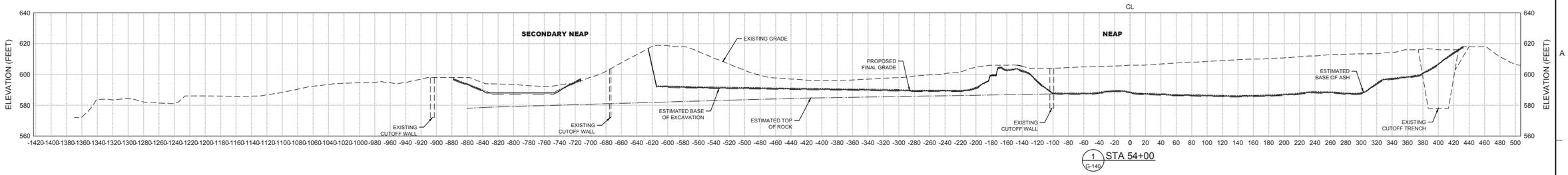
PROJECT: VERMILION POWER PLANT
VERMILION FLY ASH POND CLOSURE

SITE: VERMILION COUNTY, ILLINOIS

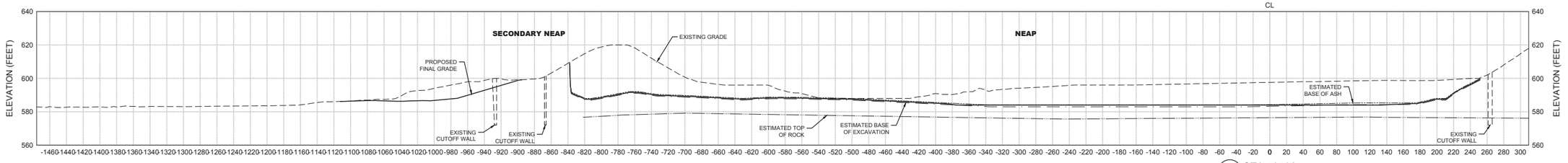
DESIGN BY:	JHG	DATE:	JANUARY 2022
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CHECKED BY:	TWW	FILE:	11-CHE8404 C-320
REVIEWED BY:	JPS	DRAWING NO.:	C-320
APPROVED BY:	JPS		

PERMIT APPLICATION
DESIGN DRAWING - NOT FOR CONSTRUCTION

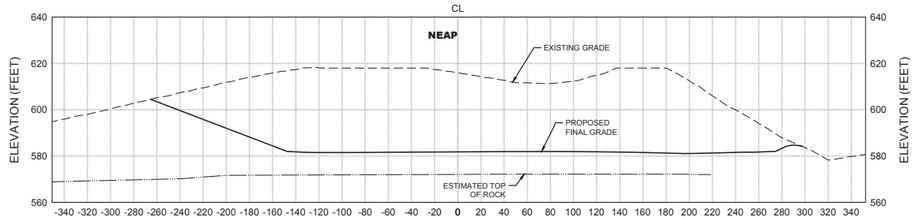
S:\COM\PAYP\PROJECTS_POST_2014\CHE8404_VPS_CLOSURE_RVA_SP\RT\000 - CAD\DRAWING\SCONC\[PTUAL11-12+CHE8404 C-320



1 G-140 STA 54+00



2 G-140 STA 58+00



3 G-140 STA 63+00

NOTES:

1. GROUNDWATER AND PHREATIC SURFACE CONDITIONS SHOWN MAY VARY BASED ON CLIMACTIC AND SEASONAL VARIATIONS. THE CONTRACTOR IS RESPONSIBLE FOR EVALUATING AND CONFIRMING CONDITIONS PRIOR TO AND DURING CONSTRUCTION.
2. EXISTING CUTOFF WALL AND CUTOFF TRENCH LOCATIONS AND ELEVATIONS ARE BASED ON AS-BUILT DRAWINGS.
3. FINAL GRADING AND FINAL SLOPE TIE-INS TO THE PERIMETER WILL BE COMPLETED WITH CONSTRUCTION BID DOCUMENTS.
4. ESTIMATED BASE OF ASH PROVIDED BY OTHERS.

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS 60602 USA
TELEPHONE: 312.658.0500

DYNEGY MIDWEST GENERATION, LLC
1500 EASTPORT PLAZA DRIVE
COLLINSVILLE, IL 62234 USA

TITLE: SITE SECTIONS - NEAP

PROJECT: VERMILION POWER PLANT
VERMILION FLY ASH POND CLOSURE

SITE: VERMILION COUNTY, ILLINOIS

DESIGN BY:	JHG	DATE:	JANUARY 2022
DRAWN BY:	TMM	PROJECT NO.:	CHE8404
CHECKED BY:	TWW	FILE:	14-CHE8404 C-350
REVIEWED BY:	JPS	DRAWING NO.:	C-350
APPROVED BY:	JPS		

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Dynegy Midwest Generation, LLC
10188 E 2150 North Rd
Oakwood, IL 61834

Date
May 29, 2024

Project No.
1940103584-009

NATURE AND EXTENT REPORT

VERMILION POWER PLANT, NEW EAST ASH POND, IEPA ID NO. W1838000002-04

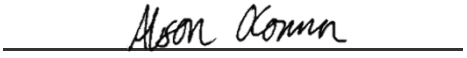
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ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
ASD	Alternative Source Demonstration
BCU	bedrock confining unit
CCR	coal combustion residuals
CAP	Corrective Action Plan
cm/s	centimeters per second
E001	Event 1
E002	Event 2
E003	Event 3
GCSM	geochemical conceptual site model
GWPS	groundwater protection standard
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
ISGS	Illinois State Geological Survey
LCL	lower confidence limit
mg/L	milligrams per liter
NAVD88	North American Vertical Datum 1988
NEAP	New East Ash Pond
NGVD29	National Geodetic Vertical Datum of 1929
NPDES	National Pollutant Discharge Elimination System
PMP	potential migration pathway
SI	surface impoundment
TDS	total dissolved solids
UCU	upper confining unit
UU	upper unit
VPP	Vermilion Power Plant

EXECUTIVE SUMMARY

Groundwater samples collected at the Vermilion Power Plant (VPP) New East Ash Pond (NEAP) during June 2023 for the Quarter 2, 2023 compliance sampling event (Event 1 [E001]) were evaluated for exceedances of the groundwater protection standards (GWPS) described in Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.600. Exceedances were identified in the following hydrostratigraphic units and wells:

- Detected bedrock confining unit (BCU) (potential migration pathway [PMP]) exceedances:
  - Chloride at wells 35D and 70D
  - Lithium at wells 35D and 70D
  - Sulfate at well 35D
  - Total dissolved solids (TDS) at well 35D
- Detected upper unit (UU; PMP) exceedances:
  - Sulfate at well 70S
  - TDS at well 70S

As a result of the identified E001 exceedances, a Corrective Measures Assessment was initiated on December 31, 2023, and submitted on May 29, 2024, in accordance with 35 I.A.C. § 845.660 [1]. The subsequent compliance sampling events for the Quarter 3 and Quarter 4 2023 sampling events (Event 2 [E002] and Event 3 [E003]) were completed in September and November 2023 and groundwater samples were evaluated for exceedances of the GWPS as described in 35 I.A.C. § 845.600. Exceedances identified during the E002 event were consistent with those listed above. Additional exceedances were identified in the following UU/PMP well during event E003:

- Chloride at 71D

An Alternative Source Demonstration (ASD) was completed for the chloride, lithium, sulfate, and TDS exceedances at BCU wells 35D and 70D [2]. The Illinois Environmental Protection Agency (IEPA) did not concur with the ASD [3], however, the non-concurrence was appealed and the Illinois Pollution Control Board (IPCB) granted a partial stay order on April 18, 2024 [4]. The remaining E003 exceedance (chloride at 71D) is similar to the other detected exceedances of chloride for which an ASD was submitted [5]. An ASD for chloride exceedances at 71D was submitted to the IEPA on May 8, 2024 and is under review [5]; these exceedances will not be discussed in this report pending IEPAs decision on the ASDs.

As required by 35 I.A.C. § 845.650(d)(1) this report characterizes the nature and extent of sulfate and TDS at well 70S, and relevant site conditions to determine how they may affect the corrective measures ultimately selected for the NEAP and documents the additional measures taken in accordance with 35 I.A.C. § 845.650(d).

Sulfate and TDS above the GWPS were encountered at one monitoring location (70S) within the UU PMP hydrostratigraphic unit. The extent of sulfate and TDS at concentrations above the GWPS is defined laterally by existing wells, and vertically by the presence of low permeability tills in the upper confining unit (UCU), low permeability bedrock of the BCU and deeper wells that do not have GWPS exceedances. The sulfate concentrations are attenuated physically through dilution and dispersion and may be geochemically attenuated via surface complexation reactions with metal oxides.

1. INTRODUCTION

35 I.A.C. § 845.650(d)(1) requires the owner or operator of a coal combustion residuals (CCR) surface impoundment (SI) to characterize the nature and extent of a release and relevant site conditions that may affect the remedy ultimately selected for a CCR SI if any constituent regulated under 35 I.A.C. § 845 is found to exceed the GWPS. This report documents the nature and extent of constituents detected above the GWPS that are attributable to the VPP NEAP.

The groundwater data and analysis in this report includes results from historical sampling through the E003 sampling event, which was completed on November 29, 2023. Results for events E001 through E003 were submitted and placed in the facility's operating record within 60 days of receiving final laboratory analytical data as required by 35 I.A.C. § 845.800(d)(15) [6, 7, 8]. The statistical determination presented in the report identified the following exceedances of the GWPS at compliance groundwater wells in the following hydrostratigraphic units:

- Detected BCU/PMP Exceedances:
  - Chloride at wells 35D, 70D, and 71D
  - Lithium at wells 35D and 70D
  - Sulfate at well 35D
  - TDS at well 35D
- Detected UU/PMP Exceedances:
  - Sulfate at well 70S
  - TDS at well 70S

An ASD, as allowed by 35 I.A.C. § 845.650(e) was completed for the chloride, lithium, sulfate, and TDS exceedances at BCU monitoring wells 35D and 70D [2] and received a partial stay order from the IPCB on April 18, 2024 [4]. An ASD was also submitted for the chloride exceedance in well 71D during the E003 sampling event [5]. These exceedances will not be discussed in this report pending IEPAs decision on the ASDs.

This report discusses in detail the extent of the sulfate and TDS exceedances at well 70S as well as a geochemical conceptual site model (GCSM) describing the nature of these exceedances.

2. UNIT BACKGROUND

2.1 Site Location and Description

The VPP is located in Vermilion County in east central Illinois, approximately five miles northeast of the Village of Oakwood, located within the east half of the northeast quarter of the southeast quarter of Section 20, township 20 North, Range 12 West (**Figure 2-1**). The VPP is an approximately 982-acre property consisting of 19 parcels, including a retired coal-fired power plant and SIs. The VPP ceased operations in 2011 when the power plant retired. All ash ponds at the VPP are out of service. The NEAP lies in the bottomlands of the Middle Fork of the Vermilion River (Middle Fork) and is bordered to the west by bluffs, to the south by unimproved Dynegy Midwest Generation, LLC land, and to the north and east by the Middle Fork.

2.2 Description of CCR Unit

The NEAP (IEPA Unit Identification [ID] W1838000002-04) is currently an inactive, unlined CCR SI. The present-day NEAP system consists of the NEAP (29-acres) and the secondary pond (**Figure 2-2**). When the NEAP was active, the ash in the NEAP settled out of the sluice water, was decanted to the polishing pond, and then discharged to the Middle Fork in accordance with the effluent limits and monitoring requirements of the VPP's National Pollutant Discharge Elimination System (NPDES) Permit IL0004057. The permitted NPDES outfalls to the Middle Fork are still in effect.

The 1989 footprint of the East Ash Pond was built directly overtop a thick shale formation which is greater than 80 feet thick in the vicinity of the ash ponds. The earthen berms on the north, east, and south sides of the 1989 footprint were "keyed" into the underlying shale formation with two four-foot-thick soil/bentonite slurry walls. These walls extended approximately 8 feet down into the shale and approximately 12 feet above the shale surface into the clay-core center of the earthen berms. A natural earthen bluff composed of low permeability native clays formed the west side of the 1989 footprint (**Figure 2-2**). New berms were constructed to expand the capacity of the East Ash Pond in 2002, forming the footprint of the present-day NEAP (**Figure 2-3**). The new berms raised the height of the original berms by approximately 20 feet and were constructed with 8-foot clay liners keyed into the underlying clay core.

The CCR unit contains primarily fly ash, bottom ash, and boiler slag and the base of ash in this unit is approximately 585 feet[1] within the NEAP (**Figure 2-4**). Water levels (the phreatic surface) measured in piezometer NED1 within the CCR unit indicate the phreatic surface is above groundwater elevations measured outside the CCR unit in the surrounding monitoring wells. The phreatic surface within the NEAP fluctuates with permitted discharges (*i.e.,* water levels decline during permitted discharges and slowly recover between events)

Water that may come into contact with CCR within the footprint of the NEAP becomes CCR source water. CCR source water samples, collected from the temporary porewater monitoring well

[1] All elevations in this report are referenced to North American Vertical Datum of 1988 (NAVD88) unless otherwise noted.

(NED1) screened within the CCR materials at the NEAP were used to provide information for ASDs and groundwater transport modeling[2].

2.3 Geology and Hydrogeology

Significant site investigation has been completed at the VPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the NEAP has been well characterized and detailed in the Hydrogeologic Site Characterization Report [9].

2.3.1 Hydrostratigraphic Units

In addition to CCR, three distinct water-bearing units have been identified in the vicinity of the NEAP that are based on stratigraphic relationships and common hydrogeologic characteristics. The units, listed from surface downward, are summarized as follows:

- **Upper Unit (UU):** includes mixed alluvial deposits of the Cahokia Alluvium described as sand with occasional layers of silty clay. The alluvial sand is generally a fine to medium sand that contains silts, clays, and gravels in varying amounts. This unit is present outside of the NEAP and in the bottomlands of the Middle Fork.
- **Upper Confining Unit (UCU):** consists of predominantly low permeability silty and clayey diamictons (glacial till) of the Wedron Formation with intermittent sand layers and lenses. This unit is present outside of the NEAP and along the western bluff of the Middle Fork.
- **Bedrock Confining Unit (BCU):** lowermost unit identified at the site and underlies all unlithified deposits. This unit occurs within Pennsylvanian shale which is the uppermost lithified unit at the site.

2.3.2 Uppermost Aquifer

None of the hydrostratigraphic units have been identified as an aquifer as defined by 35 I.A.C. § 610.110; however, the UU and BCU have been identified as PMP. The NEAP was constructed with berms containing a low-permeable clay core keyed into shale, which is greater than 80 feet thick in the vicinity of the ash ponds providing separation between CCR materials contained within the NEAP and any potential aquifers (**Figures 2-5, 2-6,** and **2-7**). Groundwater monitoring wells screened in the alluvial deposits are frequently dry and continue to be hydraulically isolated from the ash pond. Further, groundwater in the shale is at the end of its flow path as it migrates upward into the overlying alluvium and directly into the Middle Fork in some locations, preventing downward migration of water in contact with CCR materials contained within the NEAP [5] [9] [10].

2.3.3 Potential Migration Pathways

The UU is a laterally continuous fine- to coarse-grained deposit within the bottomlands of the Middle Fork in the vicinity of the NEAP, with the exception of the areas excavated during construction of the East Ash Pond in the 1989 pond footprint. These alluvial deposits lie unconformably on top of the underlying glacial till/or bedrock and terminate laterally along the

[2] Per Federal Register 80 (21302), which promulgated the final C.F.R. 40 § 257 rule, porewater concentrations should be used to characterize potential leaching from impoundments. As discussed further in USEPA's risk assessment of CCR surface impoundments (USEPA 2014), porewater is "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field," and concentrations within the porewater are "the most representative data available for impoundments because these data are field-measured concentrations of leachate." Therefore, CCR source water collected from porewater wells screened near the base of ash within the unit represents the CCR source term.

western bluffs of the river valley where the deposits rest unconformably against the till that comprises the uplands. Groundwater monitoring wells screened in the alluvial deposits are frequently dry and continue to be hydraulically isolated from the ash pond by the low permeability slurry walls. Four monitoring wells (16B, 35S, 71S, and 70S) are screened in the UU adjacent to the NEAP to monitor this PMP. The BCU is the lowermost unit identified at the site and the only laterally continuous hydrostratigraphic unit identified in both the bottomlands of the Middle Fork and uplands in the vicinity of the NEAP. Groundwater in the BCU is at the end of its flow path as it flows west to east and migrates upward into the overlying alluvium and directly into the Middle Fork in some locations [5] [9] [10]. Five monitoring wells (22, 16A, 35D, 70D, and 71D) are screened in the BCU adjacent to the NEAP to monitor this PMP.

2.3.4 Regional Bedrock Geology

Regional investigations of the Illinois Basin have identified bedrock (specifically brines within the bedrock formations) as a source of chloride in groundwater [11] [12]. Previous studies indicate that groundwater migrates toward the center of the Illinois Basin and discharges upward through overlying confining units [13] [14]. The "Saline groundwater and brines can be brought near or to the land surface by natural conditions, such as migrating up prominent fractures and/or faults in bedrock, or by anthropogenic activities, such as exploration for and exploitation of petroleum. The mixing of upward-migrating saline groundwater with fresh groundwater from shallow aquifers can make groundwater from private wells undrinkable and can present a very expensive problem for municipalities" [15]. Illinois State Geological Survey (ISGS) reporting includes 31 chloride results from available water samples (including some samples from VPP), which range from 2.1 to 30,269 milligrams per liter (mg/L) with a mean value of 1,689 mg/L and median of 13 mg/L [16]. The report also concludes that water from the wells completed in shale contained higher concentrations of aluminum, barium, bromide, boron, chloride, fluoride, iron, lithium, potassium, sodium, and strontium. Tritium and carbon-14 age dating has demonstrated that groundwater from the bedrock is significantly older than that from the shallow Quaternary deposits [10, 16].

2.3.5 Local Bedrock and Subsurface Mining

The upper bedrock at the site typically consists of Pennsylvanian Age Shelburn Formation, which is composed of non-marine and marine, silty and micaceous shales. The Shelburn Formation contains a major coal seam mined in the region, the Danville Coal, also called No. 7 Coal. The upper zone of the shale is often weathered and appears greenish-gray to bluish-gray. Generally, the top of the shale occurs within 10 to 25 feet of ground surface in the vicinity of the NEAP and rapidly increases in depth toward the western upland bordering the site. The depth to bedrock is greatest east of the Middle Fork, where it exceeds 150 feet (location MW31). The bedrock high at the site occurs directly west of the NEAP and higher elevations trend toward the northeast [10].

Boring logs from the site also indicate the Danville (No. 7) Coal or mine features were intercepted at eight locations in the vicinity of the NEAP (B201 to B208) and one location to the north of the Middle Fork (location MW30). The thickness of the coal seam ranged from 4 to 7 feet with an average thickness of 5.4 feet. The area around the NEAP has experienced extensive coal-mining activity from 1893 until 1970. Two coal mines, the Crawford Mine (ISGS Mine Index No. 3889) and Fletcher's Middlefork Mine (ISGS Mine Index No. 3888), were historically operated beneath and in the vicinity of the NEAP. To varying degrees, these mining activities have altered the natural topography, hydrology, surface water and groundwater chemistry that existed in the area

before mining began. The potential effects of the coal mine on the groundwater includes observed subsidence and voids that may provide migration pathways and potential geochemical changes as a result of oxidation of coal beds and shales during mining.

2.3.6 Water Table Elevation and Groundwater Flow Direction

Phreatic surface elevations collected from NED1 since March 2021 range from 594.86 to 598.68 feet (**Table 2-1**; [9]) which is above the water levels observed in BCU and UU PMPs within the bottomlands of the Middle Fork; however, the groundwater elevation contours of the BCU (**Figure 2-8**) illustrate flow toward the Middle Fork with no observable radial component of flow outward along the perimeter of the NEAP. The absence of a radial component of flow indicates the NEAP does not significantly impact groundwater flow direction.

The UU terminates on the west side of the NEAP along the upland bluff area (upgradient of the NEAP) and wells screened in the UU east of the NEAP (downgradient of the NEAP) are frequently dry [9]. Groundwater elevations averaged 566.27 feet in the UU from May to December 2023, where wells 16B and 35S were dry during all measurement events (**Table 2-1**). Groundwater elevation in the alluvial deposits (UU) typically conforms to ground surface topography and fluctuates in response to changes in river stage and variations in precipitation [10]. Recent data available from pressure transducers installed in the NEAP monitoring wells screened in the UU indicate relatively quick responses (increases and decreases in a period of one month) to changes in river stage and variations in precipitation (**Appendix A;** [5]).

Groundwater in the BCU is at the end of its flow path as it migrates upward into the overlying alluvium and directly into the Middle Fork in some locations [10]. The groundwater elevation in wells surrounding the NEAP averaged 568.23 feet in the BCU from May to December 2023. Wells in the BCU do not recover back to static water levels between groundwater sampling events (**Appendix A**). The observed lack of groundwater elevation response in BCU wells to precipitation and short-term changes in the Middle Fork river stage indicates the BCU has limited hydrologic connection to overlying strata and surface water systems [5].

2.3.7 Vertical Hydraulic Gradients

Unlike the bottomlands of the Middle Fork where groundwater within the shale is typically discharging upward into the alluvial deposits and the river, vertical groundwater movement in the uplands (comprised of glacial till) is downward. Groundwater levels in the glacial deposits are consistently higher than those in the underlying shale (**Table 2-1**), as demonstrated with the calculated vertical hydraulic gradients at well nest 10/22 that have an average downward gradient of 0.148 (**Table 2-2**). In 2023 groundwater elevations at UCU well 10 were greater than groundwater elevations at BCU well 22, which was consistent with previous observations at this well nest (**Appendix B**) [9, 10].

Downgradient shallow UU wells 16B (nested with BCU well 16A) and 35S (nested with BCU well 35D) are frequently dry, and downgradient BCU wells 70D (nested with UU well 70S) and 71D (nested with UU well 71S) may not represent static groundwater elevations as previously described in **Section 2.3.5**; therefore, the following discussion on vertical hydraulic gradient downgradient of the NEAP focuses on historical site data [10] as recent data is not sufficient to evaluate vertical hydraulic gradients.

In 2002, upward vertical gradients were observed between the shale and alluvial deposits at all the nested wells within the bottomlands of the Middle Fork during at least part of the monitoring period, with the exception of nested wells 23/24 (these evaluations included alluvial deposit and shale well nests 13B/13A, 16B/16A, 23/24, 26/27, and 28/29). The greatest upward gradients were observed between shallow shale well 13A and nested deep shale well 32 which was reported to be flowing under artesian conditions [10]. Note that well 35D (installed in March 2017) replaced well 13A, where the greatest upward gradients within the bedrock were observed and reported [10]; it is expected that vertical gradients are upward at well nest 35S/35D under normal conditions (static conditions). Nested wells 16B/16A experienced upward vertical gradients in only one of the eight groundwater level monitoring events in 2002 and the overall eight-month average vertical gradient was downward. Since March 2021, groundwater elevations measured at BCU well 16A ranged from 568.28 to 571.32 feet (**Appendix B** and **Table 2-1**), which were consistently greater than the elevation of the top of bedrock at location 16A (approximately 566 feet National Geodetic Vertical Datum of 1929 (NGVD29)) indicating the presence of upward gradients in the bedrock. The upward vertical gradients support that BCU groundwater is hydraulically isolated from the overlying local groundwater flow system in the UU downgradient of the NEAP; and groundwater does not flow from the UU downward into the BCU downgradient of the NEAP.

2.3.7.1 Impact of Surface Water Bodies on Groundwater Flow

The predominant surface water body in the region is the Middle Fork. The Middle Fork is directly adjacent to and downgradient from the NEAP. A United States Geological Survey stream gage (03336645) for the Middle Fork Vermilion River above Oakwood, Illinois is located 3 miles south (downstream) of the VPP. The gage datum elevation is 544.42 feet NGVD29. Elevations of the river are lower than groundwater elevations and little seasonal variation in groundwater flow has been observed; therefore, for most of the year the Middle Fork is a gaining stream. Although the majority of groundwater baseflow into the river is from unlithified deposits within the river valley, the Middle Fork is also a regional receiving water body for the shallow bedrock [9].

The Illinois Power Company Lake (Company Lake) is another large surface water body located to the south of the VPP. Company Lake is located within the VPP property and was created to provide process water for the VPP prior to its retirement. A former stream valley was dammed, and the reservoir was filled with water pumped from the Middle Fork (the river-intake pump house for VPP is located east of the lake on the Middle Fork to the east of the VPP) and supplemented by natural precipitation. Company Lake is southwest of the NEAP and south of the VPP, which sits on top of the bluff between the lake and the North Ash Pond and Old East Ash Pond. The base of the lake is interpreted to be the UCU. Groundwater elevation in the UCU well 10 averaged 608.77 feet from March to December 2023, whereas groundwater elevations in BCU well 22 averaged 603.03 feet from March to December 2023. Groundwater levels in these glacial deposits are consistently higher than those in the underlying shale indicating downward vertical gradients (**Appendix B**). **Figure 2-8** also illustrates flow from west to east within the bedrock towards the Middle Fork. Therefore, Company Lake is not downgradient of the NEAP.

2.3.8 Hydraulic Conductivities

2.3.8.1 Field Hydraulic Conductivities

Hydraulic conductivity was calculated based on field tests at several wells in proximity to the NEAP. Hydraulic conductivity ranged from 7.4×10^{-4} to 1.1 centimeters per second (cm/s), with a

geometric mean of 1.1 x 10^{-2} cm/s within the UU (mixed deposits of the Cahokia Alluvium). Hydraulic conductivities ranged from 1.1 x 10^{-6} to 2.3 x 10^{-5} cm/s, with a geometric mean of 7.1 x 10^{-6} cm/s within the BCU. The horizontal hydraulic conductivity for the UCU was 8.8 x 10^{-6} cm/s [9]. Field hydraulic conductivities are included in **Table 2-3**.

2.3.8.2 Laboratory Hydraulic Conductivities

Hydraulic conductivity laboratory tests were performed for eleven samples collected at the NEAP. Two samples were collected from the UU (mixed deposits of the Cahokia Alluvium) at two locations (70S and 71S) in the vicinity of the NEAP as part of the 2021 field investigation and the resulting vertical hydraulic conductivities for the samples ranged from 5.2 x 10^{-4} to 1.3 x 10^{-3} cm/s [9]. Eight samples were collected as part of the 2021 investigation to characterize the UCU in the vicinity of the VPP. The resulting vertical hydraulic conductivities from upland borings located to the west of the NEAP ranged from 1.6 x 10^{-8} to 8.2 x 10^{-5} cm/s with a geometric mean of approximately 6.2 x 10^{-7} cm/s [9]. The vertical hydraulic conductivity calculated from tests performed in the laboratory on one shale core ranged from 1 x 10^{-8} to 5 x 10^{-8} cm/s [10].

2.4 Groundwater Monitoring

The monitoring system for the NEAP consists of monitoring wells installed in the UU, UCU, and BCU, including background monitoring wells 10 and 22, located west of the NEAP, and compliance monitoring wells 16A, 16B, 35S, 35D, 70S, 70D, 71S and 71D (**Table 2-4, Figure 2-9**). NED1 (installed in CCR) is used to collect porewater samples and monitor water levels within the NEAP [17].

2.5 Hydrogeologic Conceptual Site Model

The HCR [9] and information provided above forms the foundation of the NEAP hydrogeological setting. The NEAP is constructed of berms with a low-permeable clay core that were keyed into the underlying shale formation with cutoff walls. The cutoff walls extended in depth to the underlying shale and above the shale surface into the low-permeable clay core of the earthen berms. The low-permeable materials surrounding the footprint of the NEAP form the existing hydraulic containment system. Within the berms, the NEAP overlies the low permeability Pennsylvanian shale. The geologic conceptual model for the site used for the groundwater modeling [18] consists of the following layers:

- mixed alluvial deposits of the Cahokia Alluvium described as sand with occasional layers of silty clay. The alluvial sand is generally a fine to medium sand that contains silts, clays, and gravels in varying amounts. This unit is present outside of the NEAP and in the bottomlands of the Middle Fork.
- low permeability silty and clayey diamictons (glacial till) of the Wedron Formation with intermittent sand layers and lenses. This unit is present outside of the NEAP and along the western bluff of the Middle Fork.
- Pennsylvanian shale is the lowermost unit identified at the site and underlies all unlithified deposits.

None of the hydrostratigraphic units described above have been identified as an aquifer; however, the UU and BCU have been identified as PMPs.

Recharge at the site primarily enters the UU at the surface, although a minor amount of flow may originate west of the NEAP and flows east toward the Middle Fork which is the regional receiving

body for groundwater. Vertical migration into the BCU is inhibited by upward gradients and the low permeability Pennsylvanian shale. The resulting primary potential transport pathway for impacts from the NEAP is migration of porewater though the low permeability clay soils associated with construction of the NEAP into the adjacent UU materials.

3. OCCURRENCE AND DISTRIBUTION OF GROUNDWATER EXCEEDANCES (EXTENT)

Results from groundwater samples collected from the NEAP during E001 were received on August 3, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C), comparison of statistically derived values with the GWPSs described in 35 I.A.C. § 845.600 to determine exceedances of the GWPS was completed [6, 7, 8]. Exceedances for which an ASD was not completed include the following parameters in UU well 70S:

- Sulfate and TDS (**Figure 3-1)**

3.1 Additional Investigation to Define Nature and Extent

Following initial sampling in 2021, potential exceedances of the GWPS were identified for the parameters and locations identified above [19]. Additional investigation was completed in 2023 to collect soil samples to further evaluate the concentrations and potential attenuation mechanisms near the NEAP (full analysis presented in **Appendix C**).

Two soil borings were advanced adjacent to locations with potential exceedances (35 and 70). Solids samples were collected and analyzed for the following:

- EPA 6020A for Total Metals;
- Bulk Mineralogy by Rietveld x-ray diffraction Analysis;
- Sequential Extraction Procedure Analysis;
- Cation Exchange Capacity Analysis;
- Total Organic Carbon Analysis; and
- Sulfides, Acid Volatile Analysis.

Data from this investigation has been incorporated into this report where applicable.

3.2 Extent in the Upper Unit/Potential Migration Pathway

Exceedances are identified quarterly following comparison of lower confidence limits (LCLs) to the GWPSs described in 35 I.A.C. § 845.600. The LCLs vary as the dataset is updated to include additional quarterly events (**Table 3-1**). The discussion below includes ranges of concentrations measured in wells with exceedances, because there is no single value for LCLs. The statistical results from the three compliance monitoring events are presented in **Table 3-1** and all data evaluated has been summarized in **Table 3-2**.

3.2.1 Sulfate and TDS

Sulfate and TDS concentrations in monitoring well 70S resulted in exceedances of the GWPS (400 mg/L and 1,200 mg/L, respectively) (**Figure 3-1**). The concentrations and extent of sulfate and TDS exceedances at the NEAP are summarized as follows:

- 70S – Exceedances were reported in all three compliance sampling events. Data collected between 2021 and 2023 reported sulfate concentrations ranging from 541 to 840 mg/L and TDS concentrations ranging from 1,140 to 1,580 mg/L (**Table 3-2**). The lateral extent of elevated sulfate and TDS concentrations are defined by adjacent monitoring wells 71S (46 to

69 mg/L and 474 to 538 mg/L, respectively) located east of 70S, and 16B and 35S (locations were dry in 2023), located on east side (downgradient) of the NEAP (**Figure 2-7**, **Table 2-1** and **Table 3-2**). The UU terminates on the west side of the NEAP along the upland bluff area (upgradient of the NEAP) (**Figures 2-5, 2-6,** and **2-7).** Surface water samples of the Middle Fork of the Vermilion River were collected twice in 2019 for a Human Health and Ecological Risk Assessment [20]. Results from those events indicated all concentrations of sulfate and TDS were less than 40 mg/L and 370 mg/L, respectively (**Appendix D**). Downward vertical migration of sulfate and TDS concentrations above the GWPS is limited by the lower permeability glacial till of the Wedron Formation (UCU) and the upward vertical gradients in the Pennsylvanian shale (BCU) [9].

4. GEOCHEMICAL CONCEPTUAL SITE MODEL (NATURE)

A GCSM was developed to describe the conditions of the groundwater in the vicinity of the VPP NEAP and is summarized here (full analysis presented in **Appendix C**). The GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. Only parameters that have exceeded the GWPS in NEAP groundwater and will be addressed in the Corrective Action Plan (CAP) are included in the GCSM. As discussed in previous sections, the exceedances observed at the NEAP include sulfate and TDS.

The primary source of sulfate and TDS to groundwater in the UU is expected to be the NEAP CCR porewater (*i.e.*, CCR source water). CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" [21] and represents the material potentially leached from impoundments. The CCR materials are the primary source of constituent loading to the CCR porewater. Over an extended period (*e.g.*, months to years), the CCR porewater (*i.e.*, water contained within the interstitial pore spaces of the CCR that can be sampled by low-flow groundwater sampling methods) reaches equilibrium with the CCR materials. The porewater is therefore representative of the mobile phase constituents capable of migrating into the underlying materials and potentially downgradient in groundwater [21]. The NEAP CCR source water is therefore the primary indicator of constituents *available* to the groundwater and is considered as the primary source term for environmental investigation and fate and transport modeling.

Sulfide minerals are naturally occurring in coal deposits, and sulfate is the dominant sulfur species in CCR. Sulfate and TDS were detected at relatively high concentrations in CCR porewater compared to the monitoring wells, and it is suspected that the concentrations of these chemicals of concern in the porewater are contributing to exceedances at well 70S. TDS trends at well 70S have a positive and linear correlation with sulfate trends; in combination with their relative concentrations, these results indicate that sulfate is a major contributor to TDS concentrations at this well. Sulfide oxidation in the major coal seam underlying the NEAP may also contribute sulfate to overlying formations, particularly the BCU.

Sulfate in the groundwater may be attenuated via surface complexation reactions with metal oxides, such as amorphous iron oxides. Amorphous metal oxides are expected to be present in the site solids and redox conditions across the site favor dynamic equilibrium reactions between amorphous iron oxides and ferrous iron. As such, sulfate in the groundwater may be immobilized by sorption onto metal oxide surfaces. Attenuation of sulfate is expected to contribute to a reduction in TDS in the groundwater.

5. COMBINED GEOCHEMICAL AND HYDROGEOLOGIC CONCEPTUAL SITE MODELS

5.1 Sulfate and TDS Conceptual Site Model

The GCSM describing current conditions at the NEAP combining the hydrogeologic and geochemical GCSMs for sulfate and TDS is as follows. Water that may come into contact with CCR in the NEAP becomes porewater within the unlined CCR unit. Changes in UU groundwater elevations do not affect NEAP water levels and outward radial flow along the perimeter of the NEAP has not been observed [9]. The lack of these observations suggest that the NEAP is hydraulically isolated from both the UU alluvial deposits, by the soil/bentonite slurry walls and compacted clay core center of the ash pond's earthen berms, and the underlying BCU by the low permeabilities and upward gradients. Despite the apparent hydraulic isolation, groundwater concentrations of sulfate and TDS at 70S, located adjacent to and at a similar elevation as the base of the CCR unit, indicate a potential flow path between the NEAP and UU is present. The upward vertical gradients and low hydraulic conductivity of the BCU suggest that the NEAP porewater migrates horizontally through the clay berm and contributes to GWPS exceedances identified at UU well 70S. Localized flow conditions at 70S indicate groundwater flow in the UU is towards the east and the Middle Fork, with the extent of sulfate and TDS GWPS exceedances in the UU defined by downgradient well 71S. Groundwater flow characteristics of the BCU identify upward vertical hydraulic gradients and low hydraulic conductivities of the shale BCU that limits the potential downward migration of sulfate and TDS [9, 10]. These conditions are represented by no exceedances of sulfate and TDS within most monitoring wells within the BCU (*i.e.,* 70D, 71D, 16A) and elevated concentrations of sulfate and TDS in 35D are attributed to naturally occurring conditions within the BCU and not from the NEAP [2].

TDS trends at well 70S have a positive and linear correlation with sulfate trends; in combination with their relative concentrations, these results indicate that sulfate is a major contributor to TDS concentrations at this well. In addition to physical attenuation mechanisms of dilution and dispersion, elevated concentrations of sulfate may be attenuated via surface complexation reactions with metal oxides, such as amorphous iron oxides. The attenuation of sulfate is expected to correspond to a reduction in TDS in the groundwater.

6. CONCLUSIONS AND FUTURE ACTIVITIES

In accordance with 35 I.A.C. § 845.650(d)(1), the nature and extent of GWPS exceedances of sulfate and TDS have been described in sufficient detail to support a complete and accurate assessment of the corrective measures necessary to effectively clean up all releases from the NEAP.

As discussed in **Section 3.2.1**, the horizontal and vertical delineation of sulfate and TDS exceedances at 70S is delineated by downgradient UU wells, surface water concentrations, and groundwater in the BCU below 70S where no exceedances of GWPS are present. Groundwater modeling is being completed as required by 35 I.A.C. § 845.220(c)(2) to provide predictive groundwater modeling simulations in support of potential CAP remedial alternatives and will be submitted to IEPA in conjunction with the CAP permit application.

7. REFERENCES

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TABLES

TABLE 2-1. Summary of Groundwater Elevations
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
10	Background	UCU	06/20/2023	[48.57]	[610.52]
10	Background	UCU	09/18/2023	50.58	608.51
10	Background	UCU	10/26/2023	51.42	607.67
10	Background	UCU	11/27/2023	51.31	607.78
10	Background	UCU	12/14/2023	52.00	607.09
16B	Compliance	UU	06/19/2023	Dry	Dry
16B	Compliance	UU	09/18/2023	Dry	Dry
16B	Compliance	UU	11/27/2023	Dry	Dry
16A	Compliance	BCU	09/18/2023	9.40	570.92
16A	Compliance	BCU	10/26/2023	9.67	570.65
16A	Compliance	BCU	11/27/2023	10.60	569.72
16A	Compliance	BCU	12/14/2023	11.22	569.10
22	Background	BCU	05/19/2023	53.83	604.78
22	Background	BCU	06/19/2023	54.20	604.41
22	Background	BCU	07/19/2023	54.57	604.04
22	Background	BCU	08/19/2023	55.47	603.15
22	Background	BCU	09/18/2023	56.51	602.11
22	Background	BCU	10/26/2023	56.81	601.81
22	Background	BCU	11/27/2023	56.62	602.00
22	Background	BCU	12/14/2023	56.69	601.93
35S	Compliance	UU	06/29/2023	[Dry]	[Dry]
35S	Compliance	UU	11/27/2023	Dry	Dry
35D	Compliance	BCU	05/19/2023	12.37	571.77
35D	Compliance	BCU	06/19/2023	12.80	571.33
35D	Compliance	BCU	07/19/2023	13.54	570.59
35D	Compliance	BCU	08/19/2023	11.36	572.77
35D	Compliance	BCU	09/18/2023	11.51	572.63
35D	Compliance	BCU	10/26/2023	17.01	567.13
35D	Compliance	BCU	11/27/2023	11.02	573.12
35D	Compliance	BCU	12/14/2023	17.19	566.95
70S	Compliance	UU	05/19/2023	10.77	582.96
70S	Compliance	UU	06/19/2023	13.83	579.90
70S	Compliance	UU	07/19/2023	14.85	578.88
70S	Compliance	UU	08/19/2023	15.08	578.65
70S	Compliance	UU	09/18/2023	15.97	577.77
70S	Compliance	UU	11/27/2023	15.60	578.14
70S	Compliance	UU	12/14/2023	15.30	578.44
70D	Compliance	BCU	05/19/2023	44.67	549.84
70D	Compliance	BCU	06/19/2023	37.37	557.14
70D	Compliance	BCU	07/19/2023	41.16	553.35
70D	Compliance	BCU	08/19/2023	35.15	559.36
70D	Compliance	BCU	09/18/2023	30.25	564.27
70D	Compliance	BCU	11/27/2023	40.25	554.27
70D	Compliance	BCU	12/14/2023	40.02	554.50
71S	Compliance	UU	06/19/2023	Dry	Dry
71S	Compliance	UU	09/18/2023	12.72	566.84

Table 2-1. Summary of Groundwater Elevations
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
71S	Compliance	UU	10/26/2023	16.20	563.36
71S	Compliance	UU	11/27/2023	12.45	567.11
71S	Compliance	UU	12/14/2023	12.16	567.40
71D	Compliance	BCU	05/19/2023	38.19	541.69
71D	Compliance	BCU	06/19/2023	37.20	542.68
71D	Compliance	BCU	07/19/2023	39.71	540.17
71D	Compliance	BCU	08/19/2023	38.26	541.62
71D	Compliance	BCU	09/18/2023	37.70	542.19
71D	Compliance	BCU	11/27/2023	39.73	540.16
71D	Compliance	BCU	12/14/2023	41.87	538.02
NED1	Water Level	CCR	09/18/2023	4.75	595.32
NED1	Water Level	CCR	10/26/2023	5.21	594.86
NED1	Water Level	CCR	11/27/2023	4.82	595.25
NED1	Water Level	CCR	12/14/2023	4.44	595.63

Notes:
Due to malfunctioning pressure transducer, data gaps exist in monthly water level elevations prior to the fourth quarter. Monthly depth to water measurements were collected manually in the fourth quarter.
BMP = below measuring point
Bracketing [ ] indicates that the measurement was obtained outside of the episodic depth to groundwater measurements time frame.
NAVD88 = North American Vertical Datum of 1988
Monitored Unit Abbreviations:

BCU = bedrock confining unit

CCR = coal combustion residuals

UCU = upper confining unit

UU = upper unit

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Table 2-2. Vertical Hydraulic Gradients
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Date	10 Groundwater Elevation (ft NAVD88)	22 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UCU	BCU				
3/29/2021	609.54	603.60	5.94	43.61	0.1362	down
4/12/2021	610.25	603.87	6.38	38.79	0.1645	down
5/10/2021	604.57	598.84	5.73	38.64	0.1483	down
6/3/2021	609.21	603.40	5.81	43.28	0.1343	down
6/17/2021	609.48	603.32	6.16	43.55	0.1415	down
7/8/2021	611.18	603.72	7.46	38.79	0.1923	down
3/29/2023	611.05	--	--	--	--	--
5/19/2023	--	604.78	--	--	--	--
6/19/2023		604.41	--	--	--	--
6/20/2023	610.52	--	--	--	--	--
7/19/2023	--	6044.04	--	--	--	--
8/19/2023	--	603.15	--	--	--	--
9/18/2023	608.51	602.11	6.40	42.58	0.1503	down
10/26/2023	607.67	601.81	5.86	41.74	0.1404	down
11/27/2023	607.78	602.00	5.78	41.85	0.1381	down
12/14/2023	607.09	601.93	5.16	41.16	0.1254	down
			Middle of screen elevation 10			604.7
			Middle of screen elevation 22			565.9
			Top of screen elevation 10			609.7
			Top of screen elevation 22			575.9

Date	70S Groundwater Elevation (ft NAVD88)	70D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UU	BCU				
3/29/2021	585.60	548.14	37.46	30.74	1.2186	down
4/12/2021	584.17	543.92	40.25	30.74	1.3094	down
5/10/2021	584.75	545.43	39.32	30.74	1.2791	down
6/3/2021	582.66	546.75	35.91	30.74	1.1682	down
6/17/2021	580.00	544.54	35.46	34.10	1.0399	down
7/8/2021	585.81	544.72	41.09	30.74	1.3367	down
5/19/2023	582.96	549.84	33.12	30.74	1.0774	down
6/19/2023	579.90	557.14	22.76	34.00	0.6694	down
7/19/2023	578.88	553.35	25.53	32.98	0.7741	down
8/19/2023	578.65	559.36	19.29	32.75	0.5890	down
9/18/2023	577.77	564.27	13.50	31.87	0.4236	down
10/26/2023	--	--	--	--	--	--
11/27/2023	578.14	554.27	23.87	32.24	0.7404	down
12/14/2023	578.44	554.50	23.94	32.54	0.7357	down
			Middle of screen elevation 70S			576.6
			Middle of screen elevation 70D			545.9
			Top of screen elevation 70S			581.6
			Top of screen elevation 70D			550.9

Table 2-2. Vertical Hydraulic Gradients
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Date	71S Groundwater Elevation (ft NAVD88)	71D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UU	BCU				
3/29/2021	571.23	541.21	30.02	29.05	1.0334	down
4/12/2021	569.85	538.61	31.24	27.67	1.1290	down
5/10/2021	569.54	Dry	--	--	--	--
6/3/2021	569.17	Dry	--	--	--	--
6/17/2021	--	539.90	--	--	--	--
7/8/2021	570.83	DRY	--	--	--	--
5/19/2023	--	541.69	--	--	--	--
6/19/2023	Dry	542.68	--	--	--	--
7/19/2023	--	540.17	--	--	--	--
8/19/2023	--	541.62	--	--	--	--
9/18/2023	566.84	542.19	24.65	24.66	0.9996	down
10/26/2023	563.36	--	--	--	--	--
11/27/2023	567.11	540.16	26.95	24.93	1.0810	down
12/14/2023	567.40	538.02	29.38	25.22	1.1649	down
			Middle of screen elevation 71S			569.2
			Middle of screen elevation 71D			542.2
			Top of screen elevation 71S			571.7
			Top of screen elevation 71D			547.2

Date	35S Groundwater Elevation (ft NAVD88)	35D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UU	BCU				
3/29/2021	573.12	549.33	23.79	31.35	0.7588	down
4/12/2021	572.89	561.82	11.07	31.12	0.3557	down
5/10/2021	Dry	570.83	--	--	--	--
6/3/2021	Dry	572.26	--	--	--	--
6/17/2021	Dry	570.33	--	--	--	--
7/8/2021	Dry	570.54	--	--	--	--
3/29/2023	--	574.49	--	--	--	--
5/19/2023	Dry	571.77	--	--	--	--
6/19/2023	Dry	571.33	--	--	--	--
7/19/2023	Dry	570.59	--	--	--	--
8/19/2023	Dry	572.77	--	--	--	--
9/18/2023	Dry	572.63	--	--	--	--
10/26/2023	Dry	567.13	--	--	--	--
11/27/2023	Dry	573.12	--	--	--	--
12/14/2023	Dry	566.95	--	--	--	--
			Middle of screen elevation 35S			575.6
			Middle of screen elevation 35D			541.8
			Top of screen elevation 35S			578.1
			Top of screen elevation 35D			546.8

Table 2-2. Vertical Hydraulic Gradients
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Date	16A Groundwater Elevation (ft NAVD88)	16B Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
3/29/2021	569.01	Dry	--	--	--	--
4/12/2021	568.28	Dry	--	--	--	--
5/10/2021	569.34	Dry	--	--	--	--
6/3/2021	568.39	Dry	--	--	--	--
6/17/2021	569.51	Dry	--	--	--	--
7/8/2021	571.32	Dry	--	--	--	--
3/29/2023	569.04	Dry	--	--	--	--
5/19/2023	--	--	--	--	--	--
6/19/2023	--	Dry	--	--	--	--
7/19/2023	--	--	--	--	--	--
8/19/2023	--	--	--	--	--	--
9/18/2023	570.92	Dry	--	--	--	--
10/26/2023	570.65	--	--	--	--	--
11/27/2023	569.72	Dry	--	--	--	--
12/14/2023	569.10	--	--	--	--	--
			Middle of screen elevation 16A			546.5
			Middle of screen elevation 16B			569.0
			Top of screen elevation 16A			556.5
			Top of screen elevation 16B			571.5

Notes:

1. Distance change was calculated using the midpoint of the piezometer screen and water table surface. If the water table surface was above the top of the monitoring well screen, then distance change was calculated using the midpoint of both screens.

2. Vertical gradients between ±0.0015 are considered flat, and typically have less than 0.02 foot difference in groundwater elevation between wells.

ft = foot/feet
NAVD88 = North American Vertical Datum of 1988
dh = head change
dl = distance change
-- = Not calculated

Table 2-3. Field Hydraulic Conductivities

Nature and Extent Report

Vermilion Power Plant

New East Ash Pond

Oakwood, Illinois

Well ID	Gradient Position	Bottom of Screen Elevation (ft NAVD88)	Screen Length [1] (ft)	Field Identified Screened Material	Slug Type	Analysis Method	Number of Field Tests	Test Analyzed[2]	Hydraulic Conductivity (cm/s)	Minimum Hydraulic Conductivity (cm/s)	Maximum Hydraulic Conductivity (cm/s)	Hydraulic Conductivity Geometric Mean (cm/s)
Upper Unit												
23	S	577.30	10.0	ML/ S(CL)	Solid	Springer-Gelhar	2	RH-1	1.12E+00	7.40E-04	1.12E+00	1.06E-02
70S	S	571.64	10.0	SC/SM	Solid	Bouwer-Rice	4	RH-1	1.43E-03			
71S	D	566.69	5.0	SP	Solid	Bouwer-Rice	4	FH-1	7.40E-04			
Bedrock Confining Unit												
16A	D	536.50	20.0	Shale	Solid	Bouwer-Rice	1	FH-1	1.13E-06	1.13E-06	2.34E-05	7.09E-06
22	U	556.00	20.0	Shale	Solid	Bouwer-Rice	2	FH-1	2.34E-05			
24	S	544.25	19.9	Shale	Solid	Bouwer-Rice	2	FH-1	9.56E-06			
25	S	540.10	19.6	Shale	Solid	Bouwer-Rice	1	FH-1	9.97E-06			
CCR Unit												
NED1	NA	582.98	10.0	Ash	Solid	Bouwer-Rice	4	RH-1	2.43E-03	2.43E-03	2.43E-03	2.43E-03
Upper Confining Unit												
10	U	599.70	10.0	CL	Solid	Bouwer-Rice	1	RH-1	8.76E-06	8.76E-06	8.76E-06	8.76E-06

Notes:

1. All wells are constructed from 2 inch PVC with 0.01 inch slotted screens.
2. Test response data (elapsed time and corresponding changes in water levels) were plotted as normalized displacement to evaluate similarity among repeat test data within each well. A single test was selected for analysis at each well based on the quality of the test data (i.e., smooth recovery curve) and coincidence of repeat test data.

cm/s = centimeters per second
D = downgradient
FH-1 = Falling Head 1 Test
ft = foot/feet
NA = Not Applicable
NAVD88 = North American Vertical Datum of 1988
RH-1 = Rising Head 1 Test
S = sidegradient
U = upgradient

USCS = Unified Soil Classification System
CCR = Coal Combustion Residual
ML = Silt
S(CL) = Sandy clay
SC = Clayey sand
SM = Silty sand
SP = Sand
CL = Lean clay

Table 2-4. Monitoring Well Construction Details
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

Location	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft bgs)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
10	UCU	4/29/1987	659.1	659.3	Top of PVC	656.3	46.6	56.6	609.7	599.7	56.6	581.4	10	2	40.178985	-87.739824
16B	UU	4/28/1987	580.6	580.6	Top of PVC	578.6	7	12	571.5	566.5	12	566.5	5	2	40.17809	-87.735084
16A	BCU	4/28/1987	580.3	580.5	Top of PVC	578.6	21.8	41.8	556.5	536.5	41.8	536.5	20	2	40.178093	-87.735056
22	BCU	12/5/2001	658.6	658.8	Top of PVC	655.9	80	100	576.0	556.0	100	556.0	20	2	40.178997	-87.73985
35D	BCU	3/3/2017	584.1	584.3	Top of PVC	581.8	35	45	546.2	536.2	45	535.5	10	2	40.179762	-87.735575
70S	UU	3/4/2021	593.7	593.9	Top of PVC	591.6	10	20	581.6	571.6	20	571.6	10	2	40.176952	-87.737931
70D	BCU	3/4/2021	594.5	594.7	Top of PVC	591.9	41	51	550.9	540.9	51	539.9	10	2	40.176957	-87.737958
71S	UU	3/3/2021	579.6	579.7	Top of PVC	577.2	5.5	10.5	571.7	566.7	10.5	566.7	5	2	40.177106	-87.735397
71D	BCU	3/3/2021	579.9	580.1	Top of PVC	577.2	30	40	547.2	537.2	40	537.2	10	2	40.177118	-87.735391
NED1	CCR	2/12/2019	600.1	600.2	Top of PVC	597.8	5.32	14.95	592.4	582.8	15.44	582.3	9.63	2	40.17947	-87.738094

Notes:
All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
bgs = below ground surface
ft = foot/feet
HSU = Hydrostratigraphic Unit
BCU = Bedrock Confining Unit
CCR = Coal Combustion Residuals
UCU = Upper Confining Unit
UU = Upper Unit
PVC = polyvinyl chloride

Table 3-1. Exceedance Parameter Statistical Results

Nature and Extent Report

Vermilion Power Plant

New East Ash Pond

Oakwood, Illinois

Location	Parameter	Unit	Groundwater Protection Standard	2023 Q2 LCL	2023 Q3 LCL	2023 Q4 LCL
70S	Sulfate, total	mg/L	400	587	598	607
70S	Total Dissolved Solids	mg/L	1,200	1,210	1,220	1,240

Notes:

LCL = Lower Confidence Level

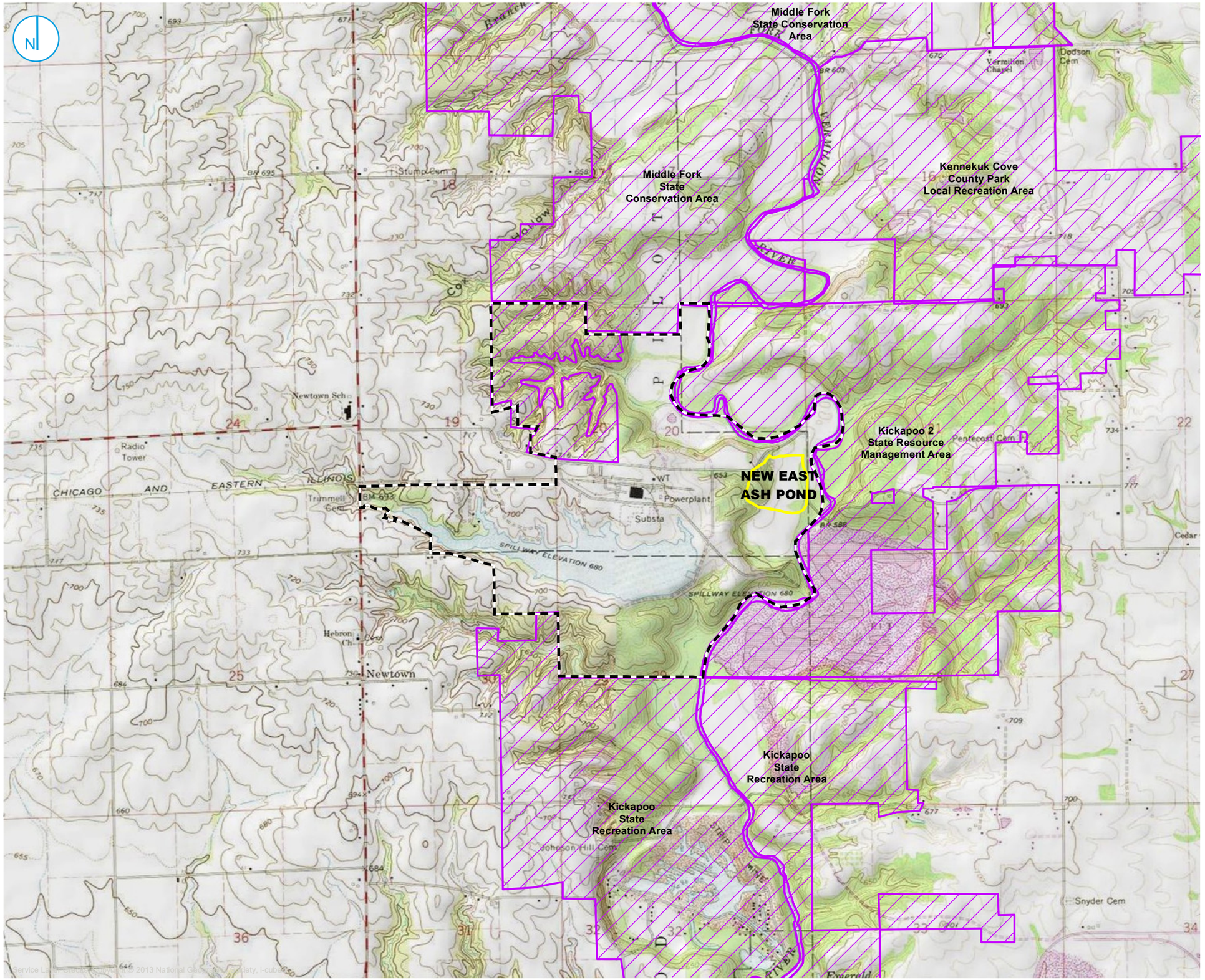
mg/L = milligrams per liter

Table 3-2. Summary of Groundwater Data
Nature and Extent Report
Vermilion Power Plant
New East Ash Pond
Oakwood, Illinois

HSU	Location	Parameter	Unit	Sample Count	Non-Detect Result Count	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
BCU	16A	Sulfate, total	mg/L	23	1	4	03/21/2017	11/29/2023	4.10	24.0	28.7	78.0
BCU	16A	Total Dissolved Solids	mg/L	23	0	0	03/21/2017	11/29/2023	558	676	677	770
BCU	22	Sulfate, total	mg/L	11	0	0	04/01/2021	11/28/2023	26.0	30.0	29.8	34.0
BCU	22	Total Dissolved Solids	mg/L	11	0	0	04/01/2021	11/28/2023	450	476	475	494
BCU	35D	Sulfate, total	mg/L	24	0	0	03/21/2017	11/29/2023	821	1,365	1,417	1,940
BCU	35D	Total Dissolved Solids	mg/L	24	0	0	03/21/2017	11/29/2023	2,020	3,305	3,397	4,420
BCU	70D	Sulfate, total	mg/L	11	0	0	04/01/2021	11/29/2023	46.0	49.0	49.4	53.0
BCU	70D	Total Dissolved Solids	mg/L	11	0	0	04/01/2021	11/29/2023	792	1,600	1,565	1,940
BCU	71D	Sulfate, total	mg/L	6	0	0	04/01/2021	11/29/2023	43.0	54.5	55.2	72.0
BCU	71D	Total Dissolved Solids	mg/L	6	0	0	04/01/2021	11/29/2023	896	1,770	1,639	2,400
CCR	NED1	Sulfate, total	mg/L	7	0	0	04/01/2021	11/29/2023	860	1,300	1,277	1,510
CCR	NED1	Total Dissolved Solids	mg/L	7	0	0	04/01/2021	11/29/2023	1,500	2,340	2,190	2,500
UCU	10	Sulfate, total	mg/L	30	0	0	03/21/2017	11/28/2023	224	280	287	379
UCU	10	Total Dissolved Solids	mg/L	29	0	0	03/21/2017	11/28/2023	826	946	951	1,100
UU	70S	Sulfate, total	mg/L	11	0	0	04/01/2021	11/29/2023	541	670	681	840
UU	70S	Total Dissolved Solids	mg/L	11	0	0	04/01/2021	11/29/2023	1,140	1,340	1,353	1,580
UU	71S	Sulfate, total	mg/L	8	0	0	04/01/2021	08/17/2021	46.0	66.5	63.1	69.0
UU	71S	Total Dissolved Solids	mg/L	8	0	0	04/01/2021	08/17/2021	474	495	501	538

Notes:
< = less than the method detection limit
mg/L = miligrams per liter
HSU = Hydrostratigraphic Unit
BCU = Bedrock Confining Unit
CCR = Coal Combustion Residuals
UCU = Upper Confining Unit
UU = Upper Unit

FIGURES



PART 845 REGULATED UNIT (SUBJECT UNIT)

PROPERTY BOUNDARY

PROTECTED AREA

0 1,000 2,000 Feet

SITE LOCATION MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-1

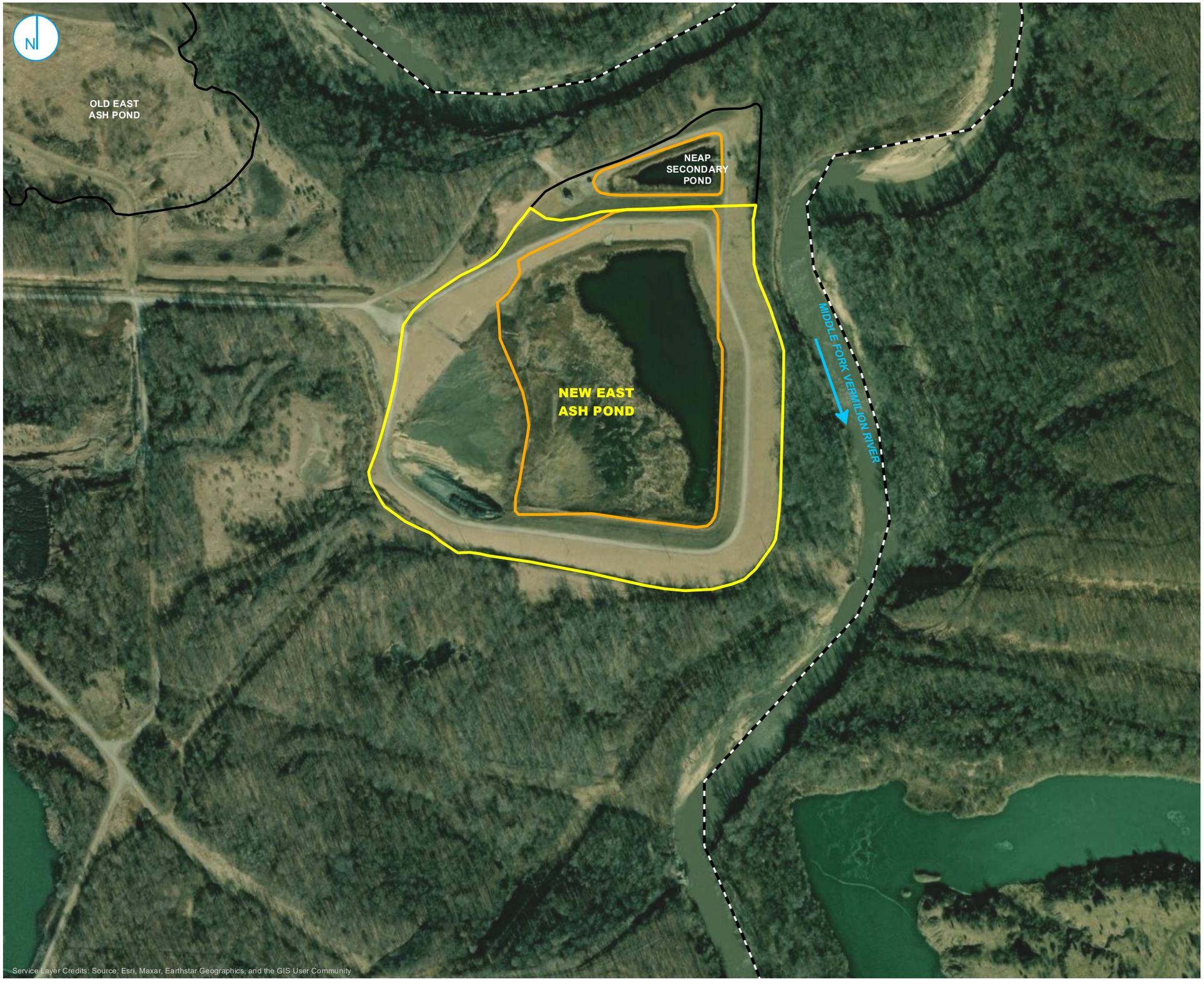
RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\22285\MXD\845_Operating_Permit\Vermilion\NEAP\GMP\Figure 1-1_Site Location Map.mxd

PROJECT: 169000XXXX | DATED: 10/7/2021 | DESIGNER: STOLZSD

Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed



REGULATED UNIT (SUBJECT UNIT)
EAST ASH POND (1989 POND FOOTPRINT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

EAST ASH POND (1989 POND FOOTPRINT)

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\222285\MXD\Model_Figures\Vermilion\Groundwater_Modeling_Technical_Memo_NEAP\Figure 1-1. East Ash Pond (1989 Pond Footprint).mxd
PROJECT: 169000XXXX | DATED: 4/23/2024 | DESIGNER: galarmmc



REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

SITE MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22228SI\MXD\Nature_and_Extent\VER\Nature_and_Extent_Report_NEAP\Figure 2-2_Site Map.mxd

PROJECT: 169000XXXX | DATED: 5/13/2024 | DESIGNER: GALARNMC



BOTTOM OF ASH ELEVATION
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

NOTE
BOTTOM OF ASH CONTOURS PROVIDED BY GEOSYNTEC.

