Luminant

Electric Energy, Inc.
1500 Eastport Plaza Drive
Collinsville, IL 62234

April 18, 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: Electric Energy, Inc – Joppa Power Plant (ID No. W1270100004-02)

Electric Energy, Inc. (EEI) is hereby submitting this assessment of groundwater corrective measures for Joppa Power Plant 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

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

Enclosure

Intended for
Electric Energy, Inc.

Date
April 18, 2024

Project No.
1940103584-006

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

JOPPA POWER PLANT, EAST ASH POND, IEPA ID NO. W1270100004-02

Bright ideas. Sustainable change.

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT JOPPA POWER PLANT, EAST ASH POND, IEPA ID NO. W1270100004-02

Project name	**Joppa Power Plant East Ash Pond**
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Recipient	**Electric Energy, Inc.**
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ACRONYMS AND ABBREVIATIONS

%	percent
35 I.A.C.	Title 35 of the Illinois Administrative Code
ASD	Alternative Source Demonstration
CAAA	Corrective Action Alternatives Analysis
CAP	Corrective Action Plan
CBR	closure-by-removal
CCR	coal combustion residuals
CIP	closure-in-place
CMA	Corrective Measures Assessment
cm/s	centimeters per second
CSM	conceptual site model
E001	Event 1
EAP	East Ash Pond
EEI	Electric Energy, Inc.
EPRI	Electric Power Research Institute
GMP	groundwater monitoring plan
gpm	gallons per minute
GWPS	groundwater protection standard(s)
HCR	Hydrogeologic Site Characterization Report
ID	identification
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
ITRC	National Research Council, Interstate Technology & Regulatory Council
IX	ion exchange
JPP	Joppa Power Plant
LAU	Lower Aquifer Unit
LCU	Lower Confining Unit
NID	National Inventory of Dams
No.	number
NPDES	National Pollutant Discharge Elimination System
NRT/OBG	Natural Resource Technology, an OBG Company
PCRM	Preliminary Corrective Remedial Measure
PRB	Permeable Reactive Barrier
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SI	surface impoundment
SSI	Supplemental Site Investigation
UA	uppermost aquifer
UCU	upper confining unit
USEPA	United States Environmental Protection Agency
ZVI	zero-valent iron

1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll) has developed this assessment of groundwater corrective measures on behalf of Electric Energy, Inc. (EEI), 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) surface impoundment (SI) referred to as the East Ash Pond (EAP) at the Joppa Power Plant (JPP), also referred to as CCR Unit identification [ID] Number (No.) 401, Illinois Environmental Protection Agency (IEPA) ID No. W1270100004-02, and National Inventory of Dams (NID) No. IL50714. This report addresses content requirements specific to 35 I.A.C. § 845.660 (Assessment of Corrective Measures) for exceedances of boron at the EAP.

1.1 Source Control and Residual Plume Management

EEI intends to initiate significant source control and residual plume management efforts as part of the EAP closure, as documented in the Final Closure Plan and Construction Permit Application that were submitted to IEPA in July of 2022 (Geosyntec Consultants, 2022). The proposed closure exceeds the minimum Closure Performance Standards listed in 35 I.A.C. § 845.750. The closure will include removing free liquids in accordance with the performance standard in 35 I.A.C. § 845 and maintaining that condition during the closure construction period. The closure will eliminate, to the maximum extent feasible, the hydraulic head that can force leachate into subsurface soils and is the mechanism that can drive risk (United States Environmental Protection Agency [USEPA], 2015a, p. 21342):

> *EPA's risk assessment shows that the highest risks are associated with CCR surface impoundments due to the hydraulic head imposed by impounded water. Dewatered CCR surface impoundments will no longer be subjected to hydraulic head so the risk of releases, including the risk that the unit will leach into the groundwater, would be no greater than those from CCR landfills.*

The EAP will be closed using a consolidate-and-cap approach consisting of excavating approximately 1.8 million cubic yards of CCR (including CCR from an approximately 54-acre closure-by-removal [CBR] area within the perimeter dikes of the EAP and all CCR from a 32-acre area outside of the perimeter dikes of the EAP) and using it for beneficial use in a consolidated closure-in-place (CIP) footprint. The consolidated CCR will be covered with an alternate geomembrane final cover system having performance that exceeds the 35 I.A.C. §845.750(c)(2) minimum final cover requirements. The proposed source control is predicted to reduce water flux into and out of the EAP by 99.99 percent (%) and allow the groundwater protection standards (GWPS) to be achieved within approximately 20 years after the completion of closure (Ramboll, 2022). These source control activities will serve as the primary groundwater corrective measure at the EAP. The potentially feasible corrective measures presented herein are intended to be supplementary to the primary groundwater corrective measure (*i.e.,* source control) and are intended to serve as management measures to address any residual plume(s) 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 EAP. The adaptive site management approach will allow timely incorporation of new site information over the closure and post-closure life cycle of the EAP to ensure the achievement of the 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 active 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. If the groundwater concentrations do not decrease consistent with modeling predictions, 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 to provide continuous improvement to the EAP groundwater remediation 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 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 EAP 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 EAP. 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 EAP. 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 EAP.
3. Ongoing groundwater monitoring at the EAP 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 with 35 I.A.C. § 845.780(c). 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 JPP is located west of the Village of Joppa in Massac County, Illinois, northeast of the Ohio River (**Figure 2-1**). The EAP is located in the west half of Section 14 directly north of the JPP and is bounded immediately to the east by the railway right-of-way, which is adjacent to forested portions of residential property in the Village of Joppa. The EAP (**Figure 2-2**) is a 128-acre inactive unlined CCR SI used to manage CCR and non-CCR waste streams during operation of the JPP.