0 150 300
Feet

BOTTOM OF ASH MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

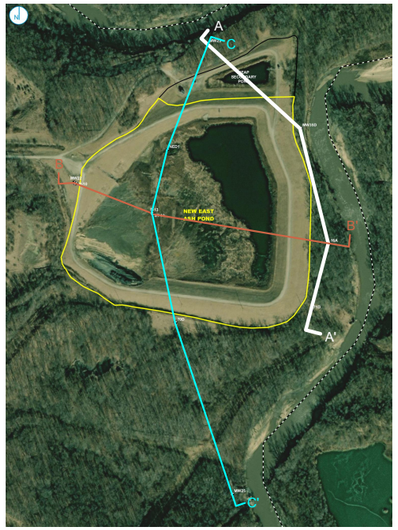
FIGURE 2-4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

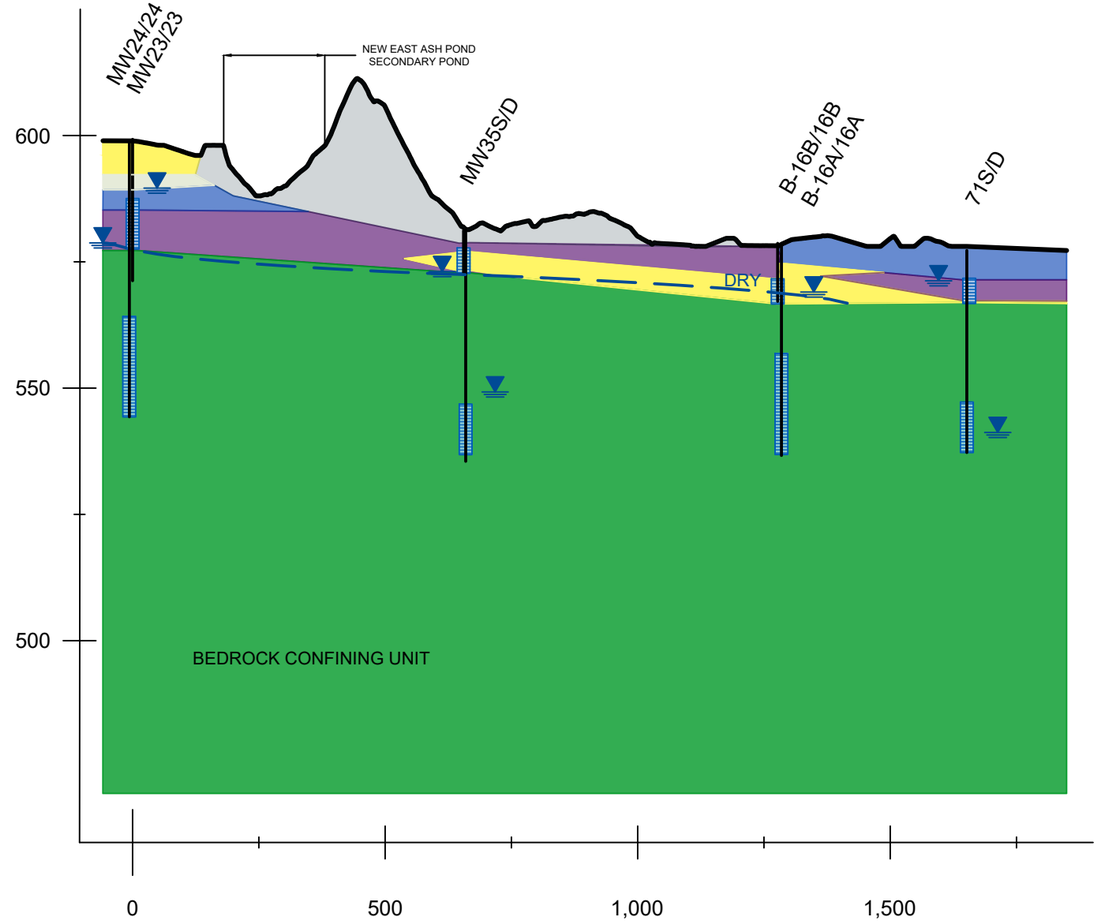
Y:\Mapping\Projects\22\22285\MXD\845_Operating_Permit\Vermilion\NEAP\Figure 2-8_Bottom of Ash.mxd

PROJECT: 169000XXXX | DATED: 10/12/2021 | DESIGNER: STOLZSD



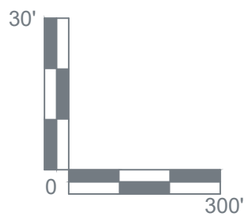
A
(NORTH)

A'
(SOUTH)



NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 10X.
4. Groundwater elevations measured on March 29, 2021.
5. PMP = Potential Migration Pathway



LEGEND

- FILL
- CLAY (CL/CH)
- TILL (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- GRAVEL (GP/GW)
- BEDROCK / WEATHERED BEDROCK (INTERBEDDED SHALE, LIMESTONE, SANDSTONE, V. LITTLE SS)
- WELL SCREEN INTERVAL
- BEDROCK CONFINING UNT POTENTIOMETRIC SURFACE
- BEDROCK CONFINING UNIT / PMP GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)

GEOLOGIC CROSS SECTION
A-A'

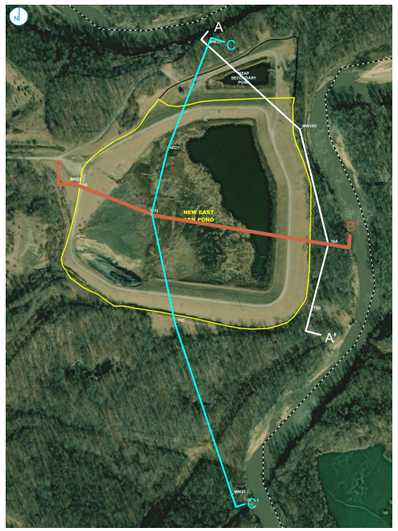
NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

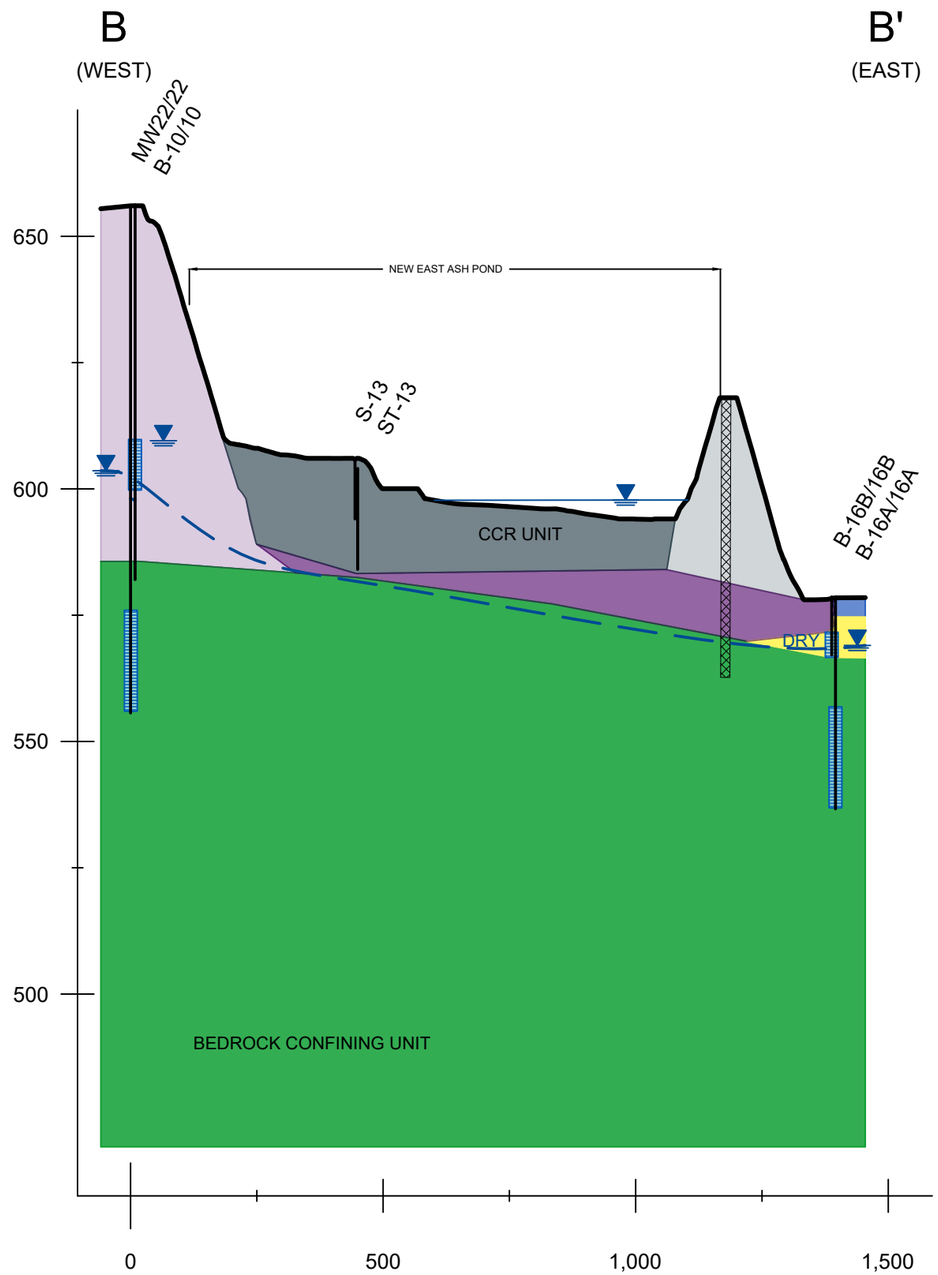
FIGURE 2-5

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

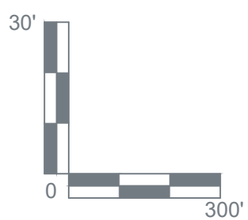
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NOTES

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2. Scale is approximate.
3. Vertical scale is exaggerated 10X.
4. Groundwater elevations measured on March 29, 2021.
5. PMP = Potential Migration Pathway



LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- FILL
- CLAY (CL/CH)
- TILL (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- BEDROCK / WEATHERED BEDROCK (INTERBEDDED SHALE, LIMESTONE, SANDSTONE, V. LITTLE SS)
- WELL SCREEN INTERVAL
- BEDROCK CONFINING UNT POTENTIOMETRIC SURFACE
- BEDROCK CONFINING UNIT / PMP GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)
- CLAY CORE KEYED 8-FT INTO BEDROCK

GEOLOGIC CROSS SECTION
B-B'

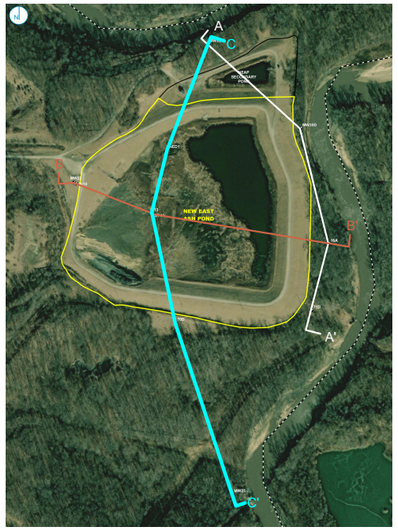
NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

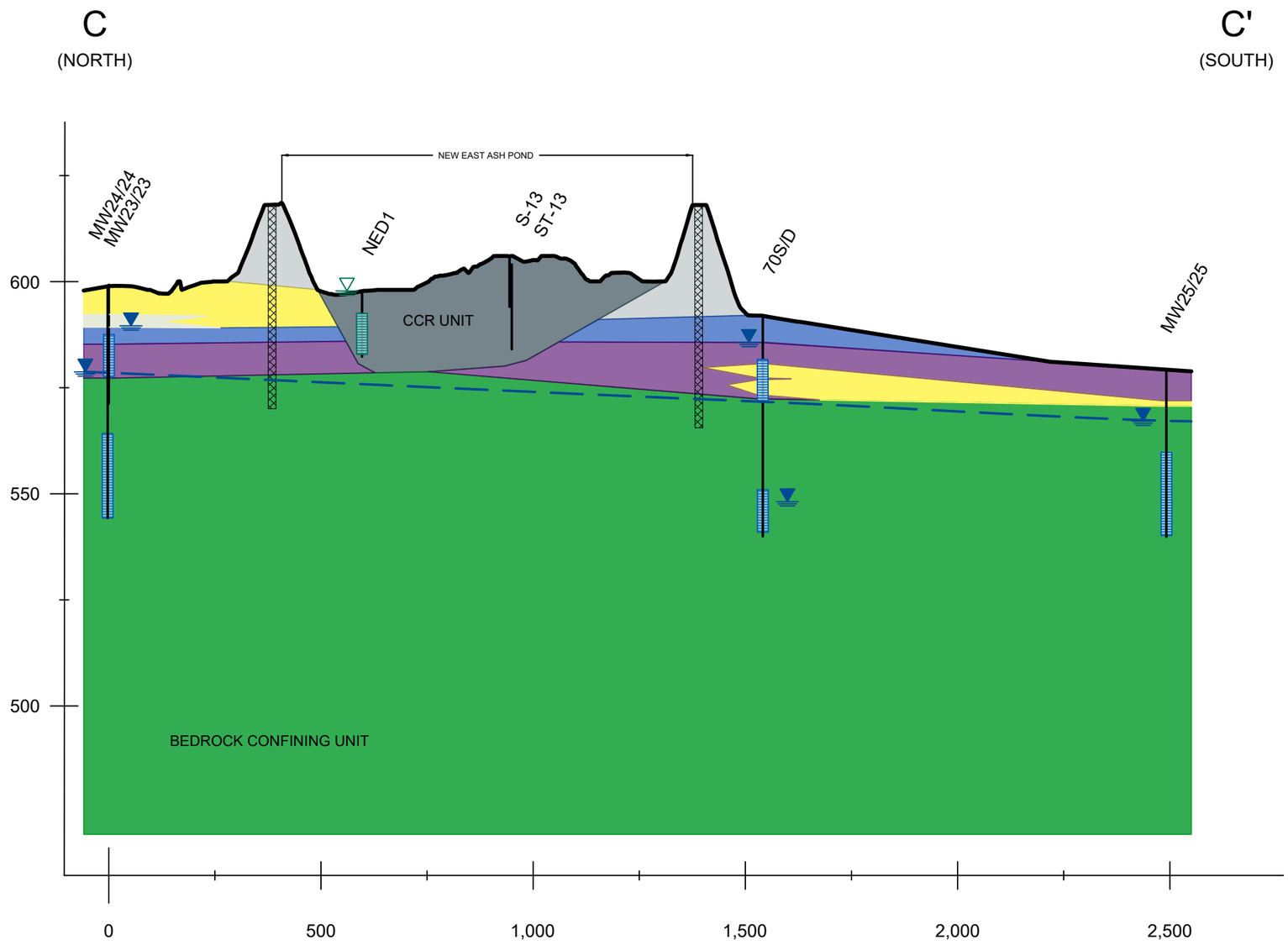
FIGURE 2-6

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

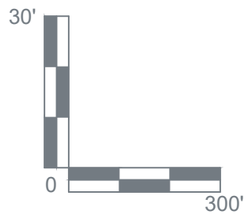
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Plotted: 07/19/2021 by Shared Desktop (Ramboll) via SharePoint





NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 10X.
4. Groundwater elevations measured on March 29, 2021.
5. PMP = Potential Migration Pathway



LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- FILL
- CLAY (CL/CH)
- TILL (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- GRAVEL (GP/GW)
- BEDROCK / WEATHERED BEDROCK (INTERBEDDED SHALE, LIMESTONE, SANDSTONE, V. LITTLE SS)
- WELL SCREEN INTERVAL
- BEDROCK CONFINING UNT POTENTIOMETRIC SURFACE
- POREWATER ELEVATION
- BEDROCK CONFINING UNIT / PMP GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)
- CLAY CORE KEYED 8-FT INTO BEDROCK

GEOLOGIC CROSS SECTION
C-C'

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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Part 845 Operating Permits\Sites\Vermilion\Hydrogeo Report\NEAP HCR\Figures\working files\CAD\Cross Sections\Vermilion-NEAP-Cross Sections.dwg
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COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
PORE WATER WELL
MONITORING WELL
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24 HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.
3. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988

0 150 300
Feet

BEDROCK CONFINING UNIT POTENTIOMETRIC SURFACE MAP JUNE 19, 2023 (E001)

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-8

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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PROJECT: 169000XXXX | DATED: 11/13/2023 | DESIGNER: GALARNMC



COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
PORE WATER WELL
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

MONITORING WELL LOCATION MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-9

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\22851MXD\Nature_and_Extent\VER\Nature_and_Extent_Report_NEAP\Figure 2-5. Monitoring Well Location Map.mxd

PROJECT: 169000XXXX | DATED: 4/22/2024 | DESIGNER: galammc



TOTAL SULFATE EXCEEDANCE

TOTAL DISSOLVED SOLIDS EXCEEDANCE

COMPLIANCE WELL WITHOUT EXCEEDANCE

REGULATED UNIT (SUBJECT UNIT)

SITE FEATURE

PROPERTY BOUNDARY

0 150 300
Feet

GWPS EXCEEDANCE MAP UPPER UNIT/POTENTIAL MIGRATION PATHWAY QUARTER 2, 2023

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 3-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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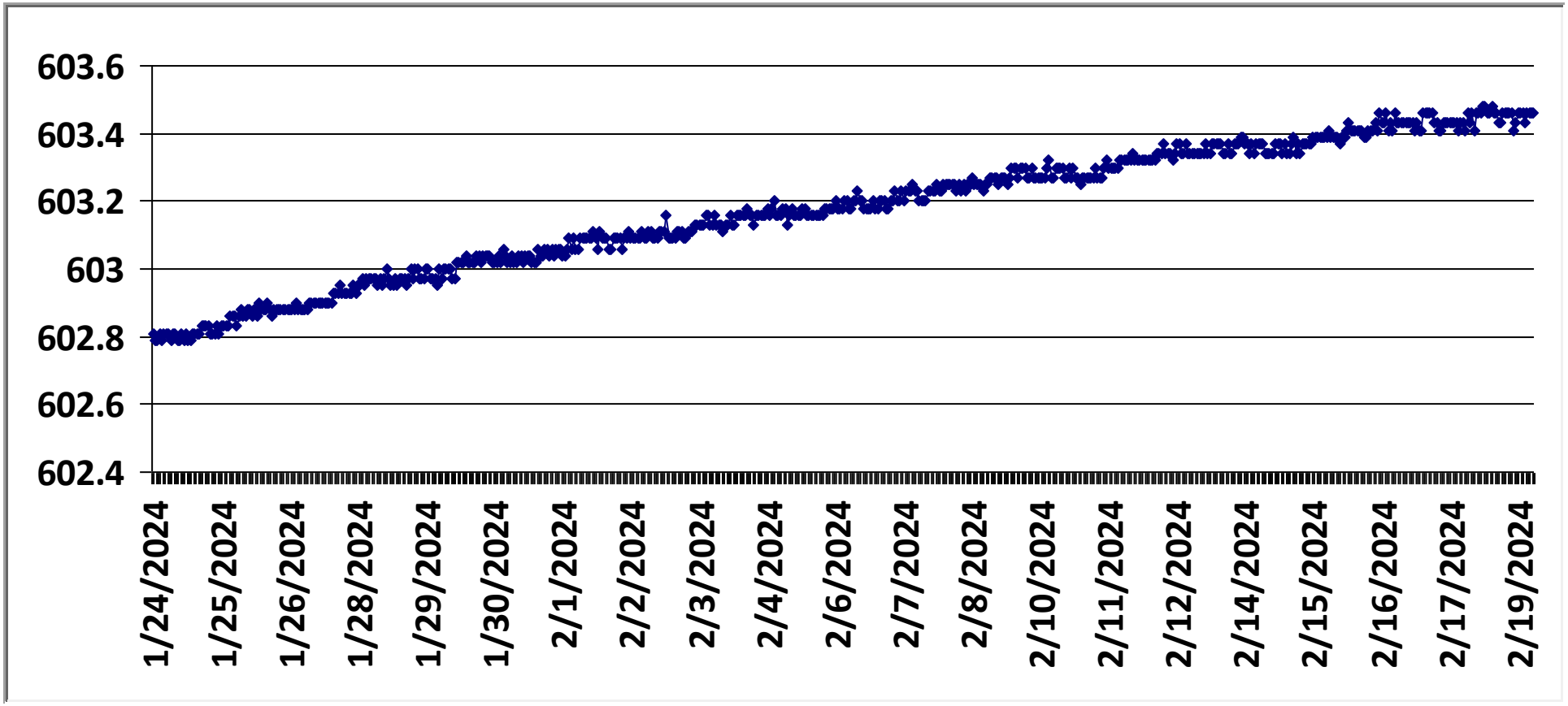
PROJECT: 169000XXXX | DATED: 4/22/2024 | DESIGNER: galammc

APPENDICES

APPENDIX A
Transducer Data

VER_022

21739726

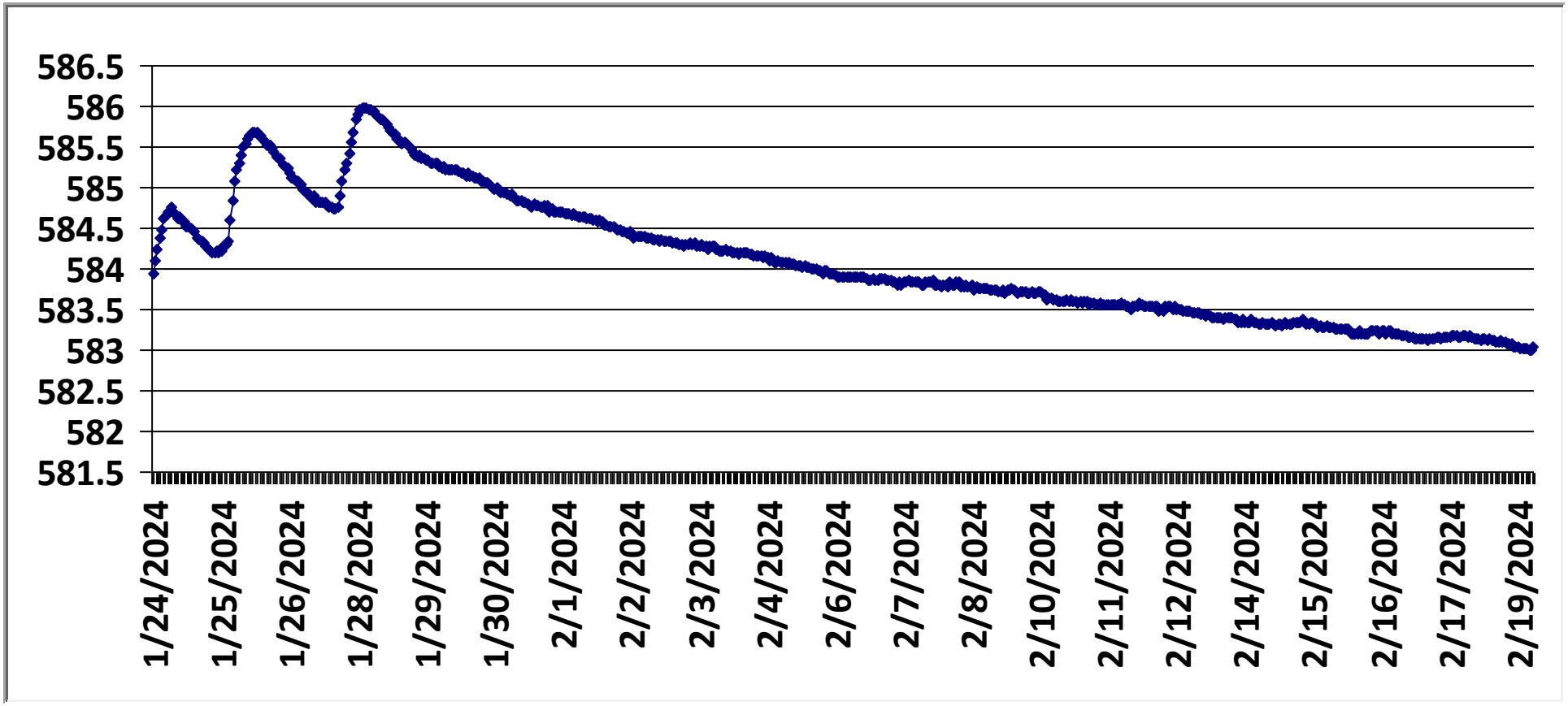


RAMBØLL

Groundwater Level Data

TIME SERIES

VER_070#S 21615597



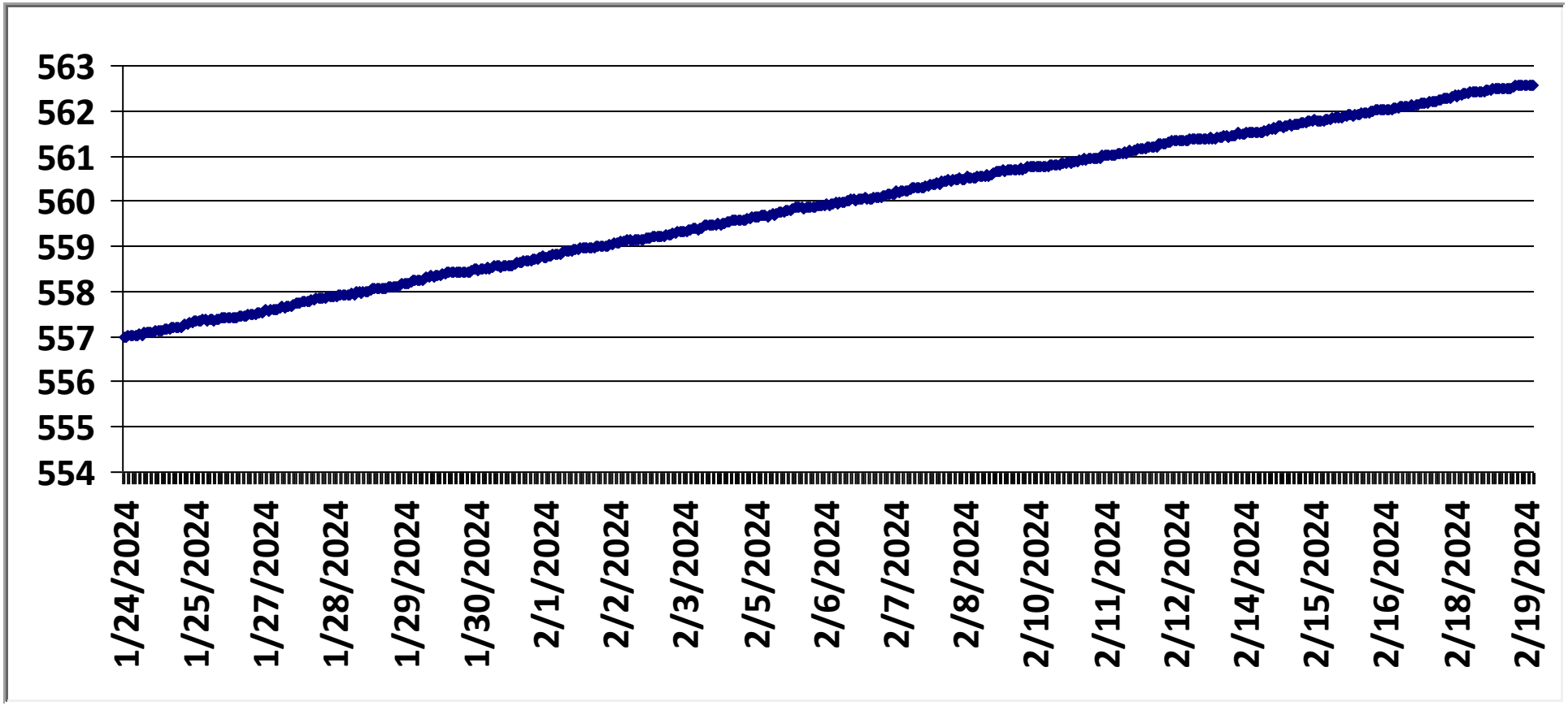
RAMBØLL

Groundwater Level Data

TIME SERIES

VER_070&D

21615620

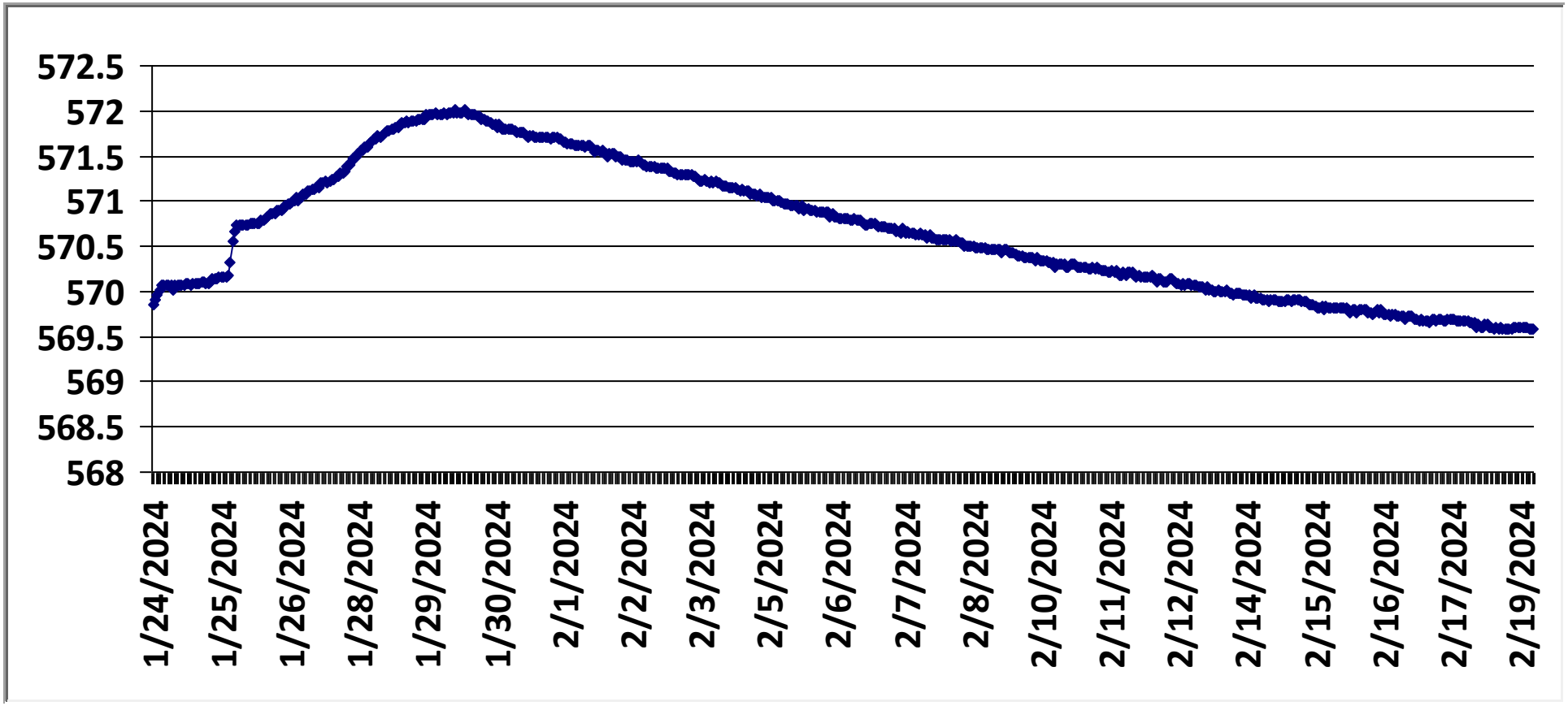


RAMBØLL

Groundwater Level Data

TIME SERIES

VER_071#S 21615599



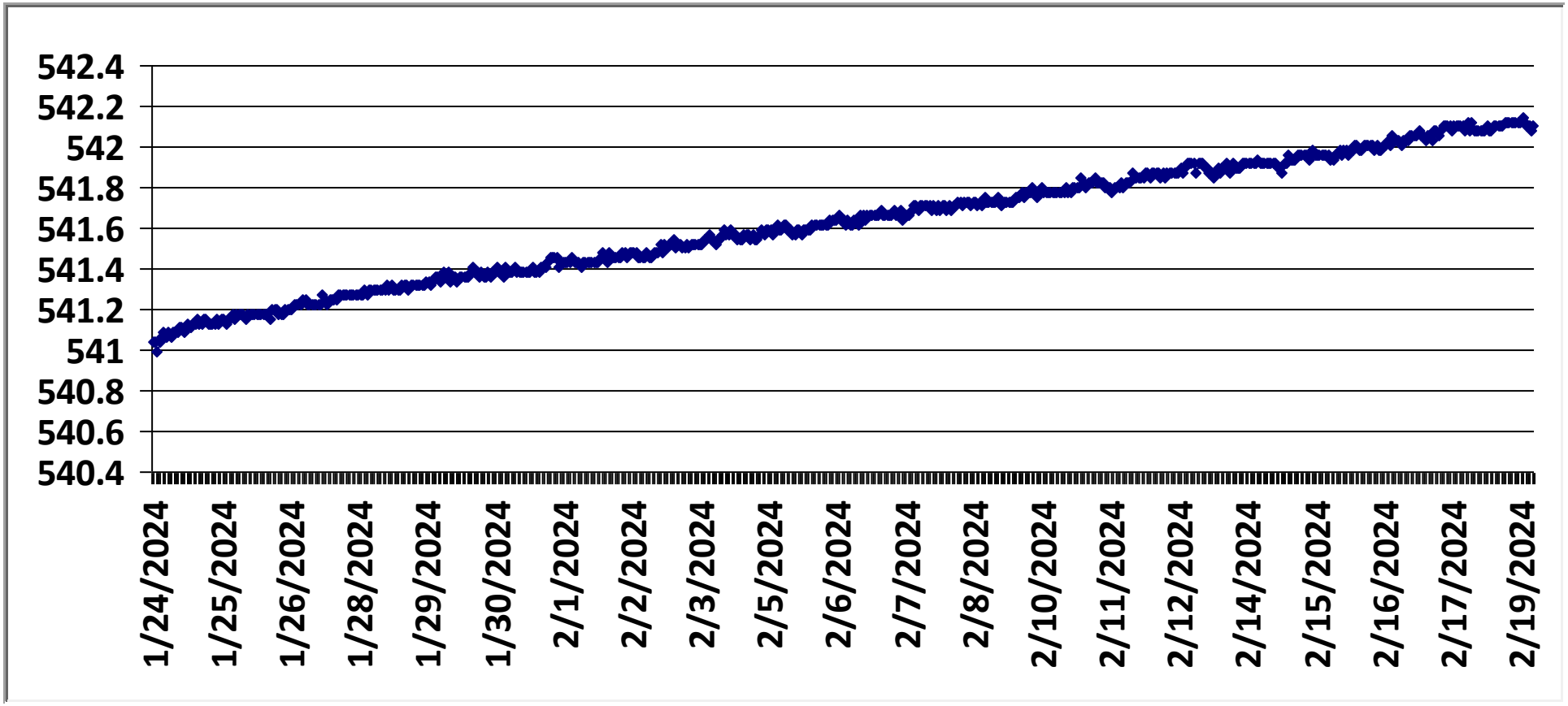
RAMBØLL

Groundwater Level Data

TIME SERIES

VER_071&D

21863675

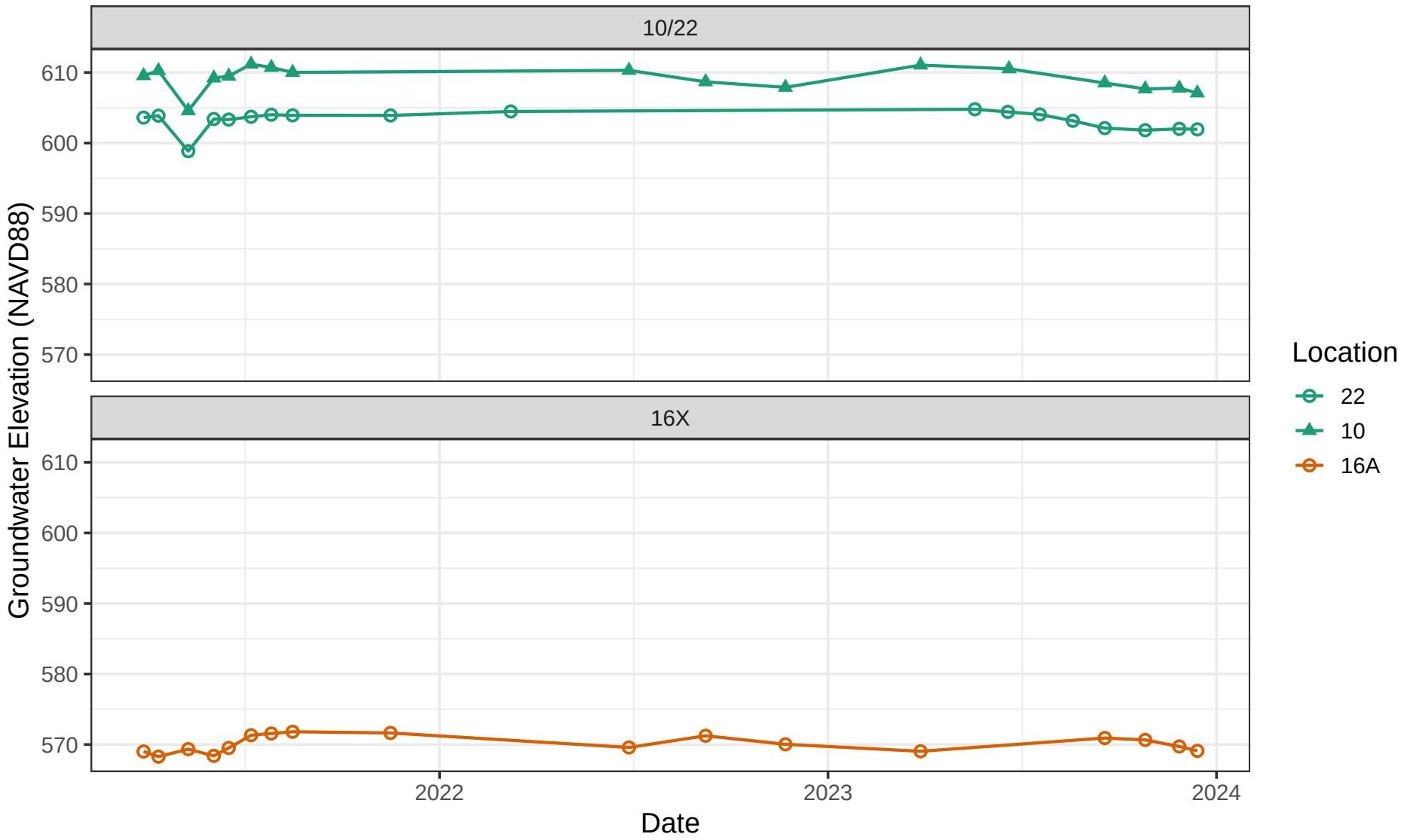


RAMBØLL

Groundwater Level Data

TIME SERIES

APPENDIX B
Hydrographs

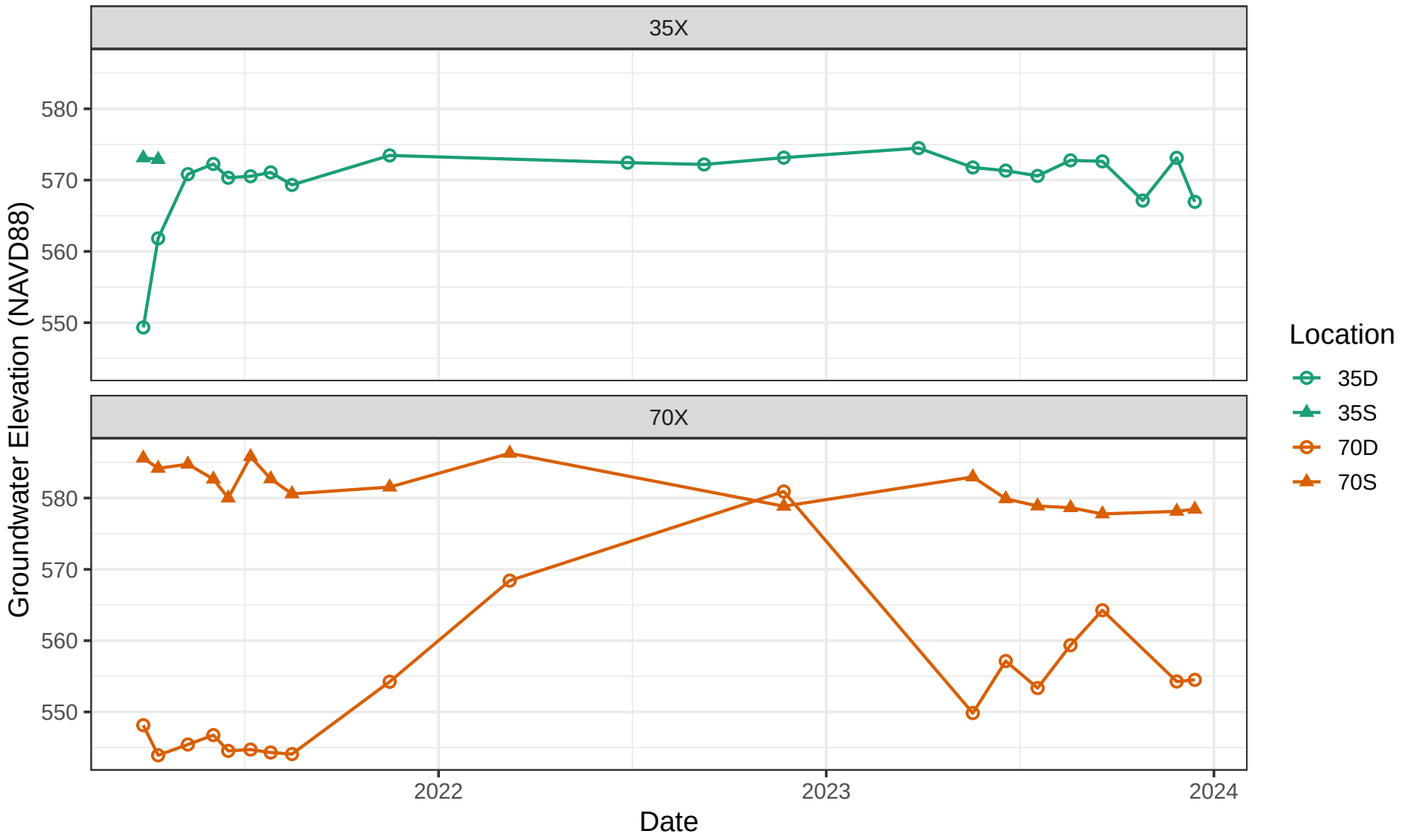


RAMBOLL

Hydrographs
Nature and Extent Report
Vermilion New East Ash Pond
Oakwood, IL

Figure
1

Drafter: AOC Date: 2024−04−29 Contract Number: 1940103584



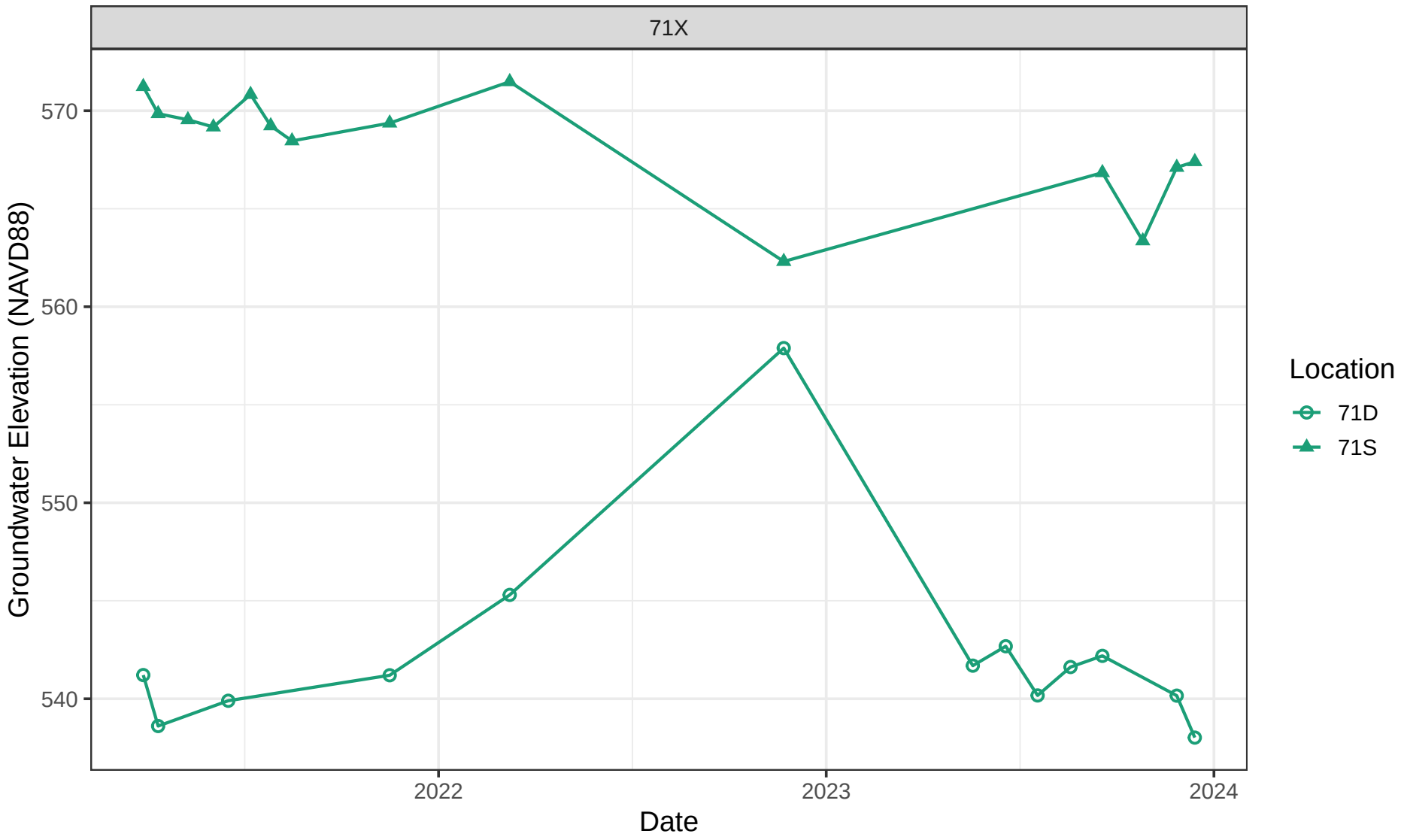
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Hydrographs
Nature and Extent Report
Vermilion New East Ash Pond
Oakwood, IL

Figure
2

Drafter: AOC Date: 2024−04−29 Contract Number: 1940103584

Path: dara/Vistra − 845/Corrective Action Assessment/Nature and Extent/Hydrographs



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Hydrographs
Nature and Extent Report
Vermilion New East Ash Pond
Oakwood, IL

Figure
3

Drafter: AOC Date: 2024−04−29 Contract Number: 1940103584

APPENDIX C
Geochemical Conceptual Site Model

Geosyntec consultants

engineers | scientists | innovators

Geochemical Conceptual Site Model

Vermilion Power Plant – New East Ash Pond

(CCR Unit #912)

Prepared for

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May 2024

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
BCU	bedrock confining unit
CEC	cation exchange capacity
CCR	coal combustion residuals
COC	constituent of concern
ft bgs	feet below ground surface
GCSM	geochemical conceptual site model
GWPS	groundwater protection standards
I.A.C.	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
m	meters
meq/100 g	milliequivalents per 100 grams
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mV	millivolts
N&E	nature and extent
NEAP	New East Ash Pond
ORP	oxidation-reduction potential
PMP	potential migration pathway
Q4	fourth quarter
SEP	sequential extraction procedure
SU	standard units
TDS	total dissolved solids
TOC	total organic carbon
UU	upper unit
UCU	upper confining unit
USEPA	United States Environmental Protection Agency
VPP	Vermilion Power Plant
wt %	weight percent
XRD	X-Ray diffraction

1. EXECUTIVE SUMMARY

A geochemical conceptual site model (GCSM) has been developed to describe subsurface conditions at the Vermilion Power Plant New East Ash Pond (NEAP) coal combustion residuals (CCR) unit (Unit #912). The GCSM was prepared in support of an evaluation of the nature and extent of exceedances of constituents of concern (COCs), specifically sulfate and total dissolved solids (TDS), above the groundwater protection standards at the NEAP. Three geologic units are present in the vicinity of the NEAP: the upper unit (UU) which consists predominately of sand with intermittent layers of silty clay, the upper confining unit (UCU) comprised of low permeability silty and clay diamictons (glacial till), and the bedrock confining unit (BCU) which is composed of weathered shale and contains a major coal seam. These units have not been classified as an aquifer, though the UU and BCU have been identified as potential migration pathways. This GCSM discusses exceedances of sulfate and TDS at well 70S, which is screened in the UU.

The primary source of sulfate and TDS to groundwater in the UU is expected to be the NEAP CCR porewater (i.e., CCR contact water). Sulfide minerals are naturally occurring in coal deposits, and sulfate is the dominant sulfur species in CCR. Sulfate and TDS were detected at relatively high concentrations in CCR porewater compared to the monitoring wells, and it is suspected that the concentrations of these COCs in the porewater are contributing to exceedances at well 70S. TDS trends at well 70S have a positive and linear correlation with sulfate trends; in combination with their relative concentrations, these results indicate that sulfate is a major contributor to TDS concentrations at this well. Sulfide oxidation in the major coal seam underlying the NEAP may also contribute sulfate to overlying formations, particularly the BCU.

Sulfate in the groundwater may be attenuated via surface complexation reactions with metal oxides, such as amorphous iron oxides. Amorphous metal oxides are expected to be present in the site solids and redox conditions across the Site favor dynamic equilibrium reactions between amorphous iron oxides and ferrous iron. As such, sulfate in the groundwater may be immobilized by sorption onto metal oxide surfaces. Attenuation of sulfate is expected to contribute to a reduction in TDS in the groundwater.

2. INTRODUCTION

This report documents the development of a geochemical conceptual site model (GCSM) that describes subsurface conditions at the Vermilion Power Plant (VPP) New East Ash Pond (NEAP) coal combustion residuals (CCR) unit (Unit #912). A GCSM describes the environmental media and geochemical processes that contribute to the mobilization, distribution, and attenuation of constituents in the subsurface soil and groundwater environment. The GCSM was prepared in support of an evaluation of the nature and extent (N&E) of exceedances of constituent of concerns (COCs) above the groundwater protection standards (GWPS) at the NEAP. The document has been prepared as an appendix to the VPP NEAP N&E Report prepared by Ramboll Americas Engineering Solutions Inc. (Ramboll).

Constituents with exceedances above the GWPS at Vermilion NEAP are sulfate and total dissolved solids (TDS). Both the sulfate and TDS exceedances were detected in samples from compliance well 70S during the second quarter (Q2) through fourth quarter (Q4) 2023 monitoring events completed under Illinois Administrative Code (I.A.C.) Title 35 Section 845.630. The sulfate and TDS exceedances at 70S were detected in samples from the upper unit (UU) potential migration pathway (PMP). This GCSM is limited to describing the nature of the exceedances in the UU (sulfate and TDS at well 70S).

An Alternative Source Demonstration (ASD), as allowed by 35 I.A.C. § 845.650(e), was completed for the Q2 2023 chloride, lithium, and TDS exceedances at bedrock confining unit (BCU) wells 35D and 70D, and for a sulfate exceedance at well 35D (Ramboll 2023). The Illinois Environmental Protection Agency (IEPA) did not concur with the ASD in a letter dated December 28, 2023 (IEPA 2023) due to the following data gaps:

1. Characterization that the draw water from the bedrock is completely isolated from the local groundwater flow system.
2. Lack of assessment of the interaction between bedrock groundwater and the Old East Ash Pond.
3. Lack of analysis of the leachable constituents from the CCR in the NEAP.

On February 2, 2024, Dynegy Midwest Generation, LLC submitted a Petition for Review of the non-concurrence with the NEAP Q2 2023 ASD and Motion for Stay to the Illinois Pollution Control Board (IPCB). The IPCB granted a partial stay on February 15, 2024. Therefore, the nature and extent of chloride, lithium, sulfate, and TDS at wells 35D and 70D are not discussed in this document.

On May 8, 2024, an ASD was submitted for the Q4 2023 chloride exceedance at BCU well 71D (Ramboll 2024). Therefore, the nature and extent of chloride at well 71D is not discussed in this report.

3. SITE BACKGROUND

3.1 Site Overview

An overview of site characteristics and hydrogeology is presented in the VPP NEAP N&E Report. A site layout figure is provided in Attachment A.[1] The NEAP was originally constructed in 1989 and at the time was referred to as the original East Ash Pond. The original East Ash Pond was constructed with berms containing low permeability clay cores keyed into the underlying shale formation. In 2002, new berms were constructed, and the pond was expanded, forming the present-day NEAP. Operations at the NEAP ceased in 2011.

The Vermilion NEAP impoundment is bordered by the Middle Fork of the Vermilion River (Middle Fork) to the north and east; the retired VPP to the west; and the Kickapoo State Recreation Area to the south. The NEAP is located southeast of two inactive CCR impoundments: the Old East Ash Pond and the North Ash Pond (Attachment A). The three inactive CCR units on the VPP property will be closed by removal to an on-site landfill, as per the requirements of the Agreed Interim Order (Illinois, Attorney General, 2021). The NEAP is also adjacent to the Secondary New East Ash Pond which is an unlined stormwater pond.

There are numerous abandoned coal mines in the vicinity of the NEAP (Kelron 2003). An abandoned surface mine (the Harmattan Mine) is located approximately 225 meters (m) southeast of the NEAP and six abandoned subsurface mines (the Crawford Mine, Middle Fork No. 2 Mine, Pilot Mine, Bonnett Mine, Horner Fletcher Mine, and Calvert Mine) are located within a 1000 m radius of the NEAP. The Crawford Mine underlies the northern portion of the NEAP and the Middle Fork No. 2 Mine is adjacent to the southern portion of the NEAP.

A Hydrogeologic Site Characterization Report (Ramboll 2021a) and Groundwater Monitoring Plan (Ramboll 2021b) have previously described the geologic units present in the vicinity of the VPP NEAP, which include the UU, an upper confining unit (UCU), and the BCU. The UU is made up of alluvial deposits of the Cahokia Alluvium and consists predominately of sand with intermittent layers of silty clay. The UCU is primarily low permeability silty and clayey diamictons of the Wedron Formation with sporadic sand lenses. Underlying the unlithified deposits is the BCU, which is weathered shale of the Pennsylvanian Age Shelburn Formation. The Shelburn Formation is approximately 75 feet (ft) thick in the vicinity of the NEAP and contains a major coal seam. None of these three units have been identified as an aquifer, though the UU and BCU have been identified as PMPs (Ramboll 2021a).

3.2 Groundwater Monitoring Network

A groundwater monitoring network was proposed in accordance with I.A.C. Title 35 Section 845.630 to monitor groundwater quality which passes the waste boundary as part of the Operating

[1] This figure is also provided as Figure 2-1 of the VPP NEAP N&E Report.

Permit Application to IEPA for the NEAP. The proposed groundwater monitoring network is described in the Groundwater Monitoring Plan (Ramboll 2021b) and shown in Attachment B.[2] Well construction information is provided in Attachment C.[3]

Groundwater flow in the BCU and UU is typically west to east towards the Middle Fork, which is the receiving water body for the BCU and UU PMPs. Groundwater flow directions in the BCU and horizontal hydraulic gradients in both the BCU and UU are generally consistent across seasons, though wells screened in the UU are frequently dry (Ramboll 2021a).

Vertical hydraulic gradients were reported in Ramboll (2021a) and Kelron (2003) in the uplands and bottomlands surrounding the NEAP. In the uplands west of the NEAP near well nest 10/22, vertical groundwater migration is downward from the UCU to the BCU. In the bottomlands of the Middle Fork (east of the NEAP), vertical groundwater migration is upward from the BCU to the UU. Further, artesian conditions were observed within a coal seam north of the NEAP, which indicates possible vertical flow from the coal seam to the BCU (Kelron 2003). A detailed discussion of the hydrology of the Site is presented in Section 2.3 of the VPP NEAP N&E Report.

[2] This figure is also provided as Figure 2-9 of the VPP NEAP N&E Report.
[3] This table is also provided as Table 2-4 of the VPP NEAP N&E Report.

4. GEOCHEMICAL SITE CONDITIONS

The general behavior of sulfate in groundwater systems is discussed in Section 4.1. A summary of Site solids and aqueous conditions within the UU are provided in Section 4.2 and 4.3, respectively, with discussion of how groundwater both upgradient and downgradient of the VPS NEAP may interact with the Site solids to affect constituent behavior. This includes discussion of potential sorbing or precipitating phases and how the stability of those phases may be affected by changes in groundwater redox conditions.

4.1 Constituent Transport and Fate

Sulfate is the primary form of oxidized sulfur (S(VI)) in the environment and is a divalent oxyanion at pH values greater than 2 SU (Stumm and Morgan 1996). Sulfate in groundwater may adsorb onto positively charged sites on solid metal oxide phases, most commonly iron and manganese oxides (Brown et al. 1999). The extent and strength of sulfate adsorption to metal oxide surfaces depends on pH, ionic strength, and the oxide surface area available for sorption. Sulfate can also form insoluble complexes such as barite ($BaSO_4$) (NCBI 2024). Sulfate in groundwater may be reduced to elemental sulfur (S[0]) or sulfide (S[-II]) under sufficiently reducing conditions, a process governed by local microbial communities (Stumm and Morgan 1996). Generally, reduced sulfur is less mobile in groundwater than sulfate and readily precipitates as insoluble metal sulfides (Stumm and Morgan 1996).

TDS is a measure of the mass of dissolved material in water, rather than a specific chemical constituent. Individual constituent contributions to TDS depend on both the concentration and molar mass of each contributor. Typically, major ions (i.e. calcium, sodium, magnesium, potassium, chloride, sulfate, and carbonate species) represent the primary contributors to TDS. As such, TDS is often positively correlated with electrical conductivity and ionic strength (Rusydi 2018, Ghalib et al. 2020). TDS concentrations can be reduced by the removal from aqueous phases of the individual constituents that contribute to TDS.

4.2 Site Solids Characterization

Site solids were characterized in June 2023 to determine the type and abundance of minerals present in the BCU and the UU, their geochemical properties, and their effect on the geochemistry of the groundwater system. Solids were characterized using a variety of analytical techniques, the results of which are presented in Tables 1 through 4. Solids were collected from two locations adjacent to the following existing wells in the NEAP monitoring network:

- VER-35, located downgradient of the NEAP to the northeast and adjacent to well 35. Solids were collected from two intervals within the BCU (50-60 feet below ground surface [ft bgs] and 60-63 ft bgs) representing predominately shale lithologies.

- VER-70, located downgradient of the NEAP to the south and adjacent to well 70. Solids were collected from two intervals within the UU (30-40 ft bgs and 41-42 ft bgs) and one interval

within the BCU (75-80 ft bgs). Exceedances of sulfate and TDS above the GWPS were detected at well 70S (screened in the UU from 10-20 ft bgs) during the Q2 through Q4 2023 sampling events.

Field boring logs for these locations, a map showing the boring locations, and boring logs from the initial well installation efforts are provided in Attachment D.

Additional solids samples were also collected from the site to support the Hydrogeologic Site Characterization Report (Ramboll 2021a). Solids were collected from three locations during installation of groundwater monitoring wells in 2021:

- 70D, located downgradient of the NEAP to the south. Solids were collected from one interval within the UU (16-18 ft bgs) and one interval within the BCU (22-24 ft bgs).
- 71D, located downgradient of the NEAP to the southeast. Solids were collected from one interval within the UU (9-11 ft bgs) and one interval within the BCU (12-14 ft bgs).
- 103, north of the plant area upgradient from the NEAP to the west. Solids were collected from three intervals within the UCU (13-15 ft bgs, 92-94 ft bgs, and 173-17ft bgs).

Boring logs and well construction diagrams for these locations and a map showing the location of well 103 are provided in Attachment E.

4.2.1 Cation Exchange Capacity, Total Organic Carbon, and Sulfide

The cation exchange capacity (CEC) of a solid represents the total negative surface charge of that material, which is related to the material's surface potential to sorb cations. Amorphous iron hydroxides, organic matter, and clays all tend to possess high negative surface charges at circum-neutral pH and therefore tend to contribute to higher CEC values. Total organic carbon (TOC) represents the carbon component of organic matter within a solid material. The CEC and TOC values for solids are presented in Table 1. CEC and TOC values are consistently low in the vicinity of the NEAP (CEC: 8.0 – 11 milliequivalents per 100 g of sample [meq/100g]; TOC: 0.46 – 1.5 weight percent [wt %]), indicating that the solids have low amounts of organic matter present and limited capacity to sorb cations.

Acid-volatile sulfide was also measured in the site solids. Sulfide concentrations were below detection (< 0.23 milligrams per kilogram [mg/kg]) in the solids (see Table 1), which may indicate that sulfide oxidation has occurred. The weathered nature of the shale in the BCU supports the occurrence of weathering reactions involving sulfide minerals, which could be contributing to sulfate concentrations detected in the groundwater samples. The laboratory analytical results for CEC, TOC, and sulfide are available in Attachment F.

4.2.2 Total Metals via Bulk Characterization

Total metals were analyzed to determine the major and trace metal content of the solids and the results are presented in Table 2a. The laboratory analytical results are available in Attachment G. The solids samples collected from the site in 2021 to support the Hydrogeologic Site Characterization Report (Ramboll 2021a) were submitted for total metals analysis; the analytical results for those samples are presented in Table 2b and the laboratory analytical results are available in Attachment G.

Based on the total metals analysis conducted in 2023 and presented in Table 2a, total iron concentrations in the UU solids ranged from 33,000 – 37,000 mg/kg. Iron concentrations were higher in the BCU solids, ranging from 44,000 – 49,000 mg/kg. The abundance of iron within the bulk solids matrix of both the UU and BCU PMPs indicates the likelihood of iron-bearing minerals within the system. The presence of iron-bearing minerals was confirmed via X-Ray diffraction (XRD), as discussed in Section 4.2.4. Total manganese concentrations were relatively low and consistent in site solids from the UU and BCU, ranging from 690 – 710 mg/kg in the UU and 690 – 790 mg/kg in the BCU. Total aluminum concentrations were higher in site solids from the BCU (67,000 – 81,000 mg/kg) than the UU (58,000 – 61,000 mg/kg), which is consistent with the shale lithologies in the BCU. The presence of these metals (iron, manganese, and aluminum) in the aquifer solids may provide potential attenuation sites for COCs in the form of metal oxides (Brown et al. 1999). The total metals results presented in Table 2b also identify iron and manganese in site solids (aluminum was not analyzed). The solids analyzed in 2021 (Table 2b) exhibit a wide range of iron (10,400 – 43,100 mg/kg) and manganese (290 – 792 mg/kg) concentrations compared to those of the 2023 samples (Table 2a); this may be due to differences in sample location and depth.

4.2.3 Sequential Extraction Procedure Analysis of Metals

Samples of composited material from select NEAP-associated boring locations were submitted to Eurofins (Knoxville, TN) for sequential extraction procedure (SEP). SEPs are chemical extractions used to dissolve metals from specific solid-associated phases. SEPs use progressively stronger reagents to solubilize metals from increasingly recalcitrant phases. Although these procedures do not identify the discrete solid phases in a soil/aquifer matrix, they do provide a means to evaluate the class of solids and relative stability in relation to general solubility, changes in oxidation/reduction (redox) potential, and pH fluctuations (Tessier et al. 1979, Kuo et al. 1983, Sposito et al. 1984, Hickey and Kittrick 1984, Gruebel et al. 1988). Therefore, SEP data are useful to infer the mechanism and potential reversibility of attenuation processes. The results of the 7-step extraction procedure and analysis are provided in Table 3 and Attachment H.

SEP analysis of iron, lithium, and manganese was conducted on site solids collected from the BCU.[4] An abundance of iron was associated with metal hydroxides (49 – 54%) and non-crystalline

[4] Results of the SEP analysis for lithium are not included in this discussion, as lithium was addressed in the Q2 2023 ASD (Ramboll 2023).

materials (10 – 11%). Similarly, a significant portion of manganese was associated with metal hydroxides (52 – 55%) and non-crystalline material (14 – 15%). This indicates that metal oxides are present and may provide potential sorption sites for sulfate. An additional 17 and 29% of the iron and manganese, respectively, were associated with the acid/sulfide fraction. Some iron and manganese were associated with the organic material bound fraction (ranging from below detection for iron to 5.9% of manganese), though CEC and TOC data indicated there were low amounts of organic matter present in the site solids. Iron and manganese were also detected in the residual metals fraction (from 4.0% of manganese to 11% of iron), which may indicate incorporation of these metals into clay minerals and/or the aluminosilicate crystal lattice of feldspars. A relatively small amount of iron (1.3 – 1.5%) was associated with carbonates, which is consistent the results of XRD analysis which detected siderite in the site solids (Section 4.2.4).

4.2.4 Mineralogical Analysis

X-Ray diffraction (XRD) with Rietveld refinement was conducted for identification of minerals in solid samples. XRD is an analytical technique that provides information about the identity of the crystalline material within a sample but does not provide information about non-crystalline or amorphous phases. XRD results are normalized to 100% of the total weight, meaning that material not characterized by XRD is ignored in the percent calculation. Trace minerals present at concentrations less than about one percent are not detectable by XRD. Site solids from the BCU and UU were primarily composed of quartz (SiO_2), which ranged from 35 – 39 wt% of the minerals present in BCU site solids and 48 – 49 wt% of the minerals present in UU solids (Table 4; Attachment I). Muscovite was the second most abundant mineral detected by XRD, with concentrations ranging from 23 – 27 wt% in BCU sites solids and 14 – 15 wt% in UU site solids. Concentrations of feldspar minerals, including albite (11 – 13 wt%) and microcline (0.72 – 1.3 wt%), were consistent across the Site.

Carbonate minerals, such as dolomite and siderite, were also identified in the site solids. Dolomite was only detected in the two UU solids samples (12 wt%). Siderite ($FeCO_3$) was detected at higher concentrations in the BCU solids (4.9 – 5.4 wt%) than the UU solids (0.1 – 0.9 wt%). Siderite may form following sulfide mineral oxidation (Lindsay et al. 2015), as was the case with siderite formation in a major BCU coal seam mined in the vicinity of the NEAP (Mehnert 2002). Iron-bearing crystalline minerals (such as chlorite and siderite) were identified by XRD, but these did not include iron oxides. As such, it is anticipated that iron oxides in the site solids primarily exist in amorphous phases. Clay minerals chlorite (1.2 – 7.7 wt%), kaolinite (3.2 – 7.5 wt%), and illite (5.2 – 8.0 wt%) were detected in each of the site solids samples. Montmorillonite was also identified at in one site solids sample from the UU (0.8 wt%). Clay minerals such as kaolinite provide potential attenuation sites for sulfate due to the presence of surface hydroxyl groups (Sokolova and Alekseeva 2008).

4.3 Aqueous Geochemistry

NEAP porewater (i.e., CCR contact water) and groundwater from wells across the UU, UCU, and BCU were analyzed for a range of geochemical parameters. NEAP porewater was collected from porewater monitoring well NED1. CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" (USEPA, 2014) and represents the material potentially leached from impoundments. The CCR materials are the primary source of constituent loading to the CCR porewater. Over an extended period (*e.g.,* months to years), the CCR porewater (*i.e.,* water) reaches equilibrium with the CCR materials. The concentrations within the porewater are "the most representative data available for impoundments because these data are field-measured concentrations of leachate" (USEPA, 2014). Porewater is therefore the most appropriate source term for potential flux out of CCR impoundments.

Water chemistry data from sampling events between 2016 (or 2021) and 2023 is presented in Figures 1 through 5b. For clarity in interpretation, a cold color scheme was applied to wells screened in the BCU (wells 70D, 71D, 16A, 35D, 24, and 22) and a warm color scheme was applied to wells in the UU and UCU (wells 70S, 71S, 23, and 10). In the figure legends, wells are arranged according to their geologic unit and in counterclockwise order, starting with wells 70D and 70S and ending with background wells 22 and 10 (Attachment B). Concentrations discussed in the following subsections are inclusive of April 2021 to November 2023 for consistency across locations. Wells 16B and 35S were frequently dry during sampling events and there is limited water chemistry data available for these wells. As such, wells 16B and 35S have been excluded from the following discussion, tables, and figures. Exceedances addressed in the Q2 2023 ASD (chloride at BCU wells 35D and 70D, lithium at wells 35D and 70D, sulfate at well 35D, and TDS at wells 35D and 70D; Ramboll 2023) and Q4 2023 ASD (chloride at BCU well 71D; Ramboll 2024) are also excluded from the following discussion. The aqueous phase data used in the site evaluation is summarized in Attachment J.

4.3.1 Exceedance Parameters

A sulfate exceedance above the GWPS of 400 milligrams per liter (mg/L) was detected in samples from well 70S during the Q2 2023 sampling event (Figure 1). Sulfate has been higher in samples from well 70S than other wells since monitoring commenced in April 2021. Concentrations at well 70S have ranged from 541 – 840 mg/L, though concentrations remained stable during the last three monitoring events. Higher sulfate concentrations have also been detected in samples from the porewater well (NED1), with concentrations ranging from 860 – 1,510 mg/L. The relatively higher concentrations of sulfate in the porewater are likely contributing to the sulfate concentrations at well 70S. Concentrations of sulfate at the other background and compliance wells in the UU have generally been below the sulfate GWPS, though samples from UU background well 10 have higher detected sulfate concentrations (224 – 350 mg/L; April 2021 to November 2023) relative to other background and compliance wells.

A TDS exceedance above the GWPS of 1,200 mg/L was detected in the sample from well 70S during the Q2 2023 monitoring event (Figure 2). Similar to sulfate, TDS has generally been higher at well 70S since monitoring commenced in April 2021, with concentrations ranging from 1,140 – 1,580 mg/L. TDS concentrations at the porewater well (NED1) have ranged from 1,500 – 2,350 mg/L and are generally consistent with sulfate trends (Figure 2). The higher TDS in the porewater is likely contributing to exceedances at well 70S. TDS at the other background and compliance wells has been below the GWPS, though background well 10 (850 – 1,080 mg/L) has higher TDS concentrations than other compliance and background wells. TDS at well 70S has a strong positive linear correlation with sulfate (R^2 = 0.79, Figure 3). This correlation, in combination with the observation that sulfate concentrations constitute almost half of the total TDS mass reported at 70S, indicate that sulfate is a major contributor to TDS at well 70S.

4.3.2 Redox/pH Summary

The oxidation-reduction (redox) potential (ORP) and pH in aqueous systems are major controls on the speciation of redox-active chemicals. ORP and pH will affect sulfate mobility in groundwater and determine the stability of iron and manganese oxyhydroxides.

In wells across the groundwater monitoring network, pH values are circumneutral and appear to be stable over time (Figure 4). For clarity, Figure 4 presents pH values between 2021 and 2023, though pH values available at wells 10 and 16A extending back to 2016 were consistent with 2021 – 2023 results. The pH at background wells 10 and 22 ranged from 6.6 – 7.0 standard units (SU) and 7.2 – 7.6 SU, respectively. Compliance wells were generally within the range of pH measurements at background wells. Wells screened in the BCU typically had a slightly higher pH than wells screened in the UU or UCU. Porewater well NED1 consistently had the highest pH, ranging from 7.6 to 9.2 SU.

Groundwater samples within the NEAP monitoring network exhibit a range of redox conditions (Figure 5). For clarity, Figure 5 presents ORP values between 2021 and 2023, though ORP values available at wells 10 and 16A extending back to 2016 were consistent with 2021 – 2023 results. Redox across the site have generally fluctuated between oxidizing and reducing conditions, with ORP values ranging from -133 millivolts [mV] (well 35D, Q2 2021) to 255 mV (background well 10, Q2 2021) over the last two years. However, in general, samples from most wells still exhibit oxidizing conditions. Oxidizing conditions across the Site are consistent with the lack of detectable sulfide in the site solids and the weathered nature of the shale in the BCU (Sections 3.1 and 4.2.1). Taken together, these observations indicate that sulfide oxidation to sulfate has occurred in geologic units in the vicinity of the NEAP, particularly in the BCU. Reducing conditions have consistently been detected at porewater well NED1, potentially reflecting an influence of unburned carbon on the porewater. UU well 70S is consistently more reducing than the UU background well 10, which may reflect an influence from the reducing porewater within the NEAP.

4.3.3 Pourbaix Diagrams

Eh-pH, or Pourbaix, diagrams can be used to illustrate the predicted speciation of specific analytes at thermodynamic equilibrium under the conditions observed for a groundwater sample. Select crystalline mineral species were suppressed to be representative of anticipated groundwater conditions (e.g. mineral formation not anticipated to be kinetically favored under the temperature and pressure conditions of the Site). Conditions observed at well 70S on June 21, 2023 were used to represent groundwater within the UU (Table 5; Figures 6a and 7a).[5] Conditions detected at well 70D were used to represent groundwater within the BCU (Table 5; Figures 6b and 7b).

Groundwater samples collected within the UU and BCU plot predominantly along the equilibrium line between aqueous ferrous iron (Fe^{++}) and amorphous iron oxides ($Fe(OH)_3$(ppd)) (Figures 6a and 6b). The current conditions in site groundwater therefore represent metal concentrations that occur during the dissolution and precipitation of iron in re-establishment of equilibrium conditions. Conditions detected at well 70S (Figure 6a) indicate that groundwater at this well, and across the UU more broadly, is experiencing dynamic equilibrium of iron in which chemical reactions between amorphous iron oxides and aqueous ferrous iron may occur. Dynamic equilibrium conditions involving dissolution and precipitation of iron oxide minerals are also predicted in the BCU, represented by well 70D (Figure 6b). The modeling results at wells 70S and 70D indicate that while amorphous iron oxides are likely present in the UU and BCU (consistent with the interpretation of the SEP results) under most conditions they may be subject to dissolution and precipitation processes. Amorphous iron oxides may provide potential mineral surfaces for sorption of COCs within the aquifer.

Iron sulfide minerals, such as pyrite, are not predicted to be stable in the UU (represented by well 70S) or BCU (represented by well 70D). As such, any existing sulfide minerals within the geologic units in the vicinity of the NEAP would be expected to undergo oxidative dissolution. This is consistent with the lack of detectable sulfides in the site solids.

The Eh-pH diagram for manganese species in UU groundwater show that samples plot close to the equilibrium line between dissolved manganese (Mn^{++}) and rhodochrosite (a manganese carbonate mineral) (Figure 7a). This indicates that well 70S may experience dynamic equilibrium between manganese carbonate minerals, such as rhodochrosite, and aqueous manganese (Figure 7a). Solid phase manganese minerals are not predicted to be stable under conditions in the BCU (represented by well 70D; Figure 7b).

4.3.4 Total and Dissolved Iron and Manganese Concentrations

The distribution of iron and manganese between total and dissolved phases can provide insights into redox conditions and constituent behavior. A comparison of the total and dissolved iron and

[5] Field oxidation-reduction potential (ORP) measurements were converted to Eh by adding +200 mv to correct for the Ag/AgCl electrode.

manganese data from recent sampling events is provided in Table 6. Total iron was detected at least once at all sample locations analyzed during Q2 and Q3 2023, with values ranging from 0.088 mg/L (well 70S, Q3 2023) to 2.6 mg/L (well 35D, Q3 2023). Dissolved iron was detected at four of the eight sampling locations, with values ranging from 0.24 mg/L (background well 22, Q2 2023) to 1.9 mg/L (well 35D, Q3 2023). Detectable dissolved iron generally coincided with reducing conditions in the wells, indicating that reducing conditions are contributing to dissolved iron in the groundwater. Where dissolved iron was detected, concentrations were typically a significant (> 50%) portion of the total iron identified which is consistent with the dissolution reactions between ferrous iron and solid phase iron predicted in the Pourbaix diagrams.

Total manganese was detected at all locations analyzed, with reported values ranging from 0.018 mg/L (background well 22, Q3 2023) to 1.8 mg/L (well 70S, Q2 2023) (Table 6). Dissolved manganese was also detected at all eight sampling locations, with values ranging from 0.0083 mg/L (background well 10, Q3 2023) to 1.5 mg/L (well 70S, Q2 2023). Wells in the BCU and UU had dissolved manganese concentrations making up > 64% of the total manganese. This is generally consistent with the predicted mobilization of manganese to the aqueous phase based on Pourbaix diagrams, particularly in the BCU (Figure 7b). The highest concentrations of dissolved and total manganese were detected at well 70S, which was predicted to experience dynamic equilibrium between aqueous manganese and solid phase manganese minerals.

4.3.5 Major Ion Distribution and Groundwater Signatures

Piper diagrams were constructed using data from the NEAP monitoring network to visualize major ion distributions in the groundwater. Piper diagrams are a common tool for assessing geochemical similarities or differences in terms of the major ion distributions between aqueous samples. UU and UCU groundwater is characterized by a low abundance of chloride and monovalent cations (sodium and potassium; Figure 8). The relatively high contribution of divalent cations (calcium and magnesium) in the UU and UCU may be the result of carbonate minerals, particularly dolomite, which was identified in site solids collected from the UU (Table 4). BCU groundwater is generally characterized by a high abundance of monovalent cations and a low abundance of sulfate (with the exception of well 35D). The porewater well (NED1) had a low abundance of chloride and monovalent cations and a high abundance (> 80%) of sulfate. Well 70S had a similarly high relative abundance of sulfate that is distinct from that of the other wells in the UU and UCU, indicating the potential for porewater contribution to the sulfate exceedance at well 70S. The difference in groundwater composition between 70S (which is a calcium/magnesium-sulfate type water) and background well 10 (which is a calcium/magnesium-carbonate type water) could result in changes to constituent behavior following unit closure as background groundwater migrates under the former NEAP footprint.

5. GEOCHEMICAL CONCEPTUAL SITE MODEL

5.1 Source and Mobilization Mechanisms

Sulfide minerals, such as pyrite, are naturally abundant in coals. After combustion, sulfate is the dominant sulfur species associated with fly ash. Sulfate is concentrated on the surface of fly ash particles and the majority of sulfate mineral phases are soluble under environmental conditions, such that sulfate associated with fly ash is leachable (Izquierdo and Querol 2012). Sulfate and TDS were identified in the CCR porewater at concentrations up to 1,510 mg/L and 2,350 mg/L, respectively. As such, the primary source of the sulfate exceedance at well 70S is expected to be the NEAP CCR porewater. The higher sulfate in the sample from well 70S (541 – 840 mg/L) is expected to be a major contributor to the TDS exceedance identified at this well.

Sulfide oxidation within the major coal seam underlying the NEAP may also contribute sulfate to the groundwater. Given the artesian conditions observed in the coal seam (Kelron 2003), it is likely that sulfide oxidation in the coal is contributing sulfate to overlying formations, though this process is expected to primarily contribute sulfate to the BCU.

5.2 Potential and Observed Attenuation Mechanisms

Sulfate is typically considered to be a conservative species within groundwater at circumneutral pH conditions, although attenuation is possible via sorption mechanisms. Sulfate attenuation in the UU is expected to occur primarily as a result of sorption onto metal oxides such as amorphous iron oxides or clays such as kaolinite or chlorite. SEP analysis (Table 3) indicated the presence of significant concentrations of metal oxides and Pourbaix diagrams (Figures 6a – 6b) indicate conditions across the Site favor dynamic equilibrium reactions between amorphous iron oxides and ferrous iron. While current conditions are not favorable for bioremediation of sulfate (via microbial sulfate reduction), this could occur in the vicinity of the NEAP if conditions shift to become more reducing. Attenuation of sulfate, primarily via sorption mechanisms, is expected to contribute to a reduction in TDS in the groundwater.

6. REFERENCES

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TABLES

Table 1 - CEC, TOC, and Sulfide Content of Site Solids
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Geosyntec Consultants, Inc.

Field Boring Location	VER-35		VER-70		
Sample Depth (ft bgs)	55-60	60-63	30-40	41-42	75-80
Sample Location	BCU	BCU	UU	UU	BCU
Sample Date	24-Jun-23	24-Jun-23	23-Jun-23	23-Jun-23	23-Jun-23
Field Boring Description	Weathered shale	Highly weathered shale	Gravelly clay	Clay	Highly weathered shale
CEC (meq/100 g solids)	9.0	9.2	8.0	11	9.7
TOC %	0.92	0.91	0.93	0.46	1.5
Sulfides, acid volatile (mg/kg)	< 0.21	< 0.21	< 0.23	< 0.22	< 0.22

Notes
BCU - bedrock confining unit
CEC - cation exchange capacity
meq/100 g solids - milliequivalent per 100 grams of solids
mg/kg - milligram per kilogram
TOC - total organic carbon
UU - upper unit
Non-detect values are shown as less than the reporting limit
Sample depth is shown in feet below ground surface (ft bgs)

Table 2a - Total Metals Analysis of Site Solids - 2023 Samples
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Field Boring Location	VER-35		VER-70		
Sample Depth (ft bgs)	55-60	60-63	30-40	41-42	75-80
Sample Location	BCU	BCU	UU	UU	BCU
Sample Date	24-Jun-23	24-Jun-23	23-Jun-23	23-Jun-23	23-Jun-23
Field Boring Description	Weathered shale	Highly weathered shale	Gravelly clay	Clay	Highly weathered shale
Parameter	µg/g	µg/g	µg/g	µg/g	µg/g
Aluminum	67000	67000	58000	61000	81000
Antimony	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Arsenic	6.4	5.6	7.6	8.5	7.2
Barium	400	380	370	360	470
Beryllium	2.5	2.5	1.8	1.9	2.8
Bismuth	0.22	0.21	0.18	0.16	0.27
Cadmium	0.08	0.09	0.16	0.09	0.1
Calcium	3400	3500	24000	24000	4000
Chromium	73	62	44	46	43
Cobalt	19	17	12	14	19
Copper	21	20	18	18	25
Iron	44000	44000	33000	37000	49000
Lead	19	19	19	17	20
Lithium	58	56	40	41	66
Magnesium	11000	11000	19000	17000	12000
Manganese	710	690	710	690	790
Molybdenum	0.7	0.8	1.4	3.8	0.8
Nickel	40	38	28	30	43
Potassium	21000	20000	19000	18000	24000
Phosphorous	650	680	480	560	650
Selenium	0.2	0.2	0.2	0.3	0.2
Silver	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium	86	87	92	86	101
Thallium	0.5	0.48	0.43	0.4	0.54
Tin	< 6	< 6	< 6	< 6	< 6
Titanium	3900	3800	2900	3000	3900
Uranium	3.1	3.1	2.8	2.4	3.2
Vanadium	81	77	58	61	88
Yttrium	16	17	18	18	20
Zinc	93	91	84	81	110

Notes
BCU - bedrock confining unit
µg/g - microgram per gram
UU - upper unit
TOC - total organic carbon
Sample depth is shown in feet below ground surface (ft bgs)
Total metals samples prepared via method SW 3050 and analyzed via USEPA method 6020A.

Table 2b - Total Metals Analysis of Site Solids - 2021 Samples
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Geosyntec Consultants, Inc.

Field Boring Location	103			70D		71D	
Sample Depth (ft bgs)	13-15	92-94	173-175	16-18	22-24	9-11	12-14
Sample Location	UCU	UCU	UCU	UU	BCU	UU	BCU
Sample Date	7-Mar-21	8-Mar-21	9-Mar-21	4-Mar-21	4-Mar-21	3-Mar-21	3-Mar-21
Field Boring Description	Silty clay	Sand	Silty clay	Sand with clay	Shale	Clay transitioning to sand	Weathered shale
Parameter	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Antimony	0.38	1.7	0.38	0.36	0.40	0.38	0.38
Arsenic	5.6	26	3.9	5.1	6.1	8.9	4.1
Barium	40	8.0	47	34	30	22	39
Beryllium	0.63	0.060	0.33	0.16	1.1	0.25	0.92
Boron	17	3.4	8.2	3.9	7.1	5.1	6.1
Cadmium	0.20	0.19	0.20	0.20	0.19	0.19	0.19
Chromium	23	7.2	15	7.6	27	9.3	25
Cobalt	8.1	9.8	5.8	4.1	17	9.1	14
Iron	21400	11900	14100	10400	43100	10900	34700
Lead	14	38	9.0	8.4	15	8.0	15
Lithium	26	3.9	12	5.0	33	8.1	31
Manganese	379	290	389	524	792	306	650
Mercury	0.012	0.011	0.011	0.011	0.010	0.012	0.012
Molybdenum	1.8	1.4	0.86	0.99	0.29	2.1	0.19
Selenium	0.98	0.93	0.98	1.0	0.93	0.96	0.94
Thallium	4.9	4.6	4.9	5.0	4.6	4.8	4.7

Notes
BCU - bedrock confining unit
UCU - upper confining unit
µg/g - microgram per gram
UU - upper unit
Sample depth is shown in feet below ground surface (ft bgs)

Table 3 - SEP Analysis of Site Solids
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Field Boring Location			VER-35				VER-70	
Sample Depth (ft bgs)			55-60		60-63		75-80	
Sample Location			BCU		BCU		BCU	
Sample Date			24-Jun-23		24-Jun-23		23-Jun-23	
Field Boring Description			Weathered shale		Highly weathered shale		Highly weathered shale	
Fraction	**Reagent**	**Iron SEP**	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total
1	$MgSO_4$	Exchangeable Metals	<12	-	<12	-	<13	-
2	Sodium acetate,acetic acid	Bound to Carbonates	560	1.4%	570	1.5%	730	1.3%
3	Ammonium oxalate	Bound to Non-crystalline Material	4,300	10.5%	4,200	11.1%	5,500	9.6%
4	Hydroxylamine HCl	Bound to Hydroxides	20,000	48.8%	18,000	47.4%	31,000	54.4%
5	Sodium hypochlorite	Bound to Organic Material	< 46	-	< 46	-	61 J	1.1%
6	HCl and HNO_3	Bound to Acid/Sulfide	11,000	26.8%	11,000	28.9%	14,000	24.6%
7	HF, HNO_3, HCl, and H_3BO_3	Residual Metals	4,300	10.5%	4,200	11.1%	5,500	9.6%
SEP Total			**41,000**	-	**38,000**	-	**57,000**	-
Fraction	**Reagent**	**Manganese SEP**	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total
1	$MgSO_4$	Exchangeable Metals	7.6	1.0%	7.9	1.1%	7.6	0.8%
2	Sodium acetate,acetic acid	Bound to Carbonates	29	3.7%	29	4.0%	36	3.8%
3	Ammonium oxalate	Bound to Non-crystalline Material	110	14.1%	110	15.1%	130	13.8%
4	Hydroxylamine HCl	Bound to Hydroxides	430	55.1%	380	52.1%	510	54.3%
5	Sodium hypochlorite	Bound to Organic Material	46	5.9%	35	4.8%	54	5.7%
6	HCl and HNO_3	Bound to Acid/Sulfide	130	16.7%	140	19.2%	160	17.0%
7	HF, HNO_3, HCl, and H_3BO_3	Residual Metals	31	4.0%	30	4.1%	39	4.1%
SEP Total			**780**	-	**730**	-	**940**	-

Notes
BCU - bedrock confining unit
J - result is less than the reporting limit but greater than or equal to the method detection limit
µg/g - microgram per gram
SEP - sequential extraction procedure
Non-detect values are shown as less than the detection limit
Sample depth is shown in feet below ground surface (ft bgs)

Table 4 - XRD Analysis of Site Solids
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Field Boring Location		VER-35		VER-70		
Sample Depth (ft bgs)		55-60	60-63	30-40	41-42	75-80
Sample Location		BCU	BCU	UU	UU	BCU
Sample Date		24-Jun-23	24-Jun-23	23-Jun-23	23-Jun-23	23-Jun-23
Field Boring Description		Weathered shale	Highly weathered shale	Gravelly clay	Clay	Highly weathered shale
Mineral/Compound	**Formula**	wt %	wt %	wt %	wt %	wt %
Quartz	SiO_2	38.5	38.1	48.6	48.2	35.0
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	6.9	6.8	1.2	3.6	7.7
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	23.4	23.0	13.5	15.2	27.0
Albite	$NaAlSi_3O_8$	12.6	12.6	10.6	10.8	11.5
Microcline	$KAlSi_3O_8$	1.0	1.1	1.3	1.1	0.72
Siderite	$FeCO_3$	4.9	5.0	0.9	0.1	5.4
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$	-	-	0.8	-	-
Dolomite	$CaMg(CO_3)_2$	-	-	11.7	11.7	-
Illite	$(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}[(OH)_2,(H_2O)]$	7.1	8.0	7.4	5.6	5.2
Kaolinite	$Al_2Si_2O_5(OH)_4$	5.6	5.4	3.2	3.7	7.5
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot 10H_2O$	-	-	0.8	-	-

Notes
BCU - bedrock confining unit
UU - upper unit
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.
Sample depth is shown in feet below ground surface (ft bgs)

Table 5 - Eh-pH Diagram Inputs
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Well ID		70S	70D
Sample Collection Date		21-Jun-23	20-Jun-23
Input Parameter	Unit	UU	BCU
pH	SU	6.92	6.76
Alkalinity, total	mg/L $CaCO_3$	255	542
Calcium	mg/L	224	89.8
Chloride	mg/L	14.0	573
Iron	mg/L	0.197	0.306
Magnesium	mg/L	92.9	50.4
Manganese	mg/L	1.84	0.0856
Potassium	mg/L	1.83	6.69
Sodium	mg/L	18.9	506
Sulfate	mg/L	602	52
Temperature	°C	10.6	12.8

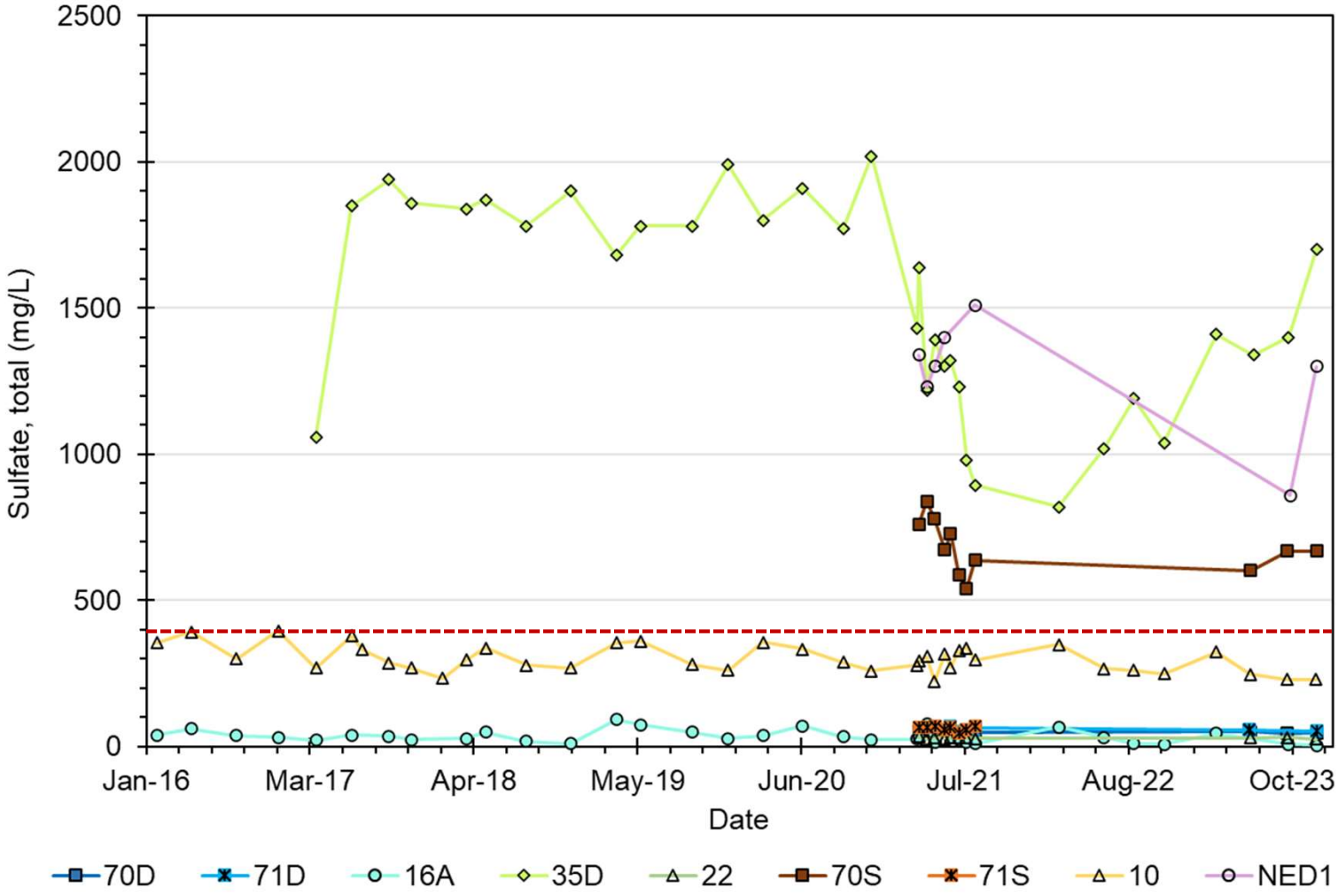
Notes
BCU - bedrock confining unit
mg/L - milligram per liter
SU - standard units
UU - upper unit

Table 6 - Total and Dissolved Aqueous Iron and Manganese Results
Geochemical Conceptual Site Model
Vermilion Power Plant - New East Ash Pond

Well ID	Sample Location	Date	Dissolved Iron (mg/L)	Total Iron (mg/L)	Dissolved Manganese (mg/L)	Total Manganese (mg/L)
70S	UU	21-Jun-23	< 0.02	0.20	1.5	1.8
		19-Sep-23	< 0.047	0.088	0.97	1.0
70D	BCU	20-Jun-23	< 0.02	0.31	0.098	0.086
		19-Sep-23	< 0.047	0.80	0.48	0.37
71D	BCU	20-Jun-23	< 0.02	0.11	0.19	0.22
16A	BCU	21-Sep-23	0.89	1.8	0.027	0.042
35D	BCU	29-Jun-23	1.8	1.9	0.030	0.031
		22-Sep-23	1.9	2.6	0.033	0.038
10	UCU	20-Jun-23	< 0.02	0.62	0.022	0.25
		19-Sep-23	< 0.047	0.93	0.0083	0.22
22	BCU	20-Jun-23	0.24	0.30	0.020	0.024
		19-Sep-23	0.25	0.21	0.017	0.018
NED1	CCR	26-Sep-23	0.28	1.8	0.20	0.28

Notes
BCU - bedrock confining unit
CCR - coal combustion residuals
mg/L - milligram per liter
UU - upper unit
Non-detect values are shown as less than the reporting limit
Wells 16B, 23, 24, 35S, and 71S are excluded from this table as recent measurements of iron and manganese were not available for these wells

FIGURES



Notes:
1. Background wells 10 and 22 shown with open triangular symbol.
2. Porewater well NED1 shown with open circular symbol.
3. mg/L - milligrams per liter
4. Red dashed line denotes groundwater protection standard

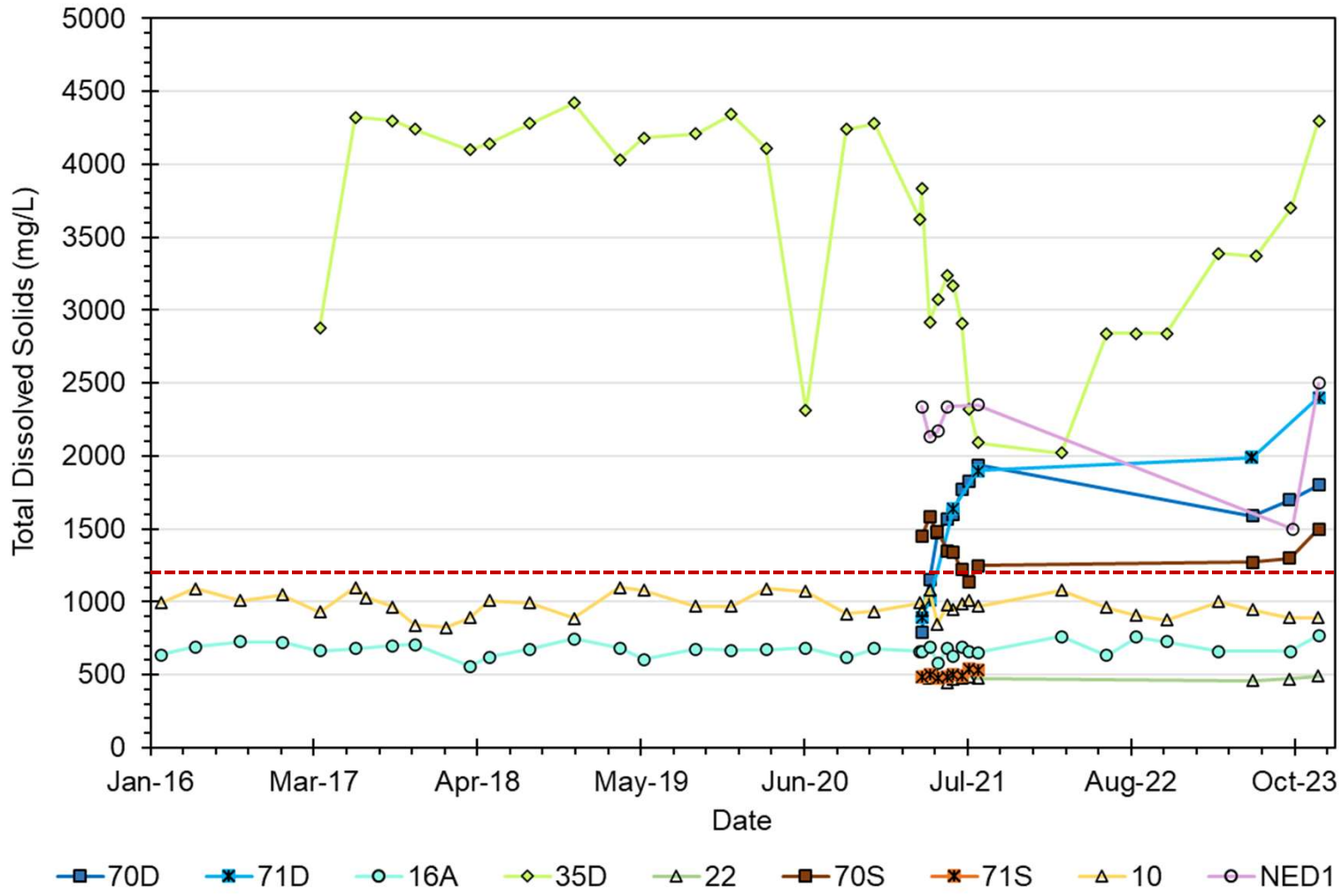
Sulfate Time Series
Vermilion, Illinois

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Chicago, Illinois | May 2024

Figure 1

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion



Notes:
1. Background wells 10 and 22 shown with open triangular symbol.
2. Porewater well NED1 shown with open circular symbol
3. mg/L - milligrams per liter
4. Red dashed line denotes groundwater protection standard

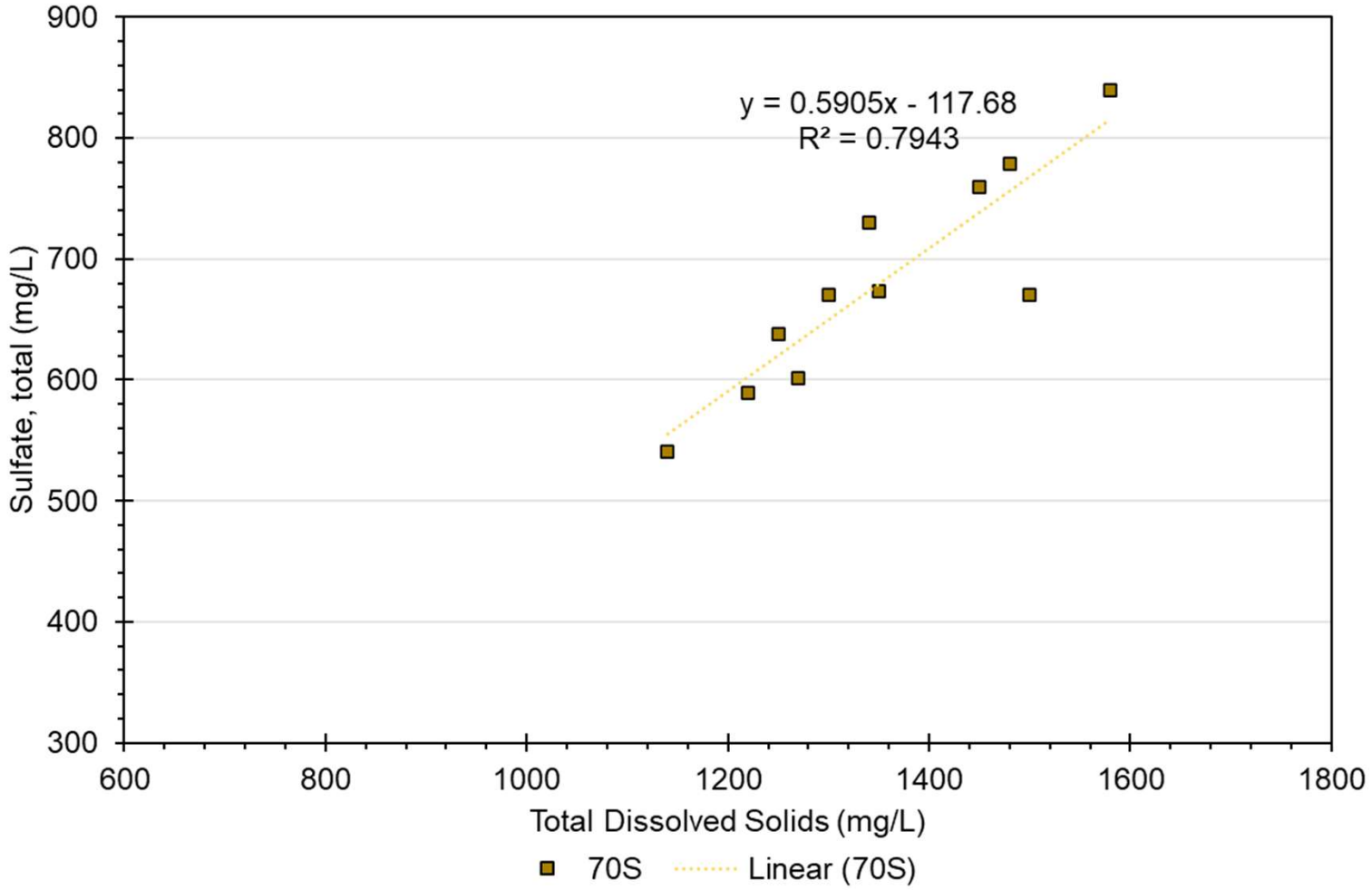
TDS Time Series
Vermilion, Illinois

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Figure 2

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion



Sulfate and TDS Correlation, 70S

Vermilion, Illinois

Geosyntec consultants

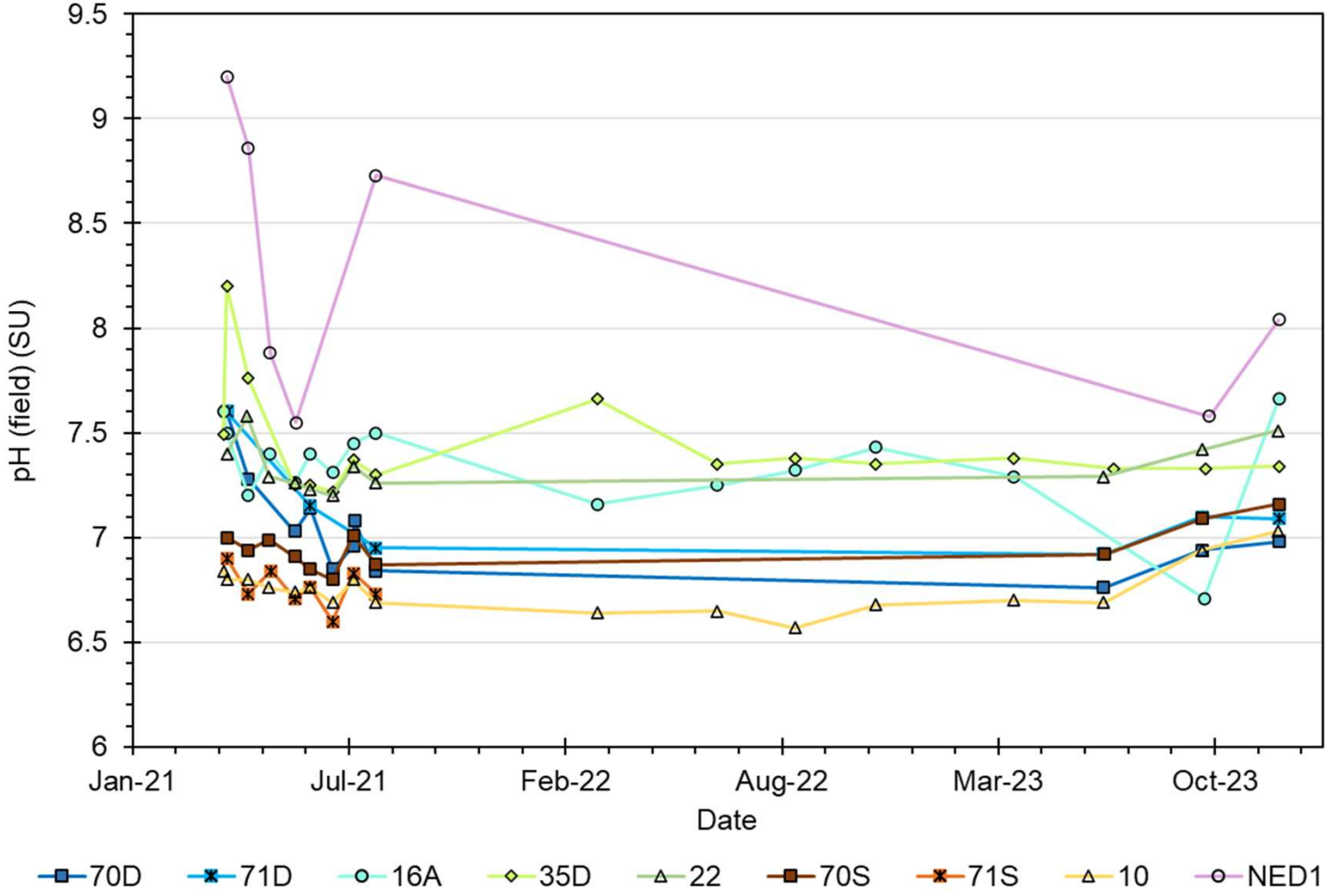
Figure 3

Chicago, Illinois | May 2024

Notes:

1. mg/L – milligrams per liter

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion



Notes:
1. Background wells 10 and 22 shown with open triangular symbol
2. Porewater well NED1 shown with open circular symbol
3. SU - standard units

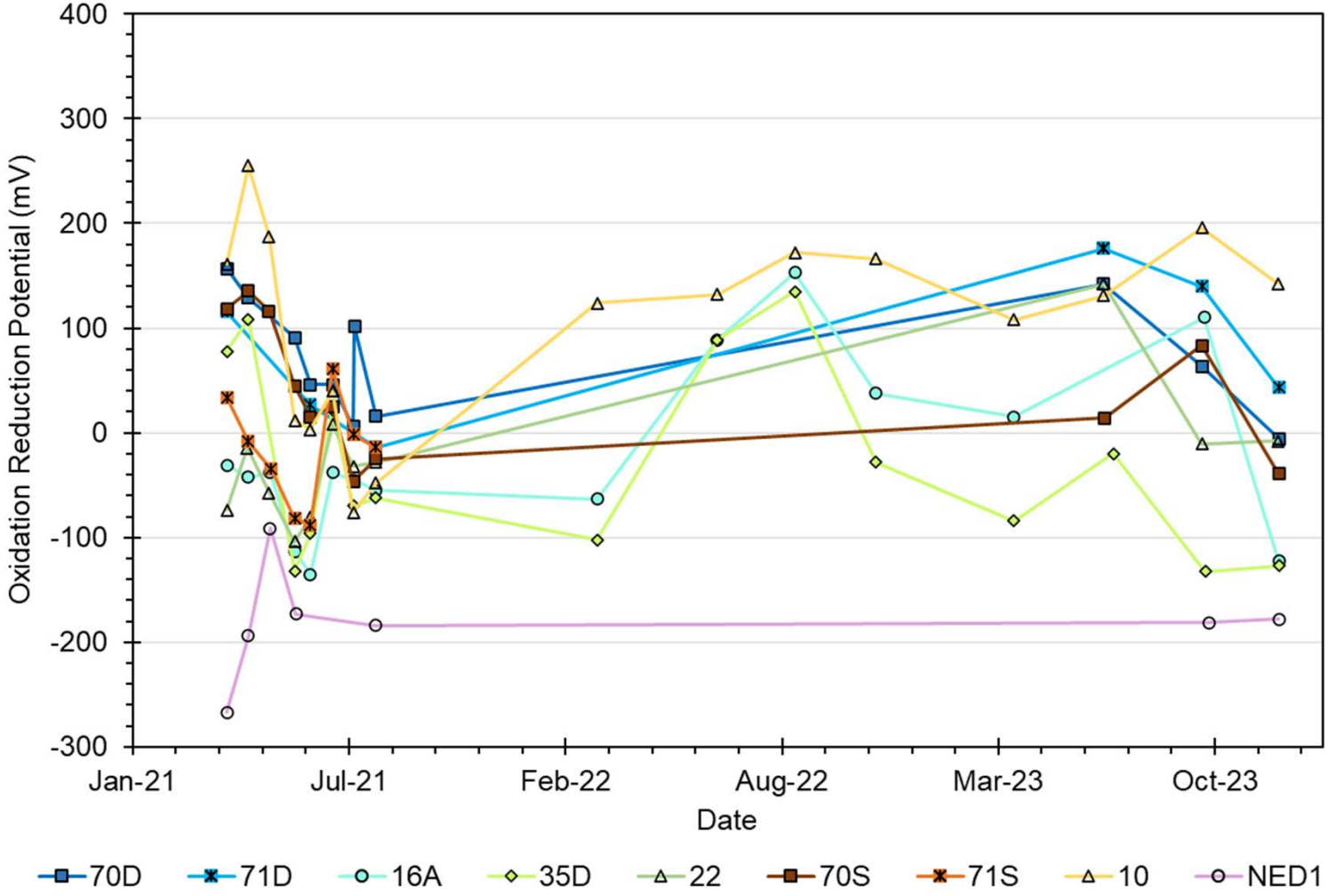
pH Time Series
Vermilion, Illinois

Geosyntec consultants

Chicago, Illinois | May 2024

Figure 4

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion



Notes:
1. Background wells 10 and 22 shown with open triangular symbol.
2. Porewater well NED1 shown with open circular symbol
3. mV - millivolt

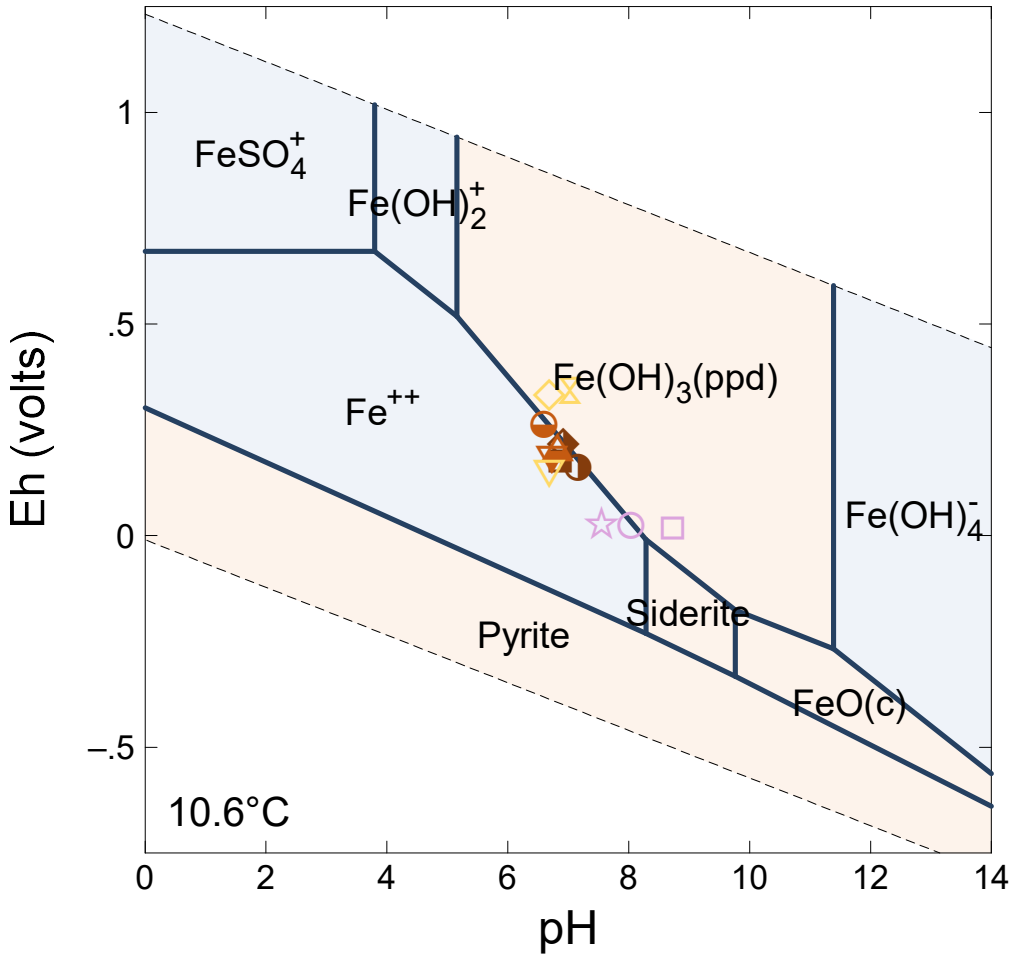
ORP Time Series
Vermilion, Illinois

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Figure 5

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion



70S_2021/08/17
70S_2023/06/21
70S_2023/11/29
71S_2021/07/08
71S_2021/07/27
71S_2021/08/17
10_2021/08/17
10_2023/06/20
10_2023/11/28
NED1_2021/06/04
NED1_2021/08/17
NED1_2023/11/29

Diagram Fe^{++}, T = 10.6 °C, P = 1.013 bars, a [main] = $10^{-5.857}$, a [H_2O] = 1, a [Cl^-] = $10^{-3.478}$, a [Ca^{++}] = $10^{-2.623}$, a [HCO_3^-] = $10^{-2.378}$, a [Mg^{++}] = $10^{-2.749}$, a [Na^+] = $10^{-3.158}$, a [SO_4^{--}] = $10^{-2.629}$, a [Mn^{++}] = $10^{-4.84}$, a [K^+] = $10^{-4.405}$, Suppressed: Ferrite-Ca, Ferrite-Mg, Goethite, Hematite, Magnetite

Notes:
1. Diagram generated using conditions at well 70S on June 21, 2023 to represent the UU.
2. Crystalline phases ferrite-Ca, ferrite-Mg, goethite, hematite, and magnetite are suppressed.

Iron Pourbaix Diagram, 70S
Vermilion, Illinois

Geosyntec consultants

Chicago, Illinois | May 2024

Figure 6a

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSW\Vermilion

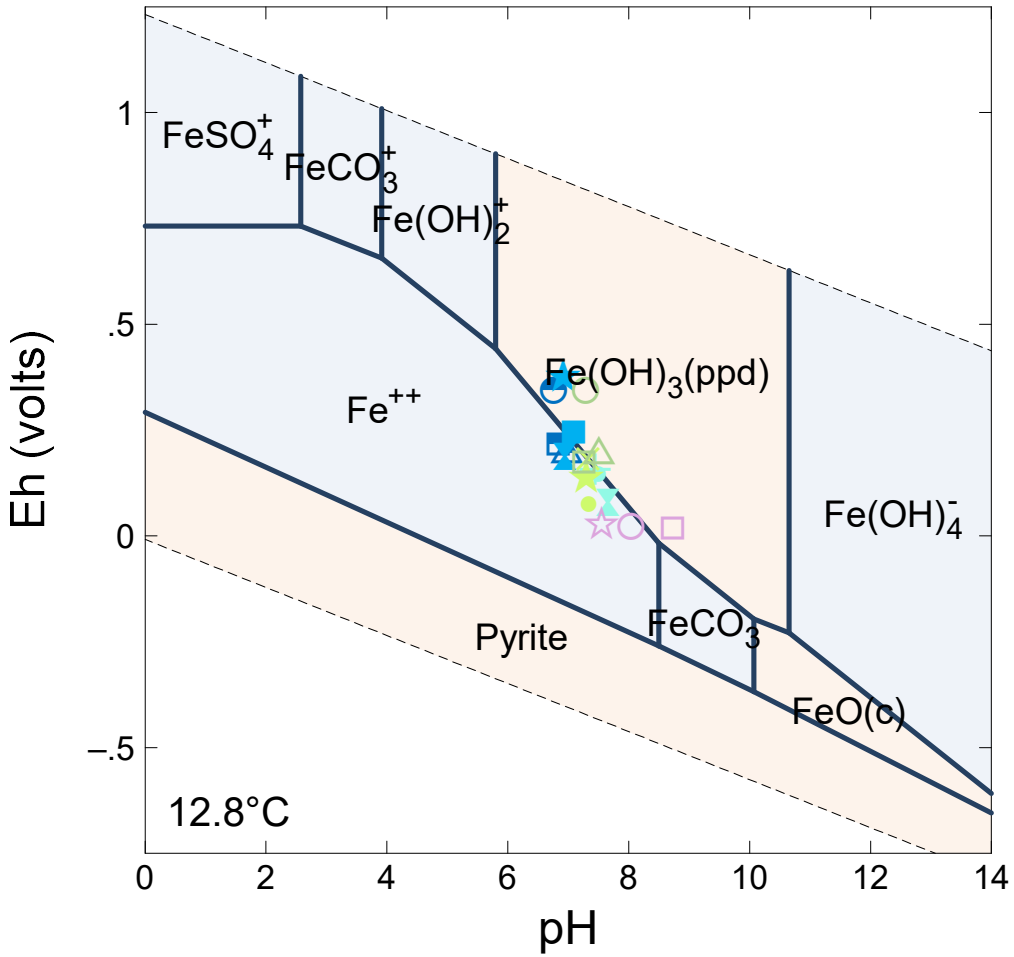


Diagram Fe^{++}, T = 12.8 °C, P = 1.013 bars, a [main] = $10^{-6.51}$, a [H_2O] = 1, a [Cl^-] = $10^{-1.87}$, a [Ca^{++}] = $10^{-2.984}$, a [HCO_3^-] = $10^{-2.051}$, a [Mg^{++}] = $10^{-2.97}$, a [Na^+] = $10^{-1.734}$, a [SO_4^{--}] = $10^{-3.661}$, a [Mn^{++}] = $10^{-6.132}$, a [K^+] = $10^{-3.843}$, Suppressed: Ferrite-Ca, Ferrite-Mg, Goethite, Hematite, Magnetite

- 70D_2021/08/17
- 70D_2023/06/20
- 70D_2023/11/29
- 71D_2021/08/17
- 71D_2023/06/20
- 71D_2023/11/29
- 16A_2021/07/27
- 16A_2021/08/17
- 16A_2023/11/29
- 35D_2021/08/17
- 35D_2023/06/29
- 35D_2023/11/29
- 22_2021/08/17
- 22_2023/06/20
- 22_2023/11/28
- NED1_2021/06/04
- NED1_2021/08/17
- NED1_2023/11/29

Notes:
1. Diagram generated using conditions at well 70D on June 20, 2023 to represent the BCU.
2. Crystalline phases ferrite-Ca, ferrite-Mg, goethite, hematite, and magnetite are suppressed.

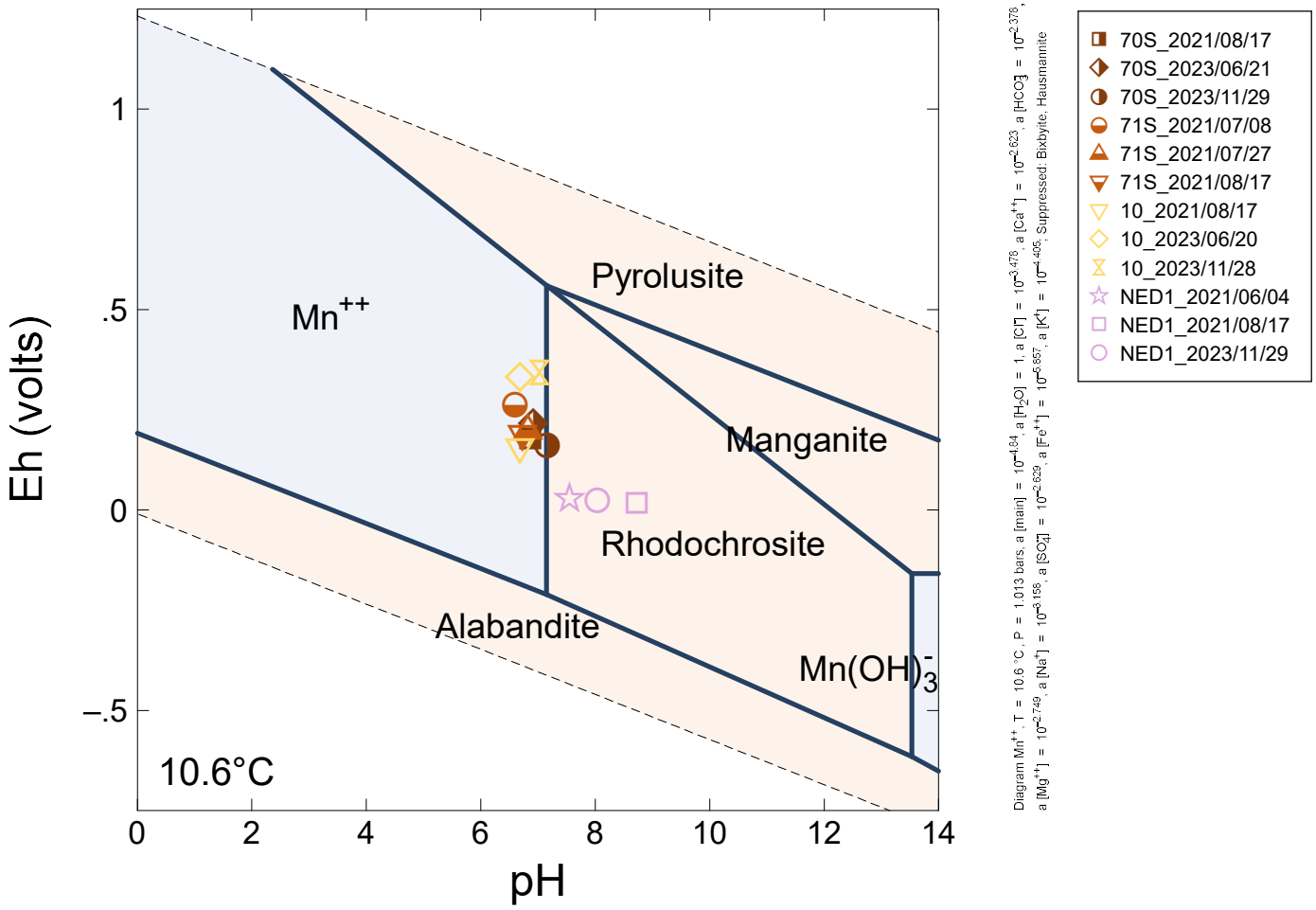
Iron Pourbaix Diagram, 70D
Vermilion, Illinois

Geosyntec consultants

Chicago, Illinois | May 2024

Figure 6b

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSW\Vermilion



Notes:
1. Diagram generated using conditions at well 70S on June 21, 2023 to represent the UU.
2. Crystalline phases hausmannite and bixbyite are suppressed.

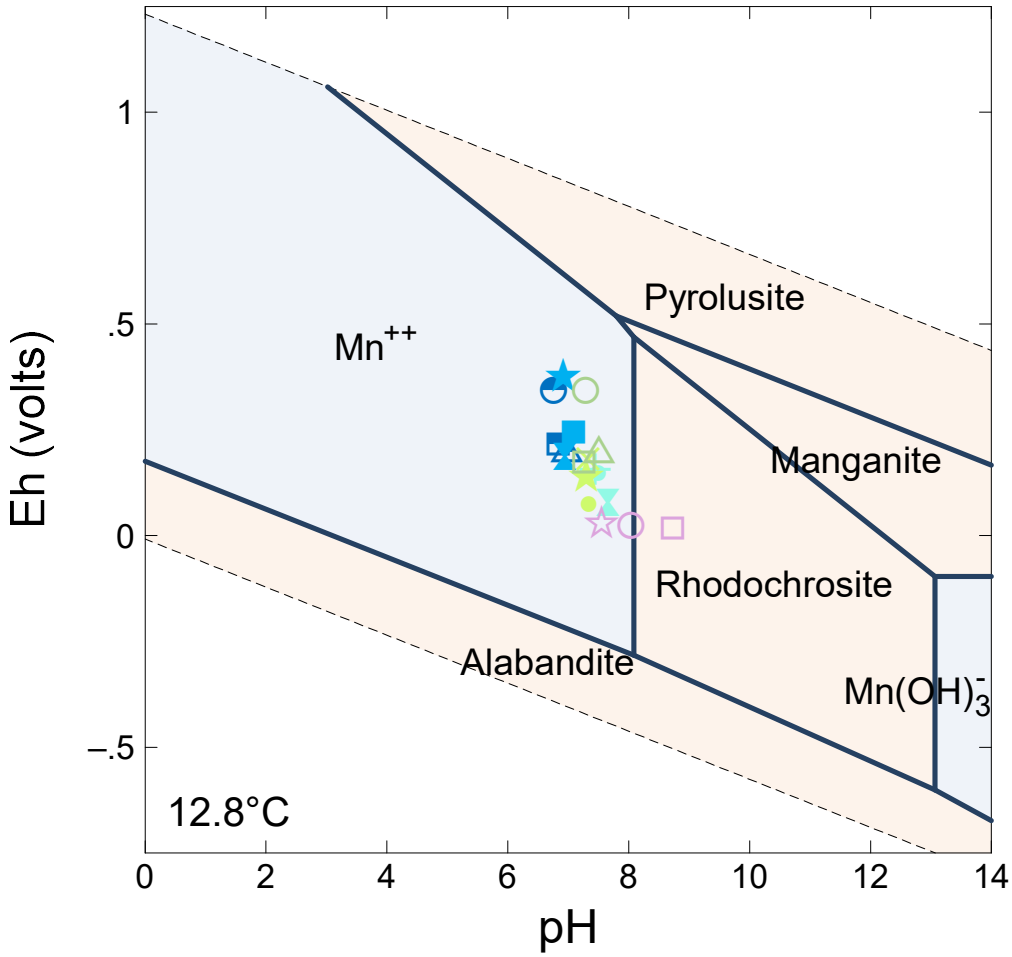
Manganese Pourbaix Diagram, 70S
Vermilion, Illinois

Geosyntec consultants

Chicago, Illinois | May 2024

Figure 7a

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSW\Vermillion



70D_2021/08/17
70D_2023/06/20
70D_2023/11/29
71D_2021/08/17
71D_2023/06/20
71D_2023/11/29
16A_2021/07/27
16A_2021/08/17
16A_2023/11/29
35D_2021/08/17
35D_2023/06/29
35D_2023/11/29
22_2021/08/17
22_2023/06/20
22_2023/11/28
NED1_2021/06/04
NED1_2021/08/17
NED1_2023/11/29

Diagram Mn^{++}, T = 12.8 °C, P = 1.013 bars, a [main] = $10^{-6.132}$, a [H_2O] = 1, a [Cl^-] = $10^{-1.87}$, a [Ca^{++}] = $10^{-2.884}$, a [HCO_3^-] = $10^{-2.051}$, a [Mg^{++}] = $10^{-2.97}$, a [Na^+] = $10^{-1.734}$, a [SO_4^{--}] = $10^{-3.661}$, a [Fe^{++}] = $10^{-6.51}$, a [K^+] = $10^{-3.843}$; Suppressed: Bixbyite, Ferrite-Ca, Ferrite-Mg, Goethite, Hausmannite, Hematite, Magnetite

Notes:
1. Diagram generated using conditions at well 70D on June 20, 2023 to represent the BCU.
2. Crystalline phases hausmannite and bixbyite are suppressed.

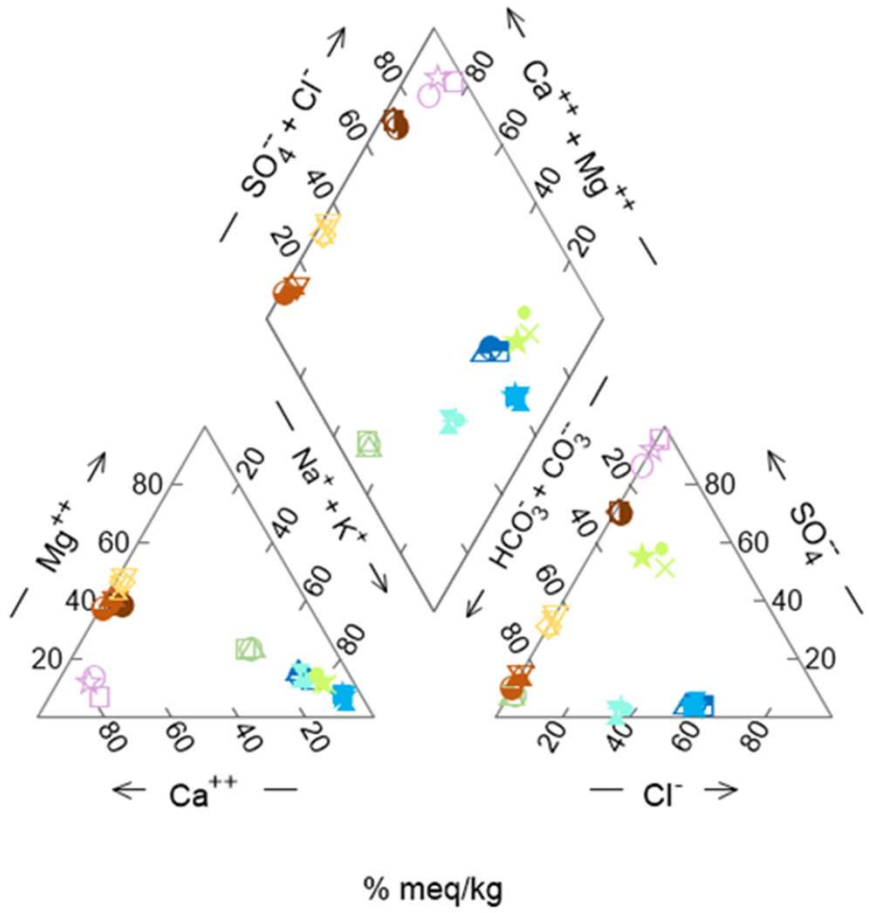
Manganese Pourbaix Diagram, 70D
Vermilion, Illinois

Geosyntec consultants

Chicago, Illinois | May 2024

Figure 7b

Geosyntec\Vistra - Groundwater Compliance - Documents\General\GCSM\Vermilion





Notes:
1. meq/kg – milliequivalents per kilogram

Piper Diagram
Vermilion, Illinois

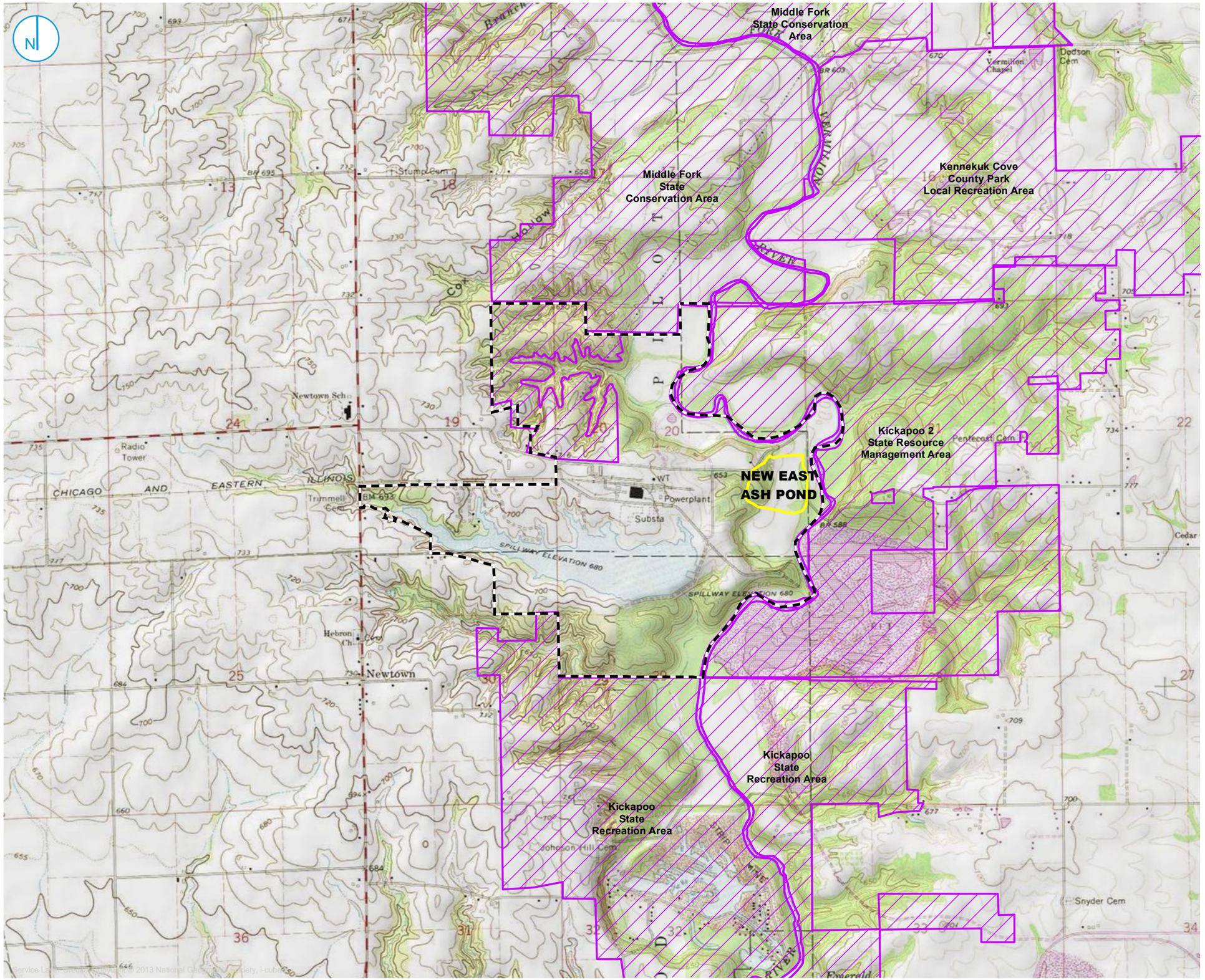
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Chicago, Illinois | May 2024

Figure 8

Geosyntec\Vstra - Groundwater Compliance - Documents\General\GCSW\Vermilion

Attachment A
Site Layout Figure



PART 845 REGULATED UNIT (SUBJECT UNIT)

PROPERTY BOUNDARY

PROTECTED AREA

0 1,000 2,000 Feet

SITE LOCATION MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\22285\MXD\845_Operating_Permit\Vermilion\NEAP\GMP\Figure 1-1_Site Location Map.mxd

PROJECT: 169000XXXX | DATED: 10/7/2021 | DESIGNER: STOLZSD

Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed

Attachment B
Proposed Part 845 Groundwater Monitoring Network



COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
PORE WATER WELL
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 150 300
Feet

MONITORING WELL LOCATION MAP

NATURE AND EXTENT REPORT
NEW EAST ASH POND
VERMILION POWER PLANT
OAKWOOD, ILLINOIS

FIGURE 2-9

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\22851MXD\Nature_and_Extent\VER\Nature_and_Extent_Report_NEAP\Figure 2-5. Monitoring Well Location Map.mxd

PROJECT: 169000XXXX | DATED: 4/22/2024 | DESIGNER: galammc

Attachment C
Monitoring Well Construction Information

Attachment C. Monitoring Well Construction Details
Nature and Extent Report
Vermilion New East Ash Pond
Vermilion Power Plant
Oakwood, IL

Location	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft bgs)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
10	UCU	1987-04-29	659.09	659.26	Top of PVC	656.33	46.6	56.6	609.70	599.70	56.6	581.40	10	2	40.178985	-87.739824
16B	UU	1987-04-28	580.62	580.62	Top of PVC	578.59	7	12	571.50	566.50	12	566.50	5	2	40.17809	-87.735084
16A	BCU	1987-04-28	580.32	580.49	Top of PVC	578.60	21.8	41.8	556.50	536.50	41.8	536.50	20	2	40.178093	-87.735056
22	BCU	2001-12-05	658.62	658.79	Top of PVC	655.93	80	100	576.00	556.00	100	556.00	20	2	40.178997	-87.73985
35D	BCU	2017-03-03	584.14	584.31	Top of PVC	581.77	35	45	546.25	536.25	45	535.50	10	2	40.179762	-87.735575
70S	UU	2021-03-04	593.74	593.91	Top of PVC	591.64	10	20	581.64	571.64	20	571.60	10	2	40.176952	-87.737931
70D	BCU	2021-03-04	594.52	594.69	Top of PVC	591.90	41	51	550.90	540.90	51	539.90	10	2	40.176957	-87.737958
71S	UU	2021-03-03	579.56	579.73	Top of PVC	577.19	5.5	10.5	571.69	566.69	10.5	566.70	5	2	40.177106	-87.735397
71D	BCU	2021-03-03	579.89	580.06	Top of PVC	577.18	30	40	547.18	537.18	40	537.20	10	2	40.177118	-87.735391
NED1	CCR	2019-02-12	600.07	600.24	Top of PVC	597.76	5.32	14.95	592.44	582.81	15.44	582.32	9.63	2	40.17947	-87.738094

Notes:
All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
BCU = Bedrock Confining Unit
bgs = below ground surface
CCR = Coal Combustion Residuals
ft = foot or feet
HSU = Hydrostratigraphic Unit
PVC = polyvinyl chloride
UCU = Upper Confining Unit
UU = Upper Unit

Attachment D

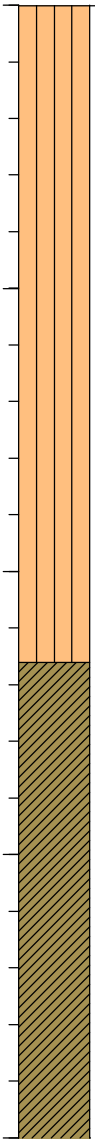
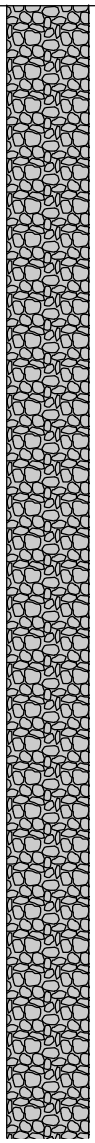
2023 Field Boring Logs and Associated Well Construction Information

Geosyntec consultants
engineers | scientists | innovators

Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-35
Page: 1 of 4

Drilling Start Date:	**06/24/2023**	Boring Depth (ft):	**63**
Drilling End Date:	**06/24/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 35D. Samples collected from 55-60 ft bgs and 60-63 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
0					10:35	NA	5.1/10	(0') GRAVELLY SILT (ML); light gray to brown (darkens downward), dry, loose, little sand, minor concretions.
								(3') CLAYEY SILT (ML); dark reddish brown, moist, firm, some black organics staining, few gravel, minor iron oxide stains.
5								
10					10:45		2.5/10	(10') As above.
								(10.6') GRAVELLY SILT (ML); light gray to brown, moist, loose, fine to coarse gravel, little sand.
								(11.6') SILTY CLAY (CL); dark grayish brown, moist, stiff, medium plasticity.
15								
20								

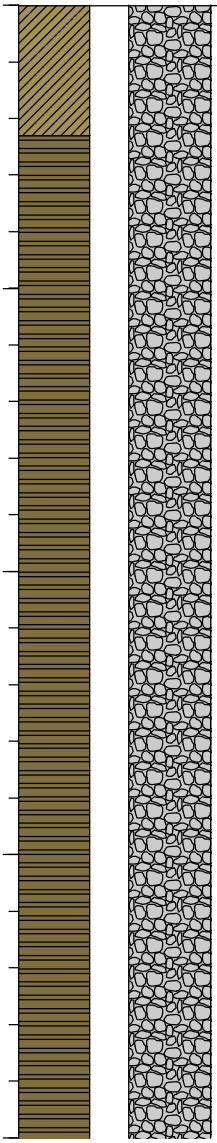
NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-35
Page: 2 of 4

Drilling Start Date:	**06/24/2023**	Boring Depth (ft):	**63**
Drilling End Date:	**06/24/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 35D. Samples collected from 55-60 ft bgs and 60-63 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
20					10:55	NA	8/8	(20') CLAY (CL); gray to light brown, moist, very soft, trace coarse gravel, high plasticity.
								(22.3') WEATHERED SHALE, gray, moist, highly decomposed, moderately disintegrated.
25								
							2/2	(28') As above.
30					11:55		8/10	(30') SHALE, gray, wet, highly decomposed, slightly disintegrated.
35								(35.3') WEATHERED SHALE, gray, moist, highly decomposed, highly disintegrated.
40								

NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-35
Page: 3 of 4

Drilling Start Date:	**06/24/2023**	Boring Depth (ft):	**63**
Drilling End Date:	**06/24/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 35D. Samples collected from 55-60 ft bgs and 60-63 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	Date & Time	Blow Counts	Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
40					12:10	NA	2/2	(40') As above.
					13:20		4/5	(42') WEATHERED SHALE, gray, moist, highly decomposed, highly disintegrated.
45								
					13:40		3.3/4	(47') As above.
50								
					14:05		3/4	(51') As above: slightly decomposed, competent at 1.5-1.6 ft.
55								
					14:20		4/5	(55') As above: slightly less weathered.
60								

NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-35
Page: 4 of 4

Drilling Start Date:	**06/24/2023**	Boring Depth (ft):	**63**
Drilling End Date:	**06/24/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 35D. Samples collected from 55-60 ft bgs and 60-63 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
60					14:50	NA	2/3	(60') As above: gray, moist, highly decomposed, highly disintegrated, few fragments are slightly more competent.
								(63') End of Boring.
65								

NOTES:

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		MW35D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Bruno Williamson Ramsey Geotechnical Engineering	3/1/2017	3/3/2017	rotary/auger

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW35D	Feet (NAVD88)	581.25 Feet (NAVD88)	7.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒

State Plane 1,279,955.58 N, 1,151,276.17 E Ⓔ/W

1/4 of 1/4 of Section , T N, R

Lat 40° 10'47.14212"

Long 87° 44' 8.06652"

Local Grid Location

Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	IL	Danville

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 / 16.5	2 2 3 3	0	0 - 2.5' **FILL, SILT:** ML, very dark grayish brown (10YR 3/2), 15-30% silt, trace wood and roots, cohesive, low plasticity, moist.	(FILL) ML								
2 SS	24 / 19	1 3 3 3	2	2.5 - 4.3' **SANDY LEAN CLAY:** s(CL), weak red (2.5YR 4/2), 5-15% fine sand, sand content increasing with depth, low plasticity, moist.	s(CL)								
3 SS	24 / 21	2 3 4 3	4	4.3 - 8' **POORLY-GRADED SAND:** SP, yellowish brown (10YR 5/6), fine sand, 15-30% clay, moist. 5.1' trace clay.	SP								
4 SS	24 / 18	3 3 3 3	6	7.5' trace gravel and cobbles.									Auger bringing up cobbles on flights.
5 SS	24 / 10	3 4 4 22	8	8 - 8.5' **FAT CLAY:** CH, very dark grayish brown (10YR 3/2), trace silt, high plasticity, moist.	CH			0.5					
			9	8.5 - 10' **Weathered SHALE Bedrock** BDX (SH), very dark grayish brown (10YR 3/2) to very dark greenish gray (GLEY 1 3/10Y), highly weathered, red (7.5YR 4/6) discoloration, fissile, moist.	BDX (SH)								
6 SS	15 / 15	20 34 50 for 3"	10	10 - 15.6' **Weathered SHALE Bedrock** to **SHALE:** BDX (SH), gray (GLEY 1 6/N), weak, fissile, intensely fractured, red (7.5YR 4/6) discoloration, dry.	BDX (SH)								
			11										
			12										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology
234 W. Florida St., Fifth Floor, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

Boring Number MW35D

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
7 SS	8 9	45 50 for 2"	13	10 - 15.6' **Weathered SHALE Bedrock** to **SHALE**: BDX (SH), gray (GLEY 1 6/N), weak, fissile, intensely fractured, red (7.5YR 4/6) discoloration, dry. *(continued)*									
8 SS	9 7	31 50 for 3"	14		BDX (SH)								
			15										
9 CORE	120 120		16	15.6 - 45.8' **SHALE**: BDX (SH), dark reddish gray (10YR 4/1) to gray (2.5Y 5/1), microcrystalline, thinly bedded to laminated, weak, slightly decomposed (very dark gray (10YR 3/1) to black (10YR 2/1) discoloration in partly healed fractures), competent, dry to moist in fractures.									Core 9, RQD = 89%. Light brown gray return water. 4" diameter outer casing set from 0-16 ft bgs.
			17										
			18										
			19										
			20										
			21										
			22										
			23										
			24		BDX (SH)								
			25										
10 CORE	131.3 120		26	25.6' partly to totally healed fractures.									Core 10, RQD = 89%. Light gray return water.
			27										
			28										
			29										
			30										
			31										
			32										

NATURAL RESOURCE TECHNOLOGY

Boring Number MW35D

Sample								Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
11 CORE	111.1 120		33–45	15.6 - 45.8' **SHALE**: BDX (SH), dark reddish gray (10YR 4/1) to gray (2.5Y 5/1), microcrystalline, thinly bedded to laminated, weak, slightly decomposed (very dark gray (10YR 3/1) to black (10YR 2/1) discoloration in partly healed fractures), competent, dry to moist in fractures. *(continued)* 41.9' - 43' crossbedding.	BDX (SH)								Core 11, RQD = 93%. Gray return water.
				45.8' End of Boring.									

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name: Vermilion Power Station	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: MW35D
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 40° 10' 47.142" Long. 87° 44' 8.067" or St. Plane 1,279,955.58 ft. N, 1,151,276.17 ft. E. Ⓔ/W	Date Well Installed: 03/03/2017
Facility ID	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Bruno Williamson, Ramsey Geotechnical Engineering
Type of Well: mw	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Gov. Lot Number: ____
Distance from Waste/Source: ____ ft.	State: IL	

A. Protective pipe, top elevation ____ ft. MSL

B. Well casing, top elevation 584.15 ft. MSL

C. Land surface elevation 581.25 ft. MSL

D. Surface seal, bottom 579.3 ft. MSL or 2.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐
Hollow Stem Auger ☐
HSA / Rotary Other ☒

15. Drilling fluid used: Water ☒ 0 2 Air ☐
Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

17. Source of water (attach analysis, if required):
City of Champaign

E. Bentonite seal, top 551.3 ft. MSL or 30.0 ft.

F. Fine sand, top ____ ft. MSL or ____ ft.

G. Filter pack, top 548.3 ft. MSL or 33.0 ft.

H. Screen joint, top 546.3 ft. MSL or 35.0 ft.

I. Well bottom 536.3 ft. MSL or 45.0 ft.

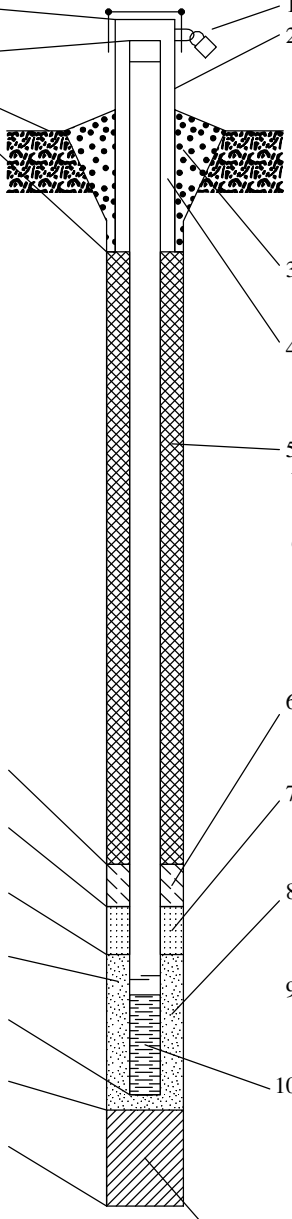
J. Filter pack, bottom 535.5 ft. MSL or 45.8 ft.

K. Borehole, bottom 535.5 ft. MSL or 45.8 ft.

L. Borehole, diameter 7.3 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 1.99 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 6.0 ft.
c. Material: Steel ☒
____ Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 4" diameter protective PVC casing
3. Surface seal: Bentonite ☐
Concrete ☒
____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ☒
Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☐
b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. ____Lbs/gal mud weight . . . Bentonite slurry ☐
d. 30 % Bentonite . . . Bentonite-cement grout ☒
e. ____Ft^3 volume added for any of the above
f. How installed: Tremie ☒
Tremie pumped ☐
Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. ____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. ____
b. Volume added ____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. NSF Quartz Sand #10-20
b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
____ Other ☐
10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒
Continuous slot ☐
____ Other ☐
b. Manufacturer ____
c. Slot size: 0.100 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☒
____ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 4/6/2017

Signature 

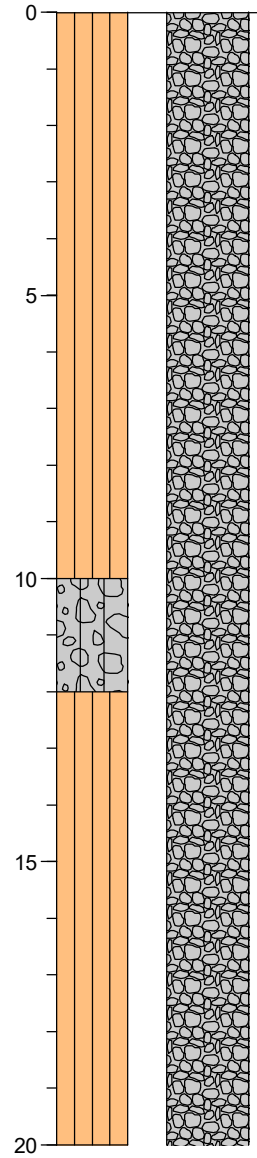
Firm: Natural Resource Technology
234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

Geosyntec consultants
engineers | scientists | innovators

Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-70
Page: 1 of 4

Drilling Start Date:	**06/23/2023**	Boring Depth (ft):	**80**
Drilling End Date:	**06/23/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 70D. Samples collected from 30-40 ft bgs, 41-42 ft bgs and 75-80 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		



DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
0					10:40	NA	6/10	(0') SILT WITH GRAVEL (ML); light brown, dry, loose, fine to coarse gravel.
								(1') SILT (ML); brown to tan, dry, firm, moderate concretions, little gravel, few clay.
5								(3.6') SILT (ML); gray to dark gray with little brown, dry, firm, few fine sand, few fine gravel, coarsens downwards, moderate concretions.
10					10:55		4/10	(10') SILTY GRAVEL (GM); gray to dark gray, moist, loose, some fine to coarse sand.
								(10.5') SILTY GRAVEL (GM); light gray, moist, loose, fines downward.
								(12') SANDY SILT (ML); brown, moist, medium dense, firm, little clay, little fine gravel.
15								
20								

NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-70
Page: 2 of 4

Drilling Start Date:	**06/23/2023**	Boring Depth (ft):	**80**
Drilling End Date:	**06/23/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 70D. Samples collected from 30-40 ft bgs, 41-42 ft bgs and 75-80 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
20					13:00	NA	3/10	(20') CLAY WITH SILT (CL); grayish brown, wet, stiff, little sand, little fine to coarse gravel.
								(21') SILTY CLAY (CL); grayish brown, wet, soft, little fine gravel, few sand.
								(21.3') SANDY CLAY (CL); grayish brown, wet, very stiff, some gravel.
25								
30							3/10	(30') GRAVELLY CLAY WITH SAND (CL); grayish brown, wet, firm, sand coarsens downward.
								(31.8') CLAY (CL); dark gray to black, wet, firm, little gravel, few roots observed, dark organics.
35								
40								

NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-70
Page: 3 of 4

Drilling Start Date:	**06/23/2023**	Boring Depth (ft):	**80**
Drilling End Date:	**06/23/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 70D. Samples collected from 30-40 ft bgs, 41-42 ft bgs and 75-80 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
40					13:50	NA	8/10	(40') POORLY GRADED SAND (SP); brown with hint of gray, wet, medium dense, fine grained.
								(41.7') CLAY (CL); brownish gray, moist, very stiff, few coarse gravel, some sand.
								(42.4') SHALE, gray, moist, laminated, highly decomposed, moderately disintegrated.
45								
50					14:30		5/10	(50') As above.
55								
60								

NOTES:

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Client: Vistra
Project: Vermilion Power Plant New East Ash Pond
Address: 10188 East 2150 North Road, Oakwood, IL

BORING LOG
Boring No. VER-70
Page: 4 of 4

Drilling Start Date:	**06/23/2023**	Boring Depth (ft):	**80**
Drilling End Date:	**06/23/2023**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Ground Surface Elev. (ft):	**Not surveyed**
Drilling Method:	**Sonic**	Boring was advanced adjacent to well 70D. Samples collected from 30-40 ft bgs, 41-42 ft bgs and 75-80 ft bgs	
Drilling Equipment:	**Geoprobe**		
Driller:	**Jeff Jehn**		
Logged By:	**Andrew Kelley**		

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Date & Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION
60					15:15	NA	1/10	(60') SHALE, gray to dark gray, wet (driller water), foliated, highly decomposed, slightly disintegrated, weaker and more highly disintegrated shale likely washed out by driller fluids.
65								
70					17:00		10/10	(70') SHALE, gray to dark gray, wet, highly decomposed, moderately disintegrated, coated in wet clay (likely slough).
75								(75') SHALE, gray to dark gray, moist, highly decomposed, slightly disintegrated.
80								(80') End of Boring.

NOTES:

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		70D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jason Greer Cascade Drilling	3/4/2021	3/4/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
70D	Feet (NAVD88)	591.90 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 1,278,929.46 N, 1,150,617.15 E Ⓔ/ W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	Illinois	Oakwood

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 47		1	0 - 6.3' **SILT:** ML, dark brown (10YR 3/3) to brown (10YR 4/3), clay (15-25%), sand, (0-5%), roots (0-5%), stiff, slow dilatancy, low toughness, low plasticity, moist.	ML				1.5					CS= Core Sample
			2											
			3						1.5					
			4											
2 CS	60 60		5						1.5					
			6											
			7	6.3 - 11.3' **SILTY CLAY:** CL/ML, brown (10YR 4/3), sand (0-10%), gravel (0-5%), firm, slow dilatancy, low toughness, medium plasticity, moist.	CL/ML				0.75					
			8											
			9	9.4' color change to yellowish brown (10YR 5/4).					0.75					
3 CS	120 120		10											
			11											
			12	11.3 - 14.7' **CLAYEY SAND:** SC, yellowish brown (10YR 5/6), rounded fine sand, silt (5-10%), gravel (0-5%), loose, wet.	SC									
			13											
			14											
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature
Firm Ramboll
234 W. Florida Street, Milwaukee,WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

Boring Number 70D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			16	14.7 - 15' **SILTY CLAY:** CL/ML, yellowish brown (10YR 5/6), soft, slow dilatancy, low toughness, medium plasticity.	CL/ML									
			16	15 - 16.2' **CLAYEY SAND:** SC, yellowish brown (10YR 5/6), rounded fine sand, silt (5-10%), gravel (0-5%), loose, wet.	SC									
			17	16.2 - 18.8' **POORLY-GRADED SAND WITH CLAY:** SP-SC, ???, subrounded to rounded, fine to medium sand, loose, wet.	SP-SC									
			18											
			19	18.8 - 19.6' **LEAN CLAY:** CL, dark gray (10YR 4/1), gravel, (0-5%), sand (0-5%), stiff, no dilatancy, low toughness, medium plasticity, moist.	CL				2.5					
4 CS	120 97		20	19.6 - 20.3' **Weathered SHALE Bedrock** BDX (SH), gray (10YR 5/1), dry.	BDX (SH)									
			21	20.3 - 52' **SHALE:** BDX (SH), gray (10YR 5/1).										
			22											
			23											
			24											
			25											
			26											
			27											
			28											
			29											
5 CS	132 132		30		BDX (SH)									
			31											
			32											
			33											
			34											
			35											
			36											
			37											
			38											
			39											
			40											

Boring Number 70D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
6 CS	132 132		41	20.3 - 52' **SHALE:** BDX (SH), gray (10YR 5/1). *(continued)*	BDX (SH)									
			42											
			43											
			44											
			45											
			46											
			47											
			48											
			49											
			50											
			51											
			52	52' End of Boring.										

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Vermilion Power Station	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: 70D
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ° ' " Long. ° ' " or St. Plane 1,278,929 ft. N, 1,150,617 ft. E. Ⓔ/W	
Facility ID		Date Well Installed: 03/04/2021
Type of Well: Well Code 12/pz	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Jason Greer; Cascade Drilling
Distance from Waste/Source ft. / State: Illinois	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	Gov. Lot Number

A. Protective pipe, top elevation: 595.10 ft. MSL
B. Well casing, top elevation: 594.52 ft. MSL
C. Land surface elevation: 591.9 ft. MSL
D. Surface seal, bottom: 590.9 ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

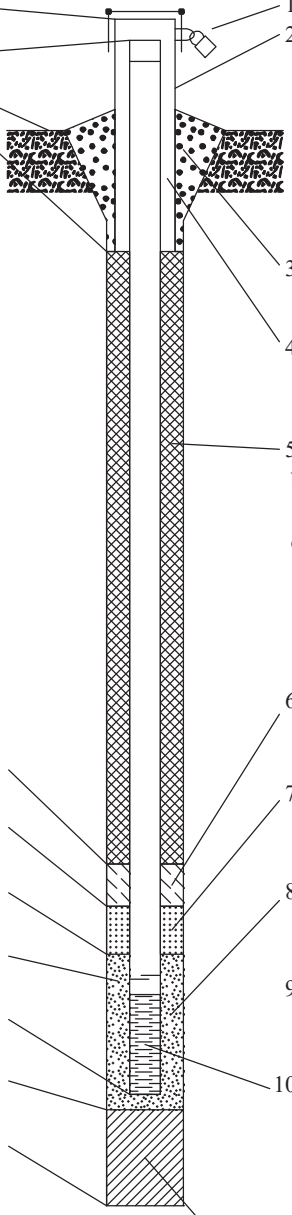
14. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☒

15. Drilling fluid used: Water ☒ 0 2 Air ☐ Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No
Describe ____

17. Source of water (attach analysis, if required):
Potable City Water

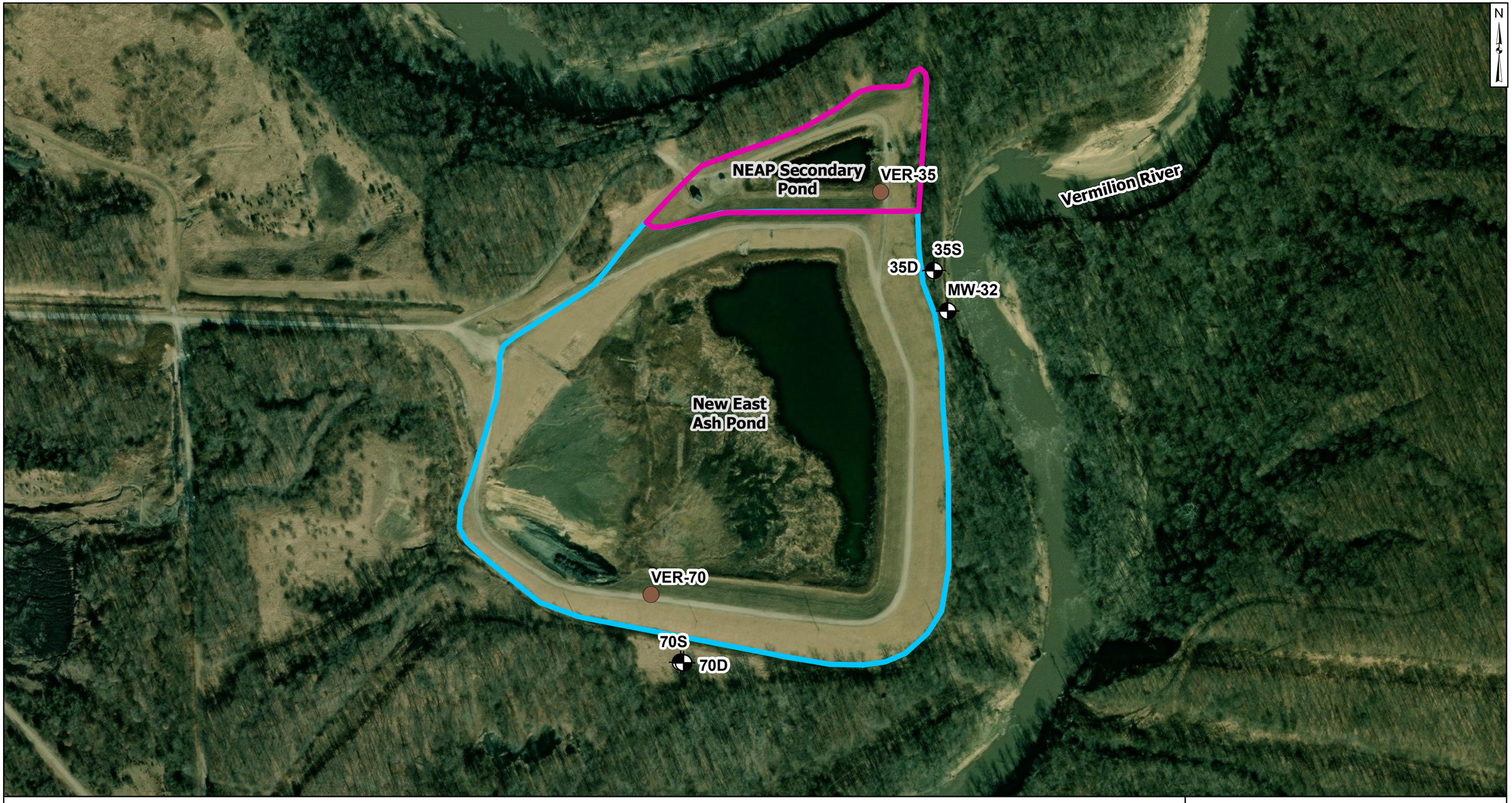
E. Bentonite seal, top: 557.9 ft. MSL or 34.0 ft.
F. Fine sand, top: ____ ft. MSL or ____ ft.
G. Filter pack, top: 552.9 ft. MSL or 39.0 ft.
H. Screen joint, top: 550.9 ft. MSL or 41.0 ft.
I. Well bottom: 540.9 ft. MSL or 51.0 ft.
J. Filter pack, bottom: 540.9 ft. MSL or 51.0 ft.
K. Borehole, bottom: 539.9 ft. MSL or 52.0 ft.
L. Borehole, diameter: 6.0 in.
M. O.D. well casing: 2.38 in.
N. I.D. well casing: 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 4 Steel Bollards
3. Surface seal: Bentonite ☐ Concrete ☒ Other ☐
4. Material between well casing and protective pipe: Bentonite ☐ Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☐
b. ____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. 9.2 Lbs/gal mud weight . . . Bentonite slurry ☒
d. ____ % Bentonite . . . Bentonite-cement grout ☐
e. ____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. ____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. NA
b. Volume added 0 ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. FILTERSIL 0.85
b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒ Continuous slot ☐ Other ☐
b. Manufacturer Johnson Screens
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ Formation Materials Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 3/31/2021

Signature: ____ Firm: Ramboll, 234 W. Florida Street, Milwaukee,WI 53204 Tel: (414) 837-3607 Fax: (414) 837-3608



Legend

- Monitoring Well
- Boring Location
- New East Ash Pond (NEAP)
- NEAP Secondary Pond

Notes

- Soil boring locations are approximate.
- Only select monitoring well locations are shown.
- Ash pond boundaries are approximate.

250 125 0 250 Feet

Boring Locations

Dynegy Midwest Generation
Vermilion Site
Oakwood, Illinois

Geosyntec consultants

Columbus, Ohio | October 2023

Figure 1

Y:\Company\Projects_post_2014\CHE8404_VPS_Closure_RIA_Sprt\500 - Technical\572 - MNA and GSI Evaluation\GIS\MXDs\20231020_Figure 1-Boring_Locations.mxd. ASoltero. 10/20/2023. Project/Phase/Task.

Attachment E
Relevant Monitoring Well Boring Logs

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		70D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jason Greer Cascade Drilling	3/4/2021	3/4/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
70D	Feet (NAVD88)	591.90 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 1,278,929.46 N, 1,150,617.15 E Ⓔ/ W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	Illinois	Oakwood

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 47		1	0 - 6.3' **SILT:** ML, dark brown (10YR 3/3) to brown (10YR 4/3), clay (15-25%), sand, (0-5%), roots (0-5%), stiff, slow dilatancy, low toughness, low plasticity, moist.	ML				1.5					CS= Core Sample
			2											
			3						1.5					
			4											
2 CS	60 60		5						1.5					
			6											
			7	6.3 - 11.3' **SILTY CLAY:** CL/ML, brown (10YR 4/3), sand (0-10%), gravel (0-5%), firm, slow dilatancy, low toughness, medium plasticity, moist.	CL/ML				0.75					
			8											
			9	9.4' color change to yellowish brown (10YR 5/4).					0.75					
3 CS	120 120		10											
			11											
			12	11.3 - 14.7' **CLAYEY SAND:** SC, yellowish brown (10YR 5/6), rounded fine sand, silt (5-10%), gravel (0-5%), loose, wet.	SC									
			13											
			14											
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature
Firm Ramboll
234 W. Florida Street, Milwaukee,WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

Boring Number 70D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			16	14.7 - 15' **SILTY CLAY:** CL/ML, yellowish brown (10YR 5/6), soft, slow dilatancy, low toughness, medium plasticity.	CL/ML									
			16	15 - 16.2' **CLAYEY SAND:** SC, yellowish brown (10YR 5/6), rounded fine sand, silt (5-10%), gravel (0-5%), loose, wet.	SC									
			17	16.2 - 18.8' **POORLY-GRADED SAND WITH CLAY:** SP-SC, ???, subrounded to rounded, fine to medium sand, loose, wet.	SP-SC									
			18											
			19	18.8 - 19.6' **LEAN CLAY:** CL, dark gray (10YR 4/1), gravel, (0-5%), sand (0-5%), stiff, no dilatancy, low toughness, medium plasticity, moist.	CL				2.5					
4 CS	120 97		20	19.6 - 20.3' **Weathered SHALE Bedrock** BDX (SH), gray (10YR 5/1), dry.	BDX (SH)									
			21	20.3 - 52' **SHALE:** BDX (SH), gray (10YR 5/1).										
			22											
			23											
			24											
			25											
			26											
			27											
			28											
			29											
5 CS	132 132		30		BDX (SH)									
			31											
			32											
			33											
			34											
			35											
			36											
			37											
			38											
			39											
			40											

Boring Number 70D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
6 CS	132 132		41	20.3 - 52' **SHALE:** BDX (SH), gray (10YR 5/1). *(continued)*	BDX (SH)									
			42											
			43											
			44											
			45											
			46											
			47											
			48											
			49											
			50											
			51											
			52	52' End of Boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		71D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jason Greer Cascade Drilling	3/3/2021	3/3/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
71D	Feet (NAVD88)	577.18 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 1,278,992.96 N, 1,151,334.05 E Ⓔ/W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	Illinois	Oakwood

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 / 110		1.5	0 - 5.8' **SILT WITH SAND:** (ML)s, dark brown (10YR 3/3) to brown (10YR 4/3), sand (15-25%), clay (5-10%), organic material (0-10%), firm, slow dilatancy, low toughness, low plasticity, moist.	(ML)s				0.75					CS= Core Sample
			3.0						0.75					
			4.5						0.75					SH= Shelby Tube
			6.0	5.8 - 9.9' **LEAN CLAY:** CL, brown (10YR 4/3), silt (15-25%), sand (0-5%), gravel (0-5%), firm, slow dilatancy, low toughness, medium plasticity, moist.	CL				0.75					
			7.5						0.75					
			9.0						0.75					
2 CS	96 / 96		10.5	9.9 - 10.3' **POORLY-GRADED SAND:** SP, dark grayish brown (10YR 4/2), subrounded to rounded, medium to coarse sand, clay (0-10%), loose, wet.	SP				2.5					
			12.0	10.3 - 20' **Weathered SHALE Bedrock** BDX (SH), gray (10YR 5/1), dry.	BDX (SH)									
			13.5											
			15.0											
			16.5											
3 SH	24 / 24		18.0											
			19.5											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number 71D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
4 CS	120 81		21.0	20 - 40' **SHALE:** BDX (SH), dark gray (10YR 4/1).										
			22.5											
			24.0											
			25.5											
			27.0											
			28.5											
5 CS	120 120		30.0		BDX (SH)									
			31.5											
			33.0											
			34.5											
			36.0											
			37.5											
			39.0											
				40' End of Boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		71S

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jason Greer Cascade Drilling	3/3/2021	3/3/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
71S	Feet (NAVD88)	577.19 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 1,278,988.40 N, 1,151,332.51 E Ⓔ/W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	Illinois	Oakwood

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			1	0 - 5.8' **SILT WITH SAND:** (ML)s, Blind Drilled to 9' below ground surface (bgs). See boring log 71D for detailed lithology.	(ML)s									
			2											
			3											
			4											
			5											
			6	5.8 - 9' **LEAN CLAY:** CL.	CL									
			7											
			8											
1 MC	24 24		9	9 - 11' **POORLY-GRADED SAND:** SP.	SP					20.8	17	7	4.7	MC= Modified California
			10											
			11	11' End of Boring.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Vermilion Power Station		103D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jason Greer Cascade Drilling	3/7/2021	3/9/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
103D	Feet (NAVD88)	717.38 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 1,279,960.01 N, 1,147,526.10 E Ⓔ/ W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Vermilion	Illinois	Oakwood

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 44		0	0 - 1.2' **TOPSOIL:** ML/CL, dark brown (10YR 3/3), sand (0-5%), gravel (0-5%), roots (0-5%), firm, slow dilatancy, low toughness, low plasticity, moist.	ML/CL				1.5					CS= Core Sample
			1.5	1.2 - 15' **SILTY CLAY:** CL/ML, yellowish brown (10YR 5/4), gray (10YR5/1) mottling (5-10%), sand (0-10%), gravel (0-5%), very stiff, no dilatancy, low to medium toughness, medium plasticity, moist.					2.5					
			3.0											
			4.5											
2 CS	60 60		6.0	6' yellowish brown (10YR 5/6) mottling (0-5%).					2.75					
			7.5						3					
			9.0		CL/ML				3					
3 CS	60 60		10.5						2.75					
			12.0											
			13.5						3.25					
4 SH	24 18		15.0	15 - 17' **LEAN CLAY:** CL, grayish browon (10YR /2), sand (5-15%), silt (25-30%), high plasticity, moist.	CL				3.25	16.6	30	15	85.3	SH= Shelby Tube
			16.5											
5 CS	96 96		18.0	17 - 20' **SILTY CLAY:** CL/ML, yellowish brown (10YR 5/4), gray (10YR5/1) mottling (5-10%), sand (0-10%), gravel (0-5%), very stiff, no dilatancy, low to medium toughness, medium plasticity, moist.	CL/ML				2.5					
			19.5											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel / Fax
	Ramboll 234 W. Florida Street, Milwaukee,WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608

Boring Number 103D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			21.0	20 - 36.1' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, slow to no dilatancy, low toughness, medium plasticity, moist.					2.5					
			22.5											
			24.0						2.25					
6 CS	60 60		25.5						1.75					
			27.0						1.75					
			28.5		CL									
			30.0						2.25					
7 SH	24 24		31.5											
8 CS	96 96		33.0						1.75					
			34.5						1.5					
			36.0	36.1 - 36.3' **POORLY-GRADED GRAVEL WITH SILT AND SAND:** (GP-GM)s, gray (10YR 5/1), subrounded to subangular, loose, wet.	(GP-GM)s				1.75					
			37.5	36.3 - 63.7' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, slow to no dilatancy, low toughness, medium plasticity, moist.										
			39.0						1.75					
9 CS	120 120		40.5											
			42.0						2.25					
			43.5						2.25					
			45.0		CL				2.5					
			46.5											
			48.0						2.5					
			49.5						2.5					
10 CS	120 120		51.0						2.75					
			52.5											

Boring Number 103D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			54.0	36.3 - 63.7' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, slow to no dilatancy, low toughness, medium plasticity, moist. *(continued)*					3.25					
			55.5						3					
			57.0						3.25					
			58.5		CL				2.75					
11 SH	24 24		60.0											
			61.5											
12 CS	36 36		63.0						2.25					
			64.5	63.7 - 64.1' **SILTY SAND:** to **SANDY SILT:** SM, gray (10YR 5/1), subrounded to rounded, fine to medium sand, loose, wet.	SM									
13 CS	60 60		66.0	64.1 - 67.8' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, slow to no dilatancy, low toughness, medium plasticity, moist.	CL				1.5					
			67.5						1.5					
			69.0	67.8 - 73.3' **SILT:** ML, gray (10YR 5/1), sand (0-5%), stiff, slow dilatancy, low toughness, non-plastic, moist to wet.					1.25					
14 CS	60 60		70.5		ML				1.5					
			72.0											
			73.5	73.3 - 92.3' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-5%), gravel (0-5%), very stiff, no dilatancy, medium toughness, dry to moist.					3.25					
15 CS	60 60		75.0						3.25					
			76.5						3.25					
			78.0											
			79.5						3.25					
16 CS	60 60		81.0		CL				2.75					
			82.5						3					
			84.0											
17 CS	60 60		85.5						2.25					

Boring Number 103D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			87.0	73.3 - 92.3' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (0-5%), gravel (0-5%), very stiff, no dilatancy, medium toughness, dry to moist. *(continued)*					2.25					
			88.5						1.75					
18 SH	12		90.0		CL									
19 CS	12 48		91.5											
			93.0	92.3 - 95.5' **POORLY-GRADED SAND:** SP, grayish brown (10YR 5/2), rounded to subrounded, fine sand, silt (5-10%), loose, wet.	SP									
			94.5											
20 MC	24 24		96.0	95.5 - 96' **SILTY CLAY:** CL/ML, grayish brown (10YR 5/2) to gray (10YR 5/1), olive (5Y 5/3) mottling (5-10%), sand (0-10%), gravel (0-5%), stiff to very stiff, no dilatancy, low to medium toughness, medium plasticity, dry to moist.	CL/ML					13.9	17	7	51.8	MC= Modified California
21 CS	36 36		97.5	96 - 130.5' **SILTY CLAY:** CL/ML, grayish brown (10YR 5/2) to gray (10YR 5/1), olive (5Y 5/3) mottling (5-10%), sand (0-10%), gravel (0-5%), stiff to very stiff, no dilatancy, low to medium toughness, medium plasticity, dry to moist.					4.25					
			99.0						4.25					
22 MC	24 24		100.5											
			102.0											
23 CS	96 96		103.5						2.5					
			105.0						4.5					
			106.5											
			108.0		CL/ML				4.5					
			109.5						4.5					
24 CS	240 240		111.0						4.25					
			112.5											
			114.0						4					
			115.5						4.5					
			117.0						4.5					
			118.5											
			120.0						4.5					

Boring Number 103D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			121.5	96 - 130.5' **SILTY CLAY:** CL/ML, grayish brown (10YR 5/2) to gray (10YR 5/1), olive (5Y 5/3) mottling (5-10%), sand (0-10%), gravel (0-5%), stiff to very stiff, no dilatancy, low to medium toughness, medium plasticity, dry to moist. *(continued)*					4.5					
			123.0						4.5					
			124.5											
			126.0		CL/ML				4.5					
			127.5						4.5					
			129.0	128.9' -129' layer of sand, grayish brown (10YR 5/2).					4.5					
25 MC	24 24		130.5	130.5 - 131' **CLAYEY SAND:** SC, gray (10YR 5/1), gravel (30-45%), silt (5-15%), clay (5-15%), medium plasticity loose, wet.	SC					8.9	16	5	5.7	
26 MC	24 24		132.0	131 - 132.5' **POORLY-GRADED SAND:** SP, grayish brown (10YR 5/2), rounded to subrounded, fine sand, silt (5-10%), loose, wet.	SP					15.3	14	7	35.2	
			133.5	131.8' -132' layer of clay.	SP-SC									
27 CS	72 72		135.0	132.5 - 133' **POORLY-GRADED SAND WITH CLAY:** SP-SC, grayish brown (10YR 5/2), silt (0-5%), clay (0-5%), low plasticity.					2.5					
			136.5	133 - 146.2' **LEAN CLAY:** CL, gray (10YR 5/1), silt (15-25%), sand (0-5%), gravel (0-5%), stiff to very stiff, no dilatancy, low to medium toughness, medium plasticity, dry to moist.					3					
			138.0											
			139.5		CL				3.25					
28 MC	24 24		141.0	140.5 - 141' **LEAN CLAY:** CL, grayish brown (10YR 5/2), silt (15-25%), clay (15-25%), medium plasticity, dry to moist.	CL					10.8	23	12	12.6	
29 CS	192 192		142.5	141 - 146.2' **LEAN CLAY:** CL, gray (10YR 5/1), silt (15-25%), sand (0-5%), gravel (0-5%), stiff to very stiff, no dilatancy, low to medium toughness, medium plasticity, dry to moist.					3					
			144.0		CL									
			145.5						2.25					
			147.0	146.2 - 148.6' **POORLY-GRADED SAND WITH SILT:** SP-SM, gray (10YR 5/1), subrounded to rounded, fine sand, loose, moist.	SP-SM									
			148.5	148.6 - 150.2' **SILT WITH SAND:** (ML)s, gray (10YR 5/1), firm, slow dilatancy, low toughness, non-plastic, moist.	(ML)s				0.75					
			150.0											
			151.5	150.2 - 158' **SILTY CLAY:** CL/ML, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, no dilatancy, medium to low toughness, medium plasticity, moist to dry.	CL/ML				4					
			153.0											

Boring Number 103D

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			154.5	150.2 - 158' **SILTY CLAY:** CL/ML, gray (10YR 5/1), sand (0-10%), gravel (0-5%), stiff to very stiff, no dilatancy, medium to low toughness, medium plasticity, moist to dry. *(continued)*	CL/ML				3.5					
			156.0						4.25					
			157.5						4.25					
30 NR	24 0		159.0	158 - 160' No recovery.										NR= No recovery Core casing dropped to 160' below ground surface (bgs) while collecting sample
31 MC	24 6		160.5	160 - 161' **POORLY-GRADED SAND:** SP, gray (10YR 5/1), subrounded to rounded, fine sand, loose, wet.	SP									
32 MC	24 24		162.0	161 - 163' **SILTY SAND:** to **SANDY SILT:** SM.	SM									
33 CS	72 72		163.5	163 - 163.5' **POORLY-GRADED SAND WITH SILT:** SP-SM, gray (10YR 5/1), silt (15-25%), clay (15-25%), medium plasticity, dry to moist.	SP-SM					13.8	17	6	81.9	
			165.0	163.5 - 166.2' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (5-10%), gravel (0-5%), hard, no dilatancy, medium toughness, medium plasticity, dry to moist.	CL				4.5					
			166.5	166.2 - 167' **WELL-GRADED SAND:** SW, gray (10YR 5/1), subrounded to rounded, gravel (0-5%), loose, wet.	SW				4.5					
			168.0	167 - 169.5' **LEAN CLAY:** to **SILTY CLAY:** CL, gray (10YR 5/1), sand (5-10%), gravel (0-5%), hard, no dilatancy, medium toughness, medium plasticity, dry to moist.	CL				4.5					
34 CS	60 60		169.5	169.5 - 170.3' **WELL-GRADED SAND:** SW, gray (10YR 5/1), subrounded to rounded, fine to coarse sand, gravel (0-5%), loose, wet.	SW				3.5					
			171.0	170.3 - 175.5' **SILTY CLAY:** CL/ML, gray (10YR 5/1) to dark gray (10YR 4/1), sand (5-10%), gravel (0-5%), very stiff to hard, no dilatancy, medium toughness, medium plasticity, dry to moist.	CL/ML				4.5					
			174.0											
35 MC	24 24		175.5	175.5 - 177' **POORLY-GRADED SAND:** SP.	SP				4.25					
			177.0	177' End of Boring.										



Legend

- Boring Location
- New East Ash Pond (NEAP)
- NEAP Secondary Pond

Notes

- Ash pond boundaries are approximate.
- Aerial basemap provided by ESRI.

500 250 0 500 Feet

Boring Location

Dynegy Midwest Generation
Vermilion Site
Oakwood, Illinois

Geosyntec consultants

Columbus, Ohio | May 2024

Figure **1**

S:\Projects_post_2014\CHE8404_VPS_Closure_RIA_Sprt\500 - Technical\572 - MNA and GSI Evaluation\GIS\MXDs\20240522_Figure 1- MW and Boring Locations.mxd. hduff. 5/23/2024.

Attachment F
Site Solids CEC, TOC, and Sulfide Analytical Data

Analysis Report

GS23-03679

F402001 SGS LAKEFIELD RESEARCH
PO BOX 4300
185 CONCESSION STREET
LAKEFIELD, ONTARIO ON K0L 2H0
CANADA

Received : 11-Sep-2023
Completed : 25-Sep-2023
Order Reference : CA19110-Jul23 - VER-36-55-60-20230624

Laboratory ID:	GS23-03679.001	GS23-03679.002	GS23-03679.003	GS23-03679.004
Client Sample #:	VER-36-55-60-20230624	VER-36-60-63-20230624	VER-70-30-40-20230623	VER-70-41-42-20230623
Description:				
CEC Actual (meq/100g)	8.98	9.23	8.03	11.38

NOTE:
The analysis report above refers to the time and place of testing, and strictly to the supplied sample(s) only, without reference to any other matter. This report does not evidence or refer to any consignment or shipment or/and SGS sampling and inspection.

Report File Reference Number: 0000284032

Signed and dated in Guelph, ON
On 25-Sep-2023

For and on behalf of SGS Canada Inc., Agriculture and Food



Jack Legg, CCA-ON, 4R NMS
Branch Manager, Agronomist

This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/en/terms-and-conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Analysis Report

GS23-03679

F402001 SGS LAKEFIELD RESEARCH
PO BOX 4300
185 CONCESSION STREET
LAKEFIELD, ONTARIO ON K0L 2H0
CANADA

Received : 11-Sep-2023
Completed : 25-Sep-2023
Order Reference : CA19110-Jul23 - VER-36-55-60-20230624

Laboratory ID:	GS23-03679.005
Client Sample #:	VER-70-75-80-20230623
Description:	
CEC Actual (meq/100g)	9.66

NOTE:
The analysis report above refers to the time and place of testing, and strictly to the supplied sample(s) only, without reference to any other matter. This report does not evidence or refer to any consignment or shipment or/and SGS sampling and inspection.

Report File Reference Number: 0000284032

Signed and dated in Guelph, ON
On 25-Sep-2023

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Jack Legg, CCA-ON, 4R NMS
Branch Manager, Agronomist

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SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : PO#GLP8063

21-September-2023

Geosyntec Consultant
Attn : Allison Kreinberg/Brian Aces

2100 Commonwealth Boulevard, Suit 100
Ann Arbor, Michigan
48108, USA

Phone: 734-794-1545
Fax:

Date Rec. : 31 July 2023
LR Report: **CA19105-JUL23**
Reference: Vermillion - PO#GLP8063

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Sample Date & Time	C %	TOC %	CO3 (HCl) as %CO3 %
1: Analysis Start Date		18-Sep-23	20-Sep-23	19-Sep-23
2: Analysis Start Time		09:15	09:48	12:49
3: Analysis Completed Date		18-Sep-23	20-Sep-23	20-Sep-23
4: Analysis Completed Time		09:24	12:00	12:00
5: VER-35 55-60 20230624	24-Jun-23 14:20	1.45	0.920	2.64
6: VER-35 60-63 20230624	24-Jun-23 14:50	1.42	0.910	2.53
7: VER-70 30-40 20230623	23-Jun-23 13:15	2.33	0.930	7.00
8: VER-70 41-42 20230623	23-Jun-23 13:50	1.70	0.460	6.17
9: VER-70 75-80 20230623	23-Jun-23 17:00	1.96	1.48	2.38

Catharine Arnold

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0003474824

Results relate only to the sample tested. Data reported represents the sample submitted to SGS. Reproduction of this analytical report in full or in part is prohibited without prior written approval. Please refer to SGS General Conditions of Services located at https://www.sgs.ca/en/terms-and-conditions (Printed copies are available upon request.)
Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
SGS Canada Inc. Environment-Health & Safety statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

CERTIFICATE OF ANALYSIS

Work Order	: **WT2325832**	Page	: 1 of 3
Client	: **SGS Canada Inc**	Laboratory	: ALS Environmental - Waterloo
Contact	: Catharine Arnold	Account Manager	: Emily Smith
Address	: 185 Concession Street P.O. Box 4300 Lakefield ON Canada K0L 2H0	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: CA19109-JUL23	Date Samples Received	: 18-Aug-2023 09:00
PO	: ----	Date Analysis Commenced	: 21-Aug-2023
C-O-C number	: ----	Issue Date	: 24-Aug-2023 17:16
Sampler	: CLIENT		
Site	: ----		
Quote number	: Waterloo General Price List		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Niral Patel		Centralized Prep, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	WT ALS Environmental - Waterloo	60 Northland Road, Unit 1, Waterloo, ON

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: VER-35 55-60 20230624	VER-35 60-63 20230624	VER-70 30-40 20230623	VER-70 41-42 20230623	VER-70 75-80 20230623
					Client sampling date / time: 24-Jun-2023 14:20	24-Jun-2023 14:50	23-Jun-2023 13:15	23-Jun-2023 13:50	23-Jun-2023 17:00
					WT2325832-001	WT2325832-002	WT2325832-003	WT2325832-004	WT2325832-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/WT A	0.25	%	5.08	4.54	14.2	10.9	10.1
Inorganics									
Sulfides, acid volatile	----	E396-L/WT A	0.20	mg/kg	<0.21	<0.21	<0.23	<0.22	<0.22

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2325832**	Page	: 1 of 6
Client	: **SGS Canada Inc**	Laboratory	: ALS Environmental - Waterloo
Contact	: Catharine Arnold	Account Manager	: Emily Smith
Address	: 185 Concession Street P.O. Box 4300 Lakefield ON Canada K0L 2H0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: CA19109-JUL23	Date Samples Received	: 18-Aug-2023 09:00
PO	: ----	Issue Date	: 24-Aug-2023 17:15
C-O-C number	: ----		
Sampler	: CLIENT		
Site	: ----		
Quote number	: Waterloo General Price List		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Compliant container VER-35 55-60 20230624	E396-L	24-Jun-2023	23-Aug-2023	14 days	60 days	× EHTR	23-Aug-2023	14 days	60 days	✓
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Compliant container VER-35 60-63 20230624	E396-L	24-Jun-2023	23-Aug-2023	14 days	60 days	× EHTR	23-Aug-2023	14 days	60 days	✓
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Compliant container VER-70 30-40 20230623	E396-L	23-Jun-2023	23-Aug-2023	14 days	61 days	× EHTR	23-Aug-2023	14 days	61 days	✓
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Compliant container VER-70 41-42 20230623	E396-L	23-Jun-2023	23-Aug-2023	14 days	61 days	× EHTR	23-Aug-2023	14 days	61 days	✓
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Compliant container VER-70 75-80 20230623	E396-L	23-Jun-2023	23-Aug-2023	14 days	61 days	× EHTR	23-Aug-2023	14 days	61 days	✓
Physical Tests : Moisture Content by Gravimetry										
Compliant container VER-35 55-60 20230624	E144	24-Jun-2023	----	----	----		21-Aug-2023	----	58 days	
Physical Tests : Moisture Content by Gravimetry										
Compliant container VER-35 60-63 20230624	E144	24-Jun-2023	----	----	----		21-Aug-2023	----	58 days	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Compliant container										
VER-70 30-40 20230623	E144	23-Jun-2023	----	----	----		21-Aug-2023	----	59 days	
Physical Tests : Moisture Content by Gravimetry										
Compliant container										
VER-70 41-42 20230623	E144	23-Jun-2023	----	----	----		21-Aug-2023	----	59 days	
Physical Tests : Moisture Content by Gravimetry										
Compliant container										
VER-70 75-80 20230623	E144	23-Jun-2023	----	----	----		21-Aug-2023	----	59 days	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	1099712	1	14	7.1	4.7	✓
Moisture Content by Gravimetry	E144	1096159	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	1099712	1	14	7.1	4.7	✓
Moisture Content by Gravimetry	E144	1096159	1	17	5.8	5.0	✓
Method Blanks (MB)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	1099712	1	14	7.1	4.7	✓
Moisture Content by Gravimetry	E144	1096159	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 ALS Environmental - Waterloo	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L ALS Environmental - Waterloo	Soil/Solid	APHA 4500S2J	This analysis is carried out in accordance with the method described in APHA 4500 S2-J. After extraction the Acid Volatile Sulphide is determined colourimetrically.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Distillation for Acid Volatile Sulfide in Soil	EP396-L ALS Environmental - Waterloo	Soil/Solid	APHA 4500S2J	Acid Volatile Sulfide is determined by colourimetric measurement on a sediment sample that has been treated with hydrochloric acid within a purge and trap system, where the evolved hydrogen sulfide gas is carried into a basic solution by argon gas for analysis.

QUALITY CONTROL REPORT

Work Order	: **WT2325832**	Page	: 1 of 3
Client	: SGS Canada Inc	Laboratory	: ALS Environmental - Waterloo
Contact	: Catharine Arnold	Account Manager	: Emily Smith
Address	: 185 Concession Street P.O. Box 4300 Lakefield ON Canada K0L 2H0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: CA19109-JUL23	Date Samples Received	: 18-Aug-2023 09:00
PO	: ----	Date Analysis Commenced	: 21-Aug-2023
C-O-C number	: ----	Issue Date	: 24-Aug-2023 17:15
Sampler	: CLIENT ----		
Site	: ----		
Quote number	: Waterloo General Price List		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Niral Patel		Waterloo Centralized Prep, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1096159)											
WT2325828-001	Anonymous	Moisture	----	E144	0.25	%	18.3	17.4	4.76%	20%	----
Inorganics (QC Lot: 1099712)											
WT2325828-002	Anonymous	Sulfides, acid volatile	----	E396-L	0.26	mg/kg	<0.25	<0.26	0.25	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1096159)						
Moisture	----	E144	0.25	%	<0.25	----
Inorganics (QCLot: 1099712)						
Sulfides, acid volatile	----	E396-L	0.2	mg/kg	<0.20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1096159)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Inorganics (QCLot: 1099712)									
Sulfides, acid volatile	----	E396-L	0.2	mg/kg	2.196 mg/kg	91.1	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 22 -

Page of

Environmental Division Waterloo

Work Order Reference

WT2325832

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	SGS Canada
Contact:	Catharine Arnold
Phone:	705-652-2000
	Company address below will appear on the final report
Street:	185 Concession Street
City/Province:	Lakefield, ON
Postal Code:	K0L2H0
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SGS Canada
Contact:	Jodi MacLaren

Reports / Recipients	
Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	catharine.arnold@sgs.com
Email 2	lisa.thompson@sgs.com
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	jodi.maclaren@sgs.com
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, s
Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information	
ALS Account # / Quote #:	
Job #:	CA19109-JUL23
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	WT2325832

Oil and Gas Required Fields (client use)		
AFE/Cost Center:	PO#	
Major/Minor Code:	Routing Code:	
Requisitioner:		
Location:		
ALS Contact:	**Sampler:**	

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Acid Volatile Sulphide	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	VER-35 55-60 20230624	24-Jun-23	14:20	Soil		R			
	VER-35 60-63 20230624	24-Jun-23	14:50	Soil		R			
	VER-70 30-40 20230623	23-Jun-23	13:15	Soil		R			
	VER-70 41-42 20230623	23-Jun-23	13:50	Soil		R			
	VER-70 75-80 20230623	23-Jun-23	17:00	Soil		R			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	INTERNATIONAL SOILS
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C				
				16.7				

SHIPMENT RELEASE (client use)		
Released by:	Date: 17-Aug-23	Time:

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by: BB	Date: 08/18/23	Time: 07:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JAN 2023 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

15-33

Canadian Food Inspection Agency
Government of Canada

Agence canadienne d'inspection des aliments
Gouvernement du Canada

Permit No./N° de permis:
P-2023-02135
ORIGINAL
2023/06/30
year/mo/day
année/mois/jour

IMPORT PERMIT PERMIS D'IMPORTATION

THIS PERMIT IS ISSUED PURSUANT TO:/CE PERMIS EST DÉLIVRÉ CONFORMÉMENT A:

THE PLANT PROTECTION ACT AND REGULATIONS/LOI ET RÈGLEMENT SUR LA PROTECTION DES VÉGÉTAUX

Importer/Importateur	**Exporter/Exportateur**
ALS CANADA LTD. 60 NORTHLAND ROAD, UNIT 1 WATERLOO, ONTARIO N2V2B8 Applicant Name: MARCOTTE, ALEXANDRE Phone: 519-886-6910 Email: ALEXANDRE.MARCOTTE@ALSGLOBAL.COM	VARIOUS EXPORTERS ALL COUNTRIES
Quarantine/Destination/Quarantaine ALS CANADA LTD. (WATERLOO) 60 NORTHLAND ROAD, UNIT 1 WATERLOO, ONTARIO N2V2B8	**Producer/Producteur**
Valid/Valide from/du 2023/06/30 year/month/day année/mois/jour **to/au** 2025/06/30 year/month/day année/mois/jour	**Country of Propagation or Production / Le pays de multiplication ou de production** ALL COUNTRIES

For the entry of/ Pour l'entrée de: Single shipment/Chargement simple XX Multiple shipments/Chargements multiples

Place of entry into Canada/Lieu d'entrée au Canada:
ALL REGULATED PORTS

FOR THE IMPORTATION OF:/POUR L'IMPORTATION DE:
(Description of things(s)/Description de la ou des choses)
SOIL AND SOIL-RELATED MATTER FOR ANALYSIS

A PERSON WHO IMPORTS A THING UNDER THIS PERMIT SHALL COMPLY WITH ALL THE CONDITIONS SET OUT HEREIN/TOUTE PERSONNE QUI IMPORTE UNE CHOSE EN VERTU DE CE PERMIS DEVRA RESPECTER TOUTES LES CONDITIONS DÉCRITES CI-DESSOUS

Selected Conditions / Conditions Choisies

SOIL AND SOIL-RELATED MATTER FOR ANALYSIS

1. 1. Import documentation: Importation is authorized under Section 43 of the Plant Protection Regulations. Phytosanitary certification at origin is waived.

2. End use: The material must not be sold or distributed; for research or analysis only.

3. Containment: The material must be routed directly to the approved facility. The material must be packaged and transported in sturdy, leak-proof containers. The material must be contained until processed.

4. Disposal: Any residual material must be treated in a dry oven at 121°C for a minimum of 6 hours or be autoclaved at 15 lbs pressure at 121°C for a minimum of 30 minutes, or sterilized or disposed of by another CFIA-approved method.

Canada

Canadian Food Inspection Agency
Goverment of Canada

Agence canadienne d'inspection des aliments
Gouvernement du Canada

Permit No./N° de permis:
P-2023-02135
ORIGINAL
2023/06/30
year/mo/day
année/mois/jour

IMPORT PERMIT PERMIS D'IMPORTATION

THIS PERMIT IS ISSUED PURSUANT TO:/CE PERMIS EST DÉLIVRÉ CONFORMÉMENT A:

THE PLANT PROTECTION ACT AND REGULATIONS/LOI ET RÈGLEMENT SUR LA PROTECTION DES VÉGÉTAUX

Importer/Importateur	Exporter/Exportateur
ALS CANADA LTD. 60 NORTHLAND ROAD, UNIT 1 WATERLOO, ONTARIO N2V2B8 Applicant Name: MARCOTTE, ALEXANDRE Phone: 519-886-6910 Email: ALEXANDRE.MARCOTTE@ALSGLOBAL.COM	VARIOUS EXPORTERS ALL COUNTRIES

Selected Conditions / Conditions Choisies (Continued/Suite)

5. Traceability: At all times (i.e. during importation, research or analysis, storage and until disposal), the material must be identified with labels or other effective identification means. The importer must keep a log book of all importations. This log book must show where the material is in the facility and its status (e.g. treated, stored).

6. Movement: If the imported material is moved to another facility for further analysis, treatment or disposal, a CFIA inspector must verify that the receiving facility is approved by the CFIA before issuing a Movement Certificate.

Authorized By:/Approuvé par:

For the Minister of Agriculture and Agri-Food
Pour le ministre d'agriculture et agroalimentaire

The information is required by (for) the Canadian Food Inspection Agency for the purpose of verifying import products. Information may be accessible or protected as required under the provisions of the Access to Information Act.

Canada

Attachment G
Site Solids Bulk Characterization Analytical Data

April 05, 2021

Scott Woods
Ramboll
300 S. Wacker Drive
Suite 130
Chicago, IL 60606
TEL: (312) 270-3612
FAX: (414) 837-3608

Illinois	100226
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Vermilion Soil **WorkOrder:** 21030714

Dear Scott Woods:

TEKLAB, INC received 7 samples on 3/10/2021 1:20:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Elizabeth A. Hurley
Project Manager
(618)344-1004 ex 33
ehurley@teklabinc.com

Client: Ramboll
Work Order: 21030714
Client Project: Vermilion Soil
Report Date: 05-Apr-21

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Sample Summary	14
Dates Report	15
Quality Control Results	17
Receiving Check List	26
Chain of Custody	Appended

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030714
Report Date: 05-Apr-21

Cooler Receipt Temp: 3.2 °C

Per Brian Hennings, include Iron and Manganese in the list of requested metals. (ehurley - 3/21/2021 11:54:23 AM)

Total Organic Carbon analysis performed by Pace Analytical Services, LLC. See attached report for results and QC summary.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2022	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2021	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2021	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2021	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2021	Collinsville
Arkansas	ADEQ	88-0966		3/14/2022	Collinsville
Illinois	IDPH	17584		5/31/2021	Collinsville
Kentucky	UST	0073		1/31/2022	Collinsville
Missouri	MDNR	00930		5/31/2021	Collinsville
Missouri	MDNR	930		1/31/2022	Collinsville

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-001 **Client Sample ID:** MW71D (9-11ft)

Matrix: SOLID **Collection Date:** 03/03/2021 13:40

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**18.9**	%	1	03/11/2021 19:02	R288383
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.25**	mg/Kg-dry	1	03/31/2021 23:28	175330
Lithium	NELAP	0.48		**8.12**	mg/Kg-dry	1	03/31/2021 23:28	175330
Thallium	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	03/31/2021 23:28	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	03/16/2021 11:42	174775
Arsenic	NELAP	0.19	B	**8.93**	mg/Kg-dry	10	03/20/2021 10:09	174779
Barium	NELAP	0.19		**22.3**	mg/Kg-dry	10	03/20/2021 10:09	174779
Boron	NELAP	4.81		**5.14**	mg/Kg-dry	10	03/20/2021 10:09	174779
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 10:09	174779
Chromium	NELAP	0.48		**9.33**	mg/Kg-dry	10	03/20/2021 10:09	174779
Cobalt	NELAP	0.19		**9.06**	mg/Kg-dry	10	03/20/2021 10:09	174779
Iron	NELAP	9.62		**10900**	mg/Kg-dry	10	03/20/2021 10:09	174779
Lead	NELAP	0.19		**8.03**	mg/Kg-dry	10	03/20/2021 10:09	174779
Manganese	NELAP	0.19		**306**	mg/Kg-dry	10	03/20/2021 10:09	174779
Molybdenum	NELAP	0.19		**2.05**	mg/Kg-dry	10	03/20/2021 10:09	174779
Selenium	NELAP	0.96		**< 0.96**	mg/Kg-dry	10	03/20/2021 10:09	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	03/15/2021 11:35	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/18/2021 0:00	R288943

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-002 **Client Sample ID:** MW71D (12-14)

Matrix: SOLID **Collection Date:** 03/03/2021 13:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**5.7**	%	1	03/11/2021 19:02	R288383
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.92**	mg/Kg-dry	1	03/31/2021 23:32	175330
Boron	NELAP	1.89		**6.09**	mg/Kg-dry	1	03/31/2021 23:32	175330
Lithium	NELAP	0.47		**31.1**	mg/Kg-dry	1	03/31/2021 23:32	175330
Thallium	NELAP	4.72		**< 4.72**	mg/Kg-dry	1	03/31/2021 23:32	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	03/16/2021 11:50	174775
Arsenic	NELAP	0.19	B	**4.09**	mg/Kg-dry	10	03/20/2021 11:36	174779
Barium	NELAP	0.19		**39.3**	mg/Kg-dry	10	03/20/2021 11:36	174779
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 11:36	174779
Chromium	NELAP	0.47		**25.1**	mg/Kg-dry	10	03/20/2021 11:36	174779
Cobalt	NELAP	0.19		**14.1**	mg/Kg-dry	10	03/20/2021 11:36	174779
Iron	NELAP	9.43		**34700**	mg/Kg-dry	10	03/20/2021 11:36	174779
Lead	NELAP	0.19		**14.5**	mg/Kg-dry	10	03/20/2021 11:36	174779
Manganese	NELAP	0.19		**650**	mg/Kg-dry	10	03/20/2021 11:36	174779
Molybdenum	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 11:36	174779
Selenium	NELAP	0.94		**< 0.94**	mg/Kg-dry	10	03/20/2021 11:36	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.010		**0.012**	mg/Kg-dry	1	03/15/2021 11:38	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/18/2021 0:00	R288943

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-003 **Client Sample ID:** MW71D (12-14) DUP

Matrix: SOLID **Collection Date:** 03/03/2021 13:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**5.5**	%	1	03/11/2021 19:02	R288383
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**1.07**	mg/Kg-dry	1	03/31/2021 23:35	175330
Boron	NELAP	1.92		**6.26**	mg/Kg-dry	1	03/31/2021 23:35	175330
Lithium	NELAP	0.48		**34.8**	mg/Kg-dry	1	03/31/2021 23:35	175330
Thallium	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	03/31/2021 23:35	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	03/16/2021 11:58	174775
Arsenic	NELAP	0.19	B	**5.50**	mg/Kg-dry	10	03/20/2021 11:45	174779
Barium	NELAP	0.19		**36.6**	mg/Kg-dry	10	03/20/2021 11:45	174779
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 11:45	174779
Chromium	NELAP	0.48		**27.5**	mg/Kg-dry	10	03/20/2021 11:45	174779
Cobalt	NELAP	0.19		**15.2**	mg/Kg-dry	10	03/20/2021 11:45	174779
Iron	NELAP	9.62		**39800**	mg/Kg-dry	10	03/20/2021 11:45	174779
Lead	NELAP	0.19		**15.9**	mg/Kg-dry	10	03/20/2021 11:45	174779
Manganese	NELAP	0.19		**734**	mg/Kg-dry	10	03/20/2021 11:45	174779
Molybdenum	NELAP	0.19		**0.20**	mg/Kg-dry	10	03/20/2021 11:45	174779
Selenium	NELAP	0.96		**< 0.96**	mg/Kg-dry	10	03/20/2021 11:45	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.010		**0.012**	mg/Kg-dry	1	03/15/2021 11:40	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/23/2021 0:00	R288943

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-004 **Client Sample ID:** EB04

Matrix: AQUEOUS **Collection Date:** 03/03/2021 17:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 5310 C 2000, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**< 1.0**	mg/L	1	03/11/2021 14:02	R288399
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Iron	NELAP	0.0400		**< 0.0400**	mg/L	1	03/31/2021 21:55	175331
Manganese	NELAP	0.0070		**< 0.0070**	mg/L	1	03/31/2021 21:55	175331
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	03/12/2021 8:19	174678
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 8:19	174678
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Lithium	*	0.0030		**< 0.0030**	mg/L	5	03/12/2021 8:19	174678
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 8:19	174678
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:19	174678
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	03/12/2021 8:19	174678
Contamination present in the CCB for Ba. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	03/15/2021 10:15	174722

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-005 **Client Sample ID:** MW70D (16-18)

Matrix: SOLID **Collection Date:** 03/04/2021 9:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**13.1**	%	1	03/11/2021 19:02	R288383
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.16**	mg/Kg-dry	1	03/31/2021 22:58	175330
Boron	NELAP	2.00		**3.87**	mg/Kg-dry	1	03/31/2021 22:58	175330
Lithium	NELAP	0.50		**4.97**	mg/Kg-dry	1	03/31/2021 22:58	175330
Thallium	NELAP	5.00		**< 5.00**	mg/Kg-dry	1	03/31/2021 22:58	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.36		**< 0.36**	mg/Kg-dry	10	03/16/2021 12:06	174775
Arsenic	NELAP	0.20	B	**5.07**	mg/Kg-dry	10	03/20/2021 11:54	174779
Barium	NELAP	0.20		**34.2**	mg/Kg-dry	10	03/20/2021 11:54	174779
Cadmium	NELAP	0.20		**< 0.20**	mg/Kg-dry	10	03/20/2021 11:54	174779
Chromium	NELAP	0.50		**7.55**	mg/Kg-dry	10	03/20/2021 11:54	174779
Cobalt	NELAP	0.20		**4.09**	mg/Kg-dry	10	03/20/2021 11:54	174779
Iron	NELAP	10.0	S	**10400**	mg/Kg-dry	10	03/20/2021 11:54	174779
Lead	NELAP	0.20		**8.38**	mg/Kg-dry	10	03/20/2021 11:54	174779
Manganese	NELAP	0.20	S	**524**	mg/Kg-dry	10	03/20/2021 11:54	174779
Molybdenum	NELAP	0.20		**0.99**	mg/Kg-dry	10	03/20/2021 11:54	174779
Selenium	NELAP	1.00		**< 1.00**	mg/Kg-dry	10	03/20/2021 11:54	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Matrix spike control limits for Fe & Mn are not applicable due to high sample/spike ratio.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	03/15/2021 11:42	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/23/2021 0:00	R288943

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-006 **Client Sample ID:** MW70D (22-24)

Matrix: SOLID **Collection Date:** 03/04/2021 9:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.9**	%	1	03/11/2021 19:02	R288383
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**1.05**	mg/Kg-dry	1	03/31/2021 23:39	175330
Boron	NELAP	1.85		**7.10**	mg/Kg-dry	1	03/31/2021 23:39	175330
Lithium	NELAP	0.46		**33.3**	mg/Kg-dry	1	03/31/2021 23:39	175330
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	03/31/2021 23:39	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.40		**< 0.40**	mg/Kg-dry	10	03/16/2021 12:14	174775
Arsenic	NELAP	0.19	B	**6.11**	mg/Kg-dry	10	03/20/2021 12:02	174779
Barium	NELAP	0.19		**30.2**	mg/Kg-dry	10	03/20/2021 12:02	174779
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 12:02	174779
Chromium	NELAP	0.46		**27.1**	mg/Kg-dry	10	03/20/2021 12:02	174779
Cobalt	NELAP	0.19		**16.9**	mg/Kg-dry	10	03/20/2021 12:02	174779
Iron	NELAP	9.26		**43100**	mg/Kg-dry	10	03/20/2021 12:02	174779
Lead	NELAP	0.19		**15.4**	mg/Kg-dry	10	03/20/2021 12:02	174779
Manganese	NELAP	0.19		**792**	mg/Kg-dry	10	03/20/2021 12:02	174779
Molybdenum	NELAP	0.19		**0.29**	mg/Kg-dry	10	03/20/2021 12:02	174779
Selenium	NELAP	0.93		**< 0.93**	mg/Kg-dry	10	03/20/2021 12:02	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.010		**< 0.010**	mg/Kg-dry	1	03/15/2021 11:49	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/23/2021 0:00	R288943

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Lab ID: 21030714-007 **Client Sample ID:** EB05

Matrix: AQUEOUS **Collection Date:** 03/04/2021 17:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 5310 C 2000, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**< 1.0**	mg/L	1	03/11/2021 17:13	R288399
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Iron	NELAP	0.0400		**< 0.0400**	mg/L	1	03/31/2021 22:06	175331
Manganese	NELAP	0.0070		**< 0.0070**	mg/L	1	03/31/2021 22:06	175331
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	03/12/2021 8:27	174678
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 8:27	174678
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Lithium	*	0.0030		**< 0.0030**	mg/L	5	03/12/2021 8:27	174678
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 8:27	174678
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 8:27	174678
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	03/12/2021 8:27	174678
Contamination present in the CCB for Ba. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	03/15/2021 10:18	174722

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030714
Report Date: 05-Apr-21

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
21030714-001	MW71D (9-11ft)	Solid	2	03/03/2021 13:40
21030714-002	MW71D (12-14)	Solid	2	03/03/2021 13:50
21030714-003	MW71D (12-14) DUP	Solid	2	03/03/2021 13:50
21030714-004	EB04	Aqueous	2	03/03/2021 17:30
21030714-005	MW70D (16-18)	Solid	2	03/04/2021 9:45
21030714-006	MW70D (22-24)	Solid	2	03/04/2021 9:50
21030714-007	EB05	Aqueous	2	03/04/2021 17:20

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
21030714-001A	MW71D (9-11ft)	03/03/2021 13:40	03/10/2021 13:20		
	EPA SW846 3550C, 5035A, ASTM D2974				03/11/2021 19:02
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	03/31/2021 23:28
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 11:42
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 10:09
	SW-846 7471B			03/12/2021 11:30	03/15/2021 11:35
21030714-001B	MW71D (9-11ft)	03/03/2021 13:40	03/10/2021 13:20		
	See Attached for Subcontracting Analysis				03/18/2021 0:00
21030714-002A	MW71D (12-14)	03/03/2021 13:50	03/10/2021 13:20		
	EPA SW846 3550C, 5035A, ASTM D2974				03/11/2021 19:02
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	03/31/2021 23:32
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 11:50
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 11:36
	SW-846 7471B			03/12/2021 11:30	03/15/2021 11:38
21030714-002B	MW71D (12-14)	03/03/2021 13:50	03/10/2021 13:20		
	See Attached for Subcontracting Analysis				03/18/2021 0:00
21030714-003A	MW71D (12-14) DUP	03/03/2021 13:50	03/10/2021 13:20		
	EPA SW846 3550C, 5035A, ASTM D2974				03/11/2021 19:02
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	03/31/2021 23:35
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 11:58
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 11:45
	SW-846 7471B			03/12/2021 11:30	03/15/2021 11:40
21030714-003B	MW71D (12-14) DUP	03/03/2021 13:50	03/10/2021 13:20		
	See Attached for Subcontracting Analysis				03/23/2021 0:00
21030714-004A	EB04	03/03/2021 17:30	03/10/2021 13:20		
	SW-846 3005A, 6010B, Metals by ICP (Total)			03/10/2021 19:32	03/31/2021 21:55
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			03/10/2021 19:32	03/12/2021 8:19
	SW-846 7470A (Total)			03/11/2021 19:05	03/15/2021 10:15
21030714-004B	EB04	03/03/2021 17:30	03/10/2021 13:20		
	Standard Methods 5310 C 2000, Organic Carbon				03/11/2021 14:02
21030714-005A	MW70D (16-18)	03/04/2021 9:45	03/10/2021 13:20		
	EPA SW846 3550C, 5035A, ASTM D2974				03/11/2021 19:02
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	03/31/2021 22:58
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 12:06
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 11:54
	SW-846 7471B			03/12/2021 11:30	03/15/2021 11:42

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
21030714-005B	MW70D (16-18)	03/04/2021 9:45	03/10/2021 13:20		
	See Attached for Subcontracting Analysis				03/23/2021 0:00
21030714-006A	MW70D (22-24)	03/04/2021 9:50	03/10/2021 13:20		
	EPA SW846 3550C, 5035A, ASTM D2974				03/11/2021 19:02
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	03/31/2021 23:39
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 12:14
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 12:02
	SW-846 7471B			03/12/2021 11:30	03/15/2021 11:49
21030714-006B	MW70D (22-24)	03/04/2021 9:50	03/10/2021 13:20		
	See Attached for Subcontracting Analysis				03/23/2021 0:00
21030714-007A	EB05	03/04/2021 17:20	03/10/2021 13:20		
	SW-846 3005A, 6010B, Metals by ICP (Total)			03/10/2021 19:32	03/31/2021 22:06
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			03/10/2021 19:32	03/12/2021 8:27
	SW-846 7470A (Total)			03/11/2021 19:05	03/15/2021 10:18
21030714-007B	EB05	03/04/2021 17:20	03/10/2021 13:20		
	Standard Methods 5310 C 2000, Organic Carbon				03/11/2021 17:13

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

EPA SW846 3550C, 5035A, ASTM D2974

Batch R288383 **SampType:** LCS Units **%**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	03/11/2021

Batch R288383 **SampType:** LCSQC Units **%**

SampID: LCSQC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	03/11/2021

STANDARD METHODS 5310 C 2000, ORGANIC CARBON

Batch R288399 **SampType:** MBLK Units **mg/L**

SampID: CCB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**	0.4500	0	0	-100	100	03/12/2021

Batch R288399 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**	0.4500	0	0	-100	100	03/11/2021

Batch R288399 **SampType:** LCS Units **mg/L**

SampID: CCV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		10.0		**60.8**	62.10	0	97.9	90	110	03/12/2021

Batch R288399 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		10.0		**64.3**	62.10	0	103.6	90	110	03/11/2021

Batch R288399 **SampType:** MS Units **mg/L**

SampID: 21030714-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**5.0**	5.000	0	99.4	85	115	03/11/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

STANDARD METHODS 5310 C 2000, ORGANIC CARBON

Batch R288399 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 21030714-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**4.9**	5.000	0	97.8	4.970	1.62	03/11/2021

Batch R288399 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 21030714-004BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**				0	0.00	03/11/2021

Batch R288399 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 21030714-007BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**				0	0.00	03/11/2021

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 175331 **SampType:** MBLK Units **mg/L**

SampID: MBLK-175331

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	03/31/2021
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	03/31/2021

Batch 175331 **SampType:** LCS Units **mg/L**

SampID: LCS-175331

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.93**	2.000	0	96.4	85	115	03/31/2021
Manganese		0.0070		**0.503**	0.5000	0	100.6	85	115	03/31/2021

Batch 175331 **SampType:** MS Units **mg/L**

SampID: 21030714-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.90**	2.000	0	95.2	75	125	03/31/2021
Manganese		0.0070		**0.496**	0.5000	0	99.2	75	125	03/31/2021

Batch 175331 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 21030714-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		0.0400		**1.92**	2.000	0	96.1	1.904	0.94	03/31/2021
Manganese		0.0070		**0.501**	0.5000	0	100.2	0.4960	1.00	03/31/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 174678 **SampType:** MBLK Units **mg/L**

SampID: MBLK-174678

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**< 0.0010**	0.0004	0	0	-100	100	03/12/2021
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	03/12/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	03/19/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	03/12/2021
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	03/12/2021
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	03/12/2021
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	03/12/2021
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	03/12/2021
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	03/12/2021
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	03/12/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	03/16/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	03/12/2021
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	03/12/2021
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	03/12/2021
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	03/12/2021

Batch 174678 **SampType:** LCS Units **mg/L**

SampID: LCS-174678

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.528**	0.5000	0	105.6	80	120	03/12/2021
Arsenic		0.0010		**0.559**	0.5000	0	111.8	80	120	03/12/2021
Barium		0.0010		**2.15**	2.000	0	107.7	80	120	03/12/2021
Barium		0.0010		**2.15**	2.000	0	107.4	80	120	03/19/2021
Beryllium		0.0010		**0.0547**	0.0500	0	109.4	80	120	03/12/2021
Boron		0.0250		**0.523**	0.5000	0	104.6	80	120	03/12/2021
Cadmium		0.0010		**0.0535**	0.0500	0	107.0	80	120	03/12/2021
Chromium		0.0015		**0.216**	0.2000	0	108.1	80	120	03/12/2021
Cobalt		0.0010		**0.536**	0.5000	0	107.3	80	120	03/12/2021
Lead		0.0010		**0.533**	0.5000	0	106.6	80	120	03/12/2021
Lithium	*	0.0030		**0.570**	0.5000	0	114.1	80	120	03/12/2021
Lithium	*	0.0030		**0.548**	0.5000	0	109.5	80	120	03/16/2021
Molybdenum		0.0015		**0.527**	0.5000	0	105.4	80	120	03/12/2021
Selenium		0.0010		**0.493**	0.5000	0	98.6	80	120	03/12/2021
Thallium		0.0020		**0.265**	0.2500	0	106.1	80	120	03/12/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 174678 **SampType:** MS Units **mg/L**

SampID: 21030714-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.524**	0.5000	0	104.8	75	125	03/12/2021
Arsenic		0.0010		**0.538**	0.5000	0	107.6	75	125	03/12/2021
Barium		0.0010		**2.17**	2.000	0	108.6	75	125	03/12/2021
Beryllium		0.0010		**0.0522**	0.0500	0	104.4	75	125	03/12/2021
Boron		0.0250		**0.516**	0.5000	0.01355	100.5	75	125	03/12/2021
Cadmium		0.0010		**0.0506**	0.0500	0	101.1	75	125	03/12/2021
Chromium		0.0015		**0.205**	0.2000	0	102.4	75	125	03/12/2021
Cobalt		0.0010		**0.498**	0.5000	0	99.6	75	125	03/12/2021
Lead		0.0010		**0.514**	0.5000	0	102.9	75	125	03/12/2021
Lithium	*	0.0030		**0.553**	0.5000	0	110.6	75	125	03/12/2021
Molybdenum		0.0015		**0.494**	0.5000	0	98.8	75	125	03/12/2021
Selenium		0.0010		**0.500**	0.5000	0	99.9	75	125	03/12/2021
Thallium		0.0020		**0.258**	0.2500	0	103.4	75	125	03/12/2021

Batch 174678 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 21030714-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.525**	0.5000	0	104.9	0.5238	0.17	03/12/2021
Arsenic		0.0010		**0.550**	0.5000	0	109.9	0.5382	2.09	03/12/2021
Barium		0.0010		**2.16**	2.000	0	108.1	2.172	0.43	03/12/2021
Beryllium		0.0010		**0.0537**	0.0500	0	107.3	0.05221	2.74	03/12/2021
Boron		0.0250		**0.535**	0.5000	0.01355	104.4	0.5160	3.69	03/12/2021
Cadmium		0.0010		**0.0518**	0.0500	0	103.5	0.05057	2.34	03/12/2021
Chromium		0.0015		**0.210**	0.2000	0	105.0	0.2049	2.46	03/12/2021
Cobalt		0.0010		**0.517**	0.5000	0	103.5	0.4982	3.77	03/12/2021
Lead		0.0010		**0.515**	0.5000	0	103.0	0.5143	0.13	03/12/2021
Lithium	*	0.0030		**0.568**	0.5000	0	113.6	0.5528	2.73	03/12/2021
Molybdenum		0.0015		**0.502**	0.5000	0	100.4	0.4940	1.65	03/12/2021
Selenium		0.0010		**0.506**	0.5000	0	101.2	0.4995	1.30	03/12/2021
Thallium		0.0020		**0.258**	0.2500	0	103.4	0.2584	0.02	03/12/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3050B, 6010B, METALS BY ICP

Batch 175330 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-175330

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Beryllium		0.05		**< 0.05**	0.0110	0	0	-100	100	03/31/2021
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	03/31/2021
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	03/31/2021
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	03/31/2021

Batch 175330 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-175330

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Beryllium		0.05		**4.88**	5.000	0	97.6	85	115	03/31/2021
Boron		2.00		**47.7**	50.00	0	95.4	85	115	03/31/2021
Lithium		0.50		**47.4**	50.00	0	94.8	85	115	03/31/2021
Thallium		5.00		**23.7**	25.00	0	94.9	85	115	03/31/2021

Batch 175330 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030714-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Beryllium		0.05		**4.76**	4.717	0.1600	97.6	75	125	03/31/2021
Boron		1.89		**49.2**	47.17	3.870	96.1	75	125	03/31/2021
Lithium		0.47		**51.3**	47.17	4.970	98.1	75	125	03/31/2021
Thallium		4.72		**20.9**	23.58	0	88.6	75	125	03/31/2021

Batch 175330 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030714-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Beryllium		0.05		**4.85**	4.808	0.1600	97.5	4.764	1.71	03/31/2021
Boron		1.92		**50.2**	48.08	3.870	96.3	49.19	1.94	03/31/2021
Lithium		0.48		**51.8**	48.08	4.970	97.5	51.25	1.11	03/31/2021
Thallium		4.81		**22.0**	24.04	0	91.6	20.91	5.14	03/31/2021

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174775 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-174775

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**< 0.40**	0.1500	0	0	-100	100	03/16/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174775 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-174775

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**49.6**	50.00	0	99.2	80	120	03/16/2021

Batch 174775 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030714-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.38		**46.1**	47.17	0.2287	97.3	75	125	03/16/2021

Batch 174775 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030714-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.37		**45.5**	46.30	0.2287	97.7	46.15	1.46	03/16/2021

Batch 174779 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-174779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	S	**< 0.20**	0.0202	0	112.0	-100	100	03/19/2021
Barium		0.20		**< 0.20**	0.0550	0	0	-100	100	03/19/2021
Boron		5.00		**< 5.00**	0.8000	0	0	-100	100	03/19/2021
Boron		5.00		**< 5.00**	0.8000	0	0	-100	100	04/01/2021
Cadmium		0.20		**< 0.20**	0.0150	0	0	-100	100	03/19/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	03/19/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	04/01/2021
Cobalt		0.20		**< 0.20**	0.0253	0	0	-100	100	03/19/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	04/01/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	03/19/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	04/01/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	03/19/2021
Manganese		0.20		**< 0.20**	0.0670	0	0	-100	100	04/01/2021
Manganese		0.20		**< 0.20**	0.0670	0	0	-100	100	03/19/2021
Molybdenum		0.20		**< 0.20**	0.0740	0	0	-100	100	03/19/2021
Selenium		1.00		**< 1.00**	0.1375	0	0	-100	100	03/19/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174779 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-174779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	B	**52.8**	50.00	0	105.7	80	120	03/19/2021
Barium		0.20		**206**	200.0	0	103.1	80	120	03/19/2021
Boron		5.00		**47.4**	50.00	0	94.9	80	120	04/01/2021
Boron		5.00		**48.0**	50.00	0	96.1	80	120	03/19/2021
Cadmium		0.20		**4.95**	5.000	0	99.1	80	120	03/19/2021
Chromium		0.50		**22.2**	20.00	0	111.1	80	120	04/01/2021
Chromium		0.50		**20.7**	20.00	0	103.3	80	120	03/19/2021
Cobalt		0.20		**50.9**	50.00	0	101.9	80	120	03/19/2021
Iron		10.0		**177**	200.0	0	88.4	80	120	04/01/2021
Iron		10.0		**215**	200.0	0	107.4	80	120	03/19/2021
Lead		0.20		**53.9**	50.00	0	107.7	80	120	03/19/2021
Lead		0.20		**50.9**	50.00	0	101.7	80	120	04/01/2021
Manganese		0.20		**51.9**	50.00	0	103.8	80	120	04/01/2021
Manganese		0.20		**51.6**	50.00	0	103.2	80	120	03/19/2021
Molybdenum		0.20		**49.2**	50.00	0	98.4	80	120	03/19/2021
Selenium		1.00		**48.4**	50.00	0	96.8	80	120	03/19/2021

Batch 174779 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030714-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.19	B	**53.1**	47.17	5.074	101.8	75	125	03/20/2021
Barium		0.19		**232**	188.7	34.22	105.1	75	125	03/20/2021
Cadmium		0.19		**4.92**	4.717	0.1575	101.0	75	125	03/20/2021
Chromium		0.47		**28.7**	18.87	7.550	111.9	75	125	03/20/2021
Cobalt		0.19		**49.5**	47.17	4.086	96.3	75	125	03/20/2021
Iron		9.43	S	**10800**	188.7	10420	194.4	75	125	03/20/2021
Lead		0.19		**58.2**	47.17	8.377	105.5	75	125	03/20/2021
Manganese		0.19	S	**546**	47.17	524.2	46.4	75	125	03/20/2021
Molybdenum		0.19		**47.1**	47.17	0.9900	97.8	75	125	03/20/2021
Selenium		0.94		**44.8**	47.17	0	95.0	75	125	03/20/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174779 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030714-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		0.19	B	**54.5**	48.08	5.074	102.7	53.08	2.59	03/20/2021
Barium		0.19		**229**	192.3	34.22	101.3	232.5	1.52	03/20/2021
Cadmium		0.19		**4.89**	4.808	0.1575	98.4	4.919	0.66	03/20/2021
Chromium		0.48		**29.1**	19.23	7.550	112.0	28.66	1.50	03/20/2021
Cobalt		0.19		**51.1**	48.08	4.086	97.7	49.52	3.10	03/20/2021
Iron		9.62	S	**10500**	192.3	10420	45.3	10780	2.63	03/20/2021
Lead		0.19		**58.5**	48.08	8.377	104.2	58.15	0.52	03/20/2021
Manganese		0.19	S	**516**	48.08	524.2	-17.1	546.1	5.67	03/20/2021
Molybdenum		0.19		**47.4**	48.08	0.9900	96.6	47.10	0.66	03/20/2021
Selenium		0.96		**45.5**	48.08	0	94.6	44.83	1.42	03/20/2021

SW-846 7470A (TOTAL)

Batch 174722 **SampType:** MBLK Units **mg/L**

SampID: MBLK-174722

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**< 0.00020**	0.0001	0	0	-100	100	03/12/2021

Batch 174722 **SampType:** LCS Units **mg/L**

SampID: LCS-174722

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00527**	0.0050	0	105.4	85	115	03/12/2021

Batch 174722 **SampType:** MS Units **mg/L**

SampID: 21030714-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00506**	0.0050	0	101.2	75	125	03/15/2021

Batch 174722 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 21030714-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00489**	0.0050	0	97.8	0.005059	3.45	03/15/2021

Client: Ramboll **Work Order:** 21030714

Client Project: Vermilion Soil **Report Date:** 05-Apr-21

SW-846 7471B

Batch 174674 **SampType:** MBLK Units **mg/Kg**

SampID: MBLK-174674

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**< 0.010**	0.0045	0	0	-100	100	03/15/2021

Batch 174674 **SampType:** LCS Units **mg/Kg**

SampID: LCS-174674

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.250**	0.2500	0	100.1	85	115	03/15/2021

Batch 174674 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030714-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.011		**0.303**	0.2709	0	111.8	75	125	03/15/2021

Batch 174674 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **15**

SampID: 21030714-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.011		**0.301**	0.2741	0	109.8	0.3027	0.58	03/15/2021

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030714
Report Date: 05-Apr-21

Carrier: Paul Reeves

Received By: PRY

Completed by: Amanda R. Ham
On: 10-Mar-21

Reviewed by: Emily Pohlman
On: 10-Mar-21

Pages to follow: Chain of custody 2 Extra pages included 14

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 3.2
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

pH strip #74534. - aham - 3/10/2021 3:51:49 PM

MW71D (12-14) and MW71D (12-14) Dup were received on 3/10/21 at 1430 (on ice 10.4C and out of temperature compliance). All other samples were received on 3/5/21 at 1320. Scott Woods was notified of the temperature non-compliance via workorder summary. ARH/EEP 3/10/21

Custody Seals: 722-2021-003 +004

722-2021-0305-002

210307l4

CHAIN OF CUSTODY

pg. 1 of 1 Work order # ~~210307l4~~ 210307l4

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

TE AH 3/10/21

Client:	Ramboll
Address:	300 S. Wacker Drive
City / State / Zip	Chicago, IL 60606
Contact:	Scott Woods
Phone:	(312) 270-3612
E-Mail:	scott.woods@ramboll.com
Fax:	

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 3.2 °C LTG# 5

Preserved in: ☐ LAB ☑ FIELD

FOR LAB USE ONLY

Lab Notes PH✓ 74534. PH 3/5/21

Client Comments: * MS/MSD

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No

Are these samples known to be hazardous? ☐ Yes ☐ No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

Metals: antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium by ICP/MS and mercury

Project Name/Number: Vermilion Soil

Sample Collector's Name:

Results Requested: ☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other ____ ☐ 3 Day (50% Surcharge)

Billing Instructions:

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	MATRIX: Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	INDICATE ANALYSIS REQUESTED: TOC	Total Metals
~~210307l4~~ 001	MW71D (9-11')	3-3-21 / 1340	X										X				X	X
210307l4	~~EQF MW71D (9-11') Dup~~	~~3-3-21 / 1345~~	X															3-5-21
002	MW71D (12-14)	3-3-21 / 1350	X										X				X	X
003	MW71D (12-14) Dup	3-3-21 / 1350	X										X				X	X
004	EB04	3-3-21 / 1730	X	X							X						X	X
005	MW70D (16-18)*	3-4-21 / 0945	X										X				X	X
006	MW70D (22-24)	3-4-21 / 0950	X										X				X	X
007	EB05	3-4-21 / 1720	X	X							X						X	X

Relinquished By	Date/Time	Received By	Date/Time
~~[illegible]~~	3-5-21 / 0930	[illegible]	3-5-21 0900
[illegible]	3.5.21 1320	[illegible]	3/5/21 1320

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

PH 3/5/21

BottleOrder: 63910

COC# 722-2021-0310-003 21030714
Custody seal #'s: 722-0310-001 and 722-0310-002

CHAIN OF CUSTODY

pg. 1 of 1 Work order # 21030714

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005 TE AH 3/10/21

Client:	Ramboll
Address:	300 S. Wacker Drive
City / State / Zip	Chicago, IL 60606
Contact:	Scott Woods
Phone:	(312) 270-3612
E-Mail:	scott.woods@ramboll.com
Fax:	

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 10.4 °C LTG# 1

Preserved in: ☐ LAB ☐ FIELD

FOR LAB USE ONLY

Lab Notes

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No

Are these samples known to be hazardous? ☐ Yes ☒ No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

Client Comments:

Metals: antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium by ICP/MS and mercury

* same samples as -002 & -003 on first Page. They were received 3/10/21 at 1430. AH 3/10/21

Project Name/Number: Vermilion Soil

Sample Collector's Name: Scott Woods

Results Requested: ☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other ____ ☐ 3 Day (50% Surcharge)

Billing Instructions:

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	MATRIX: Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	INDICATE ANALYSIS REQUESTED: TOC	Total Metals
21030714 002	MW-71D(12-14) *	3/3/21 1350	X										X				X	X
003	MW-71D(12-14)Dup *	3/3/21 1350	X										X				X	X

Lot wide 3/10/21

Relinquished By	Date/Time	Received By	Date/Time
Scott Woods	3/10/21 ~~0930~~ 0748		3-10-21 0748
	3.10.21 1430		3/10/21 1430

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder: 63910

AH 3/11/21

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

March 24, 2021

Elizabeth Hurley
Teklab, Inc
5445 Horseshoe Lake Rd
Collinsville, IL 62234

RE: Project: 21030714
Pace Project No.: 40223270

Dear Elizabeth Hurley:

Enclosed are the analytical results for sample(s) received by the laboratory on March 11, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten
brian.basten@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Mike Austin, Teklab, Inc
Aaron Renner, Teklab Inc

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Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project: 21030714
Pace Project No.: 40223270

Pace Analytical Services Green Bay
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 21030714
Pace Project No.: 40223270

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40223270001	**21030714-001**	Solid	03/03/21 13:40	03/11/21 09:35
40223270002	**21030714-002**	Solid	03/03/21 13:50	03/11/21 09:35
40223270003	**21030714-003**	Solid	03/03/21 13:50	03/11/21 09:35
40223270004	**21030714-005**	Solid	03/04/21 09:45	03/11/21 09:35
40223270005	**21030714-006**	Solid	03/04/21 09:50	03/11/21 09:35

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SAMPLE ANALYTE COUNT

Project: 21030714
Pace Project No.: 40223270

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40223270001	**21030714-001**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223270002	**21030714-002**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223270003	**21030714-003**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223270004	**21030714-005**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223270005	**21030714-006**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4

PASI-G = Pace Analytical Services - Green Bay

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ANALYTICAL RESULTS

Project: 21030714
Pace Project No.: 40223270

Sample: 21030714-001 **Lab ID: 40223270001** Collected: 03/03/21 13:40 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**17.9**	%	0.10	0.10	1		03/16/21 08:26		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**9.5**	%	0.10	0.10	1		03/18/21 13:07		
Total Organic Carbon	**6730**	mg/kg	1390	413	1		03/18/21 13:07	7440-44-0	
Total Organic Carbon	**7400**	mg/kg	1380	412	1		03/18/21 13:12	7440-44-0	
Mean Total Organic Carbon	**7060**	mg/kg	1380	413	1		03/18/21 13:07	7440-44-0	C4

Sample: 21030714-002 **Lab ID: 40223270002** Collected: 03/03/21 13:50 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**6.0**	%	0.10	0.10	1		03/16/21 08:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**2.0**	%	0.10	0.10	1		03/18/21 13:18		
Total Organic Carbon	**9850**	mg/kg	1340	400	1		03/18/21 13:18	7440-44-0	
Total Organic Carbon	**9660**	mg/kg	1340	399	1		03/18/21 13:24	7440-44-0	
Mean Total Organic Carbon	**9750**	mg/kg	1340	399	1		03/18/21 13:18	7440-44-0	C4

Sample: 21030714-003 **Lab ID: 40223270003** Collected: 03/03/21 13:50 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**17.2**	%	0.10	0.10	1		03/16/21 08:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**34.0**	%	0.10	0.10	1		03/23/21 04:57		
Total Organic Carbon	**474J**	mg/kg	722	215	1		03/23/21 04:57	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 21030714
Pace Project No.: 40223270

Sample: 21030714-003 **Lab ID: 40223270003** Collected: 03/03/21 13:50 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Total Organic Carbon	**668J**	mg/kg	719	214	1		03/23/21 05:02	7440-44-0	
Mean Total Organic Carbon	**571J**	mg/kg	720	215	1		03/23/21 04:57	7440-44-0	C4

Sample: 21030714-005 **Lab ID: 40223270004** Collected: 03/04/21 09:45 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Green Bay								
Percent Moisture	**15.5**	%	0.10	0.10	1		03/16/21 08:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**13.5**	%	0.10	0.10	1		03/23/21 05:33		
Total Organic Carbon	**483J**	mg/kg	708	211	1		03/23/21 05:33	7440-44-0	
Total Organic Carbon	**553J**	mg/kg	704	210	1		03/23/21 05:38	7440-44-0	
Mean Total Organic Carbon	**518J**	mg/kg	706	211	1		03/23/21 05:33	7440-44-0	C4

Sample: 21030714-006 **Lab ID: 40223270005** Collected: 03/04/21 09:50 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Green Bay								
Percent Moisture	**8.6**	%	0.10	0.10	1		03/16/21 08:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**0.61**	%	0.10	0.10	1		03/23/21 06:08		
Total Organic Carbon	**12600**	mg/kg	2070	616	1		03/23/21 06:08	7440-44-0	
Total Organic Carbon	**12500**	mg/kg	2090	625	1		03/23/21 06:14	7440-44-0	
Mean Total Organic Carbon	**12600**	mg/kg	2080	620	1		03/23/21 06:08	7440-44-0	C4

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 21030714
Pace Project No.: 40223270

QC Batch: 379833
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40223270001, 40223270002, 40223270003, 40223270004, 40223270005

SAMPLE DUPLICATE: 2190502

Parameter	Units	40223273003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	16.5	15.9	3	10	

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QUALITY CONTROL DATA

Project: 21030714
Pace Project No.: 40223270

QC Batch: 380046
QC Batch Method: EPA 9060 Modified
Analysis Method: EPA 9060 Modified
Analysis Description: 9060 TOC Average
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40223270001, 40223270002

METHOD BLANK: 2191747 Matrix: Solid
Associated Lab Samples: 40223270001, 40223270002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	<179	600	03/18/21 10:36	

LABORATORY CONTROL SAMPLE: 2191748

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	120000	121000	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2191749 2191750

Parameter	Units	40223269002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	14000	7130	7130	23700	25700	135	163	50-150	8	30	M0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 21030714
Pace Project No.: 40223270

QC Batch: 380166
QC Batch Method: EPA 9060 Modified
Analysis Method: EPA 9060 Modified
Analysis Description: 9060 TOC Average
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40223270003, 40223270004, 40223270005

METHOD BLANK: 2192459 Matrix: Solid
Associated Lab Samples: 40223270003, 40223270004, 40223270005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	<179	600	03/23/21 04:15	

LABORATORY CONTROL SAMPLE: 2192460

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	120000	123000	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2192461 2192462

Parameter	Units	40223270003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	571J	7190	7210	8910	9590	116	125	50-150	7	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2192463 2192464

Parameter	Units	40223270004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	518J	7070	7070	9080	10100	121	135	50-150	10	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: 21030714
Pace Project No.: 40223270

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

C4	Sample container did not meet EPA or method requirements.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 21030714
Pace Project No.: 40223270

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40223270001	**21030714-001**	ASTM D2974-87	379833		
40223270002	**21030714-002**	ASTM D2974-87	379833		
40223270003	**21030714-003**	ASTM D2974-87	379833		
40223270004	**21030714-005**	ASTM D2974-87	379833		
40223270005	**21030714-006**	ASTM D2974-87	379833		
40223270001	**21030714-001**	EPA 9060 Modified	380046		
40223270001	**21030714-001**	EPA 9060 Modified	380047		
40223270002	**21030714-002**	EPA 9060 Modified	380046		
40223270002	**21030714-002**	EPA 9060 Modified	380047		
40223270003	**21030714-003**	EPA 9060 Modified	380166		
40223270003	**21030714-003**	EPA 9060 Modified	380167		
40223270004	**21030714-005**	EPA 9060 Modified	380166		
40223270004	**21030714-005**	EPA 9060 Modified	380167		
40223270005	**21030714-006**	EPA 9060 Modified	380166		
40223270005	**21030714-006**	EPA 9060 Modified	380167		

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TEKLAB, INC. Chain of Custody

40223270

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☑ NO ☐ With: ☑ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: Client | QC Level: 3

Project# 21030714

Contact: Elizabeth A. Hurley | Email: ehurley@teklabinc.com

Requested Due Date: NTAT | Billing/PO: 30876 | Phone: 618-344-1004 ext 33

Comments:
- **Please Issue reports and invoices via email only**
- Please analyze for TOC by method SW-846 9060 on our standard turnaround time.
- Batch QC is required for all analyses requested.
- ~~Proposal #20150528JRH1~~ TEAH 3/10/21
- Any changes to analysis/methods must be approved by Teklab, Inc.

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	TOC											
001	21030714-001	3/3/21 1340	Unpres	Soil	✓											
002	21030714-002	3/3/21 1350	Unpres	Soil	✓											
003	21030714-003	3/3/21 1350	Unpres	Soil	✓											
004	21030714-005	3/4/21 0945	Unpres	Soil	✓											
005	21030714-006	3/4/21 0950	Unpres	Soil	✓											
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												

*Relinquished By	Date/Time	Received By	Date/Time
FedEx	3/10/21 1700		
Fed Ex	3/11/21 0935	Simone Hoggs Price	3/11/21 0935

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

Sample Preservation Receipt Form

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: Teklab Project # 40223270

All containers needing preservation have been checked and noted below: ☐Yes ☐No ☒N/A Initial when completed: Date/ Time:

Lab Lot# of pH paper: Lab Std #ID of preservation (if pH adjusted):

	Glass								Plastic					Vials						Jars				General								
Pace Lab #	AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP3U	BP3B	BP3N	BP3S	VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	JG9U	WGFU	WPFU	SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001																						1											2.5 / 5 / 10
002																						1											2.5 / 5 / 10
003																					(3)	1	3/11/21 TKN										2.5 / 5 / 10
004																						1											2.5 / 5 / 10
005																						1											2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																									3/11/21								2.5 / 5 / 10
019																									SRK								2.5 / 5 / 10
020																																	2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:_____ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A ***If yes look in headspace column**

AG1U	1 liter amber glass
BG1U	1 liter clear glass
AG1H	1 liter amber glass HCL
AG4S	125 mL amber glass H2SO4
AG4U	120 mL amber glass unpres
AG5U	100 mL amber glass unpres
AG2S	500 mL amber glass H2SO4
BG3U	250 mL clear glass unpres

BP1U	1 liter plastic unpres
BP3U	250 mL plastic unpres
BP3B	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4

VG9A	40 mL clear ascorbic
DG9T	40 mL amber Na Thio
VG9U	40 mL clear vial unpres
VG9H	40 mL clear vial HCL
VG9M	40 mL clear vial MeOH
VG9D	40 mL clear vial DI

JGFU	4 oz amber jar unpres
JG9U	9 oz amber jar unpres
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres
SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN	

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 26Mar2020
	Document No.: ENV-FRM-GBAY-0014-Rev.00	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40223270

40223270

Client Name: Teklab

Courier: ☐ CS Logistics ☒ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: 9450 9224 7299

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☒ Other Paper 3/11/21 SRK

Thermometer Used SR - 98 **Type of Ice:** (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 0.5 /Corr: 0.5

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Person examining contents:
Date: 3/11/21 /Initials: SRK

Labeled By Initials: MM

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. Pg. # 3/11/21 SRK
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☐No ☒N/A	4. Sub work 3/11/21 SRK
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: 3/11/21 SRK		8.
For Analysis: ☒Yes ☐No MS/MSD: ☒Yes ☒No	☐N/A	
Correct Containers Used:	☐Yes ☒No	9. TOC requires amber glass 3/11/21 SRK
-Pace Containers Used:	☐Yes ☒No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

April 09, 2021

Scott Woods
Ramboll
300 S. Wacker Drive
Suite 130
Chicago, IL 60606
TEL: (312) 270-3612
FAX: (414) 837-3608

Illinois	100226
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Vermilion Soil **WorkOrder:** 21030719

Dear Scott Woods:

TEKLAB, INC received 5 samples on 3/10/2021 2:30:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Elizabeth A. Hurley
Project Manager
(618)344-1004 ex 33
ehurley@teklabinc.com

Report Contents

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030719
Report Date: 09-Apr-21

This reporting package includes the following:

Cover Letter	1
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Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030719
Report Date: 09-Apr-21

Cooler Receipt Temp: 11.2 °C

Per Brian Hennings, include Iron and Manganese in the list of requested metals. (ehurley - 3/21/2021 12:04:28 PM)

Total Organic Carbon analysis performed by Pace Analytical Services, LLC. See attached report for results and QC summary.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2022	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2021	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2021	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2021	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2021	Collinsville
Arkansas	ADEQ	88-0966		3/14/2022	Collinsville
Illinois	IDPH	17584		5/31/2021	Collinsville
Kentucky	UST	0073		1/31/2022	Collinsville
Missouri	MDNR	00930		5/31/2021	Collinsville
Missouri	MDNR	930		1/31/2022	Collinsville

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Lab ID: 21030719-001 **Client Sample ID:** MW-103 (13-15)

Matrix: SOLID **Collection Date:** 03/07/2021 11:05

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**13.0**	%	1	03/16/2021 17:09	R288581
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.63**	mg/Kg-dry	1	04/01/2021 0:27	175330
Boron	NELAP	1.96		**16.5**	mg/Kg-dry	1	04/01/2021 0:27	175330
Lithium	NELAP	0.49		**26.3**	mg/Kg-dry	1	04/01/2021 0:27	175330
Thallium	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	04/01/2021 0:27	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	03/16/2021 14:08	174775
Arsenic	NELAP	0.20	B	**5.61**	mg/Kg-dry	10	03/20/2021 15:23	174779
Barium	NELAP	0.20		**40.1**	mg/Kg-dry	10	03/20/2021 15:23	174779
Cadmium	NELAP	0.20		**< 0.20**	mg/Kg-dry	10	03/20/2021 15:23	174779
Chromium	NELAP	0.49		**23.4**	mg/Kg-dry	10	03/20/2021 15:23	174779
Cobalt	NELAP	0.20		**8.14**	mg/Kg-dry	10	03/20/2021 15:23	174779
Iron	NELAP	9.80		**21400**	mg/Kg-dry	10	03/20/2021 15:23	174779
Lead	NELAP	0.20		**14.2**	mg/Kg-dry	10	03/20/2021 15:23	174779
Manganese	NELAP	0.20		**379**	mg/Kg-dry	10	03/20/2021 15:23	174779
Molybdenum	NELAP	0.20		**1.84**	mg/Kg-dry	10	03/20/2021 15:23	174779
Selenium	NELAP	0.98		**< 0.98**	mg/Kg-dry	10	03/20/2021 15:23	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**0.012**	mg/Kg-dry	1	03/15/2021 12:14	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/18/2021 0:00	R288840

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Lab ID: 21030719-002 **Client Sample ID:** MW-103 (92-94)

Matrix: SOLID **Collection Date:** 03/08/2021 8:35

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**14.0**	%	1	03/16/2021 17:09	R288581
SW-846 3050B, 6010B, METALS BY ICP								
Arsenic	NELAP	2.31	SR	**26.3**	mg/Kg-dry	1	04/01/2021 0:31	175330
Beryllium	NELAP	0.05		**0.06**	mg/Kg-dry	1	04/01/2021 0:31	175330
Boron	NELAP	1.85		**3.38**	mg/Kg-dry	1	04/01/2021 0:31	175330
Iron	NELAP	4.81	S	**11900**	mg/Kg-dry	1	04/07/2021 10:04	175476
Lead	NELAP	1.42		**38.0**	mg/Kg-dry	1	04/05/2021 13:28	175365
Lithium	NELAP	0.46		**3.90**	mg/Kg-dry	1	04/01/2021 0:31	175330
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	04/01/2021 0:31	175330
Matrix spike control limits for Fe are not applicable due to high sample/spike ratio.								
Consistent results were not achieved across multiple prep and analyses for Pb. The highest result is reported.								
RPD for MS/MSD was outside control limits for As due to sample composition.								
Matrix spike did not recover within control limitsfor As due to sample composition.								
Consistent results were not achieved across multiple prep and analyses for As. The highest result is reported.								
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**1.71**	mg/Kg-dry	10	03/16/2021 15:20	174775
Barium	NELAP	0.19		**7.99**	mg/Kg-dry	10	03/20/2021 15:32	174779
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	03/20/2021 15:32	174779
Chromium	NELAP	0.46		**7.18**	mg/Kg-dry	10	03/20/2021 15:32	174779
Cobalt	NELAP	0.19		**9.77**	mg/Kg-dry	10	03/20/2021 15:32	174779
Manganese	NELAP	0.19	S	**290**	mg/Kg-dry	10	03/20/2021 15:32	174779
Molybdenum	NELAP	0.19		**1.41**	mg/Kg-dry	10	03/20/2021 15:32	174779
Selenium	NELAP	0.93		**< 0.93**	mg/Kg-dry	10	03/20/2021 15:32	174779
Matrix spike control limits for Mn are not applicable due to high sample/spike ratio.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	03/15/2021 12:17	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/18/2021 0:00	R288840

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Lab ID: 21030719-003 **Client Sample ID:** MW-103 (173-175)

Matrix: SOLID **Collection Date:** 03/09/2021 10:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.1**	%	1	03/16/2021 17:09	R288581
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.33**	mg/Kg-dry	1	04/01/2021 0:42	175330
Boron	NELAP	1.96		**8.24**	mg/Kg-dry	1	04/01/2021 0:42	175330
Lithium	NELAP	0.49		**12.0**	mg/Kg-dry	1	04/01/2021 0:42	175330
Thallium	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	04/01/2021 0:42	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	03/16/2021 15:28	174775
Arsenic	NELAP	0.20	B	**3.87**	mg/Kg-dry	10	03/20/2021 15:40	174779
Barium	NELAP	0.20		**46.7**	mg/Kg-dry	10	03/20/2021 15:40	174779
Cadmium	NELAP	0.20		**< 0.20**	mg/Kg-dry	10	03/20/2021 15:40	174779
Chromium	NELAP	0.49		**14.9**	mg/Kg-dry	10	03/20/2021 15:40	174779
Cobalt	NELAP	0.20		**5.82**	mg/Kg-dry	10	03/20/2021 15:40	174779
Iron	NELAP	9.80		**14100**	mg/Kg-dry	10	03/20/2021 15:40	174779
Lead	NELAP	0.20		**9.02**	mg/Kg-dry	10	03/20/2021 15:40	174779
Manganese	NELAP	0.20		**389**	mg/Kg-dry	10	03/20/2021 15:40	174779
Molybdenum	NELAP	0.20		**0.86**	mg/Kg-dry	10	03/20/2021 15:40	174779
Selenium	NELAP	0.98		**< 0.98**	mg/Kg-dry	10	03/20/2021 15:40	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	03/15/2021 12:28	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/19/2021 0:00	R288840

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Lab ID: 21030719-004 **Client Sample ID:** MW-103 (173-175) DUP

Matrix: SOLID **Collection Date:** 03/09/2021 10:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.2**	%	1	03/16/2021 17:09	R288581
SW-846 3050B, 6010B, METALS BY ICP								
Beryllium	NELAP	0.05		**0.32**	mg/Kg-dry	1	04/01/2021 0:46	175330
Boron	NELAP	1.82		**7.47**	mg/Kg-dry	1	04/01/2021 0:46	175330
Lithium	NELAP	0.45		**11.8**	mg/Kg-dry	1	04/01/2021 0:46	175330
Thallium	NELAP	4.55		**< 4.55**	mg/Kg-dry	1	04/01/2021 0:46	175330
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.37		**< 0.37**	mg/Kg-dry	10	03/16/2021 15:36	174775
Arsenic	NELAP	0.18	B	**3.70**	mg/Kg-dry	10	03/20/2021 15:49	174779
Barium	NELAP	0.18		**40.8**	mg/Kg-dry	10	03/20/2021 15:49	174779
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	03/20/2021 15:49	174779
Chromium	NELAP	0.45		**14.0**	mg/Kg-dry	10	03/20/2021 15:49	174779
Cobalt	NELAP	0.18		**5.43**	mg/Kg-dry	10	03/20/2021 15:49	174779
Iron	NELAP	9.09		**13800**	mg/Kg-dry	10	03/20/2021 15:49	174779
Lead	NELAP	0.18		**8.06**	mg/Kg-dry	10	03/20/2021 15:49	174779
Manganese	NELAP	0.18		**383**	mg/Kg-dry	10	03/20/2021 15:49	174779
Molybdenum	NELAP	0.18		**0.38**	mg/Kg-dry	10	03/20/2021 15:49	174779
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	03/20/2021 15:49	174779
Sample result for As exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	03/15/2021 12:31	174674
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	03/19/2021 0:00	R288840

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Lab ID: 21030719-005 **Client Sample ID:** EB08

Matrix: AQUEOUS **Collection Date:** 03/07/2021 18:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 5310 C 2000, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**< 1.0**	mg/L	1	03/11/2021 14:51	R288399
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Iron	NELAP	0.0400		**< 0.0400**	mg/L	1	03/31/2021 22:47	175331
Manganese	NELAP	0.0070		**< 0.0070**	mg/L	1	03/31/2021 22:47	175331
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	03/12/2021 10:38	174678
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 10:38	174678
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Lithium	*	0.0030		**< 0.0030**	mg/L	5	03/29/2021 11:58	174678
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	03/12/2021 10:38	174678
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	03/12/2021 10:38	174678
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	03/12/2021 10:38	174678
Contamination present in the CCB for Ba. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	03/15/2021 10:37	174722

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030719
Report Date: 09-Apr-21

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
21030719-001	MW-103 (13-15)	Solid	2	03/07/2021 11:05
21030719-002	MW-103 (92-94)	Solid	2	03/08/2021 8:35
21030719-003	MW-103 (173-175)	Solid	2	03/09/2021 10:00
21030719-004	MW-103 (173-175) DUP	Solid	2	03/09/2021 10:00
21030719-005	EB08	Aqueous	2	03/07/2021 18:00

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
21030719-001A	MW-103 (13-15)	03/07/2021 11:05	03/10/2021 14:30		
	EPA SW846 3550C, 5035A, ASTM D2974				03/16/2021 17:09
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	04/01/2021 0:27
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 14:08
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 15:23
	SW-846 7471B			03/12/2021 11:30	03/15/2021 12:14
21030719-001B	MW-103 (13-15)	03/07/2021 11:05	03/10/2021 14:30		
	See Attached for Subcontracting Analysis				03/18/2021 0:00
21030719-002A	MW-103 (92-94)	03/08/2021 8:35	03/10/2021 14:30		
	EPA SW846 3550C, 5035A, ASTM D2974				03/16/2021 17:09
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	04/01/2021 0:31
	SW-846 3050B, 6010B, Metals by ICP			04/01/2021 12:41	04/05/2021 13:28
	SW-846 3050B, 6010B, Metals by ICP			04/06/2021 13:42	04/07/2021 10:04
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 15:20
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 15:32
	SW-846 7471B			03/12/2021 11:30	03/15/2021 12:17
21030719-002B	MW-103 (92-94)	03/08/2021 8:35	03/10/2021 14:30		
	See Attached for Subcontracting Analysis				03/18/2021 0:00
21030719-003A	MW-103 (173-175)	03/09/2021 10:00	03/10/2021 14:30		
	EPA SW846 3550C, 5035A, ASTM D2974				03/16/2021 17:09
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	04/01/2021 0:42
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 15:28
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 15:40
	SW-846 7471B			03/12/2021 11:30	03/15/2021 12:28
21030719-003B	MW-103 (173-175)	03/09/2021 10:00	03/10/2021 14:30		
	See Attached for Subcontracting Analysis				03/19/2021 0:00
21030719-004A	MW-103 (173-175) DUP	03/09/2021 10:00	03/10/2021 14:30		
	EPA SW846 3550C, 5035A, ASTM D2974				03/16/2021 17:09
	SW-846 3050B, 6010B, Metals by ICP			03/15/2021 8:54	04/01/2021 0:46
	SW-846 3050B, 6020A, Metals by ICPMS			03/13/2021 18:27	03/16/2021 15:36
	SW-846 3050B, 6020A, Metals by ICPMS			03/15/2021 8:54	03/20/2021 15:49
	SW-846 7471B			03/12/2021 11:30	03/15/2021 12:31
21030719-004B	MW-103 (173-175) DUP	03/09/2021 10:00	03/10/2021 14:30		
	See Attached for Subcontracting Analysis				03/19/2021 0:00
21030719-005A	EB08	03/07/2021 18:00	03/10/2021 14:30		
	SW-846 3005A, 6010B, Metals by ICP (Total)			03/10/2021 19:32	03/31/2021 22:47

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			03/10/2021 19:32	03/12/2021 10:38
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			03/10/2021 19:32	03/29/2021 11:58
	SW-846 7470A (Total)			03/11/2021 19:05	03/15/2021 10:37
21030719-005B	EB08	03/07/2021 18:00	03/10/2021 14:30		
	Standard Methods 5310 C 2000, Organic Carbon				03/11/2021 14:51

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

EPA SW846 3550C, 5035A, ASTM D2974

Batch R288581 **SampType:** LCS Units **%**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	03/16/2021

Batch R288581 **SampType:** LCSQC Units **%**

SampID: LCSQC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	03/16/2021

STANDARD METHODS 5310 C 2000, ORGANIC CARBON

Batch R288399 **SampType:** MBLK Units **mg/L**

SampID: CCB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**	0.4500	0	0	-100	100	03/12/2021

Batch R288399 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**	0.4500	0	0	-100	100	03/11/2021

Batch R288399 **SampType:** LCS Units **mg/L**

SampID: CCV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		10.0		**60.8**	62.10	0	97.9	90	110	03/12/2021

Batch R288399 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		10.0		**64.3**	62.10	0	103.6	90	110	03/11/2021

Batch R288399 **SampType:** MS Units **mg/L**

SampID: 21030719-005BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**4.8**	5.000	0	97.0	85	115	03/11/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

STANDARD METHODS 5310 C 2000, ORGANIC CARBON

Batch R288399 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 21030719-005BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**4.8**	5.000	0	96.0	4.850	1.04	03/11/2021

Batch R288399 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 21030719-005BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**				0	0.00	03/11/2021

SW-846 3005A, 6010B, METALS BY ICP (TOTAL)

Batch 175331 **SampType:** MBLK Units **mg/L**

SampID: MBLK-175331

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	03/31/2021
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	03/31/2021

Batch 175331 **SampType:** LCS Units **mg/L**

SampID: LCS-175331

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.93**	2.000	0	96.4	85	115	03/31/2021
Manganese		0.0070		**0.503**	0.5000	0	100.6	85	115	03/31/2021

Batch 175331 **SampType:** MS Units **mg/L**

SampID: 21030719-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.93**	2.000	0	96.6	75	125	03/31/2021
Manganese		0.0070		**0.506**	0.5000	0	101.2	75	125	03/31/2021

Batch 175331 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 21030719-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		0.0400		**1.93**	2.000	0	96.6	1.932	0.05	03/31/2021
Manganese		0.0070		**0.505**	0.5000	0	101.1	0.5061	0.14	03/31/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 174678 **SampType:** MBLK Units **mg/L**

SampID: MBLK-174678

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**< 0.0010**	0.0004	0	0	-100	100	03/12/2021
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	03/12/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	03/19/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	03/12/2021
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	03/12/2021
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	03/12/2021
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	03/12/2021
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	03/12/2021
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	03/12/2021
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	03/12/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	03/16/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	03/12/2021
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	03/12/2021
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	03/12/2021
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	03/12/2021

Batch 174678 **SampType:** LCS Units **mg/L**

SampID: LCS-174678

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.528**	0.5000	0	105.6	80	120	03/12/2021
Arsenic		0.0010		**0.559**	0.5000	0	111.8	80	120	03/12/2021
Barium		0.0010		**2.15**	2.000	0	107.4	80	120	03/19/2021
Barium		0.0010		**2.15**	2.000	0	107.7	80	120	03/12/2021
Beryllium		0.0010		**0.0547**	0.0500	0	109.4	80	120	03/12/2021
Boron		0.0250		**0.523**	0.5000	0	104.6	80	120	03/12/2021
Cadmium		0.0010		**0.0535**	0.0500	0	107.0	80	120	03/12/2021
Chromium		0.0015		**0.216**	0.2000	0	108.1	80	120	03/12/2021
Cobalt		0.0010		**0.536**	0.5000	0	107.3	80	120	03/12/2021
Lead		0.0010		**0.533**	0.5000	0	106.6	80	120	03/12/2021
Lithium	*	0.0030		**0.548**	0.5000	0	109.5	80	120	03/16/2021
Lithium	*	0.0030		**0.570**	0.5000	0	114.1	80	120	03/12/2021
Molybdenum		0.0015		**0.527**	0.5000	0	105.4	80	120	03/12/2021
Selenium		0.0010		**0.493**	0.5000	0	98.6	80	120	03/12/2021
Thallium		0.0020		**0.265**	0.2500	0	106.1	80	120	03/12/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)

Batch 174678 **SampType:** MS Units **mg/L**

SampID: 21030719-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.533**	0.5000	0	106.5	75	125	03/12/2021
Arsenic		0.0010		**0.557**	0.5000	0	111.3	75	125	03/12/2021
Barium		0.0010		**2.23**	2.000	0	111.7	75	125	03/12/2021
Beryllium		0.0010		**0.0536**	0.0500	0	107.1	75	125	03/12/2021
Boron		0.0250		**0.531**	0.5000	0	106.3	75	125	03/12/2021
Cadmium		0.0010		**0.0511**	0.0500	0	102.1	75	125	03/12/2021
Chromium		0.0015		**0.210**	0.2000	0	104.9	75	125	03/12/2021
Cobalt		0.0010		**0.513**	0.5000	0	102.6	75	125	03/12/2021
Lead		0.0010		**0.517**	0.5000	0	103.3	75	125	03/12/2021
Lithium	*	0.0030		**0.512**	0.5000	0	102.4	75	125	03/29/2021
Molybdenum		0.0015		**0.495**	0.5000	0	99.0	75	125	03/12/2021
Selenium		0.0010		**0.522**	0.5000	0	104.3	75	125	03/12/2021
Thallium		0.0020		**0.256**	0.2500	0	102.5	75	125	03/12/2021

Batch 174678 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 21030719-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.527**	0.5000	0	105.3	0.5326	1.12	03/12/2021
Arsenic		0.0010		**0.558**	0.5000	0	111.7	0.5567	0.27	03/12/2021
Barium		0.0010		**2.21**	2.000	0	110.3	2.235	1.26	03/12/2021
Beryllium		0.0010		**0.0527**	0.0500	0	105.3	0.05356	1.67	03/12/2021
Boron		0.0250		**0.501**	0.5000	0	100.3	0.5314	5.80	03/12/2021
Cadmium		0.0010		**0.0507**	0.0500	0	101.4	0.05106	0.70	03/12/2021
Chromium		0.0015		**0.209**	0.2000	0	104.5	0.2097	0.34	03/12/2021
Cobalt		0.0010		**0.510**	0.5000	0	102.1	0.5130	0.53	03/12/2021
Lead		0.0010		**0.512**	0.5000	0	102.3	0.5166	0.94	03/12/2021
Lithium	*	0.0030		**0.512**	0.5000	0	102.4	0.5118	0.09	03/29/2021
Molybdenum		0.0015		**0.496**	0.5000	0	99.1	0.4948	0.17	03/12/2021
Selenium		0.0010		**0.522**	0.5000	0	104.3	0.5217	0.02	03/12/2021
Thallium		0.0020		**0.252**	0.2500	0	100.8	0.2562	1.62	03/12/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3050B, 6010B, METALS BY ICP

Batch 175330 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-175330

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**< 2.50**	0.9700	0	0	-100	100	03/31/2021
Beryllium		0.05		**< 0.05**	0.0110	0	0	-100	100	03/31/2021
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	03/31/2021
Iron		5.00		**< 5.00**	3.550	0	0	-100	100	03/31/2021
Lead		1.50		**< 1.50**	0.5900	0	0	-100	100	03/31/2021
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	03/31/2021
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	03/31/2021

Batch 175330 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-175330

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**50.1**	50.00	0	100.3	85	115	03/31/2021
Beryllium		0.05		**4.88**	5.000	0	97.6	85	115	03/31/2021
Boron		2.00		**47.7**	50.00	0	95.4	85	115	03/31/2021
Iron		5.00		**188**	200.0	0	93.9	85	115	03/31/2021
Lead		1.50		**47.7**	50.00	0	95.4	85	115	03/31/2021
Lithium		0.50		**47.4**	50.00	0	94.8	85	115	03/31/2021
Thallium		5.00		**23.7**	25.00	0	94.9	85	115	03/31/2021

Batch 175330 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.40	S	**55.1**	48.08	26.33	59.8	75	125	04/01/2021
Beryllium		0.05		**4.63**	4.808	0.06481	95.1	75	125	04/01/2021
Boron		1.92		**49.0**	48.08	3.380	94.8	75	125	04/01/2021
Lithium		0.48		**50.9**	48.08	3.898	97.8	75	125	04/01/2021
Thallium		4.81		**21.5**	24.04	0	89.4	75	125	04/01/2021

Batch 175330 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		2.45	SR	**94.7**	49.02	26.33	139.5	55.07	52.94	04/01/2021
Beryllium		0.05		**4.75**	4.902	0.06481	95.5	4.635	2.36	04/01/2021
Boron		1.96		**49.3**	49.02	3.380	93.7	48.97	0.66	04/01/2021
Lithium		0.49		**51.7**	49.02	3.898	97.4	50.93	1.43	04/01/2021
Thallium		4.90		**22.0**	24.51	0	90.0	21.49	2.57	04/01/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3050B, 6010B, METALS BY ICP

Batch 175365 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-175365

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**< 2.50**	0.9700	0	0	-100	100	04/05/2021
Beryllium		0.05		**< 0.05**	0.0110	0	0	-100	100	04/05/2021
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	04/05/2021
Iron		5.00		**< 5.00**	3.550	0	0	-100	100	04/05/2021
Lead		1.50		**< 1.50**	0.5900	0	0	-100	100	04/05/2021
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	04/05/2021
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	04/05/2021

Batch 175365 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-175365

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**54.7**	50.00	0	109.4	85	115	04/05/2021
Beryllium		0.05		**5.25**	5.000	0	105.0	85	115	04/05/2021
Boron		2.00		**50.8**	50.00	0	101.6	85	115	04/05/2021
Iron		5.00		**207**	200.0	0	103.6	85	115	04/05/2021
Lead		1.50		**51.3**	50.00	0	102.5	85	115	04/05/2021
Lithium		0.50		**49.5**	50.00	0	99.1	85	115	04/05/2021
Thallium		5.00		**25.0**	25.00	0	100.1	85	115	04/05/2021

Batch 175365 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead		1.42		**88.4**	47.17	37.99	106.9	75	125	04/05/2021

Batch 175365 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lead		1.36		**84.4**	45.45	37.99	102.1	88.43	4.69	04/05/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3050B, 6010B, METALS BY ICP

Batch 175476 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-175476

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**< 2.50**	0.9700	0	0	-100	100	04/07/2021
Beryllium		0.05		**< 0.05**	0.0110	0	0	-100	100	04/07/2021
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	04/07/2021
Iron		5.00		**< 5.00**	3.550	0	0	-100	100	04/07/2021
Lead		1.50		**< 1.50**	0.5900	0	0	-100	100	04/07/2021
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	04/07/2021
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	04/07/2021

Batch 175476 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-175476

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**55.1**	50.00	0	110.3	85	115	04/07/2021
Beryllium		0.05		**5.35**	5.000	0	107.0	85	115	04/07/2021
Boron		2.00		**51.9**	50.00	0	103.7	85	115	04/07/2021
Iron		5.00		**212**	200.0	0	106.0	85	115	04/07/2021
Lead		1.50		**51.5**	50.00	0	102.9	85	115	04/07/2021
Lithium		0.50		**51.1**	50.00	0	102.1	85	115	04/07/2021
Thallium		5.00		**25.4**	25.00	0	101.4	85	115	04/07/2021

Batch 175476 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		4.90	S	**9980**	196.1	11920	-990.8	75	125	04/07/2021

Batch 175476 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		4.55	S	**10900**	181.8	11920	-537.7	9980	9.22	04/07/2021

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174775 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-174775

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**< 0.40**	0.1500	0	0	-100	100	03/16/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174775 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-174775

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**49.6**	50.00	0	99.2	80	120	03/16/2021

Batch 174775 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.38		**48.3**	48.08	1.712	97.0	75	125	03/16/2021

Batch 174775 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.38		**48.5**	47.17	1.712	99.2	48.33	0.38	03/16/2021

Batch 174779 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-174779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	S	**< 0.20**	0.0202	0	112.0	-100	100	03/19/2021
Barium		0.20		**< 0.20**	0.0550	0	0	-100	100	03/19/2021
Cadmium		0.20		**< 0.20**	0.0150	0	0	-100	100	03/19/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	04/01/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	03/19/2021
Cobalt		0.20		**< 0.20**	0.0253	0	0	-100	100	03/19/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	03/19/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	04/01/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	03/19/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	04/01/2021
Manganese		0.20		**< 0.20**	0.0670	0	0	-100	100	03/19/2021
Manganese		0.20		**< 0.20**	0.0670	0	0	-100	100	04/01/2021
Molybdenum		0.20		**< 0.20**	0.0740	0	0	-100	100	03/19/2021
Selenium		1.00		**< 1.00**	0.1375	0	0	-100	100	03/19/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 3050B, 6020A, METALS BY ICPMS

Batch 174779 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-174779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	B	**52.8**	50.00	0	105.7	80	120	03/19/2021
Barium		0.20		**206**	200.0	0	103.1	80	120	03/19/2021
Cadmium		0.20		**4.95**	5.000	0	99.1	80	120	03/19/2021
Chromium		0.50		**22.2**	20.00	0	111.1	80	120	04/01/2021
Chromium		0.50		**20.7**	20.00	0	103.3	80	120	03/19/2021
Cobalt		0.20		**50.9**	50.00	0	101.9	80	120	03/19/2021
Iron		10.0		**215**	200.0	0	107.4	80	120	03/19/2021
Iron		10.0		**177**	200.0	0	88.4	80	120	04/01/2021
Lead		0.20		**53.9**	50.00	0	107.7	80	120	03/19/2021
Lead		0.20		**50.9**	50.00	0	101.7	80	120	04/01/2021
Manganese		0.20		**51.9**	50.00	0	103.8	80	120	04/01/2021
Manganese		0.20		**51.6**	50.00	0	103.2	80	120	03/19/2021
Molybdenum		0.20		**49.2**	50.00	0	98.4	80	120	03/19/2021
Selenium		1.00		**48.4**	50.00	0	96.8	80	120	03/19/2021

Batch 174779 **SampType:** MS Units **mg/Kg-dry**

SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Barium		0.19		**211**	192.3	7.992	105.4	75	125	03/20/2021
Cadmium		0.19		**5.22**	4.808	0.09614	106.5	75	125	03/20/2021
Chromium		0.48		**29.5**	19.23	7.184	115.9	75	125	03/20/2021
Cobalt		0.19		**54.5**	48.08	9.769	93.1	75	125	03/20/2021
Manganese		0.19	S	**305**	48.08	289.7	32.3	75	125	03/20/2021
Molybdenum		0.19		**50.8**	48.08	1.409	102.8	75	125	03/20/2021
Selenium		0.96		**48.3**	48.08	0	100.4	75	125	03/20/2021

Batch 174779 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Barium		0.20		**234**	196.1	7.992	115.3	210.8	10.46	03/20/2021
Cadmium		0.20		**5.56**	4.902	0.09614	111.4	5.218	6.33	03/20/2021
Chromium		0.49		**30.9**	19.61	7.184	120.8	29.47	4.65	03/20/2021
Cobalt		0.20		**66.3**	49.02	9.769	115.3	54.53	19.48	03/20/2021
Manganese		0.20	S	**307**	49.02	289.7	35.7	305.2	0.64	03/20/2021
Molybdenum		0.20		**55.5**	49.02	1.409	110.4	50.83	8.80	03/20/2021
Selenium		0.98		**52.1**	49.02	0	106.3	48.27	7.64	03/20/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 7470A (TOTAL)

Batch 174722 **SampType:** MBLK Units **mg/L**
SampID: MBLK-174722

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**< 0.00020**	0.0001	0	0	-100	100	03/12/2021

Batch 174722 **SampType:** LCS Units **mg/L**
SampID: LCS-174722

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00527**	0.0050	0	105.4	85	115	03/12/2021

Batch 174722 **SampType:** MS Units **mg/L**
SampID: 21030719-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00472**	0.0050	0	94.5	75	125	03/15/2021

Batch 174722 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 21030719-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00493**	0.0050	0	98.5	0.004725	4.20	03/15/2021

SW-846 7471B

Batch 174674 **SampType:** MBLK Units **mg/Kg**
SampID: MBLK-174674

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**< 0.010**	0.0045	0	0	-100	100	03/15/2021

Batch 174674 **SampType:** LCS Units **mg/Kg**
SampID: LCS-174674

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.250**	0.2500	0	100.1	85	115	03/15/2021

Batch 174674 **SampType:** MS Units **mg/Kg-dry**
SampID: 21030719-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.011		**0.308**	0.2801	0	109.9	75	125	03/15/2021

Client: Ramboll **Work Order:** 21030719

Client Project: Vermilion Soil **Report Date:** 09-Apr-21

SW-846 7471B

Batch **174674** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **15**

SampID: 21030719-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.011		**0.295**	0.2735	0	108.0	0.3078	4.07	03/15/2021

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll
Client Project: Vermilion Soil

Work Order: 21030719
Report Date: 09-Apr-21

Carrier: Paul Reeves

Received By: PRY

Completed by: Amanda R. Ham
On: 10-Mar-21

Reviewed by: Emily Pohlman
On: 10-Mar-21

Pages to follow: Chain of custody 1 Extra pages included 15

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	11.2
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐
Chain of custody present?	Yes ☑	No ☐			
Chain of custody signed when relinquished and received?	Yes ☑	No ☐			
Chain of custody agrees with sample labels?	Yes ☑	No ☐			
Samples in proper container/bottle?	Yes ☑	No ☐			
Sample containers intact?	Yes ☑	No ☐			
Sufficient sample volume for indicated test?	Yes ☑	No ☐			
All samples received within holding time?	Yes ☑	No ☐			
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑		
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐			

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

pH strip #74534. - aham - 3/10/2021 4:11:12 PM

COC#: 222-2021-0310-005
Custody seal #'s: 722-0310-001 and 722-0310-002

CHAIN OF CUSTODY

pg. 1 of 1 Work order # 21030719

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Ramboll
Address:	300 S. Wacker Drive
City / State / Zip	Chicago, IL 60606
Contact:	Scott Woods
Phone:	(312) 270-3612
E-Mail:	scott.woods@ramboll.com
Fax:	

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 1.2 °C LTG# 1

Preserved in: ☐ LAB ☑ FIELD

FOR LAB USE ONLY

Lab Notes PHV 74534 PQ4 3/10/21

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No

Are these samples known to be hazardous? ☐ Yes ☒ No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

Client Comments:

Metals: antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium by ICP/MS and mercury

*MS/MSD

Project Name/Number: Vermilion Soil

Sample Collector's Name: Scott Woods

Results Requested: ☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other ____ ☐ 3 Day (50% Surcharge)

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	MATRIX: Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	INDICATE ANALYSIS REQUESTED: TOC	Total Metals
21030719 001	MW-103 (13-15)	3/7/21 1105	X										X				X	X
002	MW-103 (92-94)*	3/8/21 0835	X										X				X	X
003	MW-103 (173-175)	3/9/21 1000	X										X				X	X
004	MW-103 (173-175) Dup	3/9/21 1000	X										X				X	X
005	EB08	3/7/21 1800		X		X					X						X	X

Courier

SW 3/10/21

SW 3/10/21

Relinquished By	Date/Time	Received By	Date/Time
Scott Woods SW	3/10/21 0748		3-10-21 0748
	3.10.21 1430		3/10/21 1430

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder: 63910

PM 3/10/21

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

March 23, 2021

Elizabeth Hurley
Teklab, Inc
5445 Horseshoe Lake Rd
Collinsville, IL 62234

RE: Project: 21030719
Pace Project No.: 40223269

Dear Elizabeth Hurley:

Enclosed are the analytical results for sample(s) received by the laboratory on March 11, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten
brian.basten@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Mike Austin, Teklab, Inc
Aaron Renner, Teklab Inc

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CERTIFICATIONS

Project: 21030719
Pace Project No.: 40223269

Pace Analytical Services Green Bay
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 21030719
Pace Project No.: 40223269

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40223269001	**21030719-001**	Solid	03/07/21 11:05	03/11/21 09:35
40223269002	**21030719-002**	Solid	03/08/21 08:35	03/11/21 09:35
40223269003	**21030719-003**	Solid	03/09/21 10:00	03/11/21 09:35
40223269004	**21030719-004**	Solid	03/09/21 10:00	03/11/21 09:35

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SAMPLE ANALYTE COUNT

Project: 21030719
Pace Project No.: 40223269

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40223269001	**21030719-001**	ASTM D2974-87	SRK	1
		EPA 9060 Modified	TJJ	4
40223269002	**21030719-002**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223269003	**21030719-003**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4
40223269004	**21030719-004**	ASTM D2974-87	AH	1
		EPA 9060 Modified	TJJ	4

PASI-G = Pace Analytical Services - Green Bay

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ANALYTICAL RESULTS

Project: 21030719
Pace Project No.: 40223269

Sample: 21030719-001 **Lab ID: 40223269001** Collected: 03/07/21 11:05 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**13.0**	%	0.10	0.10	1		03/15/21 16:03		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**13.6**	%	0.10	0.10	1		03/18/21 11:45		
Total Organic Carbon	**11700**	mg/kg	1220	365	1		03/18/21 11:45	7440-44-0	
Total Organic Carbon	**10200**	mg/kg	1220	365	1		03/18/21 11:51	7440-44-0	
Mean Total Organic Carbon	**10900**	mg/kg	1220	365	1		03/18/21 11:45	7440-44-0	C4

Sample: 21030719-002 **Lab ID: 40223269002** Collected: 03/08/21 08:35 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**15.4**	%	0.10	0.10	1		03/16/21 08:09		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**10.3**	%	0.10	0.10	1		03/18/21 11:56		
Total Organic Carbon	**14700**	mg/kg	716	214	1		03/18/21 11:56	7440-44-0	
Total Organic Carbon	**13300**	mg/kg	711	212	1		03/18/21 12:02	7440-44-0	
Mean Total Organic Carbon	**14000**	mg/kg	713	213	1		03/18/21 11:56	7440-44-0	C4,M0

Sample: 21030719-003 **Lab ID: 40223269003** Collected: 03/09/21 10:00 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
	Pace Analytical Services - Green Bay								
Percent Moisture	**8.7**	%	0.10	0.10	1		03/16/21 08:26		
Total Organic Carbon	Analytical Method: EPA 9060 Modified								
	Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**16.5**	%	0.10	0.10	1		03/19/21 09:13		
Total Organic Carbon	**3300**	mg/kg	1490	446	1		03/19/21 09:13	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 21030719
Pace Project No.: 40223269

Sample: 21030719-003 **Lab ID: 40223269003** Collected: 03/09/21 10:00 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Total Organic Carbon	**2800**	mg/kg	1500	447	1		03/19/21 09:20	7440-44-0	
Mean Total Organic Carbon	**3050**	mg/kg	1500	447	1		03/19/21 09:13	7440-44-0	C4

Sample: 21030719-004 **Lab ID: 40223269004** Collected: 03/09/21 10:00 Received: 03/11/21 09:35 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Green Bay								
Percent Moisture	**7.7**	%	0.10	0.10	1		03/16/21 08:26		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**9.2**	%	0.10	0.10	1		03/19/21 09:25		
Total Organic Carbon	**5100**	mg/kg	1270	380	1		03/19/21 09:25	7440-44-0	
Total Organic Carbon	**5600**	mg/kg	1260	376	1		03/19/21 09:31	7440-44-0	
Mean Total Organic Carbon	**5350**	mg/kg	1270	378	1		03/19/21 09:25	7440-44-0	C4

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
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QUALITY CONTROL DATA

Project: 21030719
Pace Project No.: 40223269

QC Batch: 379794
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40223269001

SAMPLE DUPLICATE: 2190387

Parameter	Units	40223269001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	13.0	12.8	1	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 21030719
Pace Project No.: 40223269

QC Batch: 379826
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40223269002

SAMPLE DUPLICATE: 2190482

Parameter	Units	40223273005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	18.6	18.6	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 21030719
Pace Project No.: 40223269

QC Batch: 379833
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40223269003, 40223269004

SAMPLE DUPLICATE: 2190502

Parameter	Units	40223273003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	16.5	15.9	3	10	

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 21030719
Pace Project No.: 40223269

QC Batch: 380046
QC Batch Method: EPA 9060 Modified
Analysis Method: EPA 9060 Modified
Analysis Description: 9060 TOC Average
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40223269001, 40223269002, 40223269003, 40223269004

METHOD BLANK: 2191747 Matrix: Solid
Associated Lab Samples: 40223269001, 40223269002, 40223269003, 40223269004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	<179	600	03/18/21 10:36	

LABORATORY CONTROL SAMPLE: 2191748

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	120000	121000	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2191749 2191750

Parameter	Units	40223269002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	14000	7130	7130	23700	25700	135	163	50-150	8	30	M0

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QUALIFIERS

Project: 21030719
Pace Project No.: 40223269

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

C4	Sample container did not meet EPA or method requirements.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 21030719
Pace Project No.: 40223269

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40223269001	**21030719-001**	ASTM D2974-87	379794		
40223269002	**21030719-002**	ASTM D2974-87	379826		
40223269003	**21030719-003**	ASTM D2974-87	379833		
40223269004	**21030719-004**	ASTM D2974-87	379833		
40223269001	**21030719-001**	EPA 9060 Modified	380046		
40223269001	**21030719-001**	EPA 9060 Modified	380047		
40223269002	**21030719-002**	EPA 9060 Modified	380046		
40223269002	**21030719-002**	EPA 9060 Modified	380047		
40223269003	**21030719-003**	EPA 9060 Modified	380046		
40223269003	**21030719-003**	EPA 9060 Modified	380047		
40223269004	**21030719-004**	EPA 9060 Modified	380046		
40223269004	**21030719-004**	EPA 9060 Modified	380047		

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Pg __ of __ 40223269

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☑ NO ☐ With: ☑ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: Client | QC Level: 3

Comments: **Please Issue reports and invoices via email only**
Please analyze for TOC by method SW-846 9060 on our standard turnaround time.
Batch QC is required for all analyses requested.
~~Proposal#20150528JRH-1~~ TEAH 3/10/21
Any changes to analysis/methods must be approved by Teklab, Inc.

Project# 21030719

Contact: Elizabeth A. Hurley | Email: ehurley@teklabinc.com
Requested Due Date: NTAT | Billing/PO: 30878 | Phone: 618-344-1004 ext 33

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	TOC
001	21030719-001	3/7/21 1105	Unpres	Soil	✓
002	21030719-002	3/8/21 0835	Unpres	Soil	✓
003	21030719-003	3/9/21 1000	Unpres	Soil	✓
004	21030719-004	3/9/21 1000	Unpres	Soil	✓
			Unpres	Aqueous	
			Unpres	Aqueous	
			Unpres	Aqueous	
			Unpres	Aqueous	
			Unpres	Aqueous	
			Unpres	Aqueous	
			Unpres	Aqueous	

*Relinquished By	Date/Time	Received By	Date/Time
FedEx	3/10/21 1700		
Fed Ex	3/11/21 0935	[signature]	3/11/21 0935

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Sample Preservation Receipt Form

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: Teklab Project # 40223269

All containers needing preservation have been checked and noted below: □Yes □No ~~N~~/A Initial when completed: Date/ Time:

Lab Lot# of pH paper: Lab Std #ID of preservation (if pH adjusted):

	Glass								Plastic					Vials						Jars				General			VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
Pace Lab #	AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP3U	BP3B	BP3N	BP3S	VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	JG9U	WGFU	WPFU	SP5T	ZPLC	GN						
001																						1										2.5 / 5 / 10
002																						3										2.5 / 5 / 10
003																						1										2.5 / 5 / 10
004																						1										2.5 / 5 / 10
005																																2.5 / 5 / 10
006																																2.5 / 5 / 10
007																																2.5 / 5 / 10
008																																2.5 / 5 / 10
009																																2.5 / 5 / 10
010																																2.5 / 5 / 10
011																																2.5 / 5 / 10
012																																2.5 / 5 / 10
013																																2.5 / 5 / 10
014																																2.5 / 5 / 10
015																																2.5 / 5 / 10
016																																2.5 / 5 / 10
017																									3/11/21							2.5 / 5 / 10
018																									SRK							2.5 / 5 / 10
019																																2.5 / 5 / 10
020																																2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:_____ Headspace in VOA Vials (>6mm) : □Yes □No ~~N~~/A ***If yes look in headspace column**

AG1U	1 liter amber glass
BG1U	1 liter clear glass
AG1H	1 liter amber glass HCL
AG4S	125 mL amber glass H2SO4
AG4U	120 mL amber glass unpres
AG5U	100 mL amber glass unpres
AG2S	500 mL amber glass H2SO4
BG3U	250 mL clear glass unpres

BP1U	1 liter plastic unpres
BP3U	250 mL plastic unpres
BP3B	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4

VG9A	40 mL clear ascorbic
DG9T	40 mL amber Na Thio
VG9U	40 mL clear vial unpres
VG9H	40 mL clear vial HCL
VG9M	40 mL clear vial MeOH
VG9D	40 mL clear vial DI

JGFU	4 oz amber jar unpres
JG9U	9 oz amber jar unpres
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres
SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN	

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 26Mar2020
	Document No.: ENV-FRM-GBAY-0014-Rev.00	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40223269

40223269

Client Name: Teklab

Courier: ☐ CS Logistics ☒ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: 9450 9224 7299

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☒ Other Paper 3/11/21 SRK

Thermometer Used SR - 98 **Type of Ice:** (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 0.5 /Corr: 0.5

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 3/11/21 /Initials: SRK

Labeled By Initials:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. Pg. # 3/11/21 SRK
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☐No ☒N/A	4. Sub work 3/11/21 SRK
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD: ☒Yes ☐No ☐N/A		8.
Correct Containers Used: 3/11/21 SRK	~~☒Yes~~ ☒No	9. TOC requires amber glass 3/11/21 SRK
-Pace Containers Used:	☐Yes ☒No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Trace Metals - Strong Acid Digest, ICP-MS

Project : PO#GLP8063

21-September-2023

Geosyntec Consultant
Attn : Allison Kreinberg/Brian Aces

2100 Commonwealth Boulevard, Suit 100
Ann Arbor, Michigan
48108, USA

Phone: 734-794-1545
Fax:

Date Rec. : 31 July 2023
LR Report: **CA19106-JUL23**
Reference: Vermillion - PO# GLP8063

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: VER-35 55-60 20230624	6: VER-35 60-63 20230624
Sample Date & Time					24-Jun-23 14:20	24-Jun-23 14:50
Ag [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	< 0.5	< 0.5
Al [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	67000	67000
As [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	6.4	5.6
Ba [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	400	380
Be [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	2.5	2.5
Bi [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	0.22	0.21
Ca [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	3400	3500
Cd [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	0.08	0.09
Co [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	19	17
Cr [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	73	62
Cu [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	21	20
Fe [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	44000	44000
K [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	21000	20000
Li [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	58	56
Mg [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	11000	11000
Mn [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	710	690
Mo [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	0.7	0.8
Ni [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	40	38
P [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	650	680
Pb [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	19	19
Sb [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	< 0.8	< 0.8
Se [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	0.2	0.2
Sn [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	< 6	< 6
Sr [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	86	87
Ti [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	3900	3800

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SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : PO#GLP8063

LR Report : **CA19106-JUL23**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: VER-35 55-60 20230624	6: VER-35 60-63 20230624
Tl [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	0.50	0.48
U [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	3.1	3.1
V [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	81	77
Y [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	16	17
Zn [µg/g]	19-Sep-23	00:03	20-Sep-23	14:02	93	91

Analysis	7: VER-70 30-40 20230623	8: VER-70 41-42 20230623	9: VER-70 75-80 20230623
Sample Date & Time	23-Jun-23 13:15	23-Jun-23 13:50	23-Jun-23 17:00
Ag [µg/g]	< 0.5	< 0.5	< 0.5
Al [µg/g]	58000	61000	81000
As [µg/g]	7.6	8.5	7.2
Ba [µg/g]	370	360	470
Be [µg/g]	1.8	1.9	2.8
Bi [µg/g]	0.18	0.16	0.27
Ca [µg/g]	24000	24000	4000
Cd [µg/g]	0.16	0.09	0.10
Co [µg/g]	12	14	19
Cr [µg/g]	44	46	43
Cu [µg/g]	18	18	25
Fe [µg/g]	33000	37000	49000
K [µg/g]	19000	18000	24000
Li [µg/g]	40	41	66
Mg [µg/g]	19000	17000	12000
Mn [µg/g]	710	690	790
Mo [µg/g]	1.4	3.8	0.8
Ni [µg/g]	28	30	43
P [µg/g]	480	560	650
Pb [µg/g]	19	17	20
Sb [µg/g]	< 0.8	< 0.8	< 0.8
Se [µg/g]	0.2	0.3	0.2
Sn [µg/g]	< 6	< 6	< 6
Sr [µg/g]	92	86	101
Ti [µg/g]	2900	3000	3900
Tl [µg/g]	0.43	0.40	0.54
U [µg/g]	2.8	2.4	3.2
V [µg/g]	58	61	88
Y [µg/g]	18	18	20

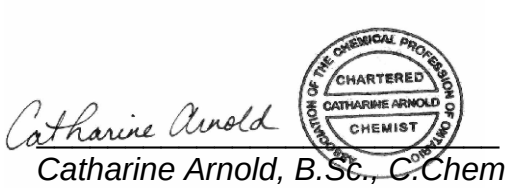
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P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Analysis	**7: VER-70 30-40 20230623**	**8: VER-70 41-42 20230623**	**9: VER-70 75-80 20230623**
Zn [µg/g]	84	81	110



Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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0003474830

Attachment H

Sequential Extraction Procedure Analytical Data

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Allison Kreinberg
Geosyntec Consultants Inc
941 Chatham Lane
Suite 103
Columbus, Ohio 43221

Generated 8/3/2023 11:56:48 AM

JOB DESCRIPTION

Vermilion SEP

JOB NUMBER

140-32513-1

Eurofins Knoxville
5815 Middlebrook Pike
Knoxville TN 37921

See page two for job notes and contact information.

my EOL

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

Authorization



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Authorized for release by
Ryan Henry, Project Manager I
WilliamR.Henry@et.eurofinsus.com
(865)291-3006

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Method Summary 34
Chain of Custody 35

Definitions/Glossary

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 140-32513-1

Laboratory: Eurofins Knoxville

Narrative

Job Narrative
140-32513-1

Receipt
The samples were received on 7/3/2023 at 11:15am and arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 20.3º C.

Receipt Exceptions
The Field Sampler was not listed on the Chain of Custody.

Metals
7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0008, "7 Step Sequential Extraction Procedure". SW-846 Method 6010B as incorporated in Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analyses.

An aliquot of each sample was sequentially extracted using the steps listed below:

· Step 1 - Exchangeable Fraction: A 5 gram aliquot of sample was extracted with 25 mL of 1M magnesium sulfate (MgSO4), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 2 - Carbonate Fraction: The sample residue from step 1 was extracted with 25 mL of 1M sodium acetate/acetic acid (NaOAc/HOAc) at pH 5, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 3 - Non-crystalline Materials Fraction: The sample residue from step 2 was extracted with 25 mL of 0.2M ammonium oxalate (pH 3), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 4 - Metal Hydroxide Fraction: The sample residue from step 3 was extracted with 25 mL of 1M hydroxylamine hydrochloride solution in 25% v/v acetic acid, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 5 - Organic-bound Fraction: The sample residue from step 4 was extracted three times with 25 mL of 5% sodium hypochlorite (NaClO) at pH 9.5, centrifuged and filtered. The resulting leachates were combined and 5 mL were digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 6 - Acid/Sulfide Fraction: The sample residue from step 5 was extracted with 25 mL of a 3:1:2 v/v solution of HCl-HNO3-H2O, centrifuged and filtered. 5 mL of the resulting leachate was diluted to 50 mL with reagent water and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 7 - Residual Fraction: A 1.0 g aliquot of the sample residue from step 6 was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Results are reported in mg/kg on a dry weight basis.

In addition, a 1.0 g aliquot of the original sample was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Total metal results are reported in mg/kg on a dry weight basis.

Results were calculated using the following equation:

Result, µg/g or mg/Kg, dry weight = (C × V × V1 × D) / (W × S × V2)

Where:
C = Concentration from instrument readout, µg/mL
V = Final volume of digestate, mL
D = Instrument dilution factor
V1 = Total volume of leachate, mL
V2 = Volume of leachate digested, mL
W = Wet weight of sample, g

Job ID: 140-32513-1 (Continued)

Laboratory: Eurofins Knoxville (Continued)

S = Percent solids/100

A method blank, laboratory control sample and laboratory control sample duplicate were prepared and analyzed with each SEP step in order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of interest from the extraction solutions. Results outside of laboratory QC limits do not reflect out of control performance, but rather the effect of the extraction solution upon the analyte.

A laboratory sample duplicate was prepared and analyzed with each batch of samples in order to provide information regarding the reproducibility of the procedure.

SEP Report Notes:

The final report lists the results for each step, the result for the total digestion of the sample, and a sum of the results of steps 1 through 7 by element.

Magnesium was not reported for step 1 because the extraction solution for this step (magnesium sulfate) contains high levels of magnesium.

Sodium was not reported for steps 2 and 5 since the extraction solution for these steps contain high levels of sodium.

The sum of steps 1 through 7 is much higher than the total result for sodium and magnesium due to the magnesium and sodium introduced by the extraction solutions.

The digestates for steps 1, 2 and 5 were analyzed at a dilution due to instrument problems caused by the high solids content of the digestates. The reporting limits were adjusted accordingly.

The serial diilution is analyzed at an additional 5 fold dilution using the dilution factors applied to the duplicate and the associated original sample. Due to a limitation of the expanded deliverable forms, the dilutions of the duplicate and serial dilution in the expanded deliverable are not expressed on a per analyte basis.

Please refer to the summary section of the report for the duplicate information as it contains the dilution factors at which the sample was analyzed.

Method 6010B: The serial dilution performed for the following samples associated with batch 140-75976 were outside control limits: VER-35 55-60 20230624 (140-32513-1), (140-32513-A-1-C SD ^10) and (140-32513-A-1-C SD ^5)

Method 6010B: The following samples were diluted to bring the concentration of target analyte, Iron, within the calibration range: VER-35 55-60 20230624 (140-32513-1), VER-35 60-63 20230624 (140-32513-2) and VER-70 75-80 20230623 (140-32513-3). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The serial dilution performed for the following samples associated with batch 140-75894 was outside control limits: VER-35 55-60 20230624 (140-32513-1), (140-32513-A-1-S SD ^5) and (140-32513-A-1-W SD ^5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
% Moisture: The samples were analyzed for percent moisture using SOP number KNOX-WC-0012 (based on Modified MCAWW 160.3 and SM2540B and on the percent moisture determinations described in methods 3540C and 3550B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Sample Summary

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-32513-1	VER-35 55-60 20230624	Solid	06/24/23 14:20	07/03/23 11:15
140-32513-2	VER-35 60-63 20230624	Solid	06/24/23 14:50	07/03/23 11:15
140-32513-3	VER-70 75-80 20230623	Solid	06/23/23 17:00	07/03/23 11:15

Client Sample ID: VER-35 55-60 20230624
Date Collected: 06/24/23 14:20
Date Received: 07/03/23 11:15

Lab Sample ID: 140-32513-1
Matrix: Solid
Percent Solids: 95.4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		21	12	mg/Kg	☼	07/11/23 08:00	07/27/23 13:01	4
Lithium	ND		10	0.63	mg/Kg	☼	07/11/23 08:00	07/27/23 13:01	4
Manganese	7.6		3.1	0.13	mg/Kg	☼	07/11/23 08:00	07/27/23 13:01	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	560		16	9.1	mg/Kg	☼	07/12/23 08:00	07/27/23 13:51	3
Lithium	0.56	J	7.9	0.47	mg/Kg	☼	07/12/23 08:00	07/27/23 13:51	3
Manganese	29		2.4	0.88	mg/Kg	☼	07/12/23 08:00	07/27/23 13:51	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	4300		5.2	3.0	mg/Kg	☼	07/13/23 08:00	07/27/23 14:40	1
Lithium	0.52	J	2.6	0.16	mg/Kg	☼	07/13/23 08:00	07/27/23 14:40	1
Manganese	110	B	0.79	0.028	mg/Kg	☼	07/13/23 08:00	07/27/23 14:40	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	20000		5.2	3.0	mg/Kg	☼	07/17/23 08:00	07/28/23 12:49	1
Lithium	13		2.6	0.16	mg/Kg	☼	07/17/23 08:00	07/28/23 12:49	1
Manganese	430		0.79	0.14	mg/Kg	☼	07/17/23 08:00	07/28/23 12:49	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		79	46	mg/Kg	☼	07/19/23 08:00	07/28/23 13:39	5
Lithium	4.1	J	39	2.3	mg/Kg	☼	07/19/23 08:00	07/28/23 13:39	5
Manganese	46		12	1.9	mg/Kg	☼	07/19/23 08:00	07/28/23 13:39	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	11000		5.2	3.0	mg/Kg	☼	07/19/23 08:00	07/28/23 14:29	1
Lithium	13		2.6	0.16	mg/Kg	☼	07/19/23 08:00	07/28/23 14:29	1
Manganese	130		0.79	0.26	mg/Kg	☼	07/19/23 08:00	07/28/23 14:29	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	4300		5.2	4.3	mg/Kg	☼	07/20/23 08:00	07/31/23 12:46	1
Lithium	15		2.6	0.16	mg/Kg	☼	07/20/23 08:00	07/31/23 12:46	1
Manganese	31		0.79	0.32	mg/Kg	☼	07/20/23 08:00	07/31/23 12:46	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	41000		5.0	4.1	mg/Kg			08/02/23 14:24	1
Lithium	46		2.5	0.15	mg/Kg			08/02/23 14:24	1
Manganese	780		0.75	0.052	mg/Kg			08/02/23 14:24	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	38000		10	8.6	mg/Kg	☼	07/21/23 08:00	07/31/23 14:12	2
Lithium	42		2.6	0.16	mg/Kg	☼	07/21/23 08:00	07/31/23 13:22	1
Manganese	610		0.79	0.32	mg/Kg	☼	07/21/23 08:00	07/31/23 13:22	1

Client Sample ID: VER-35 60-63 20230624
Date Collected: 06/24/23 14:50
Date Received: 07/03/23 11:15

Lab Sample ID: 140-32513-2
Matrix: Solid
Percent Solids: 95.4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		21	12	mg/Kg	☼	07/11/23 08:00	07/27/23 13:11	4
Lithium	ND		10	0.63	mg/Kg	☼	07/11/23 08:00	07/27/23 13:11	4
Manganese	**7.9**		3.1	0.13	mg/Kg	☼	07/11/23 08:00	07/27/23 13:11	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**570**		16	9.1	mg/Kg	☼	07/12/23 08:00	07/27/23 14:01	3
Lithium	**0.62**	**J**	7.9	0.47	mg/Kg	☼	07/12/23 08:00	07/27/23 14:01	3
Manganese	**29**		2.4	0.88	mg/Kg	☼	07/12/23 08:00	07/27/23 14:01	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**4200**		5.2	3.0	mg/Kg	☼	07/13/23 08:00	07/27/23 14:50	1
Lithium	**0.74**	**J**	2.6	0.16	mg/Kg	☼	07/13/23 08:00	07/27/23 14:50	1
Manganese	**110**	**B**	0.79	0.028	mg/Kg	☼	07/13/23 08:00	07/27/23 14:50	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**18000**		5.2	3.0	mg/Kg	☼	07/17/23 08:00	07/28/23 12:59	1
Lithium	**12**		2.6	0.16	mg/Kg	☼	07/17/23 08:00	07/28/23 12:59	1
Manganese	**380**		0.79	0.14	mg/Kg	☼	07/17/23 08:00	07/28/23 12:59	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		79	46	mg/Kg	☼	07/19/23 08:00	07/28/23 13:49	5
Lithium	**3.9**	**J**	39	2.3	mg/Kg	☼	07/19/23 08:00	07/28/23 13:49	5
Manganese	**35**		12	1.9	mg/Kg	☼	07/19/23 08:00	07/28/23 13:49	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**11000**		5.2	3.0	mg/Kg	☼	07/19/23 08:00	07/28/23 14:39	1
Lithium	**14**		2.6	0.16	mg/Kg	☼	07/19/23 08:00	07/28/23 14:39	1
Manganese	**140**		0.79	0.26	mg/Kg	☼	07/19/23 08:00	07/28/23 14:39	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**4200**		5.2	4.3	mg/Kg	☼	07/20/23 08:00	07/31/23 12:57	1
Lithium	**14**		2.6	0.16	mg/Kg	☼	07/20/23 08:00	07/31/23 12:57	1
Manganese	**30**		0.79	0.33	mg/Kg	☼	07/20/23 08:00	07/31/23 12:57	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**38000**		5.0	4.1	mg/Kg			08/02/23 14:24	1
Lithium	**45**		2.5	0.15	mg/Kg			08/02/23 14:24	1
Manganese	**730**		0.75	0.052	mg/Kg			08/02/23 14:24	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**37000**		10	8.6	mg/Kg	☼	07/21/23 08:00	07/31/23 14:22	2
Lithium	**39**		2.6	0.16	mg/Kg	☼	07/21/23 08:00	07/31/23 13:33	1
Manganese	**520**		0.79	0.33	mg/Kg	☼	07/21/23 08:00	07/31/23 13:33	1

Client Sample ID: VER-70 75-80 20230623
Date Collected: 06/23/23 17:00
Date Received: 07/03/23 11:15

Lab Sample ID: 140-32513-3
Matrix: Solid
Percent Solids: 90.0

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		22	13	mg/Kg	☼	07/11/23 08:00	07/27/23 13:16	4
Lithium	ND		11	0.67	mg/Kg	☼	07/11/23 08:00	07/27/23 13:16	4
Manganese	7.6		3.3	0.14	mg/Kg	☼	07/11/23 08:00	07/27/23 13:16	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	730		17	9.7	mg/Kg	☼	07/12/23 08:00	07/27/23 14:06	3
Lithium	ND		8.3	0.50	mg/Kg	☼	07/12/23 08:00	07/27/23 14:06	3
Manganese	36		2.5	0.93	mg/Kg	☼	07/12/23 08:00	07/27/23 14:06	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	5500		5.6	3.2	mg/Kg	☼	07/13/23 08:00	07/27/23 14:55	1
Lithium	0.41	J	2.8	0.17	mg/Kg	☼	07/13/23 08:00	07/27/23 14:55	1
Manganese	130	B	0.83	0.030	mg/Kg	☼	07/13/23 08:00	07/27/23 14:55	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	31000		11	6.4	mg/Kg	☼	07/17/23 08:00	07/28/23 14:55	2
Lithium	12		2.8	0.17	mg/Kg	☼	07/17/23 08:00	07/28/23 13:04	1
Manganese	510		0.83	0.14	mg/Kg	☼	07/17/23 08:00	07/28/23 13:04	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	61	J	83	49	mg/Kg	☼	07/19/23 08:00	07/28/23 13:54	5
Lithium	4.4	J	42	2.4	mg/Kg	☼	07/19/23 08:00	07/28/23 13:54	5
Manganese	54		12	2.1	mg/Kg	☼	07/19/23 08:00	07/28/23 13:54	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	14000		5.6	3.2	mg/Kg	☼	07/19/23 08:00	07/28/23 14:44	1
Lithium	15		2.8	0.17	mg/Kg	☼	07/19/23 08:00	07/28/23 14:44	1
Manganese	160		0.83	0.28	mg/Kg	☼	07/19/23 08:00	07/28/23 14:44	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	5500		5.6	4.6	mg/Kg	☼	07/20/23 08:00	07/31/23 13:17	1
Lithium	19		2.8	0.17	mg/Kg	☼	07/20/23 08:00	07/31/23 13:17	1
Manganese	39		0.83	0.34	mg/Kg	☼	07/20/23 08:00	07/31/23 13:17	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	57000		5.0	4.1	mg/Kg			08/02/23 14:24	1
Lithium	51		2.5	0.15	mg/Kg			08/02/23 14:24	1
Manganese	940		0.75	0.052	mg/Kg			08/02/23 14:24	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	66000		28	23	mg/Kg	☼	07/21/23 08:00	07/31/23 15:08	5
Lithium	42		2.8	0.17	mg/Kg	☼	07/21/23 08:00	07/31/23 13:39	1
Manganese	720		0.83	0.34	mg/Kg	☼	07/21/23 08:00	07/31/23 13:39	1

Default Detection Limits

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Method: 6010B SEP - SEP Metals (ICP) - Step 1
Prep: 3010A
SEP: Exchangeable

Analyte	RL	MDL	Units
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.031	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 2
Prep: 3010A
SEP: Carbonate

Analyte	RL	MDL	Units
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.28	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 3
Prep: 3010A
SEP: Non-Crystalline

Analyte	RL	MDL	Units
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.027	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 4
Prep: 3010A
SEP: Metal Hydroxide

Analyte	RL	MDL	Units
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.13	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 5
Prep: 3010A
SEP: Organic-Bound

Analyte	RL	MDL	Units
Iron	15	8.8	mg/Kg
Lithium	7.5	0.44	mg/Kg
Manganese	2.3	0.37	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 6
SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.25	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 7
Prep: Residual

Analyte	RL	MDL	Units
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.31	mg/Kg

Default Detection Limits

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	RL	MDL	Units
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.052	mg/Kg

Method: 6010B - SEP Metals (ICP) - Total

Prep: Total

Analyte	RL	MDL	Units
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.31	mg/Kg

Method: 6010B - SEP Metals (ICP) - Total

Lab Sample ID: MB 140-75187/5-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 75187

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	4.1	mg/Kg		07/21/23 08:00	07/31/23 12:31	1
Lithium	ND		2.5	0.15	mg/Kg		07/21/23 08:00	07/31/23 12:31	1
Manganese	ND		0.75	0.31	mg/Kg		07/21/23 08:00	07/31/23 12:31	1

Lab Sample ID: LCS 140-75187/6-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 75187

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	50.0	53.2		mg/Kg		106	80 - 120
Lithium	5.00	5.23		mg/Kg		105	80 - 120
Manganese	5.00	5.21		mg/Kg		104	80 - 120

Lab Sample ID: LCSD 140-75187/7-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 75187

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron	50.0	54.5		mg/Kg		109	80 - 120	2	30
Lithium	5.00	5.14		mg/Kg		103	80 - 120	2	30
Manganese	5.00	5.27		mg/Kg		105	80 - 120	1	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: VER-35 55-60 20230624
Prep Type: Total/NA
Prep Batch: 75187

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lithium	42		42.1		mg/Kg	☼	0	30
Manganese	610		613		mg/Kg	☼	0.8	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: VER-35 55-60 20230624
Prep Type: Total/NA
Prep Batch: 75187

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	38000		39200		mg/Kg	☼	2	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-75184/5-B ^4
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 75207

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		20	12	mg/Kg		07/11/23 08:00	07/27/23 12:47	4
Lithium	ND		10	0.60	mg/Kg		07/11/23 08:00	07/27/23 12:47	4
Manganese	ND		3.0	0.12	mg/Kg		07/11/23 08:00	07/27/23 12:47	4

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-75184/6-B ^5
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 75207

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			50.0	54.4		mg/Kg		109	80 - 120		
Lithium			5.00	5.66	J	mg/Kg		113	80 - 120		
Manganese			5.00	5.54		mg/Kg		111	80 - 120		

Lab Sample ID: LCSD 140-75184/7-B ^5
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 75207

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron			50.0	54.2		mg/Kg		108	80 - 120	0	30
Lithium			5.00	5.44	J	mg/Kg		109	80 - 120	4	30
Manganese			5.00	5.51		mg/Kg		110	80 - 120	1	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 1
Prep Batch: 75207

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Iron	ND			ND		mg/Kg	☼			NC	30
Lithium	ND			ND		mg/Kg	☼			NC	30
Manganese	7.6			7.29		mg/Kg	☼			4	30

Lab Sample ID: MB 140-75227/5-B ^3
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 75260

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		15	8.7	mg/Kg		07/12/23 08:00	07/27/23 13:36	3
Lithium	ND		7.5	0.45	mg/Kg		07/12/23 08:00	07/27/23 13:36	3
Manganese	ND		2.3	0.84	mg/Kg		07/12/23 08:00	07/27/23 13:36	3

Lab Sample ID: LCS 140-75227/6-B ^5
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 75260

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			50.0	ND		mg/Kg		3			
Lithium			5.00	5.13	J	mg/Kg		103	80 - 120		
Manganese			5.00	5.01		mg/Kg		100	80 - 120		

Lab Sample ID: LCSD 140-75227/7-B ^5
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 75260

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron			50.0	ND		mg/Kg		3		28	
Lithium			5.00	4.95	J	mg/Kg		99	80 - 120	4	30
Manganese			5.00	4.96		mg/Kg		99	80 - 120	1	30

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 2
Prep Batch: 75260

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	560		531		mg/Kg	☼	5	
Lithium	0.56	J	ND		mg/Kg	☼	NC	30
Manganese	29		27.9		mg/Kg	☼	4	30

Lab Sample ID: MB 140-75274/5-B
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 75294

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	2.9	mg/Kg		07/13/23 08:00	07/27/23 14:26	1
Lithium	ND		2.5	0.15	mg/Kg		07/13/23 08:00	07/27/23 14:26	1
Manganese	0.0935	J	0.75	0.027	mg/Kg		07/13/23 08:00	07/27/23 14:26	1

Lab Sample ID: LCS 140-75274/6-B
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 75294

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	50.0	51.9		mg/Kg		104	80 - 120
Lithium	5.00	4.98		mg/Kg		100	80 - 120
Manganese	5.00	5.04		mg/Kg		101	80 - 120

Lab Sample ID: LCSD 140-75274/7-B
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 75294

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron	50.0	49.5		mg/Kg		99	80 - 120	5	30
Lithium	5.00	4.82		mg/Kg		96	80 - 120	3	30
Manganese	5.00	4.89		mg/Kg		98	80 - 120	3	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75871

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 3
Prep Batch: 75294

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	4300		4280		mg/Kg	☼	1	30
Lithium	0.52	J	0.516	J	mg/Kg	☼	1	30
Manganese	110	B	114		mg/Kg	☼	2	30

Lab Sample ID: MB 140-75320/5-B
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 75407

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	2.9	mg/Kg		07/17/23 08:00	07/28/23 12:35	1
Lithium	ND		2.5	0.15	mg/Kg		07/17/23 08:00	07/28/23 12:35	1
Manganese	ND		0.75	0.13	mg/Kg		07/17/23 08:00	07/28/23 12:35	1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-75320/6-B
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 75407

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			50.0	55.0		mg/Kg		110	80 - 120		
Lithium			5.00	5.38		mg/Kg		108	80 - 120		
Manganese			5.00	5.49		mg/Kg		110	80 - 120		

Lab Sample ID: LCSD 140-75320/7-B
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 4
Prep Batch: 75407

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron			50.0	54.6		mg/Kg		109	80 - 120	1	30
Lithium			5.00	5.41		mg/Kg		108	80 - 120	0	30
Manganese			5.00	5.45		mg/Kg		109	80 - 120	1	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 4
Prep Batch: 75407

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Iron	20000			19600		mg/Kg	☼			4	30
Lithium	13			12.6		mg/Kg	☼			3	30
Manganese	430			406		mg/Kg	☼			5	30

Lab Sample ID: MB 140-75406/5-B ^5
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 75487

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		75	44	mg/Kg		07/19/23 08:00	07/28/23 13:24	5
Lithium	ND		38	2.2	mg/Kg		07/19/23 08:00	07/28/23 13:24	5
Manganese	ND		11	1.9	mg/Kg		07/19/23 08:00	07/28/23 13:24	5

Lab Sample ID: LCS 140-75406/6-B ^5
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 75487

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			150	ND		mg/Kg		-0.07			
Lithium			15.0	16.9	J	mg/Kg		112	80 - 150		
Manganese			15.0	3.96	J	mg/Kg		26	1 - 60		

Lab Sample ID: LCSD 140-75406/7-B ^5
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 75487

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron			150	ND		mg/Kg		-0.5		156	
Lithium			15.0	16.7	J	mg/Kg		111	80 - 150	1	30
Manganese			15.0	4.01	J	mg/Kg		27	1 - 60	1	30

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 5
Prep Batch: 75487

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	ND		ND		mg/Kg	☼	NC	
Lithium	4.1	J	4.21	J	mg/Kg	☼	2	30
Manganese	46		40.0		mg/Kg	☼	14	30

Lab Sample ID: MB 140-75511/5-A
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 75511

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	2.9	mg/Kg		07/19/23 08:00	07/28/23 14:14	1
Lithium	ND		2.5	0.15	mg/Kg		07/19/23 08:00	07/28/23 14:14	1
Manganese	ND		0.75	0.25	mg/Kg		07/19/23 08:00	07/28/23 14:14	1

Lab Sample ID: LCS 140-75511/6-A
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 75511

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	50.0	54.8		mg/Kg		110	80 - 120
Lithium	5.00	5.27		mg/Kg		105	80 - 120
Manganese	5.00	5.47		mg/Kg		109	80 - 120

Lab Sample ID: LCSD 140-75511/7-A
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 75511

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron	50.0	50.7		mg/Kg		101	80 - 120	8	30
Lithium	5.00	4.89		mg/Kg		98	80 - 120	7	30
Manganese	5.00	5.06		mg/Kg		101	80 - 120	8	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75894

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 6
Prep Batch: 75511

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	11000		10600		mg/Kg	☼	4	30
Lithium	13		12.7		mg/Kg	☼	4	30
Manganese	130		127		mg/Kg	☼	2	30

Lab Sample ID: MB 140-75565/5-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 75565

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	4.1	mg/Kg		07/20/23 08:00	07/31/23 12:16	1
Lithium	ND		2.5	0.15	mg/Kg		07/20/23 08:00	07/31/23 12:16	1
Manganese	ND		0.75	0.31	mg/Kg		07/20/23 08:00	07/31/23 12:16	1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-75565/6-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 75565

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			50.0	54.2		mg/Kg		108	80 - 120		
Lithium			5.00	5.37		mg/Kg		107	80 - 120		
Manganese			5.00	5.35		mg/Kg		107	80 - 120		

Lab Sample ID: LCSD 140-75565/7-A
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 75565

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron			50.0	54.0		mg/Kg		108	80 - 120	0	30
Lithium			5.00	5.29		mg/Kg		106	80 - 120	2	30
Manganese			5.00	5.30		mg/Kg		106	80 - 120	1	30

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Analysis Batch: 75976

Client Sample ID: VER-35 55-60 20230624
Prep Type: Step 7
Prep Batch: 75565

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Iron	4300			4610		mg/Kg	☼			6	30
Lithium	15			16.0		mg/Kg	☼			9	30
Manganese	31			32.3		mg/Kg	☼			3	30

Metals

SEP Batch: 75184

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 1	Solid	Exchangeable	
140-32513-2	VER-35 60-63 20230624	Step 1	Solid	Exchangeable	
140-32513-3	VER-70 75-80 20230623	Step 1	Solid	Exchangeable	
MB 140-75184/5-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-75184/6-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-75184/7-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	
140-32513-1 DU	VER-35 55-60 20230624	Step 1	Solid	Exchangeable	

Prep Batch: 75187

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Total/NA	Solid	Total	
140-32513-2	VER-35 60-63 20230624	Total/NA	Solid	Total	
140-32513-3	VER-70 75-80 20230623	Total/NA	Solid	Total	
MB 140-75187/5-A	Method Blank	Total/NA	Solid	Total	
LCS 140-75187/6-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-75187/7-A	Lab Control Sample Dup	Total/NA	Solid	Total	
140-32513-1 DU	VER-35 55-60 20230624	Total/NA	Solid	Total	

Prep Batch: 75207

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 1	Solid	3010A	75184
140-32513-2	VER-35 60-63 20230624	Step 1	Solid	3010A	75184
140-32513-3	VER-70 75-80 20230623	Step 1	Solid	3010A	75184
MB 140-75184/5-B ^4	Method Blank	Step 1	Solid	3010A	75184
LCS 140-75184/6-B ^5	Lab Control Sample	Step 1	Solid	3010A	75184
LCSD 140-75184/7-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	75184
140-32513-1 DU	VER-35 55-60 20230624	Step 1	Solid	3010A	75184

SEP Batch: 75227

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 2	Solid	Carbonate	
140-32513-2	VER-35 60-63 20230624	Step 2	Solid	Carbonate	
140-32513-3	VER-70 75-80 20230623	Step 2	Solid	Carbonate	
MB 140-75227/5-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-75227/6-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-75227/7-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	
140-32513-1 DU	VER-35 55-60 20230624	Step 2	Solid	Carbonate	

Prep Batch: 75260

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 2	Solid	3010A	75227
140-32513-2	VER-35 60-63 20230624	Step 2	Solid	3010A	75227
140-32513-3	VER-70 75-80 20230623	Step 2	Solid	3010A	75227
MB 140-75227/5-B ^3	Method Blank	Step 2	Solid	3010A	75227
LCS 140-75227/6-B ^5	Lab Control Sample	Step 2	Solid	3010A	75227
LCSD 140-75227/7-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	75227
140-32513-1 DU	VER-35 55-60 20230624	Step 2	Solid	3010A	75227

SEP Batch: 75274

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 3	Solid	Non-Crystalline	

Metals (Continued)

SEP Batch: 75274 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-2	VER-35 60-63 20230624	Step 3	Solid	Non-Crystalline	
140-32513-3	VER-70 75-80 20230623	Step 3	Solid	Non-Crystalline	
MB 140-75274/5-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-75274/6-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-75274/7-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	
140-32513-1 DU	VER-35 55-60 20230624	Step 3	Solid	Non-Crystalline	

Prep Batch: 75294

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 3	Solid	3010A	75274
140-32513-2	VER-35 60-63 20230624	Step 3	Solid	3010A	75274
140-32513-3	VER-70 75-80 20230623	Step 3	Solid	3010A	75274
MB 140-75274/5-B	Method Blank	Step 3	Solid	3010A	75274
LCS 140-75274/6-B	Lab Control Sample	Step 3	Solid	3010A	75274
LCSD 140-75274/7-B	Lab Control Sample Dup	Step 3	Solid	3010A	75274
140-32513-1 DU	VER-35 55-60 20230624	Step 3	Solid	3010A	75274

SEP Batch: 75320

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 4	Solid	Metal Hydroxide	
140-32513-2	VER-35 60-63 20230624	Step 4	Solid	Metal Hydroxide	
140-32513-3	VER-70 75-80 20230623	Step 4	Solid	Metal Hydroxide	
MB 140-75320/5-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-75320/6-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-75320/7-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	
140-32513-1 DU	VER-35 55-60 20230624	Step 4	Solid	Metal Hydroxide	

SEP Batch: 75406

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 5	Solid	Organic-Bound	
140-32513-2	VER-35 60-63 20230624	Step 5	Solid	Organic-Bound	
140-32513-3	VER-70 75-80 20230623	Step 5	Solid	Organic-Bound	
MB 140-75406/5-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-75406/6-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-75406/7-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	
140-32513-1 DU	VER-35 55-60 20230624	Step 5	Solid	Organic-Bound	

Prep Batch: 75407

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 4	Solid	3010A	75320
140-32513-2	VER-35 60-63 20230624	Step 4	Solid	3010A	75320
140-32513-3	VER-70 75-80 20230623	Step 4	Solid	3010A	75320
MB 140-75320/5-B	Method Blank	Step 4	Solid	3010A	75320
LCS 140-75320/6-B	Lab Control Sample	Step 4	Solid	3010A	75320
LCSD 140-75320/7-B	Lab Control Sample Dup	Step 4	Solid	3010A	75320
140-32513-1 DU	VER-35 55-60 20230624	Step 4	Solid	3010A	75320

Prep Batch: 75487

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 5	Solid	3010A	75406
140-32513-2	VER-35 60-63 20230624	Step 5	Solid	3010A	75406

Metals (Continued)

Prep Batch: 75487 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-3	VER-70 75-80 20230623	Step 5	Solid	3010A	75406
MB 140-75406/5-B ^5	Method Blank	Step 5	Solid	3010A	75406
LCS 140-75406/6-B ^5	Lab Control Sample	Step 5	Solid	3010A	75406
LCSD 140-75406/7-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	75406
140-32513-1 DU	VER-35 55-60 20230624	Step 5	Solid	3010A	75406

SEP Batch: 75511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 6	Solid	Acid/Sulfide	
140-32513-2	VER-35 60-63 20230624	Step 6	Solid	Acid/Sulfide	
140-32513-3	VER-70 75-80 20230623	Step 6	Solid	Acid/Sulfide	
MB 140-75511/5-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-75511/6-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-75511/7-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	
140-32513-1 DU	VER-35 55-60 20230624	Step 6	Solid	Acid/Sulfide	

Prep Batch: 75565

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 7	Solid	Residual	
140-32513-2	VER-35 60-63 20230624	Step 7	Solid	Residual	
140-32513-3	VER-70 75-80 20230623	Step 7	Solid	Residual	
MB 140-75565/5-A	Method Blank	Step 7	Solid	Residual	
LCS 140-75565/6-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-75565/7-A	Lab Control Sample Dup	Step 7	Solid	Residual	
140-32513-1 DU	VER-35 55-60 20230624	Step 7	Solid	Residual	

Analysis Batch: 75871

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 1	Solid	6010B SEP	75207
140-32513-1	VER-35 55-60 20230624	Step 2	Solid	6010B SEP	75260
140-32513-1	VER-35 55-60 20230624	Step 3	Solid	6010B SEP	75294
140-32513-2	VER-35 60-63 20230624	Step 1	Solid	6010B SEP	75207
140-32513-2	VER-35 60-63 20230624	Step 2	Solid	6010B SEP	75260
140-32513-2	VER-35 60-63 20230624	Step 3	Solid	6010B SEP	75294
140-32513-3	VER-70 75-80 20230623	Step 1	Solid	6010B SEP	75207
140-32513-3	VER-70 75-80 20230623	Step 2	Solid	6010B SEP	75260
140-32513-3	VER-70 75-80 20230623	Step 3	Solid	6010B SEP	75294
MB 140-75184/5-B ^4	Method Blank	Step 1	Solid	6010B SEP	75207
MB 140-75227/5-B ^3	Method Blank	Step 2	Solid	6010B SEP	75260
MB 140-75274/5-B	Method Blank	Step 3	Solid	6010B SEP	75294
LCS 140-75184/6-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	75207
LCS 140-75227/6-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	75260
LCS 140-75274/6-B	Lab Control Sample	Step 3	Solid	6010B SEP	75294
LCSD 140-75184/7-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	75207
LCSD 140-75227/7-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	75260
LCSD 140-75274/7-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	75294
140-32513-1 DU	VER-35 55-60 20230624	Step 1	Solid	6010B SEP	75207
140-32513-1 DU	VER-35 55-60 20230624	Step 2	Solid	6010B SEP	75260
140-32513-1 DU	VER-35 55-60 20230624	Step 3	Solid	6010B SEP	75294

Metals

Analysis Batch: 75894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 4	Solid	6010B SEP	75407
140-32513-1	VER-35 55-60 20230624	Step 5	Solid	6010B SEP	75487
140-32513-1	VER-35 55-60 20230624	Step 6	Solid	6010B SEP	75511
140-32513-2	VER-35 60-63 20230624	Step 4	Solid	6010B SEP	75407
140-32513-2	VER-35 60-63 20230624	Step 5	Solid	6010B SEP	75487
140-32513-2	VER-35 60-63 20230624	Step 6	Solid	6010B SEP	75511
140-32513-3	VER-70 75-80 20230623	Step 4	Solid	6010B SEP	75407
140-32513-3	VER-70 75-80 20230623	Step 4	Solid	6010B SEP	75407
140-32513-3	VER-70 75-80 20230623	Step 5	Solid	6010B SEP	75487
140-32513-3	VER-70 75-80 20230623	Step 6	Solid	6010B SEP	75511
MB 140-75320/5-B	Method Blank	Step 4	Solid	6010B SEP	75407
MB 140-75406/5-B ^5	Method Blank	Step 5	Solid	6010B SEP	75487
MB 140-75511/5-A	Method Blank	Step 6	Solid	6010B SEP	75511
LCS 140-75320/6-B	Lab Control Sample	Step 4	Solid	6010B SEP	75407
LCS 140-75406/6-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	75487
LCS 140-75511/6-A	Lab Control Sample	Step 6	Solid	6010B SEP	75511
LCSD 140-75320/7-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	75407
LCSD 140-75406/7-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	75487
LCSD 140-75511/7-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	75511
140-32513-1 DU	VER-35 55-60 20230624	Step 4	Solid	6010B SEP	75407
140-32513-1 DU	VER-35 55-60 20230624	Step 5	Solid	6010B SEP	75487
140-32513-1 DU	VER-35 55-60 20230624	Step 6	Solid	6010B SEP	75511

Analysis Batch: 75976

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Step 7	Solid	6010B SEP	75565
140-32513-1	VER-35 55-60 20230624	Total/NA	Solid	6010B	75187
140-32513-1	VER-35 55-60 20230624	Total/NA	Solid	6010B	75187
140-32513-2	VER-35 60-63 20230624	Step 7	Solid	6010B SEP	75565
140-32513-2	VER-35 60-63 20230624	Total/NA	Solid	6010B	75187
140-32513-2	VER-35 60-63 20230624	Total/NA	Solid	6010B	75187
140-32513-3	VER-70 75-80 20230623	Step 7	Solid	6010B SEP	75565
140-32513-3	VER-70 75-80 20230623	Total/NA	Solid	6010B	75187
140-32513-3	VER-70 75-80 20230623	Total/NA	Solid	6010B	75187
MB 140-75187/5-A	Method Blank	Total/NA	Solid	6010B	75187
MB 140-75565/5-A	Method Blank	Step 7	Solid	6010B SEP	75565
LCS 140-75187/6-A	Lab Control Sample	Total/NA	Solid	6010B	75187
LCS 140-75565/6-A	Lab Control Sample	Step 7	Solid	6010B SEP	75565
LCSD 140-75187/7-A	Lab Control Sample Dup	Total/NA	Solid	6010B	75187
LCSD 140-75565/7-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	75565
140-32513-1 DU	VER-35 55-60 20230624	Step 7	Solid	6010B SEP	75565
140-32513-1 DU	VER-35 55-60 20230624	Total/NA	Solid	6010B	75187
140-32513-1 DU	VER-35 55-60 20230624	Total/NA	Solid	6010B	75187

Analysis Batch: 76083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Sum of Steps 1-7	Solid	6010B SEP	
140-32513-2	VER-35 60-63 20230624	Sum of Steps 1-7	Solid	6010B SEP	
140-32513-3	VER-70 75-80 20230623	Sum of Steps 1-7	Solid	6010B SEP	

QC Association Summary

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

General Chemistry

Analysis Batch: 75814

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-32513-1	VER-35 55-60 20230624	Total/NA	Solid	Moisture	
140-32513-2	VER-35 60-63 20230624	Total/NA	Solid	Moisture	
140-32513-3	VER-70 75-80 20230623	Total/NA	Solid	Moisture	
140-32513-1 DU	VER-35 55-60 20230624	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: VER-35 55-60 20230624

Lab Sample ID: 140-32513-1
Date Collected: 06/24/23 14:20
Matrix: Solid
Date Received: 07/03/23 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			76083	08/02/23 14:24	KNC	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			75814	07/26/23 15:29	ACW	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: VER-35 55-60 20230624

Lab Sample ID: 140-32513-1
Date Collected: 06/24/23 14:20
Matrix: Solid
Date Received: 07/03/23 11:15
Percent Solids: 95.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 13:22	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		2			75976	07/31/23 14:12	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		4			75871	07/27/23 13:01	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		3			75871	07/27/23 13:51	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:40	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:49	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:39	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:29	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:46	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: VER-35 60-63 20230624

Lab Sample ID: 140-32513-2
Date Collected: 06/24/23 14:50
Matrix: Solid
Date Received: 07/03/23 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			76083	08/02/23 14:24	KNC	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			75814	07/26/23 15:29	ACW	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: VER-35 60-63 20230624

Lab Sample ID: 140-32513-2
Date Collected: 06/24/23 14:50
Matrix: Solid
Date Received: 07/03/23 11:15
Percent Solids: 95.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 13:33	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		2			75976	07/31/23 14:22	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		4			75871	07/27/23 13:11	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		3			75871	07/27/23 14:01	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:50	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:59	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:49	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:39	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:57	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: VER-70 75-80 20230623

Lab Sample ID: 140-32513-3
Date Collected: 06/23/23 17:00
Matrix: Solid
Date Received: 07/03/23 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			76083	08/02/23 14:24	KNC	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			75814	07/26/23 15:29	ACW	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: VER-70 75-80 20230623

Lab Sample ID: 140-32513-3
Date Collected: 06/23/23 17:00
Matrix: Solid
Date Received: 07/03/23 11:15
Percent Solids: 90.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 13:39	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		5			75976	07/31/23 15:08	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		4			75871	07/27/23 13:16	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		3			75871	07/27/23 14:06	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:55	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 13:04	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		2			75894	07/28/23 14:55	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:54	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:44	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 13:17	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75184/5-B ^4
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		4			75871	07/27/23 12:47	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75187/5-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 12:31	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75227/5-B ^3
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		3			75871	07/27/23 13:36	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75274/5-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:26	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75320/5-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:35	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75406/5-B ^5

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:24	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75511/5-A

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:14	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-75565/5-A

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:16	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75184/6-B ^5

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		5			75871	07/27/23 12:52	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75187/6-A

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 12:36	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75227/6-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		5			75871	07/27/23 13:41	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75274/6-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:31	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75320/6-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:40	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75406/6-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:29	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75511/6-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:19	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-75565/6-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:21	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75184/7-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		5			75871	07/27/23 12:57	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75187/7-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 12:41	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75227/7-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		5			75871	07/27/23 13:46	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75274/7-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:36	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75320/7-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:44	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75406/7-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:34	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75511/7-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:24	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-75565/7-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:26	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: VER-35 55-60 20230624
Lab Sample ID: 140-32513-1 DU
Date Collected: 06/24/23 14:20
Matrix: Solid
Date Received: 07/03/23 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			75814	07/26/23 15:29	ACW	EET KNX
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Client Sample ID: VER-35 55-60 20230624
Date Collected: 06/24/23 14:20
Date Received: 07/03/23 11:15

Lab Sample ID: 140-32513-1 DU
Matrix: Solid
Percent Solids: 95.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		1			75976	07/31/23 13:28	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.00 g	50 mL	75187	07/21/23 08:00	LAH	EET KNX
Total/NA	Analysis	6010B		2			75976	07/31/23 14:17	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.00 g	25 mL	75184	07/10/23 12:30	LAH	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	75207	07/11/23 08:00	LAH	EET KNX
Step 1	Analysis	6010B SEP		4			75871	07/27/23 13:06	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.00 g	25 mL	75227	07/11/23 08:00	LAH	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	75260	07/12/23 08:00	LAH	EET KNX
Step 2	Analysis	6010B SEP		3			75871	07/27/23 13:56	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	75274	07/12/23 08:00	LAH	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	75294	07/13/23 08:00	LAH	EET KNX
Step 3	Analysis	6010B SEP		1			75871	07/27/23 14:45	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	75320	07/13/23 08:00	LAH	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	75407	07/17/23 08:00	LAH	EET KNX
Step 4	Analysis	6010B SEP		1			75894	07/28/23 12:54	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.00 g	75 mL	75406	07/17/23 08:00	LAH	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	75487	07/19/23 08:00	LAH	EET KNX
Step 5	Analysis	6010B SEP		5			75894	07/28/23 13:44	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	75511	07/19/23 08:00	LAH	EET KNX
Step 6	Analysis	6010B SEP		1			75894	07/28/23 14:34	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	75565	07/20/23 08:00	LAH	EET KNX
Step 7	Analysis	6010B SEP		1			75976	07/31/23 12:51	KNC	EET KNX
	Instrument ID: DUO									

Laboratory References:
EET KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Laboratory: Eurofins Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-25
ANAB	Dept. of Energy	L2311.01	02-13-25
ANAB	ISO/IEC 17025	L2311	02-13-25
Arkansas DEQ	State	88-0688	06-16-24
Colorado	State	TN00009	02-29-24
Connecticut	State	PH-0223	09-30-23
Florida	NELAP	E87177	06-30-24
Georgia (DW)	State	906	07-27-25
Hawaii	State	NA	07-27-23 *
Kansas	NELAP	E-10349	10-31-23
Kentucky (DW)	State	90101	12-31-23
Louisiana (All)	NELAP	83979	06-30-24
Louisiana (DW)	State	LA019	12-31-23
Maryland	State	277	03-31-24
Michigan	State	9933	07-27-25
Nevada	State	TN00009	07-31-23 *
New Hampshire	NELAP	2999	01-17-24
New Jersey	NELAP	TN001	07-01-24
New York	NELAP	10781	03-31-24
North Carolina (DW)	State	21705	07-31-24
North Carolina (WW/SW)	State	64	12-31-23
Oklahoma	State	9415	08-31-23
Oregon	NELAP	TNI0189	01-01-24
Pennsylvania	NELAP	68-00576	12-01-23
Tennessee	State	02014	07-27-25
Texas	NELAP	T104704380-22-17	08-31-23
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	525-22-279-18762	10-06-25
Utah	NELAP	TN00009	07-31-24
Virginia	NELAP	460176	09-14-23
Washington	State	C593	01-19-24
West Virginia (DW)	State	9955C	12-31-23
West Virginia DEP	State	345	04-30-24
Wisconsin	State	998044300	08-31-23

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Geosyntec Consultants Inc
Project/Site: Vermilion SEP

Job ID: 140-32513-1

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	EET KNX
6010B SEP	SEP Metals (ICP)	SW846	EET KNX
Moisture	Percent Moisture	EPA	EET KNX
3010A	Preparation, Total Metals	SW846	EET KNX
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	EET KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	EET KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	EET KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	EET KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	EET KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	EET KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	EET KNX
Total	Preparation, Total Material	TAL-KNOX	EET KNX

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-KNOX = TestAmerica Laboratories, Knoxville, Facility Standard Operating Procedure.

Laboratory References:

EET KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Chain of Custody Record

eurofins Environment Testing TestAmerica

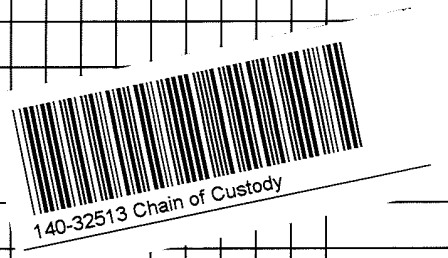
Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☑ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Allison Kreinberg	Site Contact: NA	Date:	COC No:
Geosyntec Consultants, Inc.	Tel/Fax:	Lab Contact: Ryan Henry	Carrier:	___1___ of ___1___ COCs
941 Chatham Lane, Suite 103	Analysis Turnaround Time			Sampler:
Columbus, OH 43221	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(614) 468-0421 Phone	TAT if different from Below _____			Walk-in Client:
	☒ 2 weeks			Lab Sampling:
Project Name: Vistra	☐ 1 week			
Site: Vermilion	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	6010B SEP (Li, Fe, Mn)	Sample Specific Notes:
VER-35 55-60 20230624	6/24/2023	1420	G	Solid	1	N	N	X	
VER-35 60-63 20230624	6/24/2023	1450	G	Solid	1	N	N	X	
VER-70 75-80 20230623	6/23/2023	1700	G	Solid	1	N	N	X	

No Custody Seal
Received Ambient AT: 20.0/CT: 20.3C
DH 7/3/23
1 Box FedEx 7804 7929 1869 G



Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☑ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Corr'd: _____		Therm ID No.: _____	
Relinquished by:	Company: GEOSYNTEC	Date/Time: 6/28/23	Received by:	Company: ETA KNX	Date/Time: 7/3/23 11:15	7/3/23
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:	
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:	

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7/3/2023

Form No. CA-C-WI-002, Rev. 4.21, dated 4/4/2019

Loc: 140
32513

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	✓			☐ **Containers, Broken**
2. Were ambient air containers received intact?			✓	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?			✓	☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : SC73 Correction factor: +0.3°C			✓	☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	✓			☐ **Containers, Broken**
6. Were samples received in appropriate containers?			✓	☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	✓			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	✓			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?		✓		☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	✓			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	✓			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	✓			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	✓			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			✓	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			✓	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			✓	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

10,

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: 14006199 PM Instructions:

Sample Receiving Associate: Dean Hicks Date: 7/3/23

QA026R32.doc, 062719

Attachment I
X-Ray Diffraction Analytical Data

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Environmental Services*
Project Number/ LIMS No.	*Custom XRD/MI4526-AUG23*
Sample Receipt:	*August 10, 2023*
Sample Analysis:	*August 31, 2023*
Reporting Date:	*September 13, 2023*

Instrument:	BRUKER AXS D8 Advance Diffractometer
Test Conditions:	Co radiation, 35 kV, 40 mA; Detector: LYNXEYE Regular Scanning: Step: 0.02°, Step time: 0.75s, 2θ range: 6-80° Clay Section Scanning: Step: 0.01°, Step time:0.2s, 2θ range: 3-40°
Interpretations :	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva and Topas software.
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

1) Method Summary
2) Quantitative XRD Results
3) XRD Pattern(s)

Zhihai (Adrian) Zhang, Ph.D
Mineralogist

Kim Gibbs, H.B.Sc., P.Geo.
Senior Mineralogist

ACCREDITATION: SGS Natural Resources Lakefield is accredited to the requirements of ISO/IEC 17025 for specific tests as listed on our scope of accreditation, including geochemical, mineralogical and trade mineral tests. To view a list of the accredited methods, please visit the following website and search SGS Canada Inc. - Minerals: https://www.scc.ca/en/search/palcan.

Method Summary

The Rietveld Method of Mineral Identification by XRD (ME-LR-MIN-MET-MN-D05) method used by SGS Natural Resources is accredited to the requirements of ISO/IEC 17025.

Mineral Identification and Interpretation:

Mineral identification and interpretation involves matching the diffraction pattern of an unknown material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) database and released on software as Powder Diffraction Files (PDF).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds, except when internal standards have been added by request. Mineral proportions may be strongly influenced by crystallinity, crystal structure and preferred orientations. Mineral or compound identification and quantitative analysis results should be accompanied by supporting chemical assay data or other additional tests.

Clay Mineral Separation and Identification:

Clay minerals are typically fine-grained (<2 µm) phyllosilicates in sedimentary rock. Due to the poor crystallinity and fine size of clay minerals, separation of the clay fraction from bulk samples by centrifuge is required. A slide of the oriented clay fraction is prepared and scanned followed by a series of procedures (the addition of ethylene glycol and high temperature heating). Clay minerals are identified by their individual diffraction patterns and changes in their diffraction pattern after different treatments. Clay speciation and mineral identification of the bulk sample are performed using DIFFRACplus EVA (Bruker AXS).

Quantitative Rietveld Analysis:

Quantitative Rietveld Analysis is performed by using Topas 4.2 (Bruker AXS), a graphics based profile analysis program built around a non-linear least squares fitting system, to determine the amount of different phases present in a multicomponent sample. Whole pattern analyses are predicated by the fact that the X-ray diffraction pattern is a total sum of both instrumental and specimen factors. Unlike other peak intensity-based methods, the Rietveld method uses a least squares approach to refine a theoretical line profile until it matches the obtained experimental patterns.

Rietveld refinement is completed with a set of minerals specifically identified for the sample. Zero values indicate that the mineral was included in the refinement calculations, but the calculated concentration was less than 0.05wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	VER-35 55-60 20230624 AUG4526-01 (wt %)	VER-35 60-63 20230624 AUG4526-02 (wt %)	VER-70 30-40 20230623 AUG4526-03 (wt %)	VER-70 41-42 20230623 AUG4526-04 (wt %)	VER-70 75-80 20230623 AUG4526-05 (wt %)
Quartz	38.5	38.1	48.6	48.2	35.0
Chlorite	6.9	6.8	1.2	3.6	7.7
Muscovite	23.4	23.0	13.5	15.2	27.0
Albite	12.6	12.6	10.6	10.8	11.5
Microcline	1.0	1.1	1.3	1.1	0.7
Siderite	4.9	5.0	0.9	0.1	5.4
Actinolite	-	-	0.8	-	-
Dolomite	-	-	11.7	11.7	-
Clays					
Illite	7.1	8.0	7.4	5.6	5.2
Kaolinite	5.6	5.4	3.2	3.7	7.5
Montmorillonite	-	-	0.8	-	-
TOTAL	100	100	100	100	100

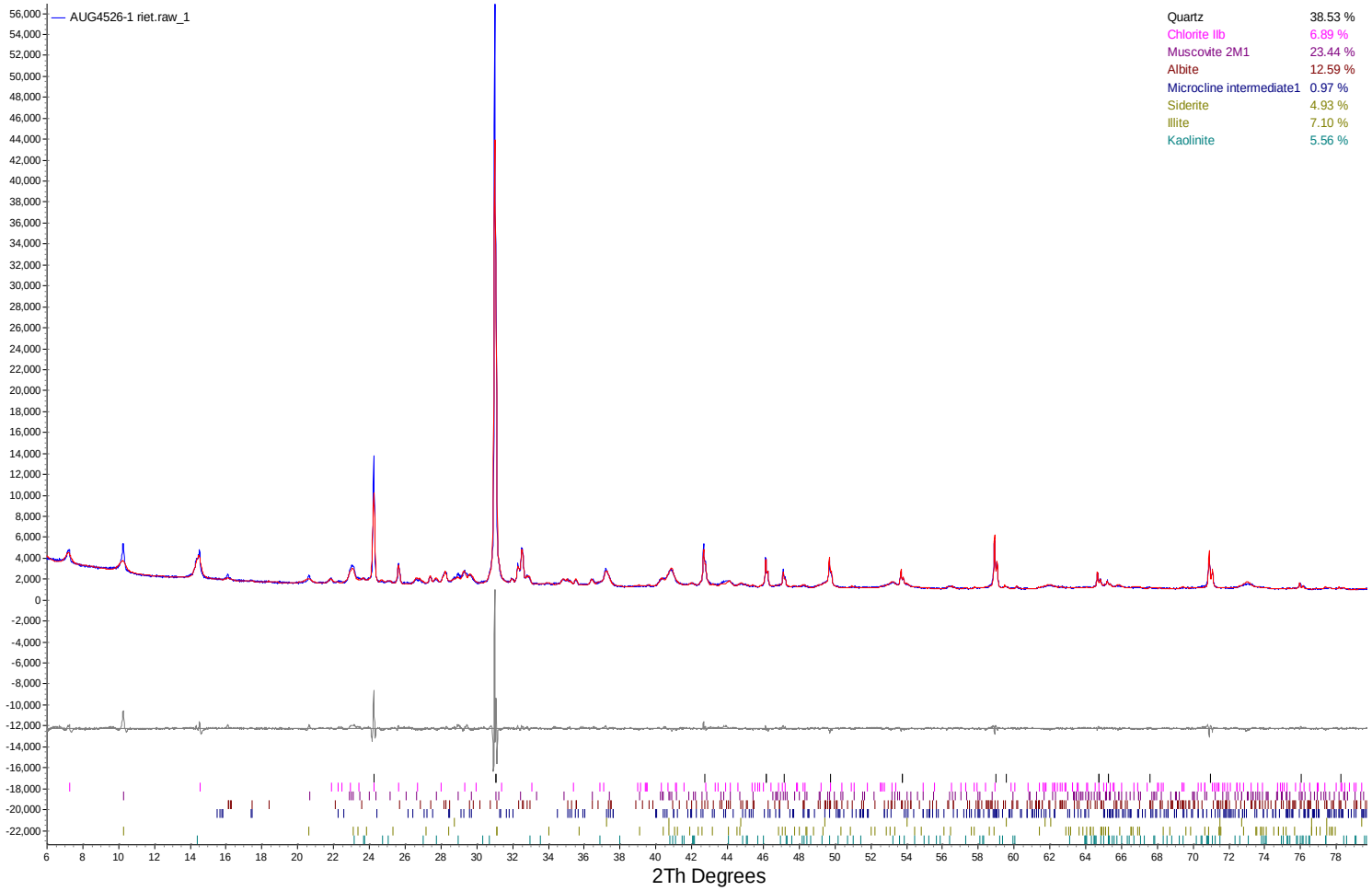
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

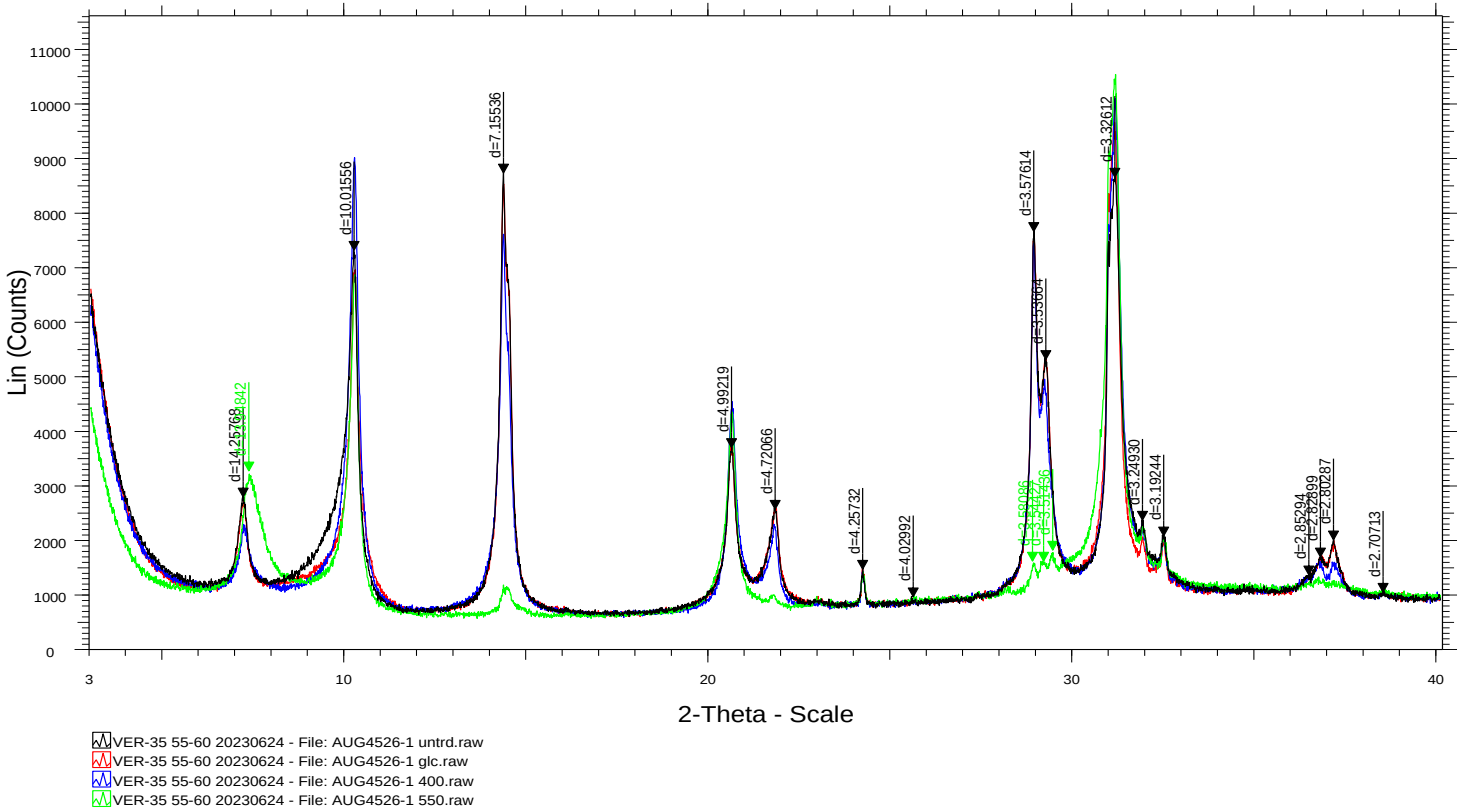
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

Mineral/Compound	Formula
Quartz	SiO_2
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Albite	$NaAlSi_3O_8$
Microcline	$KAlSi_3O_8$
Siderite	$FeCO_3$
Illite	$(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}[(OH)_2,(H_2O)]$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$
Dolomite	$CaMg(CO_3)_2$
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot 10H_2O$

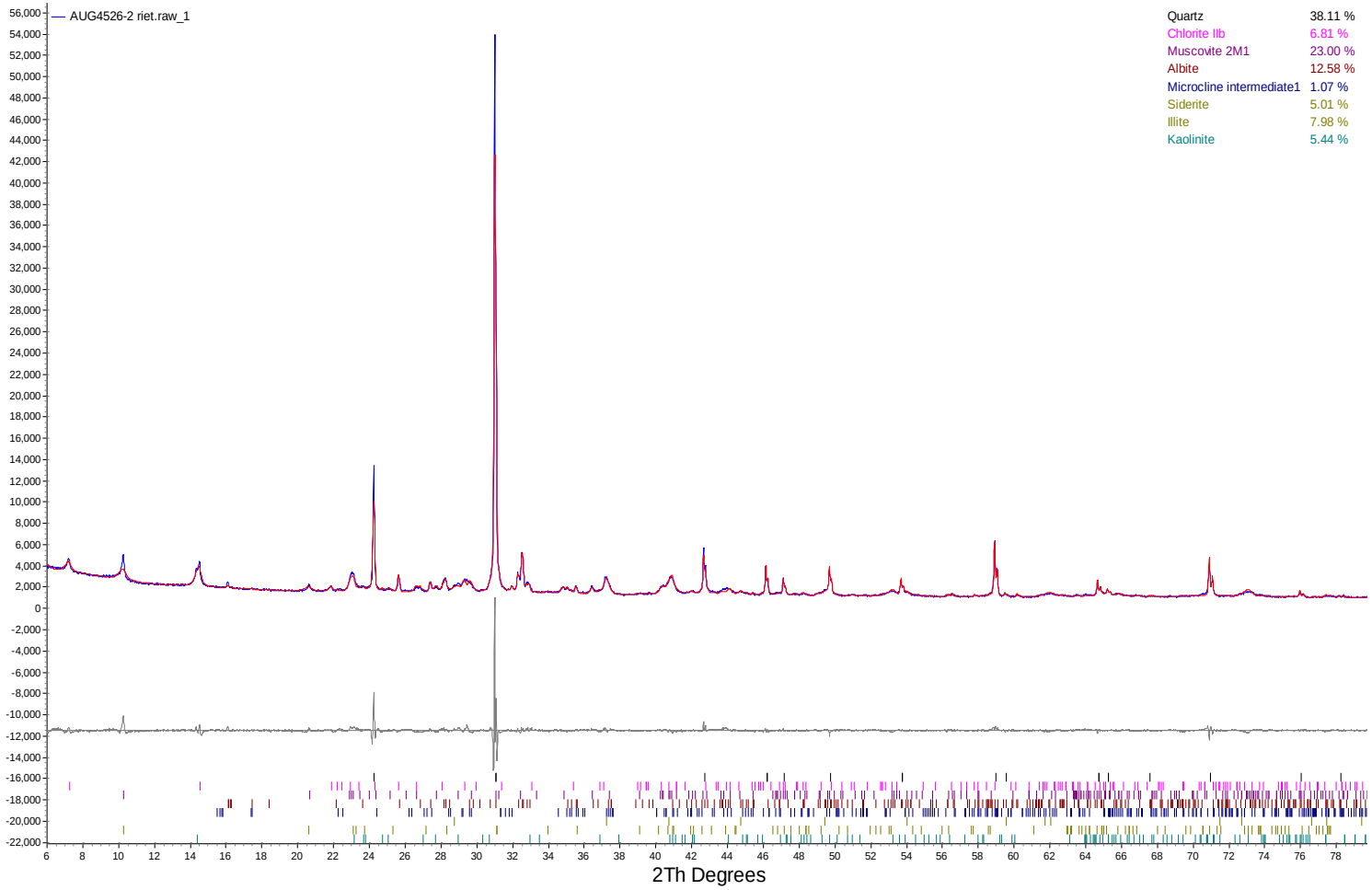
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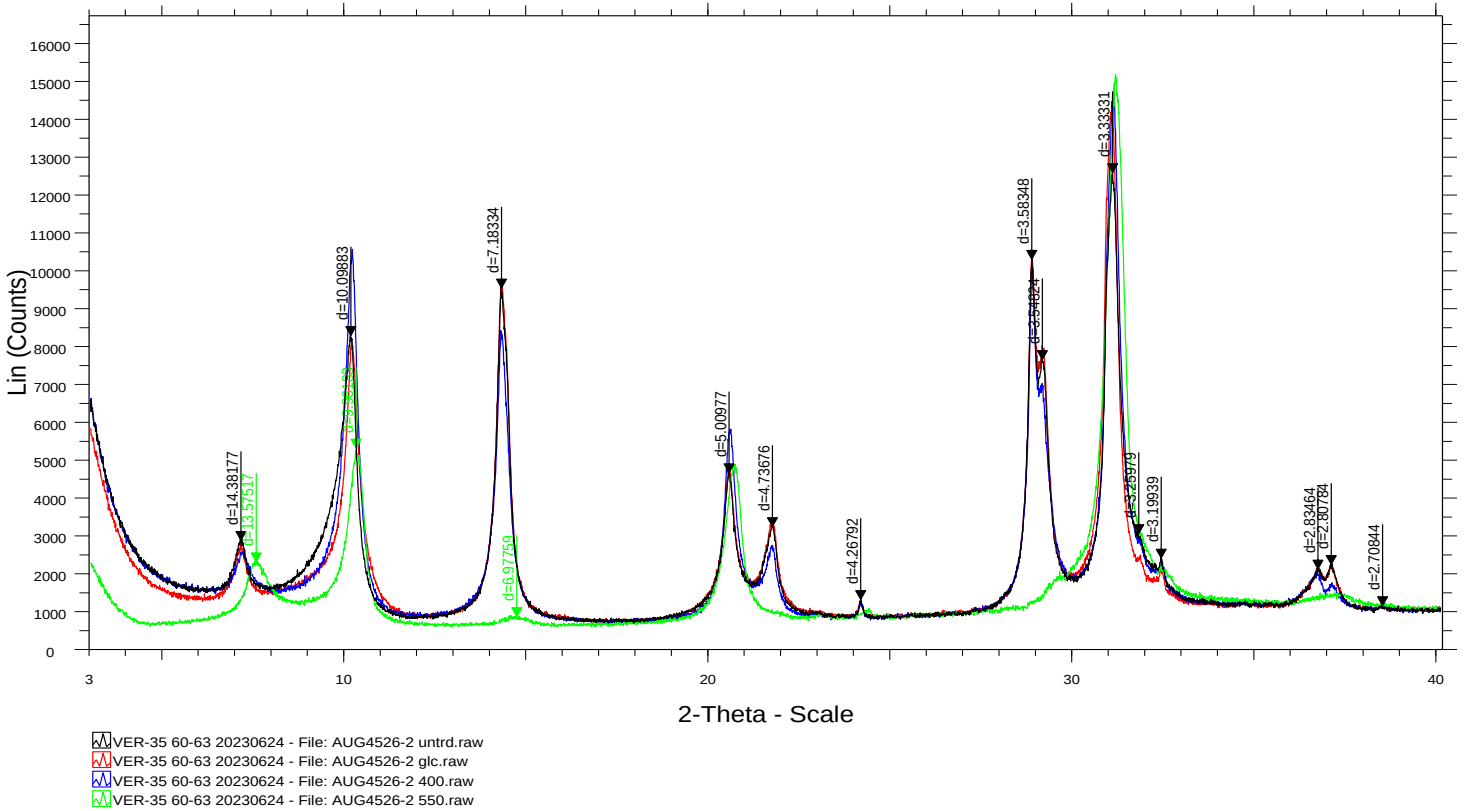
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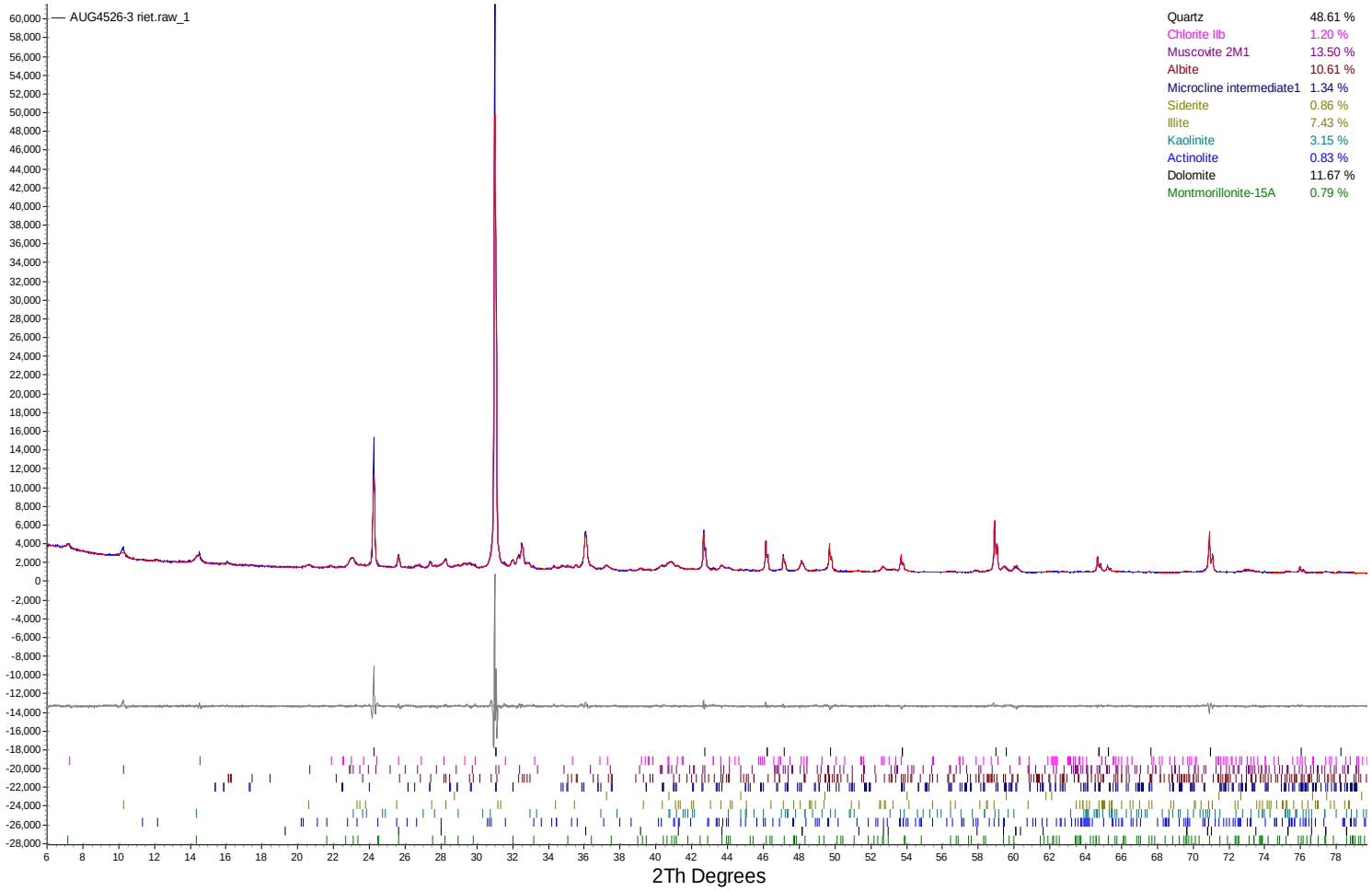
VER-35 60-63 20230624



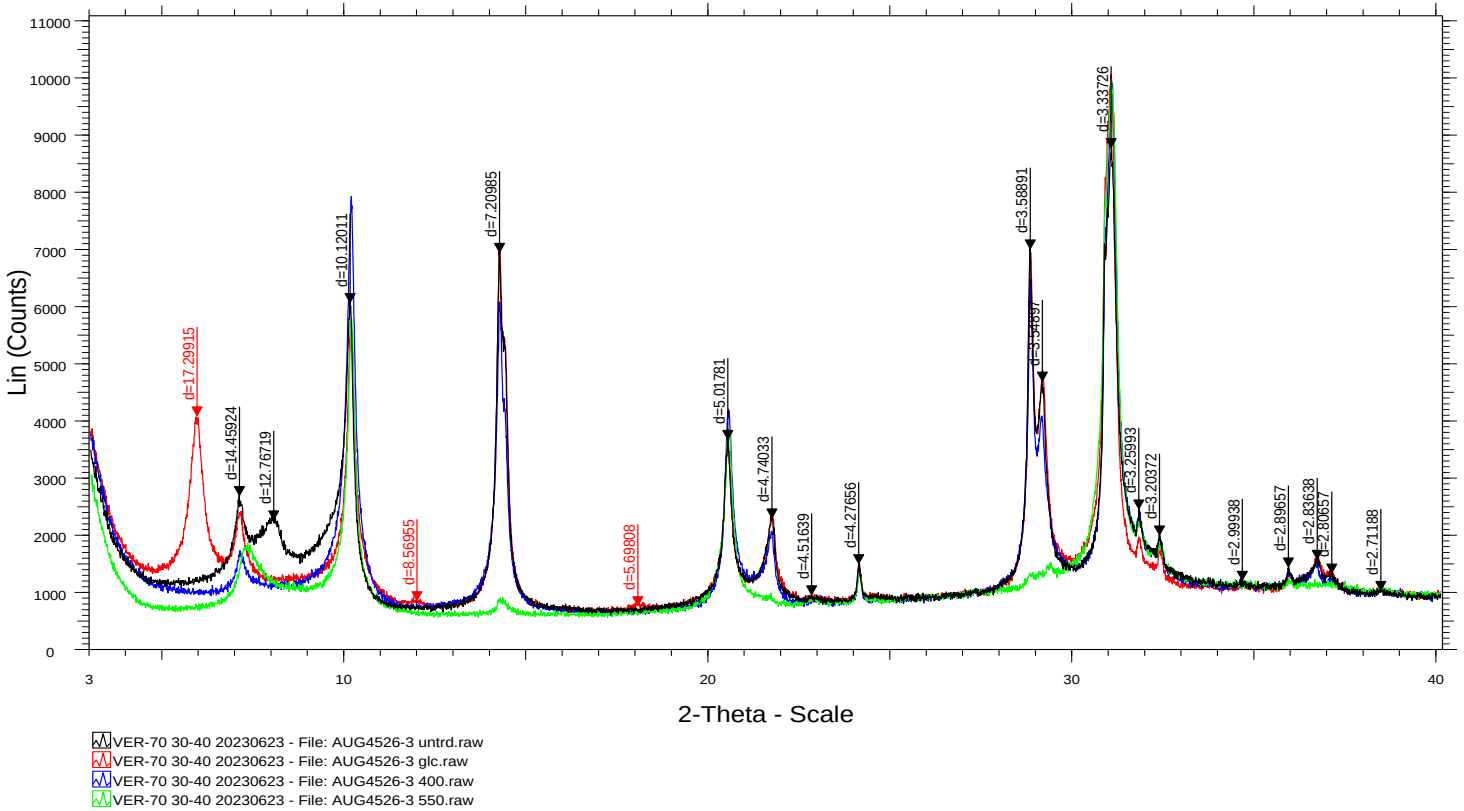
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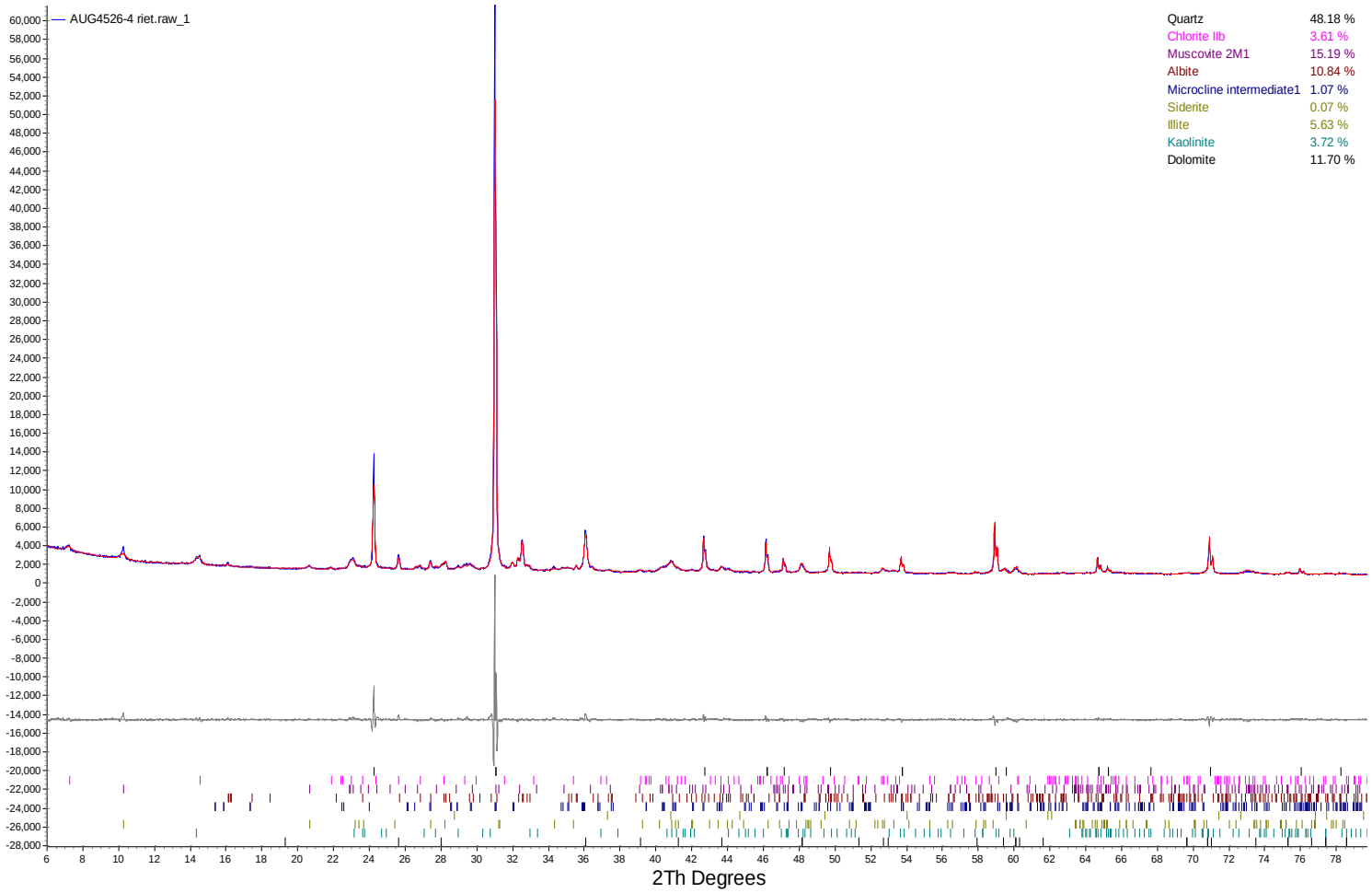
VER-70 30-40 20230623



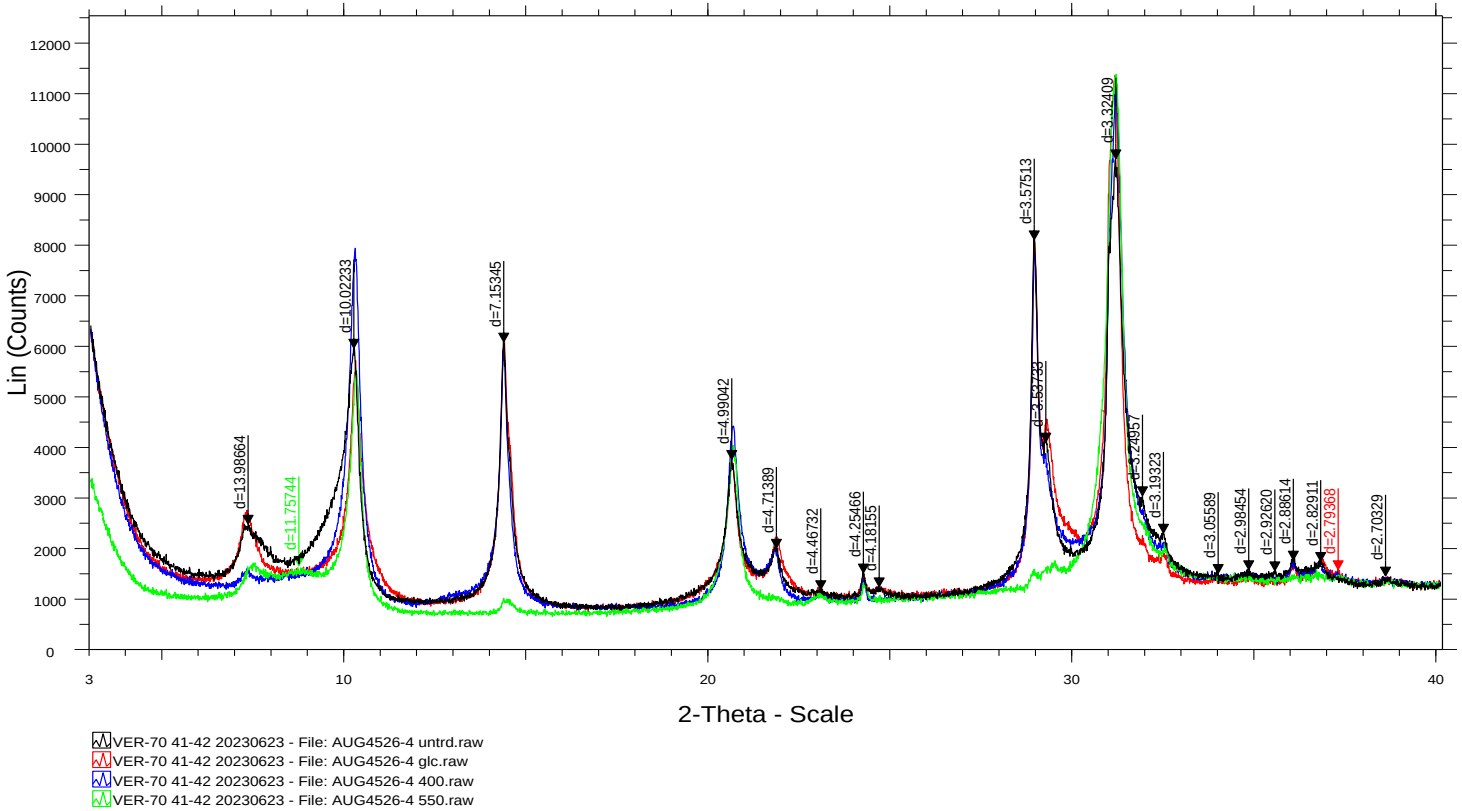
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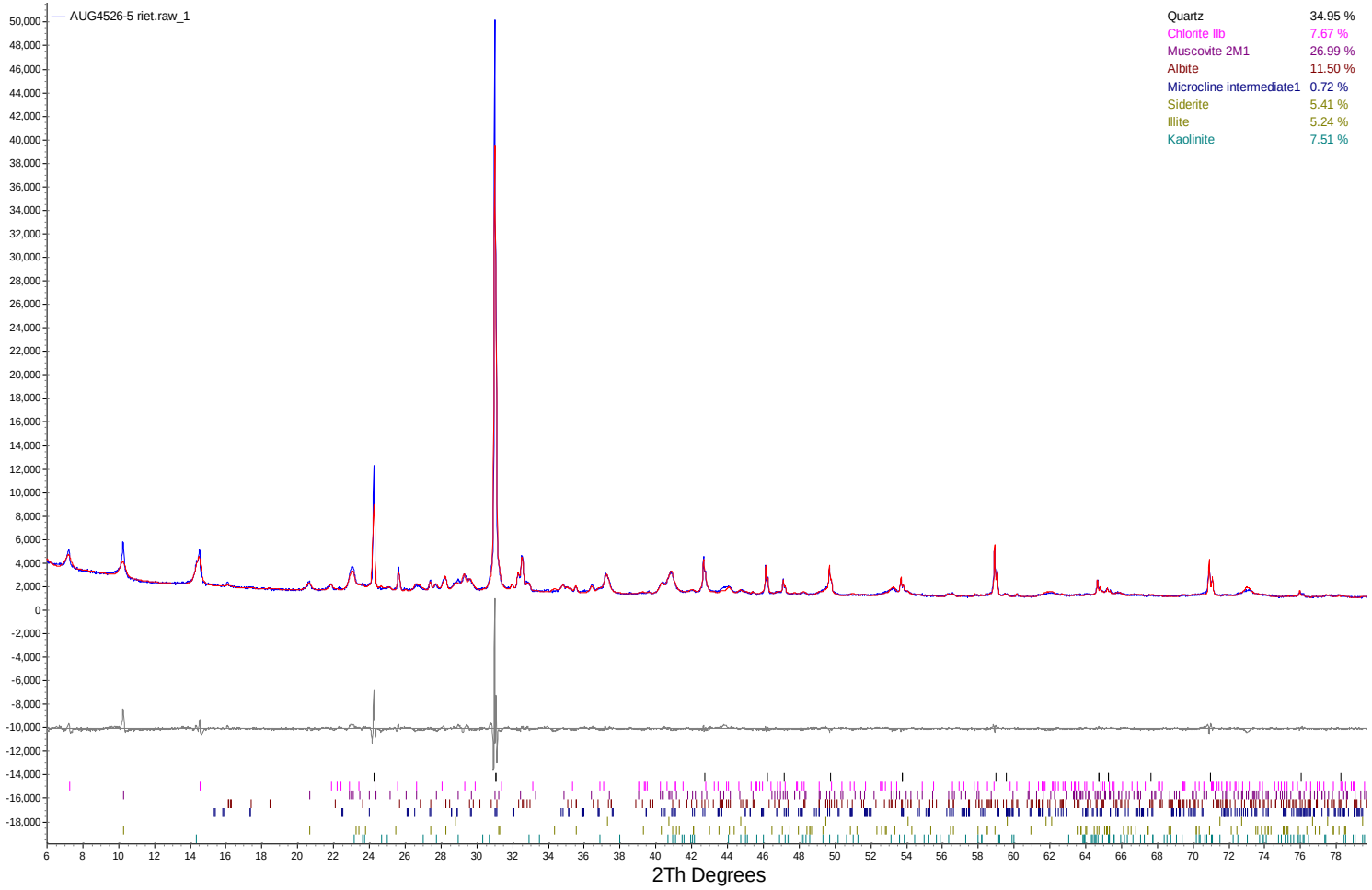
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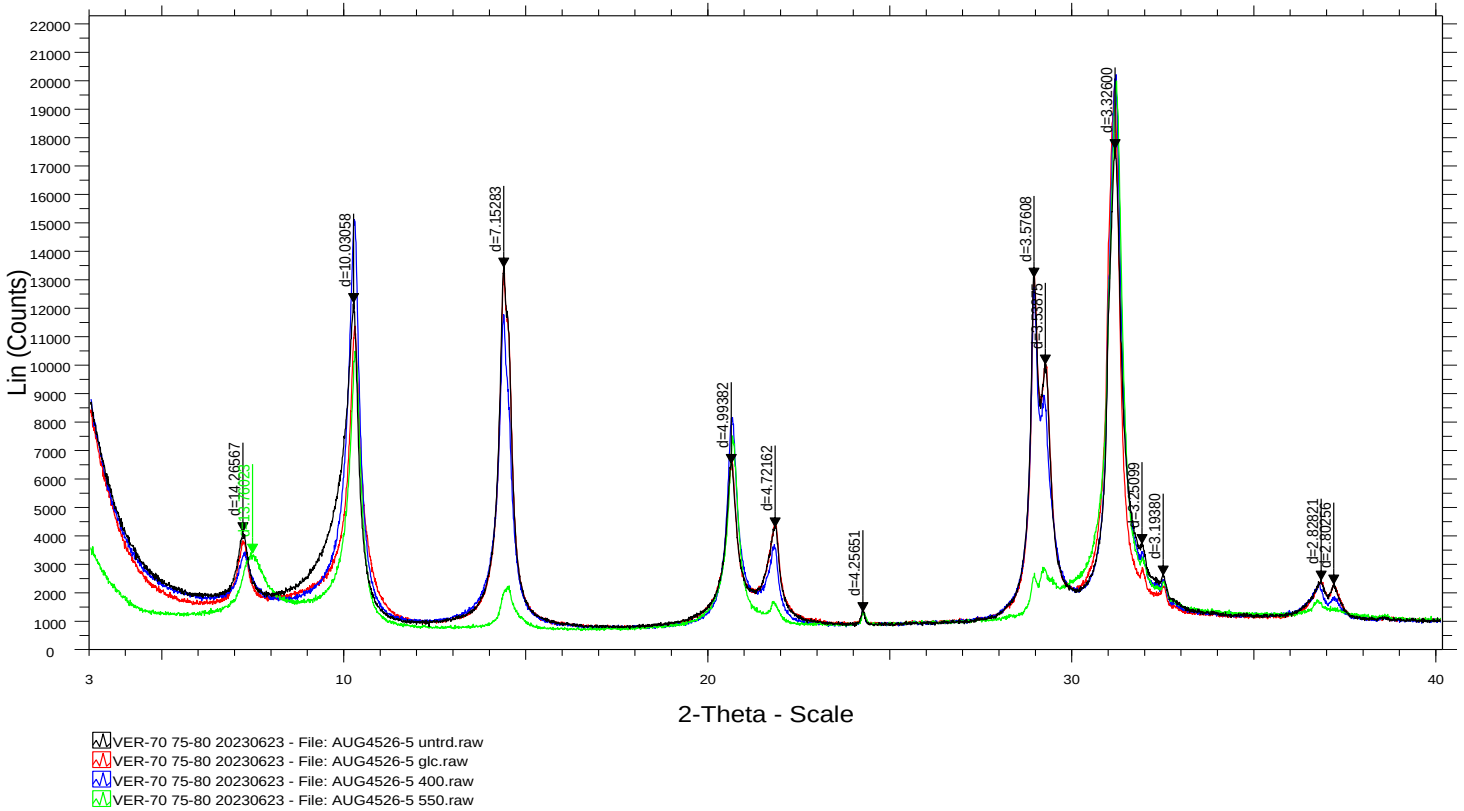
VER-70 41-42 20230623



VER-70 75-80 20230623



VER-70 75-80 20230623



Attachment J
Aqueous Phase Data Summary

Attachment J. Aqueous Phase Data Summary
Nature and Extent Report
Vermilion New East Ash Pond
Vermilion Power Plant
Oakwood, IL

HSU	Location	Well Type	Date	Replicate	Parameter	Unit	Result
BCU	22	B	2021/04/01	--	pH (field)	SU	7.4
BCU	22	B	2021/04/20	--	pH (field)	SU	7.6
BCU	22	B	2021/05/10	--	pH (field)	SU	7.3
BCU	22	B	2021/06/03	--	pH (field)	SU	7.3
BCU	22	B	2021/06/17	--	pH (field)	SU	7.2
BCU	22	B	2021/07/08	--	pH (field)	SU	7.2
BCU	22	B	2021/07/27	--	pH (field)	SU	7.3
BCU	22	B	2021/08/17	--	pH (field)	SU	7.3
BCU	22	B	2023/06/20	--	pH (field)	SU	7.3
BCU	22	B	2023/09/19	--	pH (field)	SU	7.4
BCU	22	B	2023/11/28	--	pH (field)	SU	7.5
BCU	22	B	2021/04/01	--	Oxidation Reduction Potential	mV	-73.6
BCU	22	B	2021/04/20	--	Oxidation Reduction Potential	mV	-14.4
BCU	22	B	2021/05/10	--	Oxidation Reduction Potential	mV	-57.2
BCU	22	B	2021/06/03	--	Oxidation Reduction Potential	mV	-104
BCU	22	B	2021/06/17	--	Oxidation Reduction Potential	mV	-80.0
BCU	22	B	2021/07/08	--	Oxidation Reduction Potential	mV	8.00
BCU	22	B	2021/07/27	--	Oxidation Reduction Potential	mV	-32.0
BCU	22	B	2021/08/17	--	Oxidation Reduction Potential	mV	-28.0
BCU	22	B	2023/06/20	--	Oxidation Reduction Potential	mV	142
BCU	22	B	2023/09/19	--	Oxidation Reduction Potential	mV	-10.7
BCU	22	B	2023/11/28	--	Oxidation Reduction Potential	mV	-7.90
BCU	22	B	2021/04/01	--	Eh		0.12
BCU	22	B	2021/04/20	--	Eh		0.18
BCU	22	B	2021/05/10	--	Eh		0.14
BCU	22	B	2021/06/03	--	Eh		0.092
BCU	22	B	2021/06/17	--	Eh		0.12
BCU	22	B	2021/07/08	--	Eh		0.20
BCU	22	B	2021/07/27	--	Eh		0.16
BCU	22	B	2021/08/17	--	Eh		0.17
BCU	22	B	2023/06/20	--	Eh		0.34
BCU	22	B	2023/09/19	--	Eh		0.19
BCU	22	B	2023/11/28	--	Eh		0.19
BCU	22	B	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	390
BCU	22	B	2021/04/20	--	Alkalinity, bicarbonate	mg/L CaCO3	407
BCU	22	B	2021/05/10	--	Alkalinity, bicarbonate	mg/L CaCO3	395
BCU	22	B	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	390
BCU	22	B	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	406
BCU	22	B	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	412
BCU	22	B	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	401
BCU	22	B	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	402
BCU	22	B	2023/11/28	--	Alkalinity, bicarbonate	mg/L CaCO3	400
BCU	22	B	2021/04/01	--	Barium, total	mg/L	0.0723
BCU	22	B	2021/04/20	--	Barium, total	mg/L	0.0798
BCU	22	B	2021/05/10	--	Barium, total	mg/L	0.0795
BCU	22	B	2021/06/03	--	Barium, total	mg/L	0.0787
BCU	22	B	2021/06/17	--	Barium, total	mg/L	0.0791
BCU	22	B	2021/07/08	--	Barium, total	mg/L	0.0820
BCU	22	B	2021/07/27	--	Barium, total	mg/L	0.0795
BCU	22	B	2021/08/17	--	Barium, total	mg/L	0.0785
BCU	22	B	2023/06/20	--	Barium, total	mg/L	0.0807

BCU	22	B	2023/09/19	--	Barium, total	mg/L	0.0740
BCU	22	B	2023/11/28	--	Barium, total	mg/L	0.0840
BCU	22	B	2021/04/01	--	Calcium, total	mg/L	41.5
BCU	22	B	2021/04/20	--	Calcium, total	mg/L	37.5
BCU	22	B	2021/05/10	--	Calcium, total	mg/L	45.7
BCU	22	B	2021/06/03	--	Calcium, total	mg/L	48.3
BCU	22	B	2021/06/17	--	Calcium, total	mg/L	50.3
BCU	22	B	2021/07/08	--	Calcium, total	mg/L	47.7
BCU	22	B	2021/07/27	--	Calcium, total	mg/L	48.2
BCU	22	B	2021/08/17	--	Calcium, total	mg/L	47.1
BCU	22	B	2023/06/20	--	Calcium, total	mg/L	46.2
BCU	22	B	2023/09/19	--	Calcium, total	mg/L	39.0
BCU	22	B	2023/11/28	--	Calcium, total	mg/L	44.0
BCU	22	B	2021/04/01	--	Chloride, total	mg/L	23.0
BCU	22	B	2021/04/20	--	Chloride, total	mg/L	11.0
BCU	22	B	2021/05/10	--	Chloride, total	mg/L	11.0
BCU	22	B	2021/06/03	--	Chloride, total	mg/L	7.00
BCU	22	B	2021/06/17	--	Chloride, total	mg/L	7.00
BCU	22	B	2021/07/08	--	Chloride, total	mg/L	7.00
BCU	22	B	2021/07/27	--	Chloride, total	mg/L	7.00
BCU	22	B	2021/08/17	--	Chloride, total	mg/L	7.00
BCU	22	B	2023/06/20	--	Chloride, total	mg/L	8.00
BCU	22	B	2023/09/19	--	Chloride, total	mg/L	16.0
BCU	22	B	2023/11/28	--	Chloride, total	mg/L	6.40
BCU	22	B	2023/09/19	--	Ferrous Iron, dissolved	mg/L	1.92
BCU	22	B	2023/06/20	--	Iron, dissolved	mg/L	0.236
BCU	22	B	2023/09/19	--	Iron, dissolved	mg/L	0.250
BCU	22	B	2021/04/01	--	Lithium, total	mg/L	0.0347
BCU	22	B	2021/04/20	--	Lithium, total	mg/L	0.0326
BCU	22	B	2021/05/10	--	Lithium, total	mg/L	0.0318
BCU	22	B	2021/06/03	--	Lithium, total	mg/L	0.0311
BCU	22	B	2021/06/17	--	Lithium, total	mg/L	0.0313
BCU	22	B	2021/07/08	--	Lithium, total	mg/L	0.0306
BCU	22	B	2021/07/27	--	Lithium, total	mg/L	0.0304
BCU	22	B	2021/08/17	--	Lithium, total	mg/L	0.0309
BCU	22	B	2023/06/20	--	Lithium, total	mg/L	0.0316
BCU	22	B	2023/09/19	--	Lithium, total	mg/L	0.0350
BCU	22	B	2023/11/28	--	Lithium, total	mg/L	0.0340
BCU	22	B	2021/04/01	--	Magnesium, total	mg/L	22.4
BCU	22	B	2021/04/20	--	Magnesium, total	mg/L	22.4
BCU	22	B	2021/05/10	--	Magnesium, total	mg/L	25.2
BCU	22	B	2021/06/03	--	Magnesium, total	mg/L	25.6
BCU	22	B	2021/06/17	--	Magnesium, total	mg/L	25.9
BCU	22	B	2021/07/08	--	Magnesium, total	mg/L	25.9
BCU	22	B	2021/07/27	--	Magnesium, total	mg/L	25.1
BCU	22	B	2021/08/17	--	Magnesium, total	mg/L	24.5
BCU	22	B	2023/06/20	--	Magnesium, total	mg/L	24.9
BCU	22	B	2023/11/28	--	Magnesium, total	mg/L	25.0
BCU	22	B	2023/06/20	--	Manganese, dissolved	mg/L	0.0198
BCU	22	B	2023/09/19	--	Manganese, dissolved	mg/L	0.0170
BCU	22	B	2023/06/20	--	Phosphate, dissolved	mg/L	0.0280
BCU	22	B	2023/09/19	--	Phosphate, dissolved	mg/L	<0.073
BCU	22	B	2021/04/01	--	Potassium, total	mg/L	2.32
BCU	22	B	2021/04/20	--	Potassium, total	mg/L	2.59
BCU	22	B	2021/05/10	--	Potassium, total	mg/L	2.59
BCU	22	B	2021/06/03	--	Potassium, total	mg/L	2.67
BCU	22	B	2021/06/17	--	Potassium, total	mg/L	2.59
BCU	22	B	2021/07/08	--	Potassium, total	mg/L	2.85

BCU	22	B	2021/07/27	--	Potassium, total	mg/L	2.52
BCU	22	B	2021/08/17	--	Potassium, total	mg/L	2.44
BCU	22	B	2023/06/20	--	Potassium, total	mg/L	2.62
BCU	22	B	2023/11/28	--	Potassium, total	mg/L	2.50
BCU	22	B	2023/06/20	--	Silicon, dissolved	mg/L	8.49
BCU	22	B	2023/09/19	--	Silicon, dissolved	mg/L	8.60
BCU	22	B	2021/04/01	--	Sodium, total	mg/L	121
BCU	22	B	2021/04/20	--	Sodium, total	mg/L	109
BCU	22	B	2021/05/10	--	Sodium, total	mg/L	150
BCU	22	B	2021/06/03	--	Sodium, total	mg/L	105
BCU	22	B	2021/06/17	--	Sodium, total	mg/L	104
BCU	22	B	2021/07/08	--	Sodium, total	mg/L	112
BCU	22	B	2021/07/27	--	Sodium, total	mg/L	105
BCU	22	B	2021/08/17	--	Sodium, total	mg/L	104
BCU	22	B	2023/06/20	--	Sodium, total	mg/L	110
BCU	22	B	2023/11/28	--	Sodium, total	mg/L	110
BCU	22	B	2021/04/01	--	Sulfate, total	mg/L	34.0
BCU	22	B	2021/04/20	--	Sulfate, total	mg/L	27.0
BCU	22	B	2021/05/10	--	Sulfate, total	mg/L	30.0
BCU	22	B	2021/06/03	--	Sulfate, total	mg/L	29.0
BCU	22	B	2021/06/17	--	Sulfate, total	mg/L	30.0
BCU	22	B	2021/07/08	--	Sulfate, total	mg/L	30.0
BCU	22	B	2021/07/27	--	Sulfate, total	mg/L	30.0
BCU	22	B	2021/08/17	--	Sulfate, total	mg/L	29.0
BCU	22	B	2023/06/20	--	Sulfate, total	mg/L	30.0
BCU	22	B	2023/09/19	--	Sulfate, total	mg/L	33.0
BCU	22	B	2023/11/28	--	Sulfate, total	mg/L	26.0
BCU	22	B	2021/04/01	--	Temperature (Celsius)	degrees C	12.7
BCU	22	B	2021/04/20	--	Temperature (Celsius)	degrees C	10.0
BCU	22	B	2021/05/10	--	Temperature (Celsius)	degrees C	13.1
BCU	22	B	2021/06/03	--	Temperature (Celsius)	degrees C	13.6
BCU	22	B	2021/06/17	--	Temperature (Celsius)	degrees C	14.0
BCU	22	B	2021/07/08	--	Temperature (Celsius)	degrees C	15.0
BCU	22	B	2021/07/27	--	Temperature (Celsius)	degrees C	15.5
BCU	22	B	2021/08/17	--	Temperature (Celsius)	degrees C	14.8
BCU	22	B	2023/06/20	--	Temperature (Celsius)	degrees C	13.4
BCU	22	B	2023/09/19	--	Temperature (Celsius)	degrees C	13.9
BCU	22	B	2023/11/28	--	Temperature (Celsius)	degrees C	11.4
BCU	22	B	2021/04/01	--	Total Dissolved Solids	mg/L	484
BCU	22	B	2021/04/20	--	Total Dissolved Solids	mg/L	476
BCU	22	B	2021/05/10	--	Total Dissolved Solids	mg/L	494
BCU	22	B	2021/06/03	--	Total Dissolved Solids	mg/L	450
BCU	22	B	2021/06/17	--	Total Dissolved Solids	mg/L	468
BCU	22	B	2021/07/08	--	Total Dissolved Solids	mg/L	476
BCU	22	B	2021/07/27	--	Total Dissolved Solids	mg/L	486
BCU	22	B	2021/08/17	--	Total Dissolved Solids	mg/L	474
BCU	22	B	2023/06/20	--	Total Dissolved Solids	mg/L	462
BCU	22	B	2023/09/19	--	Total Dissolved Solids	mg/L	470
BCU	22	B	2023/11/28	--	Total Dissolved Solids	mg/L	490
BCU	16A	C	2021/04/01	--	pH (field)	SU	7.5
BCU	16A	C	2021/04/21	--	pH (field)	SU	7.2
BCU	16A	C	2021/05/11	--	pH (field)	SU	7.4
BCU	16A	C	2021/06/03	--	pH (field)	SU	7.3
BCU	16A	C	2021/06/17	--	pH (field)	SU	7.4
BCU	16A	C	2021/07/08	--	pH (field)	SU	7.3
BCU	16A	C	2021/07/27	--	pH (field)	SU	7.4
BCU	16A	C	2021/08/17	--	pH (field)	SU	7.5
BCU	16A	C	2022/03/09	--	pH (field)	SU	7.2

BCU	16A	C	2022/06/28	--	pH (field)	SU	7.2
BCU	16A	C	2022/09/08	--	pH (field)	SU	7.3
BCU	16A	C	2022/11/22	--	pH (field)	SU	7.4
BCU	16A	C	2023/03/29	--	pH (field)	SU	7.3
BCU	16A	C	2023/09/21	--	pH (field)	SU	6.7
BCU	16A	C	2023/11/29	--	pH (field)	SU	7.7
BCU	16A	C	2017/03/21	--	pH (field)	SU	7.4
BCU	16A	C	2017/06/16	--	pH (field)	SU	7.4
BCU	16A	C	2017/09/14	--	pH (field)	SU	7.4
BCU	16A	C	2017/11/08	--	pH (field)	SU	7.5
BCU	16A	C	2018/03/22	--	pH (field)	SU	7.4
BCU	16A	C	2018/05/09	--	pH (field)	SU	7.0
BCU	16A	C	2018/08/17	--	pH (field)	SU	7.6
BCU	16A	C	2018/12/03	--	pH (field)	SU	7.5
BCU	16A	C	2021/04/01	--	Oxidation Reduction Potential	mV	-30.6
BCU	16A	C	2021/04/21	--	Oxidation Reduction Potential	mV	-42.6
BCU	16A	C	2021/05/11	--	Oxidation Reduction Potential	mV	-38.0
BCU	16A	C	2021/06/03	--	Oxidation Reduction Potential	mV	-113
BCU	16A	C	2021/06/17	--	Oxidation Reduction Potential	mV	-135
BCU	16A	C	2021/07/08	--	Oxidation Reduction Potential	mV	-38.0
BCU	16A	C	2021/07/27	--	Oxidation Reduction Potential	mV	-45.0
BCU	16A	C	2021/08/17	--	Oxidation Reduction Potential	mV	-55.0
BCU	16A	C	2022/03/09	--	Oxidation Reduction Potential	mV	-63.0
BCU	16A	C	2022/06/28	--	Oxidation Reduction Potential	mV	89.0
BCU	16A	C	2022/09/08	--	Oxidation Reduction Potential	mV	153
BCU	16A	C	2022/11/22	--	Oxidation Reduction Potential	mV	38.0
BCU	16A	C	2023/03/29	--	Oxidation Reduction Potential	mV	15.0
BCU	16A	C	2023/09/21	--	Oxidation Reduction Potential	mV	110
BCU	16A	C	2023/11/29	--	Oxidation Reduction Potential	mV	-122
BCU	16A	C	2021/04/01	--	Eh		0.17
BCU	16A	C	2021/04/21	--	Eh		0.16
BCU	16A	C	2021/05/11	--	Eh		0.16
BCU	16A	C	2021/06/03	--	Eh		0.085
BCU	16A	C	2021/06/17	--	Eh		0.063
BCU	16A	C	2021/07/08	--	Eh		0.16
BCU	16A	C	2021/07/27	--	Eh		0.15
BCU	16A	C	2021/08/17	--	Eh		0.14
BCU	16A	C	2022/03/09	--	Eh		0.14
BCU	16A	C	2022/06/28	--	Eh		0.29
BCU	16A	C	2022/09/08	--	Eh		0.35
BCU	16A	C	2022/11/22	--	Eh		0.24
BCU	16A	C	2023/03/29	--	Eh		0.21
BCU	16A	C	2023/09/21	--	Eh		0.30
BCU	16A	C	2023/11/29	--	Eh		0.076
BCU	16A	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	390
BCU	16A	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	407
BCU	16A	C	2021/05/11	--	Alkalinity, bicarbonate	mg/L CaCO3	361
BCU	16A	C	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	405
BCU	16A	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	406
BCU	16A	C	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	404
BCU	16A	C	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	390
BCU	16A	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	393
BCU	16A	C	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	400
BCU	16A	C	2021/04/01	--	Barium, total	mg/L	0.261
BCU	16A	C	2021/04/21	--	Barium, total	mg/L	0.335
BCU	16A	C	2021/05/11	--	Barium, total	mg/L	0.245
BCU	16A	C	2021/06/03	--	Barium, total	mg/L	0.272
BCU	16A	C	2021/06/17	--	Barium, total	mg/L	0.251

BCU	16A	C	2021/07/08	--	Barium, total	mg/L	0.249
BCU	16A	C	2021/07/27	--	Barium, total	mg/L	0.248
BCU	16A	C	2021/08/17	--	Barium, total	mg/L	0.261
BCU	16A	C	2023/09/21	--	Barium, total	mg/L	0.300
BCU	16A	C	2023/11/29	--	Barium, total	mg/L	0.330
BCU	16A	C	2021/04/01	--	Calcium, total	mg/L	40.8
BCU	16A	C	2021/04/21	--	Calcium, total	mg/L	71.1
BCU	16A	C	2021/05/11	--	Calcium, total	mg/L	36.6
BCU	16A	C	2021/06/03	--	Calcium, total	mg/L	51.6
BCU	16A	C	2021/06/17	--	Calcium, total	mg/L	42.2
BCU	16A	C	2021/07/08	--	Calcium, total	mg/L	38.0
BCU	16A	C	2021/07/27	--	Calcium, total	mg/L	35.3
BCU	16A	C	2021/08/17	--	Calcium, total	mg/L	33.3
BCU	16A	C	2023/09/21	--	Calcium, total	mg/L	35.0
BCU	16A	C	2023/11/29	--	Calcium, total	mg/L	37.0
BCU	16A	C	2021/04/01	--	Chloride, total	mg/L	131
BCU	16A	C	2021/04/21	--	Chloride, total	mg/L	106
BCU	16A	C	2021/05/11	--	Chloride, total	mg/L	139
BCU	16A	C	2021/06/03	--	Chloride, total	mg/L	128
BCU	16A	C	2021/06/17	--	Chloride, total	mg/L	144
BCU	16A	C	2021/07/08	--	Chloride, total	mg/L	151
BCU	16A	C	2021/07/27	--	Chloride, total	mg/L	163
BCU	16A	C	2021/08/17	--	Chloride, total	mg/L	176
BCU	16A	C	2023/09/21	--	Chloride, total	mg/L	130
BCU	16A	C	2023/11/29	--	Chloride, total	mg/L	160
BCU	16A	C	2023/09/21	--	Iron, dissolved	mg/L	0.890
BCU	16A	C	2021/04/01	--	Lithium, total	mg/L	0.0291
BCU	16A	C	2021/04/21	--	Lithium, total	mg/L	0.0288
BCU	16A	C	2021/05/11	--	Lithium, total	mg/L	0.0297
BCU	16A	C	2021/06/03	--	Lithium, total	mg/L	0.0303
BCU	16A	C	2021/06/17	--	Lithium, total	mg/L	0.0312
BCU	16A	C	2021/07/08	--	Lithium, total	mg/L	0.0313
BCU	16A	C	2021/07/27	--	Lithium, total	mg/L	0.0319
BCU	16A	C	2021/08/17	--	Lithium, total	mg/L	0.0319
BCU	16A	C	2023/09/21	--	Lithium, total	mg/L	0.0290
BCU	16A	C	2023/11/29	--	Lithium, total	mg/L	0.0330
BCU	16A	C	2021/04/01	--	Magnesium, total	mg/L	22.4
BCU	16A	C	2021/04/21	--	Magnesium, total	mg/L	35.5
BCU	16A	C	2021/05/11	--	Magnesium, total	mg/L	20.3
BCU	16A	C	2021/06/03	--	Magnesium, total	mg/L	27.5
BCU	16A	C	2021/06/17	--	Magnesium, total	mg/L	22.6
BCU	16A	C	2021/07/08	--	Magnesium, total	mg/L	21.2
BCU	16A	C	2021/07/27	--	Magnesium, total	mg/L	19.8
BCU	16A	C	2021/08/17	--	Magnesium, total	mg/L	19.0
BCU	16A	C	2023/11/29	--	Magnesium, total	mg/L	21.0
BCU	16A	C	2021/06/03	--	Manganese, dissolved	mg/L	0.0756
BCU	16A	C	2022/03/09	--	Manganese, dissolved	mg/L	0.0739
BCU	16A	C	2022/06/28	--	Manganese, dissolved	mg/L	0.238
BCU	16A	C	2022/09/08	--	Manganese, dissolved	mg/L	0.0536
BCU	16A	C	2022/11/22	--	Manganese, dissolved	mg/L	0.0384
BCU	16A	C	2023/03/29	--	Manganese, dissolved	mg/L	0.0300
BCU	16A	C	2023/09/21	--	Manganese, dissolved	mg/L	0.0270
BCU	16A	C	2023/11/29	--	Manganese, dissolved	mg/L	0.0300
BCU	16A	C	2017/03/21	--	Manganese, dissolved	mg/L	0.0453
BCU	16A	C	2017/06/16	--	Manganese, dissolved	mg/L	0.0500
BCU	16A	C	2017/09/14	--	Manganese, dissolved	mg/L	0.0824
BCU	16A	C	2017/11/08	--	Manganese, dissolved	mg/L	0.0675
BCU	16A	C	2018/03/22	--	Manganese, dissolved	mg/L	0.00980

BCU	16A	C	2018/05/09	--	Manganese, dissolved	mg/L	0.0239
BCU	16A	C	2018/08/17	--	Manganese, dissolved	mg/L	0.0656
BCU	16A	C	2018/12/03	--	Manganese, dissolved	mg/L	0.0461
BCU	16A	C	2023/09/21	--	Phosphate, dissolved	mg/L	0.230
BCU	16A	C	2021/04/01	--	Potassium, total	mg/L	2.71
BCU	16A	C	2021/04/21	--	Potassium, total	mg/L	2.74
BCU	16A	C	2021/05/11	--	Potassium, total	mg/L	2.86
BCU	16A	C	2021/06/03	--	Potassium, total	mg/L	2.88
BCU	16A	C	2021/06/17	--	Potassium, total	mg/L	2.90
BCU	16A	C	2021/07/08	--	Potassium, total	mg/L	3.21
BCU	16A	C	2021/07/27	--	Potassium, total	mg/L	3.03
BCU	16A	C	2021/08/17	--	Potassium, total	mg/L	2.99
BCU	16A	C	2023/11/29	--	Potassium, total	mg/L	2.90
BCU	16A	C	2023/09/21	--	Silicon, dissolved	mg/L	6.60
BCU	16A	C	2021/04/01	--	Sodium, total	mg/L	194
BCU	16A	C	2021/04/21	--	Sodium, total	mg/L	164
BCU	16A	C	2021/05/11	--	Sodium, total	mg/L	251
BCU	16A	C	2021/06/03	--	Sodium, total	mg/L	181
BCU	16A	C	2021/06/17	--	Sodium, total	mg/L	191
BCU	16A	C	2021/07/08	--	Sodium, total	mg/L	208
BCU	16A	C	2021/07/27	--	Sodium, total	mg/L	217
BCU	16A	C	2021/08/17	--	Sodium, total	mg/L	224
BCU	16A	C	2023/11/29	--	Sodium, total	mg/L	210
BCU	16A	C	2021/04/01	--	Sulfate, total	mg/L	31.0
BCU	16A	C	2021/04/21	--	Sulfate, total	mg/L	78.0
BCU	16A	C	2021/05/11	--	Sulfate, total	mg/L	16.0
BCU	16A	C	2021/06/03	--	Sulfate, total	mg/L	47.0
BCU	16A	C	2021/06/17	--	Sulfate, total	mg/L	30.0
BCU	16A	C	2021/07/08	--	Sulfate, total	mg/L	24.0
BCU	16A	C	2021/07/27	--	Sulfate, total	mg/L	16.0
BCU	16A	C	2021/08/17	--	Sulfate, total	mg/L	11.0
BCU	16A	C	2022/03/09	--	Sulfate, total	mg/L	68.0
BCU	16A	C	2022/06/28	--	Sulfate, total	mg/L	33.0
BCU	16A	C	2022/09/08	--	Sulfate, total	mg/L	11.0
BCU	16A	C	2022/11/22	--	Sulfate, total	mg/L	8.00
BCU	16A	C	2023/03/29	--	Sulfate, total	mg/L	46.0
BCU	16A	C	2023/09/21	--	Sulfate, total	mg/L	9.40
BCU	16A	C	2023/11/29	--	Sulfate, total	mg/L	4.10
BCU	16A	C	2017/03/21	--	Sulfate, total	mg/L	22.0
BCU	16A	C	2017/06/16	--	Sulfate, total	mg/L	39.0
BCU	16A	C	2017/09/14	--	Sulfate, total	mg/L	35.0
BCU	16A	C	2017/11/08	--	Sulfate, total	mg/L	24.0
BCU	16A	C	2018/03/22	--	Sulfate, total	mg/L	29.0
BCU	16A	C	2018/05/09	--	Sulfate, total	mg/L	50.0
BCU	16A	C	2018/08/17	--	Sulfate, total	mg/L	18.0
BCU	16A	C	2018/12/03	--	Sulfate, total	mg/L	<6
BCU	16A	C	2021/04/01	--	Temperature (Celsius)	degrees C	11.5
BCU	16A	C	2021/04/21	--	Temperature (Celsius)	degrees C	11.3
BCU	16A	C	2021/05/11	--	Temperature (Celsius)	degrees C	11.6
BCU	16A	C	2021/06/03	--	Temperature (Celsius)	degrees C	11.7
BCU	16A	C	2021/06/17	--	Temperature (Celsius)	degrees C	11.6
BCU	16A	C	2021/07/08	--	Temperature (Celsius)	degrees C	12.2
BCU	16A	C	2021/07/27	--	Temperature (Celsius)	degrees C	12.9
BCU	16A	C	2021/08/17	--	Temperature (Celsius)	degrees C	14.3
BCU	16A	C	2022/03/09	--	Temperature (Celsius)	degrees C	10.7
BCU	16A	C	2022/06/28	--	Temperature (Celsius)	degrees C	12.2
BCU	16A	C	2022/09/08	--	Temperature (Celsius)	degrees C	13.1
BCU	16A	C	2022/11/22	--	Temperature (Celsius)	degrees C	11.9

BCU	16A	C	2023/03/29	--	Temperature (Celsius)	degrees C	11.1
BCU	16A	C	2023/09/21	--	Temperature (Celsius)	degrees C	21.6
BCU	16A	C	2023/11/29	--	Temperature (Celsius)	degrees C	10.9
BCU	16A	C	2017/03/21	--	Temperature (Celsius)	degrees C	11.5
BCU	16A	C	2017/06/16	--	Temperature (Celsius)	degrees C	12.1
BCU	16A	C	2017/09/14	--	Temperature (Celsius)	degrees C	12.4
BCU	16A	C	2017/11/08	--	Temperature (Celsius)	degrees C	12.1
BCU	16A	C	2018/03/22	--	Temperature (Celsius)	degrees C	12.3
BCU	16A	C	2018/05/09	--	Temperature (Celsius)	degrees C	12.5
BCU	16A	C	2018/08/17	--	Temperature (Celsius)	degrees C	15.9
BCU	16A	C	2018/12/03	--	Temperature (Celsius)	degrees C	11.8
BCU	16A	C	2021/04/01	--	Total Dissolved Solids	mg/L	662
BCU	16A	C	2021/04/21	--	Total Dissolved Solids	mg/L	692
BCU	16A	C	2021/05/11	--	Total Dissolved Solids	mg/L	582
BCU	16A	C	2021/06/03	--	Total Dissolved Solids	mg/L	680
BCU	16A	C	2021/06/17	--	Total Dissolved Solids	mg/L	630
BCU	16A	C	2021/07/08	--	Total Dissolved Solids	mg/L	688
BCU	16A	C	2021/07/27	--	Total Dissolved Solids	mg/L	662
BCU	16A	C	2021/08/17	--	Total Dissolved Solids	mg/L	654
BCU	16A	C	2022/03/09	--	Total Dissolved Solids	mg/L	762
BCU	16A	C	2022/06/28	--	Total Dissolved Solids	mg/L	632
BCU	16A	C	2022/09/08	--	Total Dissolved Solids	mg/L	760
BCU	16A	C	2022/11/22	--	Total Dissolved Solids	mg/L	728
BCU	16A	C	2023/03/29	--	Total Dissolved Solids	mg/L	662
BCU	16A	C	2023/09/21	--	Total Dissolved Solids	mg/L	660
BCU	16A	C	2023/11/29	--	Total Dissolved Solids	mg/L	770
BCU	16A	C	2017/03/21	--	Total Dissolved Solids	mg/L	664
BCU	16A	C	2017/06/16	--	Total Dissolved Solids	mg/L	680
BCU	16A	C	2017/09/14	--	Total Dissolved Solids	mg/L	700
BCU	16A	C	2017/11/08	--	Total Dissolved Solids	mg/L	706
BCU	16A	C	2018/03/22	--	Total Dissolved Solids	mg/L	558
BCU	16A	C	2018/05/09	--	Total Dissolved Solids	mg/L	622
BCU	16A	C	2018/08/17	--	Total Dissolved Solids	mg/L	676
BCU	16A	C	2018/12/03	--	Total Dissolved Solids	mg/L	748
BCU	35D	C	2021/04/01	--	pH (field)	SU	8.2
BCU	35D	C	2021/04/21	--	pH (field)	SU	7.8
BCU	35D	C	2021/06/03	--	pH (field)	SU	7.2
BCU	35D	C	2021/06/17	--	pH (field)	SU	7.2
BCU	35D	C	2021/07/08	--	pH (field)	SU	7.2
BCU	35D	C	2021/07/27	--	pH (field)	SU	7.4
BCU	35D	C	2021/08/17	--	pH (field)	SU	7.3
BCU	35D	C	2022/03/09	--	pH (field)	SU	7.7
BCU	35D	C	2022/06/28	--	pH (field)	SU	7.3
BCU	35D	C	2022/09/08	--	pH (field)	SU	7.4
BCU	35D	C	2022/11/22	--	pH (field)	SU	7.3
BCU	35D	C	2023/03/29	--	pH (field)	SU	7.4
BCU	35D	C	2023/06/29	--	pH (field)	SU	7.3
BCU	35D	C	2023/09/22	--	pH (field)	SU	7.3
BCU	35D	C	2023/11/29	--	pH (field)	SU	7.3
BCU	35D	C	2017/03/21	--	pH (field)	SU	8.0
BCU	35D	C	2017/06/16	--	pH (field)	SU	7.2
BCU	35D	C	2017/09/14	--	pH (field)	SU	7.1
BCU	35D	C	2017/11/08	--	pH (field)	SU	7.2
BCU	35D	C	2018/03/22	--	pH (field)	SU	7.2
BCU	35D	C	2018/05/09	--	pH (field)	SU	6.8
BCU	35D	C	2018/08/17	--	pH (field)	SU	7.2
BCU	35D	C	2018/12/03	--	pH (field)	SU	7.1
BCU	35D	C	2021/04/01	--	Oxidation Reduction Potential	mV	78.0

BCU	35D	C	2021/04/21	--	Oxidation Reduction Potential	mV	108
BCU	35D	C	2021/06/03	--	Oxidation Reduction Potential	mV	-132
BCU	35D	C	2021/06/17	--	Oxidation Reduction Potential	mV	-96.0
BCU	35D	C	2021/07/08	--	Oxidation Reduction Potential	mV	22.0
BCU	35D	C	2021/07/27	--	Oxidation Reduction Potential	mV	-70.0
BCU	35D	C	2021/08/17	--	Oxidation Reduction Potential	mV	-62.0
BCU	35D	C	2022/03/09	--	Oxidation Reduction Potential	mV	-102
BCU	35D	C	2022/06/28	--	Oxidation Reduction Potential	mV	89.0
BCU	35D	C	2022/09/08	--	Oxidation Reduction Potential	mV	135
BCU	35D	C	2022/11/22	--	Oxidation Reduction Potential	mV	-28.0
BCU	35D	C	2023/03/29	--	Oxidation Reduction Potential	mV	-84.0
BCU	35D	C	2023/06/29	--	Oxidation Reduction Potential	mV	-20.0
BCU	35D	C	2023/09/22	--	Oxidation Reduction Potential	mV	-132
BCU	35D	C	2023/11/29	--	Oxidation Reduction Potential	mV	-127
BCU	35D	C	2021/04/01	--	Eh		0.28
BCU	35D	C	2021/04/21	--	Eh		0.31
BCU	35D	C	2021/06/03	--	Eh		0.064
BCU	35D	C	2021/06/17	--	Eh		0.100
BCU	35D	C	2021/07/08	--	Eh		0.22
BCU	35D	C	2021/07/27	--	Eh		0.13
BCU	35D	C	2021/08/17	--	Eh		0.13
BCU	35D	C	2022/06/28	--	Eh		0.28
BCU	35D	C	2022/09/08	--	Eh		0.33
BCU	35D	C	2022/11/22	--	Eh		0.17
BCU	35D	C	2023/03/29	--	Eh		0.11
BCU	35D	C	2023/06/29	--	Eh		0.18
BCU	35D	C	2023/09/22	--	Eh		0.064
BCU	35D	C	2023/11/29	--	Eh		0.072
BCU	35D	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	707
BCU	35D	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	533
BCU	35D	C	2021/05/11	--	Alkalinity, bicarbonate	mg/L CaCO3	539
BCU	35D	C	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	637
BCU	35D	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	603
BCU	35D	C	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	582
BCU	35D	C	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	507
BCU	35D	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	491
BCU	35D	C	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	680
BCU	35D	C	2021/04/01	--	Barium, total	mg/L	0.111
BCU	35D	C	2021/04/21	--	Barium, total	mg/L	0.0294
BCU	35D	C	2021/05/11	--	Barium, total	mg/L	0.0261
BCU	35D	C	2021/06/03	--	Barium, total	mg/L	0.0546
BCU	35D	C	2021/06/17	--	Barium, total	mg/L	0.140
BCU	35D	C	2021/07/08	--	Barium, total	mg/L	0.0297
BCU	35D	C	2021/07/27	--	Barium, total	mg/L	0.0263
BCU	35D	C	2021/08/17	--	Barium, total	mg/L	0.0269
BCU	35D	C	2023/06/29	--	Barium, total	mg/L	0.0237
BCU	35D	C	2023/09/22	--	Barium, total	mg/L	0.0280
BCU	35D	C	2023/11/29	--	Barium, total	mg/L	0.0290
BCU	35D	C	2021/04/01	--	Calcium, total	mg/L	112
BCU	35D	C	2021/04/21	--	Calcium, total	mg/L	93.6
BCU	35D	C	2021/05/11	--	Calcium, total	mg/L	106
BCU	35D	C	2021/06/03	--	Calcium, total	mg/L	98.1
BCU	35D	C	2021/06/17	--	Calcium, total	mg/L	99.4
BCU	35D	C	2021/07/08	--	Calcium, total	mg/L	86.0
BCU	35D	C	2021/07/27	--	Calcium, total	mg/L	70.4
BCU	35D	C	2021/08/17	--	Calcium, total	mg/L	65.7
BCU	35D	C	2023/06/29	--	Calcium, total	mg/L	87.0
BCU	35D	C	2023/09/22	--	Calcium, total	mg/L	96.0

BCU	35D	C	2023/11/29	--	Calcium, total	mg/L	120
BCU	35D	C	2021/04/01	--	Chloride, total	mg/L	529
BCU	35D	C	2021/04/21	--	Chloride, total	mg/L	281
BCU	35D	C	2021/05/11	--	Chloride, total	mg/L	306
BCU	35D	C	2021/06/03	--	Chloride, total	mg/L	461
BCU	35D	C	2021/06/17	--	Chloride, total	mg/L	393
BCU	35D	C	2021/07/08	--	Chloride, total	mg/L	372
BCU	35D	C	2021/07/27	--	Chloride, total	mg/L	234
BCU	35D	C	2021/08/17	--	Chloride, total	mg/L	199
BCU	35D	C	2023/06/29	--	Chloride, total	mg/L	493
BCU	35D	C	2023/09/22	--	Chloride, total	mg/L	460
BCU	35D	C	2023/11/29	--	Chloride, total	mg/L	470
BCU	35D	C	2023/09/22	--	Ferrous Iron, dissolved	mg/L	2.85
BCU	35D	C	2023/06/29	--	Iron, dissolved	mg/L	1.84
BCU	35D	C	2023/09/22	--	Iron, dissolved	mg/L	1.90
BCU	35D	C	2021/04/01	--	Lithium, total	mg/L	0.140
BCU	35D	C	2021/04/21	--	Lithium, total	mg/L	0.131
BCU	35D	C	2021/05/11	--	Lithium, total	mg/L	0.112
BCU	35D	C	2021/06/03	--	Lithium, total	mg/L	0.169
BCU	35D	C	2021/06/17	--	Lithium, total	mg/L	0.116
BCU	35D	C	2021/07/08	--	Lithium, total	mg/L	0.130
BCU	35D	C	2021/07/27	--	Lithium, total	mg/L	0.102
BCU	35D	C	2021/08/17	--	Lithium, total	mg/L	0.0954
BCU	35D	C	2023/06/29	--	Lithium, total	mg/L	0.144
BCU	35D	C	2023/09/22	--	Lithium, total	mg/L	0.120
BCU	35D	C	2023/11/29	--	Lithium, total	mg/L	0.160
BCU	35D	C	2021/04/01	--	Magnesium, total	mg/L	98.4
BCU	35D	C	2021/04/21	--	Magnesium, total	mg/L	86.9
BCU	35D	C	2021/05/11	--	Magnesium, total	mg/L	81.9
BCU	35D	C	2021/06/03	--	Magnesium, total	mg/L	82.8
BCU	35D	C	2021/06/17	--	Magnesium, total	mg/L	81.0
BCU	35D	C	2021/07/08	--	Magnesium, total	mg/L	73.4
BCU	35D	C	2021/07/27	--	Magnesium, total	mg/L	55.3
BCU	35D	C	2021/08/17	--	Magnesium, total	mg/L	51.3
BCU	35D	C	2023/06/29	--	Magnesium, total	mg/L	73.7
BCU	35D	C	2023/11/29	--	Magnesium, total	mg/L	110
BCU	35D	C	2021/06/03	--	Manganese, dissolved	mg/L	0.0529
BCU	35D	C	2022/03/09	--	Manganese, dissolved	mg/L	0.0166
BCU	35D	C	2022/06/28	--	Manganese, dissolved	mg/L	0.0666
BCU	35D	C	2022/09/08	--	Manganese, dissolved	mg/L	0.0519
BCU	35D	C	2022/11/22	--	Manganese, dissolved	mg/L	0.0504
BCU	35D	C	2023/03/29	--	Manganese, dissolved	mg/L	0.0414
BCU	35D	C	2023/06/29	--	Manganese, dissolved	mg/L	0.0298
BCU	35D	C	2023/09/22	--	Manganese, dissolved	mg/L	0.0330
BCU	35D	C	2023/11/29	--	Manganese, dissolved	mg/L	0.0440
BCU	35D	C	2017/03/21	--	Manganese, dissolved	mg/L	0.0602
BCU	35D	C	2017/06/16	--	Manganese, dissolved	mg/L	0.196
BCU	35D	C	2017/09/14	--	Manganese, dissolved	mg/L	0.214
BCU	35D	C	2017/11/08	--	Manganese, dissolved	mg/L	0.168
BCU	35D	C	2018/03/22	--	Manganese, dissolved	mg/L	0.138
BCU	35D	C	2018/05/09	--	Manganese, dissolved	mg/L	0.139
BCU	35D	C	2018/08/17	--	Manganese, dissolved	mg/L	0.132
BCU	35D	C	2018/12/03	--	Manganese, dissolved	mg/L	0.114
BCU	35D	C	2023/06/29	--	Phosphate, dissolved	mg/L	0.0980
BCU	35D	C	2023/09/22	--	Phosphate, dissolved	mg/L	0.120
BCU	35D	C	2021/04/01	--	Potassium, total	mg/L	8.99
BCU	35D	C	2021/04/21	--	Potassium, total	mg/L	9.31
BCU	35D	C	2021/05/11	--	Potassium, total	mg/L	8.66

BCU	35D	C	2021/06/03	--	Potassium, total	mg/L	9.95
BCU	35D	C	2021/06/17	--	Potassium, total	mg/L	9.51
BCU	35D	C	2021/07/08	--	Potassium, total	mg/L	9.65
BCU	35D	C	2021/07/27	--	Potassium, total	mg/L	8.14
BCU	35D	C	2021/08/17	--	Potassium, total	mg/L	7.91
BCU	35D	C	2023/06/29	--	Potassium, total	mg/L	8.24
BCU	35D	C	2023/11/29	--	Potassium, total	mg/L	8.90
BCU	35D	C	2023/06/29	--	Silicon, dissolved	mg/L	5.46
BCU	35D	C	2023/09/22	--	Silicon, dissolved	mg/L	7.00
BCU	35D	C	2021/04/01	--	Sodium, total	mg/L	1,120
BCU	35D	C	2021/04/21	--	Sodium, total	mg/L	809
BCU	35D	C	2021/05/11	--	Sodium, total	mg/L	1,020
BCU	35D	C	2021/06/03	--	Sodium, total	mg/L	1,120
BCU	35D	C	2021/06/17	--	Sodium, total	mg/L	1,030
BCU	35D	C	2021/07/08	--	Sodium, total	mg/L	1,040
BCU	35D	C	2021/07/27	--	Sodium, total	mg/L	685
BCU	35D	C	2021/08/17	--	Sodium, total	mg/L	641
BCU	35D	C	2023/06/29	--	Sodium, total	mg/L	1,000
BCU	35D	C	2023/11/29	--	Sodium, total	mg/L	1,100
BCU	35D	C	2021/04/01	--	Sulfate, total	mg/L	1,640
BCU	35D	C	2021/04/21	--	Sulfate, total	mg/L	1,220
BCU	35D	C	2021/05/11	--	Sulfate, total	mg/L	1,390
BCU	35D	C	2021/06/03	--	Sulfate, total	mg/L	1,300
BCU	35D	C	2021/06/17	--	Sulfate, total	mg/L	1,320
BCU	35D	C	2021/07/08	--	Sulfate, total	mg/L	1,230
BCU	35D	C	2021/07/27	--	Sulfate, total	mg/L	981
BCU	35D	C	2021/08/17	--	Sulfate, total	mg/L	895
BCU	35D	C	2022/03/09	--	Sulfate, total	mg/L	821
BCU	35D	C	2022/06/28	--	Sulfate, total	mg/L	1,020
BCU	35D	C	2022/09/08	--	Sulfate, total	mg/L	1,190
BCU	35D	C	2022/11/22	--	Sulfate, total	mg/L	1,040
BCU	35D	C	2023/03/29	--	Sulfate, total	mg/L	1,410
BCU	35D	C	2023/06/29	--	Sulfate, total	mg/L	1,340
BCU	35D	C	2023/09/22	--	Sulfate, total	mg/L	1,400
BCU	35D	C	2023/11/29	--	Sulfate, total	mg/L	1,700
BCU	35D	C	2017/03/21	--	Sulfate, total	mg/L	1,060
BCU	35D	C	2017/06/16	--	Sulfate, total	mg/L	1,850
BCU	35D	C	2017/09/14	--	Sulfate, total	mg/L	1,940
BCU	35D	C	2017/11/08	--	Sulfate, total	mg/L	1,860
BCU	35D	C	2018/03/22	--	Sulfate, total	mg/L	1,840
BCU	35D	C	2018/05/09	--	Sulfate, total	mg/L	1,870
BCU	35D	C	2018/08/17	--	Sulfate, total	mg/L	1,780
BCU	35D	C	2018/12/03	--	Sulfate, total	mg/L	1,900
BCU	35D	C	2021/04/01	--	Temperature (Celsius)	degrees C	9.39
BCU	35D	C	2021/04/21	--	Temperature (Celsius)	degrees C	12.1
BCU	35D	C	2021/06/03	--	Temperature (Celsius)	degrees C	14.2
BCU	35D	C	2021/06/17	--	Temperature (Celsius)	degrees C	14.9
BCU	35D	C	2021/07/08	--	Temperature (Celsius)	degrees C	13.7
BCU	35D	C	2021/07/27	--	Temperature (Celsius)	degrees C	12.9
BCU	35D	C	2021/08/17	--	Temperature (Celsius)	degrees C	13.5
BCU	35D	C	2022/06/28	--	Temperature (Celsius)	degrees C	14.5
BCU	35D	C	2022/09/08	--	Temperature (Celsius)	degrees C	14.9
BCU	35D	C	2022/11/22	--	Temperature (Celsius)	degrees C	13.6
BCU	35D	C	2023/03/29	--	Temperature (Celsius)	degrees C	12.4
BCU	35D	C	2023/06/29	--	Temperature (Celsius)	degrees C	14.2
BCU	35D	C	2023/09/22	--	Temperature (Celsius)	degrees C	13.7
BCU	35D	C	2023/11/29	--	Temperature (Celsius)	degrees C	10.1
BCU	35D	C	2017/03/21	--	Temperature (Celsius)	degrees C	13.2

BCU	35D	C	2017/06/16	--	Temperature (Celsius)	degrees C	13.4
BCU	35D	C	2017/09/14	--	Temperature (Celsius)	degrees C	13.2
BCU	35D	C	2017/11/08	--	Temperature (Celsius)	degrees C	12.7
BCU	35D	C	2018/03/22	--	Temperature (Celsius)	degrees C	13.9
BCU	35D	C	2018/05/09	--	Temperature (Celsius)	degrees C	14.2
BCU	35D	C	2018/08/17	--	Temperature (Celsius)	degrees C	12.7
BCU	35D	C	2018/12/03	--	Temperature (Celsius)	degrees C	12.2
BCU	35D	C	2021/04/01	--	Total Dissolved Solids	mg/L	3,830
BCU	35D	C	2021/04/21	--	Total Dissolved Solids	mg/L	2,920
BCU	35D	C	2021/05/11	--	Total Dissolved Solids	mg/L	3,070
BCU	35D	C	2021/06/03	--	Total Dissolved Solids	mg/L	3,240
BCU	35D	C	2021/06/17	--	Total Dissolved Solids	mg/L	3,170
BCU	35D	C	2021/07/08	--	Total Dissolved Solids	mg/L	2,910
BCU	35D	C	2021/07/27	--	Total Dissolved Solids	mg/L	2,320
BCU	35D	C	2021/08/17	--	Total Dissolved Solids	mg/L	2,090
BCU	35D	C	2022/03/09	--	Total Dissolved Solids	mg/L	2,020
BCU	35D	C	2022/06/28	--	Total Dissolved Solids	mg/L	2,840
BCU	35D	C	2022/09/08	--	Total Dissolved Solids	mg/L	2,840
BCU	35D	C	2022/11/22	--	Total Dissolved Solids	mg/L	2,840
BCU	35D	C	2023/03/29	--	Total Dissolved Solids	mg/L	3,390
BCU	35D	C	2023/06/29	--	Total Dissolved Solids	mg/L	3,370
BCU	35D	C	2023/09/22	--	Total Dissolved Solids	mg/L	3,700
BCU	35D	C	2023/11/29	--	Total Dissolved Solids	mg/L	4,300
BCU	35D	C	2017/03/21	--	Total Dissolved Solids	mg/L	2,880
BCU	35D	C	2017/06/16	--	Total Dissolved Solids	mg/L	4,320
BCU	35D	C	2017/09/14	--	Total Dissolved Solids	mg/L	4,300
BCU	35D	C	2017/11/08	--	Total Dissolved Solids	mg/L	4,240
BCU	35D	C	2018/03/22	--	Total Dissolved Solids	mg/L	4,100
BCU	35D	C	2018/05/09	--	Total Dissolved Solids	mg/L	4,140
BCU	35D	C	2018/08/17	--	Total Dissolved Solids	mg/L	4,280
BCU	35D	C	2018/12/03	--	Total Dissolved Solids	mg/L	4,420
BCU	70D	C	2021/04/01	--	pH (field)	SU	7.6
BCU	70D	C	2021/04/21	--	pH (field)	SU	7.3
BCU	70D	C	2021/06/03	--	pH (field)	SU	7.0
BCU	70D	C	2021/06/17	--	pH (field)	SU	7.1
BCU	70D	C	2021/07/08	--	pH (field)	SU	6.8
BCU	70D	C	2021/07/27	--	pH (field)	SU	7.0
BCU	70D	C	2021/07/28	--	pH (field)	SU	7.1
BCU	70D	C	2021/08/17	--	pH (field)	SU	6.8
BCU	70D	C	2023/06/20	--	pH (field)	SU	6.8
BCU	70D	C	2023/09/19	--	pH (field)	SU	6.9
BCU	70D	C	2023/11/29	--	pH (field)	SU	7.0
BCU	70D	C	2021/04/01	--	Oxidation Reduction Potential	mV	157
BCU	70D	C	2021/04/21	--	Oxidation Reduction Potential	mV	129
BCU	70D	C	2021/06/03	--	Oxidation Reduction Potential	mV	91.0
BCU	70D	C	2021/06/17	--	Oxidation Reduction Potential	mV	46.0
BCU	70D	C	2021/07/08	--	Oxidation Reduction Potential	mV	46.0
BCU	70D	C	2021/07/27	--	Oxidation Reduction Potential	mV	6.00
BCU	70D	C	2021/07/28	--	Oxidation Reduction Potential	mV	102
BCU	70D	C	2021/08/17	--	Oxidation Reduction Potential	mV	16.0
BCU	70D	C	2023/06/20	--	Oxidation Reduction Potential	mV	142
BCU	70D	C	2023/09/19	--	Oxidation Reduction Potential	mV	63.6
BCU	70D	C	2023/11/29	--	Oxidation Reduction Potential	mV	-5.70
BCU	70D	C	2021/04/01	--	Eh		0.35
BCU	70D	C	2021/04/21	--	Eh		0.33
BCU	70D	C	2021/06/03	--	Eh		0.29
BCU	70D	C	2021/06/17	--	Eh		0.24
BCU	70D	C	2021/07/08	--	Eh		0.24

BCU	70D	C	2021/07/27	--	Eh		0.20
BCU	70D	C	2021/07/28	--	Eh		0.30
BCU	70D	C	2021/08/17	--	Eh		0.21
BCU	70D	C	2023/06/20	--	Eh		0.34
BCU	70D	C	2023/09/19	--	Eh		0.26
BCU	70D	C	2023/11/29	--	Eh		0.19
BCU	70D	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	262
BCU	70D	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	334
BCU	70D	C	2021/05/10	--	Alkalinity, bicarbonate	mg/L CaCO3	366
BCU	70D	C	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	416
BCU	70D	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	443
BCU	70D	C	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	527
BCU	70D	C	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	540
BCU	70D	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	610
BCU	70D	C	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	580
BCU	70D	C	2021/04/01	--	Barium, total	mg/L	0.336
BCU	70D	C	2021/04/21	--	Barium, total	mg/L	0.521
BCU	70D	C	2021/05/10	--	Barium, total	mg/L	0.890
BCU	70D	C	2021/06/03	--	Barium, total	mg/L	0.687
BCU	70D	C	2021/06/17	--	Barium, total	mg/L	0.726
BCU	70D	C	2021/07/08	--	Barium, total	mg/L	0.954
BCU	70D	C	2021/07/27	--	Barium, total	mg/L	0.734
BCU	70D	C	2021/08/17	--	Barium, total	mg/L	0.761
BCU	70D	C	2023/06/20	--	Barium, total	mg/L	0.399
BCU	70D	C	2023/09/19	--	Barium, total	mg/L	0.380
BCU	70D	C	2023/11/29	--	Barium, total	mg/L	0.420
BCU	70D	C	2021/04/01	--	Calcium, total	mg/L	39.6
BCU	70D	C	2021/04/21	--	Calcium, total	mg/L	48.1
BCU	70D	C	2021/05/10	--	Calcium, total	mg/L	69.1
BCU	70D	C	2021/06/03	--	Calcium, total	mg/L	68.6
BCU	70D	C	2021/06/17	--	Calcium, total	mg/L	73.1
BCU	70D	C	2021/07/08	--	Calcium, total	mg/L	82.5
BCU	70D	C	2021/07/27	--	Calcium, total	mg/L	78.1
BCU	70D	C	2021/08/17	--	Calcium, total	mg/L	91.5
BCU	70D	C	2023/06/20	--	Calcium, total	mg/L	89.8
BCU	70D	C	2023/09/19	--	Calcium, total	mg/L	77.0
BCU	70D	C	2023/11/29	--	Calcium, total	mg/L	84.0
BCU	70D	C	2021/04/01	--	Chloride, total	mg/L	317
BCU	70D	C	2021/04/21	--	Chloride, total	mg/L	517
BCU	70D	C	2021/05/10	--	Chloride, total	mg/L	680
BCU	70D	C	2021/06/03	--	Chloride, total	mg/L	665
BCU	70D	C	2021/06/17	--	Chloride, total	mg/L	680
BCU	70D	C	2021/07/08	--	Chloride, total	mg/L	735
BCU	70D	C	2021/07/27	--	Chloride, total	mg/L	745
BCU	70D	C	2021/08/17	--	Chloride, total	mg/L	716
BCU	70D	C	2023/06/20	--	Chloride, total	mg/L	573
BCU	70D	C	2023/09/19	--	Chloride, total	mg/L	570
BCU	70D	C	2023/11/29	--	Chloride, total	mg/L	550
BCU	70D	C	2023/06/20	--	Iron, dissolved	mg/L	<0.02
BCU	70D	C	2023/09/19	--	Iron, dissolved	mg/L	<0.047
BCU	70D	C	2021/04/01	--	Lithium, total	mg/L	0.0633
BCU	70D	C	2021/04/21	--	Lithium, total	mg/L	0.0574
BCU	70D	C	2021/05/10	--	Lithium, total	mg/L	0.143
BCU	70D	C	2021/06/03	--	Lithium, total	mg/L	0.0838
BCU	70D	C	2021/06/17	--	Lithium, total	mg/L	0.0931
BCU	70D	C	2021/07/08	--	Lithium, total	mg/L	0.138
BCU	70D	C	2021/07/27	--	Lithium, total	mg/L	0.0869
BCU	70D	C	2021/08/17	--	Lithium, total	mg/L	0.0994

BCU	70D	C	2023/06/20	--	Lithium, total	mg/L	0.0850
BCU	70D	C	2023/09/19	--	Lithium, total	mg/L	0.0950
BCU	70D	C	2023/11/29	--	Lithium, total	mg/L	0.110
BCU	70D	C	2021/04/01	--	Magnesium, total	mg/L	28.1
BCU	70D	C	2021/04/21	--	Magnesium, total	mg/L	27.2
BCU	70D	C	2021/05/10	--	Magnesium, total	mg/L	57.2
BCU	70D	C	2021/06/03	--	Magnesium, total	mg/L	39.2
BCU	70D	C	2021/06/17	--	Magnesium, total	mg/L	42.3
BCU	70D	C	2021/07/08	--	Magnesium, total	mg/L	60.1
BCU	70D	C	2021/07/27	--	Magnesium, total	mg/L	45.4
BCU	70D	C	2021/08/17	--	Magnesium, total	mg/L	54.4
BCU	70D	C	2023/06/20	--	Magnesium, total	mg/L	50.4
BCU	70D	C	2023/11/29	--	Magnesium, total	mg/L	50.0
BCU	70D	C	2023/06/20	--	Manganese, dissolved	mg/L	0.0981
BCU	70D	C	2023/09/19	--	Manganese, dissolved	mg/L	0.480
BCU	70D	C	2023/06/20	--	Phosphate, dissolved	mg/L	<0.005
BCU	70D	C	2023/09/19	--	Phosphate, dissolved	mg/L	<0.073
BCU	70D	C	2021/04/01	--	Potassium, total	mg/L	11.1
BCU	70D	C	2021/04/21	--	Potassium, total	mg/L	11.2
BCU	70D	C	2021/05/10	--	Potassium, total	mg/L	11.6
BCU	70D	C	2021/06/03	--	Potassium, total	mg/L	10.5
BCU	70D	C	2021/06/17	--	Potassium, total	mg/L	11.2
BCU	70D	C	2021/07/08	--	Potassium, total	mg/L	13.4
BCU	70D	C	2021/07/27	--	Potassium, total	mg/L	9.42
BCU	70D	C	2021/08/17	--	Potassium, total	mg/L	10.4
BCU	70D	C	2023/06/20	--	Potassium, total	mg/L	6.69
BCU	70D	C	2023/11/29	--	Potassium, total	mg/L	6.10
BCU	70D	C	2023/06/20	--	Silicon, dissolved	mg/L	2.69
BCU	70D	C	2023/09/19	--	Silicon, dissolved	mg/L	3.60
BCU	70D	C	2021/04/01	--	Sodium, total	mg/L	264
BCU	70D	C	2021/04/21	--	Sodium, total	mg/L	367
BCU	70D	C	2021/05/10	--	Sodium, total	mg/L	515
BCU	70D	C	2021/06/03	--	Sodium, total	mg/L	566
BCU	70D	C	2021/06/17	--	Sodium, total	mg/L	547
BCU	70D	C	2021/07/08	--	Sodium, total	mg/L	594
BCU	70D	C	2021/07/27	--	Sodium, total	mg/L	542
BCU	70D	C	2021/08/17	--	Sodium, total	mg/L	632
BCU	70D	C	2023/06/20	--	Sodium, total	mg/L	506
BCU	70D	C	2023/11/29	--	Sodium, total	mg/L	460
BCU	70D	C	2021/04/01	--	Sulfate, total	mg/L	53.0
BCU	70D	C	2021/04/21	--	Sulfate, total	mg/L	48.0
BCU	70D	C	2021/05/10	--	Sulfate, total	mg/L	53.0
BCU	70D	C	2021/06/03	--	Sulfate, total	mg/L	48.0
BCU	70D	C	2021/06/17	--	Sulfate, total	mg/L	49.0
BCU	70D	C	2021/07/08	--	Sulfate, total	mg/L	49.0
BCU	70D	C	2021/07/27	--	Sulfate, total	mg/L	48.0
BCU	70D	C	2021/08/17	--	Sulfate, total	mg/L	50.0
BCU	70D	C	2023/06/20	--	Sulfate, total	mg/L	52.0
BCU	70D	C	2023/09/19	--	Sulfate, total	mg/L	46.0
BCU	70D	C	2023/11/29	--	Sulfate, total	mg/L	47.0
BCU	70D	C	2021/04/01	--	Temperature (Celsius)	degrees C	18.1
BCU	70D	C	2021/04/21	--	Temperature (Celsius)	degrees C	13.0
BCU	70D	C	2021/06/03	--	Temperature (Celsius)	degrees C	13.6
BCU	70D	C	2021/06/17	--	Temperature (Celsius)	degrees C	13.6
BCU	70D	C	2021/07/08	--	Temperature (Celsius)	degrees C	13.0
BCU	70D	C	2021/07/27	--	Temperature (Celsius)	degrees C	13.4
BCU	70D	C	2021/07/28	--	Temperature (Celsius)	degrees C	14.6
BCU	70D	C	2021/08/17	--	Temperature (Celsius)	degrees C	14.0

BCU	70D	C	2023/06/20	--	Temperature (Celsius)	degrees C	12.8
BCU	70D	C	2023/09/19	--	Temperature (Celsius)	degrees C	13.3
BCU	70D	C	2023/11/29	--	Temperature (Celsius)	degrees C	12.0
BCU	70D	C	2021/04/01	--	Total Dissolved Solids	mg/L	792
BCU	70D	C	2021/04/21	--	Total Dissolved Solids	mg/L	1,150
BCU	70D	C	2021/05/10	--	Total Dissolved Solids	mg/L	1,470
BCU	70D	C	2021/06/03	--	Total Dissolved Solids	mg/L	1,570
BCU	70D	C	2021/06/17	--	Total Dissolved Solids	mg/L	1,600
BCU	70D	C	2021/07/08	--	Total Dissolved Solids	mg/L	1,770
BCU	70D	C	2021/07/27	--	Total Dissolved Solids	mg/L	1,830
BCU	70D	C	2021/08/17	--	Total Dissolved Solids	mg/L	1,940
BCU	70D	C	2023/06/20	--	Total Dissolved Solids	mg/L	1,590
BCU	70D	C	2023/09/19	--	Total Dissolved Solids	mg/L	1,700
BCU	70D	C	2023/11/29	--	Total Dissolved Solids	mg/L	1,800
BCU	71D	C	2021/04/01	--	pH (field)	SU	7.6
BCU	71D	C	2021/06/17	--	pH (field)	SU	7.2
BCU	71D	C	2021/08/17	--	pH (field)	SU	7.0
BCU	71D	C	2023/06/20	--	pH (field)	SU	6.9
BCU	71D	C	2023/09/19	--	pH (field)	SU	7.1
BCU	71D	C	2023/11/29	--	pH (field)	SU	7.1
BCU	71D	C	2021/04/01	--	Oxidation Reduction Potential	mV	116
BCU	71D	C	2021/06/17	--	Oxidation Reduction Potential	mV	27.0
BCU	71D	C	2021/08/17	--	Oxidation Reduction Potential	mV	-14.0
BCU	71D	C	2023/06/20	--	Oxidation Reduction Potential	mV	176
BCU	71D	C	2023/09/19	--	Oxidation Reduction Potential	mV	140
BCU	71D	C	2023/11/29	--	Oxidation Reduction Potential	mV	43.1
BCU	71D	C	2021/04/01	--	Eh		0.31
BCU	71D	C	2021/06/17	--	Eh		0.22
BCU	71D	C	2021/08/17	--	Eh		0.18
BCU	71D	C	2023/06/20	--	Eh		0.37
BCU	71D	C	2023/09/19	--	Eh		0.33
BCU	71D	C	2023/11/29	--	Eh		0.24
BCU	71D	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	258
BCU	71D	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	352
BCU	71D	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	475
BCU	71D	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	628
BCU	71D	C	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	770
BCU	71D	C	2021/04/01	--	Barium, total	mg/L	0.299
BCU	71D	C	2021/04/21	--	Barium, total	mg/L	0.141
BCU	71D	C	2021/06/17	--	Barium, total	mg/L	0.400
BCU	71D	C	2021/08/17	--	Barium, total	mg/L	0.677
BCU	71D	C	2023/06/20	--	Barium, total	mg/L	0.531
BCU	71D	C	2023/11/29	--	Barium, total	mg/L	0.780
BCU	71D	C	2021/04/01	--	Calcium, total	mg/L	37.7
BCU	71D	C	2021/04/21	--	Calcium, total	mg/L	17.6
BCU	71D	C	2021/06/17	--	Calcium, total	mg/L	28.7
BCU	71D	C	2021/08/17	--	Calcium, total	mg/L	34.9
BCU	71D	C	2023/06/20	--	Calcium, total	mg/L	47.3
BCU	71D	C	2023/11/29	--	Calcium, total	mg/L	45.0
BCU	71D	C	2021/04/01	--	Chloride, total	mg/L	172
BCU	71D	C	2021/04/21	--	Chloride, total	mg/L	389
BCU	71D	C	2021/06/17	--	Chloride, total	mg/L	563
BCU	71D	C	2021/08/17	--	Chloride, total	mg/L	674
BCU	71D	C	2023/06/20	--	Chloride, total	mg/L	733
BCU	71D	C	2023/11/29	--	Chloride, total	mg/L	800
BCU	71D	C	2023/06/20	--	Iron, dissolved	mg/L	<0.02
BCU	71D	C	2021/04/01	--	Lithium, total	mg/L	0.112
BCU	71D	C	2021/04/21	--	Lithium, total	mg/L	0.0311

BCU	71D	C	2021/06/17	--	Lithium, total	mg/L	0.0502
BCU	71D	C	2021/08/17	--	Lithium, total	mg/L	0.0627
BCU	71D	C	2023/06/20	--	Lithium, total	mg/L	0.0792
BCU	71D	C	2023/11/29	--	Lithium, total	mg/L	0.110
BCU	71D	C	2021/04/01	--	Magnesium, total	mg/L	36.5
BCU	71D	C	2021/04/21	--	Magnesium, total	mg/L	9.97
BCU	71D	C	2021/06/17	--	Magnesium, total	mg/L	18.3
BCU	71D	C	2021/08/17	--	Magnesium, total	mg/L	23.7
BCU	71D	C	2023/06/20	--	Magnesium, total	mg/L	33.5
BCU	71D	C	2023/11/29	--	Magnesium, total	mg/L	33.0
BCU	71D	C	2023/06/20	--	Manganese, dissolved	mg/L	0.190
BCU	71D	C	2023/06/20	--	Phosphate, dissolved	mg/L	<0.005
BCU	71D	C	2021/04/01	--	Potassium, total	mg/L	8.79
BCU	71D	C	2021/04/21	--	Potassium, total	mg/L	5.25
BCU	71D	C	2021/06/17	--	Potassium, total	mg/L	6.83
BCU	71D	C	2021/08/17	--	Potassium, total	mg/L	7.14
BCU	71D	C	2023/06/20	--	Potassium, total	mg/L	6.75
BCU	71D	C	2023/11/29	--	Potassium, total	mg/L	6.30
BCU	71D	C	2023/06/20	--	Silicon, dissolved	mg/L	2.98
BCU	71D	C	2021/04/01	--	Sodium, total	mg/L	215
BCU	71D	C	2021/04/21	--	Sodium, total	mg/L	374
BCU	71D	C	2021/06/17	--	Sodium, total	mg/L	591
BCU	71D	C	2021/08/17	--	Sodium, total	mg/L	722
BCU	71D	C	2023/06/20	--	Sodium, total	mg/L	826
BCU	71D	C	2023/11/29	--	Sodium, total	mg/L	810
BCU	71D	C	2021/04/01	--	Sulfate, total	mg/L	44.0
BCU	71D	C	2021/04/21	--	Sulfate, total	mg/L	43.0
BCU	71D	C	2021/06/17	--	Sulfate, total	mg/L	72.0
BCU	71D	C	2021/08/17	--	Sulfate, total	mg/L	63.0
BCU	71D	C	2023/06/20	--	Sulfate, total	mg/L	56.0
BCU	71D	C	2023/11/29	--	Sulfate, total	mg/L	53.0
BCU	71D	C	2021/04/01	--	Temperature (Celsius)	degrees C	16.5
BCU	71D	C	2021/06/17	--	Temperature (Celsius)	degrees C	13.7
BCU	71D	C	2021/08/17	--	Temperature (Celsius)	degrees C	14.1
BCU	71D	C	2023/06/20	--	Temperature (Celsius)	degrees C	12.8
BCU	71D	C	2023/09/19	--	Temperature (Celsius)	degrees C	21.7
BCU	71D	C	2023/11/29	--	Temperature (Celsius)	degrees C	11.4
BCU	71D	C	2021/04/01	--	Total Dissolved Solids	mg/L	896
BCU	71D	C	2021/04/21	--	Total Dissolved Solids	mg/L	1,010
BCU	71D	C	2021/06/17	--	Total Dissolved Solids	mg/L	1,640
BCU	71D	C	2021/08/17	--	Total Dissolved Solids	mg/L	1,900
BCU	71D	C	2023/06/20	--	Total Dissolved Solids	mg/L	1,990
BCU	71D	C	2023/11/29	--	Total Dissolved Solids	mg/L	2,400
CCR	NED1	Porewater	2021/04/01	--	pH (field)	SU	9.2
CCR	NED1	Porewater	2021/04/21	--	pH (field)	SU	8.9
CCR	NED1	Porewater	2021/05/11	--	pH (field)	SU	7.9
CCR	NED1	Porewater	2021/06/04	--	pH (field)	SU	7.6
CCR	NED1	Porewater	2021/08/17	--	pH (field)	SU	8.7
CCR	NED1	Porewater	2023/09/26	--	pH (field)	SU	7.6
CCR	NED1	Porewater	2023/11/29	--	pH (field)	SU	8.0
CCR	NED1	Porewater	2021/04/01	--	Oxidation Reduction Potential	mV	-267
CCR	NED1	Porewater	2021/04/21	--	Oxidation Reduction Potential	mV	-194
CCR	NED1	Porewater	2021/05/11	--	Oxidation Reduction Potential	mV	-91.0
CCR	NED1	Porewater	2021/06/04	--	Oxidation Reduction Potential	mV	-173
CCR	NED1	Porewater	2021/08/17	--	Oxidation Reduction Potential	mV	-184
CCR	NED1	Porewater	2023/09/26	--	Oxidation Reduction Potential	mV	-181
CCR	NED1	Porewater	2023/11/29	--	Oxidation Reduction Potential	mV	-178
CCR	NED1	Porewater	2021/04/01	--	Eh		-0.068

CCR	NED1	Porewater	2021/04/21	--	Eh		0.0041
CCR	NED1	Porewater	2021/05/11	--	Eh		0.11
CCR	NED1	Porewater	2021/06/04	--	Eh		0.024
CCR	NED1	Porewater	2021/08/17	--	Eh		0.010
CCR	NED1	Porewater	2023/09/26	--	Eh		0.011
CCR	NED1	Porewater	2023/11/29	--	Eh		0.018
CCR	NED1	Porewater	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	4.00
CCR	NED1	Porewater	2021/05/11	--	Alkalinity, bicarbonate	mg/L CaCO3	132
CCR	NED1	Porewater	2021/06/04	--	Alkalinity, bicarbonate	mg/L CaCO3	117
CCR	NED1	Porewater	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	18.0
CCR	NED1	Porewater	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	210
CCR	NED1	Porewater	2021/04/01	--	Alkalinity, carbonate	mg/L CaCO3	81.0
CCR	NED1	Porewater	2021/04/21	--	Alkalinity, carbonate	mg/L CaCO3	62.0
CCR	NED1	Porewater	2021/08/17	--	Alkalinity, carbonate	mg/L CaCO3	41.0
CCR	NED1	Porewater	2021/04/01	--	Barium, total	mg/L	0.0324
CCR	NED1	Porewater	2021/04/21	--	Barium, total	mg/L	0.0290
CCR	NED1	Porewater	2021/05/11	--	Barium, total	mg/L	0.0289
CCR	NED1	Porewater	2021/06/04	--	Barium, total	mg/L	0.0319
CCR	NED1	Porewater	2021/08/17	--	Barium, total	mg/L	0.0314
CCR	NED1	Porewater	2023/09/26	--	Barium, total	mg/L	0.190
CCR	NED1	Porewater	2023/11/29	--	Barium, total	mg/L	0.230
CCR	NED1	Porewater	2021/04/01	--	Calcium, total	mg/L	497
CCR	NED1	Porewater	2021/04/21	--	Calcium, total	mg/L	472
CCR	NED1	Porewater	2021/05/11	--	Calcium, total	mg/L	674
CCR	NED1	Porewater	2021/06/04	--	Calcium, total	mg/L	532
CCR	NED1	Porewater	2021/08/17	--	Calcium, total	mg/L	531
CCR	NED1	Porewater	2023/09/26	--	Calcium, total	mg/L	240
CCR	NED1	Porewater	2023/11/29	--	Calcium, total	mg/L	470
CCR	NED1	Porewater	2021/04/01	--	Chloride, total	mg/L	44.0
CCR	NED1	Porewater	2021/04/21	--	Chloride, total	mg/L	32.0
CCR	NED1	Porewater	2021/05/11	--	Chloride, total	mg/L	18.0
CCR	NED1	Porewater	2021/06/04	--	Chloride, total	mg/L	18.0
CCR	NED1	Porewater	2021/08/17	--	Chloride, total	mg/L	25.0
CCR	NED1	Porewater	2023/09/26	--	Chloride, total	mg/L	27.0
CCR	NED1	Porewater	2023/11/29	--	Chloride, total	mg/L	11.0
CCR	NED1	Porewater	2023/09/26	--	Iron, dissolved	mg/L	0.280
CCR	NED1	Porewater	2021/04/01	--	Lithium, total	mg/L	0.247
CCR	NED1	Porewater	2021/04/21	--	Lithium, total	mg/L	0.305
CCR	NED1	Porewater	2021/05/11	--	Lithium, total	mg/L	0.275
CCR	NED1	Porewater	2021/06/04	--	Lithium, total	mg/L	0.359
CCR	NED1	Porewater	2021/08/17	--	Lithium, total	mg/L	0.363
CCR	NED1	Porewater	2023/09/26	--	Lithium, total	mg/L	0.0600
CCR	NED1	Porewater	2023/11/29	--	Lithium, total	mg/L	0.300
CCR	NED1	Porewater	2021/04/01	--	Magnesium, total	mg/L	12.7
CCR	NED1	Porewater	2021/04/21	--	Magnesium, total	mg/L	15.1
CCR	NED1	Porewater	2021/05/11	--	Magnesium, total	mg/L	43.4
CCR	NED1	Porewater	2021/06/04	--	Magnesium, total	mg/L	48.7
CCR	NED1	Porewater	2021/08/17	--	Magnesium, total	mg/L	25.3
CCR	NED1	Porewater	2023/11/29	--	Magnesium, total	mg/L	49.0
CCR	NED1	Porewater	2023/09/26	--	Manganese, dissolved	mg/L	0.200
CCR	NED1	Porewater	2023/09/26	--	Phosphate, dissolved	mg/L	0.470
CCR	NED1	Porewater	2021/04/01	--	Potassium, total	mg/L	28.4
CCR	NED1	Porewater	2021/04/21	--	Potassium, total	mg/L	31.1
CCR	NED1	Porewater	2021/05/11	--	Potassium, total	mg/L	29.1
CCR	NED1	Porewater	2021/06/04	--	Potassium, total	mg/L	25.3
CCR	NED1	Porewater	2021/08/17	--	Potassium, total	mg/L	32.4
CCR	NED1	Porewater	2023/11/29	--	Potassium, total	mg/L	27.0
CCR	NED1	Porewater	2023/09/26	--	Silicon, dissolved	mg/L	3.10

CCR	NED1	Porewater	2021/04/01	--	Sodium, total	mg/L	130
CCR	NED1	Porewater	2021/04/21	--	Sodium, total	mg/L	97.1
CCR	NED1	Porewater	2021/05/11	--	Sodium, total	mg/L	71.3
CCR	NED1	Porewater	2021/06/04	--	Sodium, total	mg/L	63.9
CCR	NED1	Porewater	2021/08/17	--	Sodium, total	mg/L	104
CCR	NED1	Porewater	2023/11/29	--	Sodium, total	mg/L	59.0
CCR	NED1	Porewater	2021/04/01	--	Sulfate, total	mg/L	1,340
CCR	NED1	Porewater	2021/04/21	--	Sulfate, total	mg/L	1,230
CCR	NED1	Porewater	2021/05/11	--	Sulfate, total	mg/L	1,300
CCR	NED1	Porewater	2021/06/04	--	Sulfate, total	mg/L	1,400
CCR	NED1	Porewater	2021/08/17	--	Sulfate, total	mg/L	1,510
CCR	NED1	Porewater	2023/09/26	--	Sulfate, total	mg/L	860
CCR	NED1	Porewater	2023/11/29	--	Sulfate, total	mg/L	1,300
CCR	NED1	Porewater	2021/04/01	--	Temperature (Celsius)	degrees C	11.2
CCR	NED1	Porewater	2021/04/21	--	Temperature (Celsius)	degrees C	11.2
CCR	NED1	Porewater	2021/05/11	--	Temperature (Celsius)	degrees C	11.9
CCR	NED1	Porewater	2021/06/04	--	Temperature (Celsius)	degrees C	12.6
CCR	NED1	Porewater	2021/08/17	--	Temperature (Celsius)	degrees C	17.0
CCR	NED1	Porewater	2023/09/26	--	Temperature (Celsius)	degrees C	20.3
CCR	NED1	Porewater	2023/11/29	--	Temperature (Celsius)	degrees C	14.9
CCR	NED1	Porewater	2021/04/01	--	Total Dissolved Solids	mg/L	2,340
CCR	NED1	Porewater	2021/04/21	--	Total Dissolved Solids	mg/L	2,130
CCR	NED1	Porewater	2021/05/11	--	Total Dissolved Solids	mg/L	2,170
CCR	NED1	Porewater	2021/06/04	--	Total Dissolved Solids	mg/L	2,340
CCR	NED1	Porewater	2021/08/17	--	Total Dissolved Solids	mg/L	2,350
CCR	NED1	Porewater	2023/09/26	--	Total Dissolved Solids	mg/L	1,500
CCR	NED1	Porewater	2023/11/29	--	Total Dissolved Solids	mg/L	2,500
UCU	10	B	2021/04/01	--	pH (field)	SU	6.8
UCU	10	B	2021/04/21	--	pH (field)	SU	6.8
UCU	10	B	2021/05/10	--	pH (field)	SU	6.8
UCU	10	B	2021/06/03	--	pH (field)	SU	6.7
UCU	10	B	2021/06/17	--	pH (field)	SU	6.8
UCU	10	B	2021/07/08	--	pH (field)	SU	6.7
UCU	10	B	2021/07/27	--	pH (field)	SU	6.8
UCU	10	B	2021/08/17	--	pH (field)	SU	6.7
UCU	10	B	2022/03/09	--	pH (field)	SU	6.6
UCU	10	B	2022/06/28	--	pH (field)	SU	6.7
UCU	10	B	2022/09/08	--	pH (field)	SU	6.6
UCU	10	B	2022/11/22	--	pH (field)	SU	6.7
UCU	10	B	2023/03/29	--	pH (field)	SU	6.7
UCU	10	B	2023/06/20	--	pH (field)	SU	6.7
UCU	10	B	2023/09/19	--	pH (field)	SU	6.9
UCU	10	B	2023/11/28	--	pH (field)	SU	7.0
UCU	10	B	2017/07/12	--	pH (field)	SU	6.7
UCU	10	B	2017/09/14	--	pH (field)	SU	6.7
UCU	10	B	2017/11/08	--	pH (field)	SU	6.9
UCU	10	B	2018/01/24	--	pH (field)	SU	7.0
UCU	10	B	2018/03/22	--	pH (field)	SU	6.8
UCU	10	B	2018/05/09	--	pH (field)	SU	6.4
UCU	10	B	2017/03/21	--	pH (field)	SU	6.8
UCU	10	B	2017/06/16	--	pH (field)	SU	6.8
UCU	10	B	2018/08/17	--	pH (field)	SU	6.9
UCU	10	B	2018/12/03	--	pH (field)	SU	6.7
UCU	10	B	2021/04/01	--	Oxidation Reduction Potential	mV	162
UCU	10	B	2021/04/21	--	Oxidation Reduction Potential	mV	255
UCU	10	B	2021/05/10	--	Oxidation Reduction Potential	mV	188
UCU	10	B	2021/06/03	--	Oxidation Reduction Potential	mV	12.0
UCU	10	B	2021/06/17	--	Oxidation Reduction Potential	mV	3.00

UCU	10	B	2021/07/08	--	Oxidation Reduction Potential	mV	40.0
UCU	10	B	2021/07/27	--	Oxidation Reduction Potential	mV	-76.0
UCU	10	B	2021/08/17	--	Oxidation Reduction Potential	mV	-48.0
UCU	10	B	2022/03/09	--	Oxidation Reduction Potential	mV	124
UCU	10	B	2022/06/28	--	Oxidation Reduction Potential	mV	132
UCU	10	B	2022/09/08	--	Oxidation Reduction Potential	mV	172
UCU	10	B	2022/11/22	--	Oxidation Reduction Potential	mV	166
UCU	10	B	2023/03/29	--	Oxidation Reduction Potential	mV	108
UCU	10	B	2023/06/20	--	Oxidation Reduction Potential	mV	131
UCU	10	B	2023/09/19	--	Oxidation Reduction Potential	mV	196
UCU	10	B	2023/11/28	--	Oxidation Reduction Potential	mV	143
UCU	10	B	2017/07/12	--	Oxidation Reduction Potential	mV	121
UCU	10	B	2017/09/14	--	Oxidation Reduction Potential	mV	137
UCU	10	B	2017/11/08	--	Oxidation Reduction Potential	mV	84.0
UCU	10	B	2018/01/24	--	Oxidation Reduction Potential	mV	50.0
UCU	10	B	2018/03/22	--	Oxidation Reduction Potential	mV	74.0
UCU	10	B	2018/05/09	--	Oxidation Reduction Potential	mV	73.0
UCU	10	B	2021/04/01	--	Eh		0.36
UCU	10	B	2021/04/21	--	Eh		0.45
UCU	10	B	2021/05/10	--	Eh		0.38
UCU	10	B	2021/06/03	--	Eh		0.21
UCU	10	B	2021/06/17	--	Eh		0.20
UCU	10	B	2021/07/08	--	Eh		0.24
UCU	10	B	2021/07/27	--	Eh		0.12
UCU	10	B	2021/08/17	--	Eh		0.15
UCU	10	B	2022/03/09	--	Eh		0.32
UCU	10	B	2022/06/28	--	Eh		0.33
UCU	10	B	2022/09/08	--	Eh		0.37
UCU	10	B	2022/11/22	--	Eh		0.36
UCU	10	B	2023/03/29	--	Eh		0.31
UCU	10	B	2023/06/20	--	Eh		0.33
UCU	10	B	2023/09/19	--	Eh		0.39
UCU	10	B	2023/11/28	--	Eh		0.34
UCU	10	B	2017/07/12	--	Eh		0.31
UCU	10	B	2017/09/14	--	Eh		0.33
UCU	10	B	2017/11/08	--	Eh		0.28
UCU	10	B	2018/01/24	--	Eh		0.25
UCU	10	B	2018/03/22	--	Eh		0.27
UCU	10	B	2018/05/09	--	Eh		0.27
UCU	10	B	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	550
UCU	10	B	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	546
UCU	10	B	2021/05/10	--	Alkalinity, bicarbonate	mg/L CaCO3	476
UCU	10	B	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	579
UCU	10	B	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	550
UCU	10	B	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	561
UCU	10	B	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	550
UCU	10	B	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	582
UCU	10	B	2023/11/28	--	Alkalinity, bicarbonate	mg/L CaCO3	510
UCU	10	B	2021/04/01	--	Barium, total	mg/L	0.0790
UCU	10	B	2021/04/21	--	Barium, total	mg/L	0.0470
UCU	10	B	2021/05/10	--	Barium, total	mg/L	0.0678
UCU	10	B	2021/06/03	--	Barium, total	mg/L	0.0795
UCU	10	B	2021/06/17	--	Barium, total	mg/L	0.0625
UCU	10	B	2021/07/08	--	Barium, total	mg/L	0.0680
UCU	10	B	2021/07/27	--	Barium, total	mg/L	0.0712
UCU	10	B	2021/08/17	--	Barium, total	mg/L	0.0772
UCU	10	B	2023/06/20	--	Barium, total	mg/L	0.0734
UCU	10	B	2023/09/19	--	Barium, total	mg/L	0.0690

UCU	10	B	2023/11/28	--	Barium, total	mg/L	0.110
UCU	10	B	2021/04/01	--	Calcium, total	mg/L	182
UCU	10	B	2021/04/21	--	Calcium, total	mg/L	193
UCU	10	B	2021/05/10	--	Calcium, total	mg/L	160
UCU	10	B	2021/06/03	--	Calcium, total	mg/L	186
UCU	10	B	2021/06/17	--	Calcium, total	mg/L	186
UCU	10	B	2021/07/08	--	Calcium, total	mg/L	166
UCU	10	B	2021/07/27	--	Calcium, total	mg/L	182
UCU	10	B	2021/08/17	--	Calcium, total	mg/L	192
UCU	10	B	2023/06/20	--	Calcium, total	mg/L	187
UCU	10	B	2023/09/19	--	Calcium, total	mg/L	160
UCU	10	B	2023/11/28	--	Calcium, total	mg/L	160
UCU	10	B	2021/04/01	--	Chloride, total	mg/L	6.00
UCU	10	B	2021/04/21	--	Chloride, total	mg/L	6.00
UCU	10	B	2021/05/10	--	Chloride, total	mg/L	4.00
UCU	10	B	2021/06/03	--	Chloride, total	mg/L	5.00
UCU	10	B	2021/06/17	--	Chloride, total	mg/L	6.00
UCU	10	B	2021/07/08	--	Chloride, total	mg/L	5.00
UCU	10	B	2021/07/27	--	Chloride, total	mg/L	4.00
UCU	10	B	2021/08/17	--	Chloride, total	mg/L	5.00
UCU	10	B	2023/06/20	--	Chloride, total	mg/L	4.00
UCU	10	B	2023/09/19	--	Chloride, total	mg/L	4.60
UCU	10	B	2023/11/28	--	Chloride, total	mg/L	4.60
UCU	10	B	2017/07/12	--	Chloride, total	mg/L	7.00
UCU	10	B	2017/09/14	--	Chloride, total	mg/L	8.00
UCU	10	B	2017/11/08	--	Chloride, total	mg/L	7.00
UCU	10	B	2018/01/24	--	Chloride, total	mg/L	12.0
UCU	10	B	2018/03/22	--	Chloride, total	mg/L	9.00
UCU	10	B	2018/05/09	--	Chloride, total	mg/L	8.00
UCU	10	B	2023/06/20	--	Iron, dissolved	mg/L	<0.02
UCU	10	B	2023/09/19	--	Iron, dissolved	mg/L	<0.047
UCU	10	B	2017/07/12	--	Iron, dissolved	mg/L	0.0400
UCU	10	B	2017/09/14	--	Iron, dissolved	mg/L	<0.0075
UCU	10	B	2017/11/08	--	Iron, dissolved	mg/L	<0.0075
UCU	10	B	2018/01/24	--	Iron, dissolved	mg/L	<0.0075
UCU	10	B	2018/03/22	--	Iron, dissolved	mg/L	0.0272
UCU	10	B	2018/05/09	--	Iron, dissolved	mg/L	<0.009
UCU	10	B	2021/04/01	--	Lithium, total	mg/L	0.0143
UCU	10	B	2021/04/21	--	Lithium, total	mg/L	0.0180
UCU	10	B	2021/05/10	--	Lithium, total	mg/L	0.0112
UCU	10	B	2021/06/03	--	Lithium, total	mg/L	0.0164
UCU	10	B	2021/06/17	--	Lithium, total	mg/L	0.0155
UCU	10	B	2021/07/08	--	Lithium, total	mg/L	0.0163
UCU	10	B	2021/07/27	--	Lithium, total	mg/L	0.0167
UCU	10	B	2021/08/17	--	Lithium, total	mg/L	0.0161
UCU	10	B	2023/06/20	--	Lithium, total	mg/L	0.0145
UCU	10	B	2023/09/19	--	Lithium, total	mg/L	0.0140
UCU	10	B	2023/11/28	--	Lithium, total	mg/L	0.0140
UCU	10	B	2021/04/01	--	Magnesium, total	mg/L	87.2
UCU	10	B	2021/04/21	--	Magnesium, total	mg/L	123
UCU	10	B	2021/05/10	--	Magnesium, total	mg/L	81.9
UCU	10	B	2021/06/03	--	Magnesium, total	mg/L	110
UCU	10	B	2021/06/17	--	Magnesium, total	mg/L	104
UCU	10	B	2021/07/08	--	Magnesium, total	mg/L	109
UCU	10	B	2021/07/27	--	Magnesium, total	mg/L	111
UCU	10	B	2021/08/17	--	Magnesium, total	mg/L	110
UCU	10	B	2023/06/20	--	Magnesium, total	mg/L	100
UCU	10	B	2023/11/28	--	Magnesium, total	mg/L	79.0

UCU	10	B	2021/06/03	--	Manganese, dissolved	mg/L	0.0286
UCU	10	B	2022/03/09	--	Manganese, dissolved	mg/L	0.0282
UCU	10	B	2022/06/28	--	Manganese, dissolved	mg/L	0.0720
UCU	10	B	2022/09/08	--	Manganese, dissolved	mg/L	0.166
UCU	10	B	2022/11/22	--	Manganese, dissolved	mg/L	0.0625
UCU	10	B	2023/03/29	--	Manganese, dissolved	mg/L	0.0105
UCU	10	B	2023/06/20	--	Manganese, dissolved	mg/L	0.0218
UCU	10	B	2023/09/19	--	Manganese, dissolved	mg/L	0.00830
UCU	10	B	2023/11/28	--	Manganese, dissolved	mg/L	0.0510
UCU	10	B	2017/07/12	--	Manganese, dissolved	mg/L	0.0722
UCU	10	B	2017/09/14	1	Manganese, dissolved	mg/L	0.131
UCU	10	B	2017/11/08	1	Manganese, dissolved	mg/L	0.0954
UCU	10	B	2018/01/24	--	Manganese, dissolved	mg/L	0.0783
UCU	10	B	2018/03/22	1	Manganese, dissolved	mg/L	0.0327
UCU	10	B	2018/05/09	1	Manganese, dissolved	mg/L	0.0284
UCU	10	B	2017/03/21	--	Manganese, dissolved	mg/L	0.0591
UCU	10	B	2017/06/16	--	Manganese, dissolved	mg/L	0.0545
UCU	10	B	2017/09/14	2	Manganese, dissolved	mg/L	0.151
UCU	10	B	2017/11/08	2	Manganese, dissolved	mg/L	0.116
UCU	10	B	2018/03/22	2	Manganese, dissolved	mg/L	0.0286
UCU	10	B	2018/05/09	2	Manganese, dissolved	mg/L	0.0321
UCU	10	B	2018/08/17	--	Manganese, dissolved	mg/L	0.0866
UCU	10	B	2018/12/03	--	Manganese, dissolved	mg/L	0.0626
UCU	10	B	2023/06/20	--	Phosphate, dissolved	mg/L	0.0210
UCU	10	B	2023/09/19	--	Phosphate, dissolved	mg/L	<0.073
UCU	10	B	2021/04/01	--	Potassium, total	mg/L	1.64
UCU	10	B	2021/04/21	--	Potassium, total	mg/L	1.58
UCU	10	B	2021/05/10	--	Potassium, total	mg/L	1.74
UCU	10	B	2021/06/03	--	Potassium, total	mg/L	1.88
UCU	10	B	2021/06/17	--	Potassium, total	mg/L	1.66
UCU	10	B	2021/07/08	--	Potassium, total	mg/L	1.67
UCU	10	B	2021/07/27	--	Potassium, total	mg/L	1.63
UCU	10	B	2021/08/17	--	Potassium, total	mg/L	1.62
UCU	10	B	2023/06/20	--	Potassium, total	mg/L	3.27
UCU	10	B	2023/11/28	--	Potassium, total	mg/L	1.90
UCU	10	B	2023/06/20	--	Silicon, dissolved	mg/L	10.1
UCU	10	B	2023/09/19	--	Silicon, dissolved	mg/L	11.0
UCU	10	B	2021/04/01	--	Sodium, total	mg/L	8.92
UCU	10	B	2021/04/21	--	Sodium, total	mg/L	10.3
UCU	10	B	2021/05/10	--	Sodium, total	mg/L	8.21
UCU	10	B	2021/06/03	--	Sodium, total	mg/L	11.3
UCU	10	B	2021/06/17	--	Sodium, total	mg/L	11.0
UCU	10	B	2021/07/08	--	Sodium, total	mg/L	11.5
UCU	10	B	2021/07/27	--	Sodium, total	mg/L	9.16
UCU	10	B	2021/08/17	--	Sodium, total	mg/L	9.99
UCU	10	B	2023/06/20	--	Sodium, total	mg/L	9.95
UCU	10	B	2023/11/28	--	Sodium, total	mg/L	9.30
UCU	10	B	2021/04/01	--	Sulfate, total	mg/L	292
UCU	10	B	2021/04/21	--	Sulfate, total	mg/L	309
UCU	10	B	2021/05/10	--	Sulfate, total	mg/L	224
UCU	10	B	2021/06/03	--	Sulfate, total	mg/L	317
UCU	10	B	2021/06/17	--	Sulfate, total	mg/L	272
UCU	10	B	2021/07/08	--	Sulfate, total	mg/L	328
UCU	10	B	2021/07/27	--	Sulfate, total	mg/L	338
UCU	10	B	2021/08/17	--	Sulfate, total	mg/L	296
UCU	10	B	2022/03/09	--	Sulfate, total	mg/L	350
UCU	10	B	2022/06/28	--	Sulfate, total	mg/L	267
UCU	10	B	2022/09/08	--	Sulfate, total	mg/L	262

UCU	10	B	2022/11/22	--	Sulfate, total	mg/L	250
UCU	10	B	2023/03/29	--	Sulfate, total	mg/L	324
UCU	10	B	2023/06/20	--	Sulfate, total	mg/L	248
UCU	10	B	2023/09/19	--	Sulfate, total	mg/L	230
UCU	10	B	2023/11/28	--	Sulfate, total	mg/L	230
UCU	10	B	2017/07/12	--	Sulfate, total	mg/L	332
UCU	10	B	2017/09/14	1	Sulfate, total	mg/L	281
UCU	10	B	2017/11/08	1	Sulfate, total	mg/L	269
UCU	10	B	2018/01/24	--	Sulfate, total	mg/L	233
UCU	10	B	2018/03/22	1	Sulfate, total	mg/L	296
UCU	10	B	2018/05/09	1	Sulfate, total	mg/L	337
UCU	10	B	2017/03/21	--	Sulfate, total	mg/L	269
UCU	10	B	2017/06/16	--	Sulfate, total	mg/L	379
UCU	10	B	2017/09/14	2	Sulfate, total	mg/L	286
UCU	10	B	2017/11/08	2	Sulfate, total	mg/L	270
UCU	10	B	2018/03/22	2	Sulfate, total	mg/L	258
UCU	10	B	2018/05/09	2	Sulfate, total	mg/L	325
UCU	10	B	2018/08/17	--	Sulfate, total	mg/L	280
UCU	10	B	2018/12/03	--	Sulfate, total	mg/L	269
UCU	10	B	2021/04/01	--	Temperature (Celsius)	degrees C	12
UCU	10	B	2021/04/21	--	Temperature (Celsius)	degrees C	9.83
UCU	10	B	2021/05/10	--	Temperature (Celsius)	degrees C	14.3
UCU	10	B	2021/06/03	--	Temperature (Celsius)	degrees C	14.3
UCU	10	B	2021/06/17	--	Temperature (Celsius)	degrees C	14.1
UCU	10	B	2021/07/08	--	Temperature (Celsius)	degrees C	15.3
UCU	10	B	2021/07/27	--	Temperature (Celsius)	degrees C	15.3
UCU	10	B	2021/08/17	--	Temperature (Celsius)	degrees C	16.2
UCU	10	B	2022/03/09	--	Temperature (Celsius)	degrees C	12.9
UCU	10	B	2022/06/28	--	Temperature (Celsius)	degrees C	15.9
UCU	10	B	2022/09/08	--	Temperature (Celsius)	degrees C	17.6
UCU	10	B	2022/11/22	--	Temperature (Celsius)	degrees C	13.6
UCU	10	B	2023/03/29	--	Temperature (Celsius)	degrees C	12.5
UCU	10	B	2023/06/20	--	Temperature (Celsius)	degrees C	15.0
UCU	10	B	2023/09/19	--	Temperature (Celsius)	degrees C	16.5
UCU	10	B	2023/11/28	--	Temperature (Celsius)	degrees C	9.76
UCU	10	B	2017/07/12	--	Temperature (Celsius)	degrees C	17.2
UCU	10	B	2017/09/14	--	Temperature (Celsius)	degrees C	14.8
UCU	10	B	2017/11/08	--	Temperature (Celsius)	degrees C	13.1
UCU	10	B	2018/01/24	--	Temperature (Celsius)	degrees C	10.7
UCU	10	B	2018/03/22	--	Temperature (Celsius)	degrees C	14.3
UCU	10	B	2018/05/09	--	Temperature (Celsius)	degrees C	15.3
UCU	10	B	2017/03/21	--	Temperature (Celsius)	degrees C	12.8
UCU	10	B	2017/06/16	--	Temperature (Celsius)	degrees C	15.6
UCU	10	B	2018/08/17	--	Temperature (Celsius)	degrees C	21.2
UCU	10	B	2018/12/03	--	Temperature (Celsius)	degrees C	11.8
UCU	10	B	2021/04/01	--	Total Dissolved Solids	mg/L	942
UCU	10	B	2021/04/21	--	Total Dissolved Solids	mg/L	1,080
UCU	10	B	2021/05/10	--	Total Dissolved Solids	mg/L	850
UCU	10	B	2021/06/03	--	Total Dissolved Solids	mg/L	980
UCU	10	B	2021/06/17	--	Total Dissolved Solids	mg/L	946
UCU	10	B	2021/07/08	--	Total Dissolved Solids	mg/L	988
UCU	10	B	2021/07/27	--	Total Dissolved Solids	mg/L	1,010
UCU	10	B	2021/08/17	--	Total Dissolved Solids	mg/L	970
UCU	10	B	2022/03/09	--	Total Dissolved Solids	mg/L	1,080
UCU	10	B	2022/06/28	--	Total Dissolved Solids	mg/L	960
UCU	10	B	2022/09/08	--	Total Dissolved Solids	mg/L	908
UCU	10	B	2022/11/22	--	Total Dissolved Solids	mg/L	875
UCU	10	B	2023/03/29	--	Total Dissolved Solids	mg/L	1,000

UCU	10	B	2023/06/20	--	Total Dissolved Solids	mg/L	946
UCU	10	B	2023/09/19	--	Total Dissolved Solids	mg/L	890
UCU	10	B	2023/11/28	--	Total Dissolved Solids	mg/L	890
UCU	10	B	2017/07/12	--	Total Dissolved Solids	mg/L	1,030
UCU	10	B	2017/09/14	1	Total Dissolved Solids	mg/L	1,020
UCU	10	B	2017/11/08	1	Total Dissolved Solids	mg/L	900
UCU	10	B	2018/01/24	--	Total Dissolved Solids	mg/L	826
UCU	10	B	2018/03/22	1	Total Dissolved Solids	mg/L	890
UCU	10	B	2018/05/09	--	Total Dissolved Solids	mg/L	1,010
UCU	10	B	2017/03/21	--	Total Dissolved Solids	mg/L	932
UCU	10	B	2017/06/16	--	Total Dissolved Solids	mg/L	1,100
UCU	10	B	2017/09/14	2	Total Dissolved Solids	mg/L	964
UCU	10	B	2017/11/08	2	Total Dissolved Solids	mg/L	842
UCU	10	B	2018/03/22	2	Total Dissolved Solids	mg/L	872
UCU	10	B	2018/08/17	--	Total Dissolved Solids	mg/L	994
UCU	10	B	2018/12/03	--	Total Dissolved Solids	mg/L	886
UU	70S	C	2021/04/01	--	pH (field)	SU	7.0
UU	70S	C	2021/04/21	--	pH (field)	SU	6.9
UU	70S	C	2021/05/10	--	pH (field)	SU	7.0
UU	70S	C	2021/06/03	--	pH (field)	SU	6.9
UU	70S	C	2021/06/17	--	pH (field)	SU	6.8
UU	70S	C	2021/07/08	--	pH (field)	SU	6.8
UU	70S	C	2021/07/27	--	pH (field)	SU	7.0
UU	70S	C	2021/08/17	--	pH (field)	SU	6.9
UU	70S	C	2023/06/21	--	pH (field)	SU	6.9
UU	70S	C	2023/09/19	--	pH (field)	SU	7.1
UU	70S	C	2023/11/29	--	pH (field)	SU	7.2
UU	70S	C	2021/04/01	--	Oxidation Reduction Potential	mV	118
UU	70S	C	2021/04/21	--	Oxidation Reduction Potential	mV	135
UU	70S	C	2021/05/10	--	Oxidation Reduction Potential	mV	116
UU	70S	C	2021/06/03	--	Oxidation Reduction Potential	mV	45.0
UU	70S	C	2021/06/17	--	Oxidation Reduction Potential	mV	15.0
UU	70S	C	2021/07/08	--	Oxidation Reduction Potential	mV	25.0
UU	70S	C	2021/07/27	--	Oxidation Reduction Potential	mV	-46.0
UU	70S	C	2021/08/17	--	Oxidation Reduction Potential	mV	-25.0
UU	70S	C	2023/06/21	--	Oxidation Reduction Potential	mV	14.0
UU	70S	C	2023/09/19	--	Oxidation Reduction Potential	mV	83.5
UU	70S	C	2023/11/29	--	Oxidation Reduction Potential	mV	-39.2
UU	70S	C	2021/04/01	--	Eh		0.32
UU	70S	C	2021/04/21	--	Eh		0.33
UU	70S	C	2021/05/10	--	Eh		0.32
UU	70S	C	2021/06/03	--	Eh		0.24
UU	70S	C	2021/06/17	--	Eh		0.21
UU	70S	C	2021/07/08	--	Eh		0.22
UU	70S	C	2021/07/27	--	Eh		0.15
UU	70S	C	2021/08/17	--	Eh		0.17
UU	70S	C	2023/06/21	--	Eh		0.21
UU	70S	C	2023/09/19	--	Eh		0.28
UU	70S	C	2023/11/29	--	Eh		0.16
UU	70S	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	310
UU	70S	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	270
UU	70S	C	2021/05/10	--	Alkalinity, bicarbonate	mg/L CaCO3	262
UU	70S	C	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	272
UU	70S	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	278
UU	70S	C	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	305
UU	70S	C	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	287
UU	70S	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	272
UU	70S	C	2023/11/29	--	Alkalinity, bicarbonate	mg/L CaCO3	280

UU	70S	C	2021/04/01	--	Barium, total	mg/L	0.0175
UU	70S	C	2021/04/21	--	Barium, total	mg/L	0.0205
UU	70S	C	2021/05/10	--	Barium, total	mg/L	0.0185
UU	70S	C	2021/06/03	--	Barium, total	mg/L	0.0165
UU	70S	C	2021/06/17	--	Barium, total	mg/L	0.0187
UU	70S	C	2021/07/08	--	Barium, total	mg/L	0.0172
UU	70S	C	2021/07/27	--	Barium, total	mg/L	0.0148
UU	70S	C	2021/08/17	--	Barium, total	mg/L	0.0195
UU	70S	C	2023/06/21	--	Barium, total	mg/L	0.0183
UU	70S	C	2023/09/19	--	Barium, total	mg/L	0.0160
UU	70S	C	2023/11/29	--	Barium, total	mg/L	0.0200
UU	70S	C	2021/04/01	--	Calcium, total	mg/L	253
UU	70S	C	2021/04/21	--	Calcium, total	mg/L	281
UU	70S	C	2021/05/10	--	Calcium, total	mg/L	270
UU	70S	C	2021/06/03	--	Calcium, total	mg/L	245
UU	70S	C	2021/06/17	--	Calcium, total	mg/L	250
UU	70S	C	2021/07/08	--	Calcium, total	mg/L	220
UU	70S	C	2021/07/27	--	Calcium, total	mg/L	229
UU	70S	C	2021/08/17	--	Calcium, total	mg/L	232
UU	70S	C	2023/06/21	--	Calcium, total	mg/L	224
UU	70S	C	2023/09/19	--	Calcium, total	mg/L	210
UU	70S	C	2023/11/29	--	Calcium, total	mg/L	220
UU	70S	C	2021/04/01	--	Chloride, total	mg/L	19.0
UU	70S	C	2021/04/21	--	Chloride, total	mg/L	17.0
UU	70S	C	2021/05/10	--	Chloride, total	mg/L	16.0
UU	70S	C	2021/06/03	--	Chloride, total	mg/L	15.0
UU	70S	C	2021/06/17	--	Chloride, total	mg/L	15.0
UU	70S	C	2021/07/08	--	Chloride, total	mg/L	14.0
UU	70S	C	2021/07/27	--	Chloride, total	mg/L	11.0
UU	70S	C	2021/08/17	--	Chloride, total	mg/L	15.0
UU	70S	C	2023/06/21	--	Chloride, total	mg/L	14.0
UU	70S	C	2023/09/19	--	Chloride, total	mg/L	17.0
UU	70S	C	2023/11/29	--	Chloride, total	mg/L	20.0
UU	70S	C	2023/06/21	--	Iron, dissolved	mg/L	<0.02
UU	70S	C	2023/09/19	--	Iron, dissolved	mg/L	<0.047
UU	70S	C	2021/04/01	--	Lithium, total	mg/L	0.0137
UU	70S	C	2021/04/21	--	Lithium, total	mg/L	0.0127
UU	70S	C	2021/05/10	--	Lithium, total	mg/L	0.0107
UU	70S	C	2021/06/03	--	Lithium, total	mg/L	0.0122
UU	70S	C	2021/06/17	--	Lithium, total	mg/L	0.0129
UU	70S	C	2021/07/08	--	Lithium, total	mg/L	0.0121
UU	70S	C	2021/07/27	--	Lithium, total	mg/L	0.0127
UU	70S	C	2021/08/17	--	Lithium, total	mg/L	0.0157
UU	70S	C	2023/06/21	--	Lithium, total	mg/L	0.0150
UU	70S	C	2023/09/19	--	Lithium, total	mg/L	0.0190
UU	70S	C	2023/11/29	--	Lithium, total	mg/L	0.0220
UU	70S	C	2021/04/01	--	Magnesium, total	mg/L	101
UU	70S	C	2021/04/21	--	Magnesium, total	mg/L	121
UU	70S	C	2021/05/10	--	Magnesium, total	mg/L	123
UU	70S	C	2021/06/03	--	Magnesium, total	mg/L	97.5
UU	70S	C	2021/06/17	--	Magnesium, total	mg/L	97.6
UU	70S	C	2021/07/08	--	Magnesium, total	mg/L	84.3
UU	70S	C	2021/07/27	--	Magnesium, total	mg/L	90.0
UU	70S	C	2021/08/17	--	Magnesium, total	mg/L	92.0
UU	70S	C	2023/06/21	--	Magnesium, total	mg/L	92.9
UU	70S	C	2023/11/29	--	Magnesium, total	mg/L	90.0
UU	70S	C	2023/06/21	--	Manganese, dissolved	mg/L	1.47
UU	70S	C	2023/09/19	--	Manganese, dissolved	mg/L	0.970

UU	70S	C	2023/06/21	--	Phosphate, dissolved	mg/L	<0.005
UU	70S	C	2023/09/19	--	Phosphate, dissolved	mg/L	<0.073
UU	70S	C	2021/04/01	--	Potassium, total	mg/L	1.63
UU	70S	C	2021/04/21	--	Potassium, total	mg/L	1.92
UU	70S	C	2021/05/10	--	Potassium, total	mg/L	1.74
UU	70S	C	2021/06/03	--	Potassium, total	mg/L	1.91
UU	70S	C	2021/06/17	--	Potassium, total	mg/L	1.86
UU	70S	C	2021/07/08	--	Potassium, total	mg/L	1.76
UU	70S	C	2021/07/27	--	Potassium, total	mg/L	1.97
UU	70S	C	2021/08/17	--	Potassium, total	mg/L	2.03
UU	70S	C	2023/06/21	--	Potassium, total	mg/L	1.83
UU	70S	C	2023/11/29	--	Potassium, total	mg/L	2.40
UU	70S	C	2023/06/21	--	Silicon, dissolved	mg/L	4.62
UU	70S	C	2023/09/19	--	Silicon, dissolved	mg/L	6.40
UU	70S	C	2021/04/01	--	Sodium, total	mg/L	18.6
UU	70S	C	2021/04/21	--	Sodium, total	mg/L	19.5
UU	70S	C	2021/05/10	--	Sodium, total	mg/L	21.8
UU	70S	C	2021/06/03	--	Sodium, total	mg/L	22.5
UU	70S	C	2021/06/17	--	Sodium, total	mg/L	21.6
UU	70S	C	2021/07/08	--	Sodium, total	mg/L	18.5
UU	70S	C	2021/07/27	--	Sodium, total	mg/L	19.9
UU	70S	C	2021/08/17	--	Sodium, total	mg/L	19.0
UU	70S	C	2023/06/21	--	Sodium, total	mg/L	18.9
UU	70S	C	2023/11/29	--	Sodium, total	mg/L	29.0
UU	70S	C	2021/04/01	--	Sulfate, total	mg/L	760
UU	70S	C	2021/04/21	--	Sulfate, total	mg/L	840
UU	70S	C	2021/05/10	--	Sulfate, total	mg/L	779
UU	70S	C	2021/06/03	--	Sulfate, total	mg/L	673
UU	70S	C	2021/06/17	--	Sulfate, total	mg/L	730
UU	70S	C	2021/07/08	--	Sulfate, total	mg/L	589
UU	70S	C	2021/07/27	--	Sulfate, total	mg/L	541
UU	70S	C	2021/08/17	--	Sulfate, total	mg/L	638
UU	70S	C	2023/06/21	--	Sulfate, total	mg/L	602
UU	70S	C	2023/09/19	--	Sulfate, total	mg/L	670
UU	70S	C	2023/11/29	--	Sulfate, total	mg/L	670
UU	70S	C	2021/04/01	--	Temperature (Celsius)	degrees C	10.7
UU	70S	C	2021/04/21	--	Temperature (Celsius)	degrees C	9.08
UU	70S	C	2021/05/10	--	Temperature (Celsius)	degrees C	8.64
UU	70S	C	2021/06/03	--	Temperature (Celsius)	degrees C	9.90
UU	70S	C	2021/06/17	--	Temperature (Celsius)	degrees C	9.90
UU	70S	C	2021/07/08	--	Temperature (Celsius)	degrees C	12.1
UU	70S	C	2021/07/27	--	Temperature (Celsius)	degrees C	14.0
UU	70S	C	2021/08/17	--	Temperature (Celsius)	degrees C	15.0
UU	70S	C	2023/06/21	--	Temperature (Celsius)	degrees C	10.6
UU	70S	C	2023/09/19	--	Temperature (Celsius)	degrees C	12.7
UU	70S	C	2023/11/29	--	Temperature (Celsius)	degrees C	12.3
UU	70S	C	2021/04/01	--	Total Dissolved Solids	mg/L	1,450
UU	70S	C	2021/04/21	--	Total Dissolved Solids	mg/L	1,580
UU	70S	C	2021/05/10	--	Total Dissolved Solids	mg/L	1,480
UU	70S	C	2021/06/03	--	Total Dissolved Solids	mg/L	1,350
UU	70S	C	2021/06/17	--	Total Dissolved Solids	mg/L	1,340
UU	70S	C	2021/07/08	--	Total Dissolved Solids	mg/L	1,220
UU	70S	C	2021/07/27	--	Total Dissolved Solids	mg/L	1,140
UU	70S	C	2021/08/17	--	Total Dissolved Solids	mg/L	1,250
UU	70S	C	2023/06/21	--	Total Dissolved Solids	mg/L	1,270
UU	70S	C	2023/09/19	--	Total Dissolved Solids	mg/L	1,300
UU	70S	C	2023/11/29	--	Total Dissolved Solids	mg/L	1,500
UU	71S	C	2021/04/01	--	pH (field)	SU	6.9

UU	71S	C	2021/04/21	--	pH (field)	SU	6.7
UU	71S	C	2021/05/12	--	pH (field)	SU	6.8
UU	71S	C	2021/06/03	--	pH (field)	SU	6.7
UU	71S	C	2021/06/17	--	pH (field)	SU	6.8
UU	71S	C	2021/07/08	--	pH (field)	SU	6.6
UU	71S	C	2021/07/27	--	pH (field)	SU	6.8
UU	71S	C	2021/08/17	--	pH (field)	SU	6.7
UU	71S	C	2021/04/01	--	Oxidation Reduction Potential	mV	34.1
UU	71S	C	2021/04/21	--	Oxidation Reduction Potential	mV	-8.10
UU	71S	C	2021/05/12	--	Oxidation Reduction Potential	mV	-34.7
UU	71S	C	2021/06/03	--	Oxidation Reduction Potential	mV	-82.0
UU	71S	C	2021/06/17	--	Oxidation Reduction Potential	mV	-88.0
UU	71S	C	2021/07/08	--	Oxidation Reduction Potential	mV	61.0
UU	71S	C	2021/07/27	--	Oxidation Reduction Potential	mV	-2.00
UU	71S	C	2021/08/17	--	Oxidation Reduction Potential	mV	-14.0
UU	71S	C	2021/04/01	--	Eh		0.23
UU	71S	C	2021/04/21	--	Eh		0.19
UU	71S	C	2021/05/12	--	Eh		0.16
UU	71S	C	2021/06/03	--	Eh		0.12
UU	71S	C	2021/06/17	--	Eh		0.11
UU	71S	C	2021/07/08	--	Eh		0.26
UU	71S	C	2021/07/27	--	Eh		0.19
UU	71S	C	2021/08/17	--	Eh		0.18
UU	71S	C	2021/04/01	--	Alkalinity, bicarbonate	mg/L CaCO3	422
UU	71S	C	2021/04/21	--	Alkalinity, bicarbonate	mg/L CaCO3	419
UU	71S	C	2021/05/12	--	Alkalinity, bicarbonate	mg/L CaCO3	403
UU	71S	C	2021/06/03	--	Alkalinity, bicarbonate	mg/L CaCO3	419
UU	71S	C	2021/06/17	--	Alkalinity, bicarbonate	mg/L CaCO3	422
UU	71S	C	2021/07/08	--	Alkalinity, bicarbonate	mg/L CaCO3	462
UU	71S	C	2021/07/27	--	Alkalinity, bicarbonate	mg/L CaCO3	421
UU	71S	C	2021/08/17	--	Alkalinity, bicarbonate	mg/L CaCO3	442
UU	71S	C	2021/04/01	--	Barium, total	mg/L	0.0476
UU	71S	C	2021/04/21	--	Barium, total	mg/L	0.0534
UU	71S	C	2021/05/12	--	Barium, total	mg/L	0.0487
UU	71S	C	2021/06/03	--	Barium, total	mg/L	0.0446
UU	71S	C	2021/06/17	--	Barium, total	mg/L	0.0421
UU	71S	C	2021/07/08	--	Barium, total	mg/L	0.0493
UU	71S	C	2021/07/27	--	Barium, total	mg/L	0.0462
UU	71S	C	2021/08/17	--	Barium, total	mg/L	0.0672
UU	71S	C	2021/04/01	--	Calcium, total	mg/L	115
UU	71S	C	2021/04/21	--	Calcium, total	mg/L	116
UU	71S	C	2021/05/12	--	Calcium, total	mg/L	124
UU	71S	C	2021/06/03	--	Calcium, total	mg/L	116
UU	71S	C	2021/06/17	--	Calcium, total	mg/L	117
UU	71S	C	2021/07/08	--	Calcium, total	mg/L	128
UU	71S	C	2021/07/27	--	Calcium, total	mg/L	132
UU	71S	C	2021/08/17	--	Calcium, total	mg/L	122
UU	71S	C	2021/04/01	--	Chloride, total	mg/L	2.00
UU	71S	C	2021/04/21	--	Chloride, total	mg/L	3.00
UU	71S	C	2021/05/12	--	Chloride, total	mg/L	3.00
UU	71S	C	2021/06/03	--	Chloride, total	mg/L	2.00
UU	71S	C	2021/06/17	--	Chloride, total	mg/L	2.00
UU	71S	C	2021/07/08	--	Chloride, total	mg/L	2.00
UU	71S	C	2021/07/27	--	Chloride, total	mg/L	2.00
UU	71S	C	2021/08/17	--	Chloride, total	mg/L	3.00
UU	71S	C	2021/04/01	--	Lithium, total	mg/L	0.00540
UU	71S	C	2021/04/21	--	Lithium, total	mg/L	0.00610
UU	71S	C	2021/05/12	--	Lithium, total	mg/L	0.00582

UU	71S	C	2021/06/03	--	Lithium, total	mg/L	0.00590
UU	71S	C	2021/06/17	--	Lithium, total	mg/L	0.00430
UU	71S	C	2021/07/08	--	Lithium, total	mg/L	0.00430
UU	71S	C	2021/07/27	--	Lithium, total	mg/L	0.00520
UU	71S	C	2021/08/17	--	Lithium, total	mg/L	0.00710
UU	71S	C	2021/04/01	--	Magnesium, total	mg/L	49.6
UU	71S	C	2021/04/21	--	Magnesium, total	mg/L	57.2
UU	71S	C	2021/05/12	--	Magnesium, total	mg/L	58.1
UU	71S	C	2021/06/03	--	Magnesium, total	mg/L	51.0
UU	71S	C	2021/06/17	--	Magnesium, total	mg/L	50.6
UU	71S	C	2021/07/08	--	Magnesium, total	mg/L	45.2
UU	71S	C	2021/07/27	--	Magnesium, total	mg/L	55.9
UU	71S	C	2021/08/17	--	Magnesium, total	mg/L	52.2
UU	71S	C	2021/04/01	--	Potassium, total	mg/L	0.351
UU	71S	C	2021/04/21	--	Potassium, total	mg/L	0.474
UU	71S	C	2021/05/12	--	Potassium, total	mg/L	0.452
UU	71S	C	2021/06/03	--	Potassium, total	mg/L	0.410
UU	71S	C	2021/06/17	--	Potassium, total	mg/L	0.422
UU	71S	C	2021/07/08	--	Potassium, total	mg/L	0.332
UU	71S	C	2021/07/27	--	Potassium, total	mg/L	0.440
UU	71S	C	2021/08/17	--	Potassium, total	mg/L	0.908
UU	71S	C	2021/04/01	--	Sodium, total	mg/L	5.29
UU	71S	C	2021/04/21	--	Sodium, total	mg/L	6.27
UU	71S	C	2021/05/12	--	Sodium, total	mg/L	8.21
UU	71S	C	2021/06/03	--	Sodium, total	mg/L	6.60
UU	71S	C	2021/06/17	--	Sodium, total	mg/L	6.95
UU	71S	C	2021/07/08	--	Sodium, total	mg/L	4.16
UU	71S	C	2021/07/27	--	Sodium, total	mg/L	6.79
UU	71S	C	2021/08/17	--	Sodium, total	mg/L	9.32
UU	71S	C	2021/04/01	--	Sulfate, total	mg/L	68.0
UU	71S	C	2021/04/21	--	Sulfate, total	mg/L	68.0
UU	71S	C	2021/05/12	--	Sulfate, total	mg/L	69.0
UU	71S	C	2021/06/03	--	Sulfate, total	mg/L	60.0
UU	71S	C	2021/06/17	--	Sulfate, total	mg/L	65.0
UU	71S	C	2021/07/08	--	Sulfate, total	mg/L	46.0
UU	71S	C	2021/07/27	--	Sulfate, total	mg/L	60.0
UU	71S	C	2021/08/17	--	Sulfate, total	mg/L	69.0
UU	71S	C	2021/04/01	--	Temperature (Celsius)	degrees C	9.35
UU	71S	C	2021/04/21	--	Temperature (Celsius)	degrees C	9.53
UU	71S	C	2021/05/12	--	Temperature (Celsius)	degrees C	10.1
UU	71S	C	2021/06/03	--	Temperature (Celsius)	degrees C	12.3
UU	71S	C	2021/06/17	--	Temperature (Celsius)	degrees C	13.5
UU	71S	C	2021/07/08	--	Temperature (Celsius)	degrees C	13.6
UU	71S	C	2021/07/27	--	Temperature (Celsius)	degrees C	15.5
UU	71S	C	2021/08/17	--	Temperature (Celsius)	degrees C	17.2
UU	71S	C	2021/04/01	--	Total Dissolved Solids	mg/L	486
UU	71S	C	2021/04/21	--	Total Dissolved Solids	mg/L	500
UU	71S	C	2021/05/12	--	Total Dissolved Solids	mg/L	474
UU	71S	C	2021/06/03	--	Total Dissolved Solids	mg/L	484
UU	71S	C	2021/06/17	--	Total Dissolved Solids	mg/L	502
UU	71S	C	2021/07/08	--	Total Dissolved Solids	mg/L	490
UU	71S	C	2021/07/27	--	Total Dissolved Solids	mg/L	538
UU	71S	C	2021/08/17	--	Total Dissolved Solids	mg/L	534

Notes:

< = results is less than detection limit

B = Background

C = Compliance

HSU = Hydrostratigraphic Unit

BCU = Bedrock Confining Unit
CCR = Coal Combustion Residuals
UCU = Upper Confining Unit
UU = Upper Unit
mg/L = milligrams per liter
SU = standard units
V = volts

APPENDIX D
Human Health and Ecological Risk Assessment Surface Water Samples

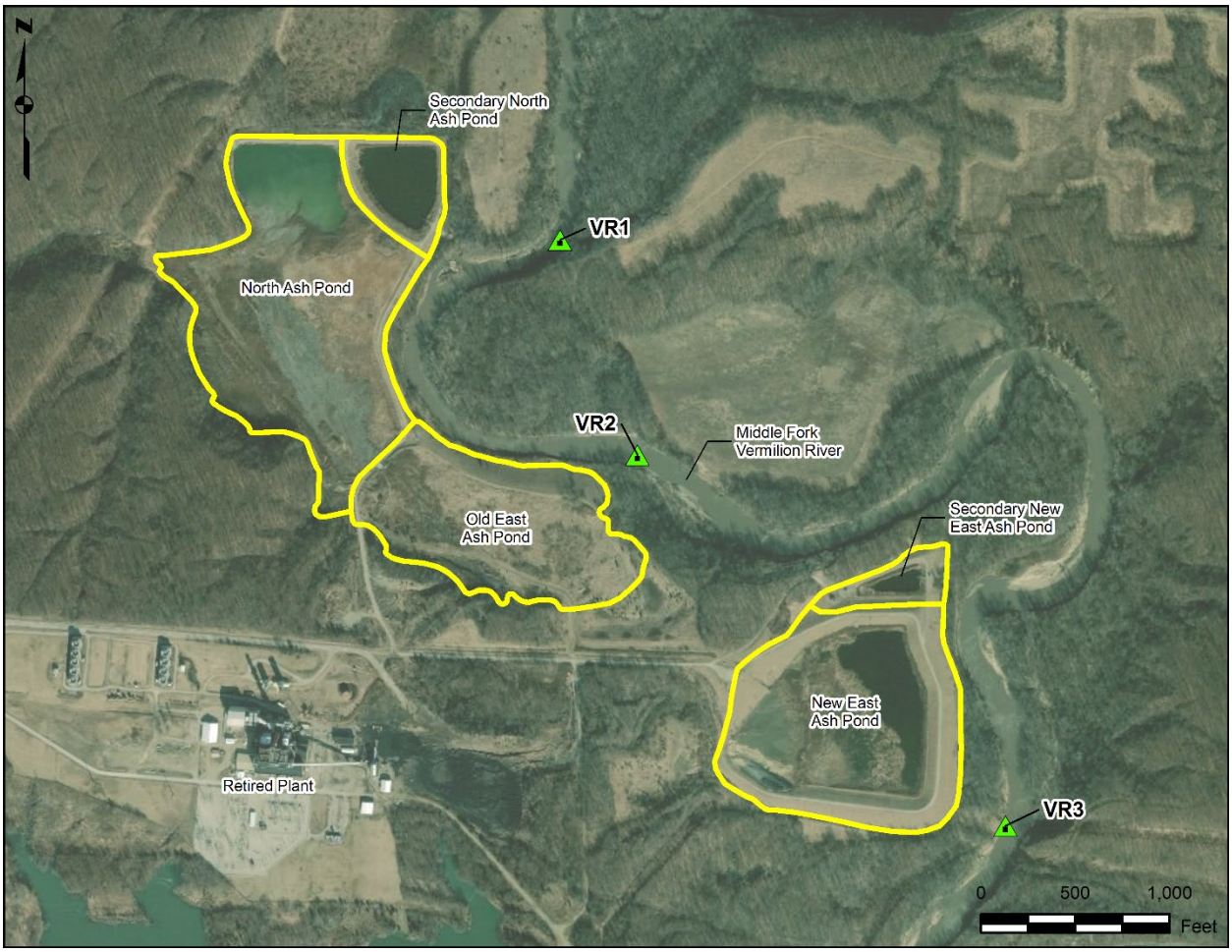


Figure 3.2 Surface Water Sample Locations. (Based on Hanson Professional Services Inc., 2019.)

Table 3.3 Constituents Analyzed in Surface Water (2019)

Analyte	
Arsenic	Iron*
Barium	Lead
Boron	Manganese
Cadmium	Mercury
Chromium	Nickel*
Chromium, Hexavalent*	Selenium
Copper*	Silver
Cyanide	Zinc*
Fluoride	

Notes:
General water quality parameters were also analyzed, but not evaluated further in the risk evaluation, including ammonia, nitrogen, chloride, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, phosphorus, sulfate, total dissolved solids, and total suspended solids.
*Metal also analyzed as dissolved metals.

Table A.2 Surface Water Data Summary, Middle Fork of the Vermilion River (2019)

Group	Analyte	Detects	Samples	Min Detect	Max Detect	Max DL	Units
Field	pH (field)	6	6	7.6	8.2	8.2	SU
Field	Specific conductance at 25C	6	6	662	696	696	micromhos/cm
Field	Temperature	3	3	7.4	8.6	8.6	deg. C
Field	Temperature	3	3	37	38	38	deg. F
Inorganic	Chloride, total in water	6	6	19	22	22	mg/L
Inorganic	Nitrate nitrogen, total	6	6	4.3	5.6	5.6	mg/L
Inorganic	Nitrite nitrogen, total	0	6			0.050	mg/L
Inorganic	Nitrogen, Ammonia, Total	0	6			0.10	mg/L
Inorganic	Phosphorus, total	6	6	0.11	0.32	0.32	mg/L
Inorganic	Sulfate	6	6	25	40	40	mg/L
Inorganic	Total Dissolved Solids	6	6	290	370	370	mg/L
Inorganic	Total Kjeldahl Nitrogen	1	6	1.5	1.5	1.5	mg/L
Inorganic	Total Suspended Solids	4	6	6.0	9.0	9.0	mg/L
Metals Dissolved	Chromium, Hexavalent	0	3			0.0050	mg/L
Metals Dissolved	Copper	0	6			0.0050	mg/L
Metals Dissolved	Iron	0	6			0.040	mg/L
Metals Dissolved	Nickel	0	6			0.0050	mg/L
Metals Dissolved	Zinc	0	6			0.010	mg/L
Metals Total	Arsenic	0	6			0.025	mg/L
Metals Total	Barium	6	6	0.036	0.040	0.040	mg/L
Metals Total	Boron	6	6	0.041	0.17	0.17	mg/L
Metals Total	Cadmium	0	6			0.0010	mg/L
Metals Total	Chromium	0	6			0.0050	mg/L
Metals Total	Chromium, Hexavalent	0	3			0.0050	mg/L
Metals Total	Cyanide	0	6			0.0050	mg/L
Metals Total	Fluoride	6	6	0.15	0.17	0.17	mg/L
Metals Total	Iron	6	6	0.34	0.65	0.65	mg/L
Metals Total	Lead	0	6			0.015	mg/L
Metals Total	Manganese	6	6	0.023	0.045	0.045	mg/L
Metals Total	Mercury	3	6	0.0000012	0.0000013	0.0000013	mg/L
Metals Total	Nickel	0	6			0.0050	mg/L
Metals Total	Selenium	0	6			0.0010	mg/L
Metals Total	Silver	0	6			0.0030	mg/L
Metals Total	Zinc	0	6			0.010	mg/L

Notes:

DL = Detection limit.