2.1 Conceptual Site Model

Significant site investigation has been completed at the JPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the EAP has been well characterized and detailed in the Hydrogeologic Site Characterization Report (HCR; Ramboll, 2021a), which was prepared to comply with the requirements specified in 35 I.A.C. § 845.620 and expands upon the Hydrogeologic Monitoring Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017). The conceptual site model (CSM) is presented below.

In addition to the CCR present at the EAP, the following four distinct hydrostratigraphic units have been identified beneath the EAP, based on stratigraphic relationships and common hydrogeologic characteristics:

- **Upper Confining Unit (UCU)**: Includes approximately 50 feet of low permeability silt and clay of the Equality Formation, silts of the Peoria/Roxana/Loveland, and clay and silt of the Metropolis Formation. This unit limits the vertical migration of CCR impacts into the UA.
- **Uppermost Aquifer (UA)**: Includes high permeability sands with gravel, silt, and clay lenses of the Upper McNairy Formation. The UA is laterally continuous across the JPP and is approximately 85 feet thick near the EAP.
- **Lower Confining Unit (LCU)**: Includes clay and silt of the Lower McNairy Formation above the regional bedrock surface. Based on material description, continuous lateral extent, and observed vertical gradients, this unit has been identified as the LCU.
- **Lower Aquifer Unit (LAU)**: The lowermost unit identified at the EAP, which underlies all unlithified deposits, is considered a potential migration pathway. This unit is comprised of the Salem Limestone, which is the uppermost lithified unit identified at the EAP and is used as a potable and non-potable water supply in the vicinity of the JPP.

Groundwater flow in the EAP migrates downward through the UCU into the relatively high permeability sands and gravels of the UA. In the UA, groundwater generally migrates south and east towards the Ohio River. Vertical gradients measured between the LAU and the UA indicate upward migration of groundwater from the LAU to the UA and into the Ohio River. Groundwater elevations and contours for the May 1, 2023 groundwater 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 EAP 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 screened in the UA, 12 compliance wells screened in the UA, and two temporary water level only surface water staff gages. The groundwater samples collected from the 14 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 groundwater monitoring event was completed on May 3, 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. The statistical determination identified the following GWPS exceedances at compliance groundwater monitoring wells (Ramboll, 2023a):

- Boron at wells G06, G07, G08, G09, G10
- Cobalt at well G05
- pH at wells G11 and G51D

Pursuant to 35 I.A.C. § 845.650(e), an Alternative Source Demonstration (ASD) presented evidence demonstrating that sources other than the EAP were the cause of the cobalt and pH GWPS exceedances listed above (Ramboll, 2023b). IEPA did not concur with the ASD due to the following alleged data gaps (IEPA, 2023):

- Source characterization of the CCR at the EAP must include total solids sampling in accordance with SW846.
- Characterization of alternative source to include sample and analysis in accordance with 35 I.A.C. § 845.640 must be provided with the ASD.

EEI submitted written comments and additional information in response to IEPA's request for information and filed a petition asking the Illinois Pollution Control Board (IPCB) to review IEPA's ASD denial. The petition included a motion for a partial stay of the 35 I.A.C. § 845 requirements as they apply to the exceedances of the cobalt and pH GWPS at the EAP. IEPA had no objection to the requested stay, which was granted by IPCB to EEI on February 1, 2024. Therefore, the CMA will address GWPS exceedances in accordance with 35 I.A.C. § 845.660, exclusive of the cobalt and pH exceedances. 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 cobalt and pH GWPS exceedances in the CAP process will remain under review pending IPCB's final action on EEI's appeal of the IEPA ASD denial or until IPCB orders otherwise.

2.3 Groundwater Plume Delineation

Due to the identification of concentrations of boron above the anticipated GWPS (Ramboll, 2021b), additional investigations were conducted in 2022 in accordance with 35 I.A.C. § 845.650 to further assess the nature, degree, and extent of boron groundwater impacts downgradient of the EAP. The Supplemental Site Investigation (SSI) fully delineated the boron impacts to groundwater downgradient of the JPP EAP, both vertically and laterally. Boron has migrated downward through the UCU, reaching the UA and migrated laterally to the south and southeast; however, downward migration of boron from the UA to the LAU has not been observed (Geosyntec Consultants, 2023).

2.4 2024 Groundwater Extraction

Groundwater extraction is planned for the EAP in 2024 as a preliminary corrective remedial measure (PCRM) to provide hydraulic containment along the eastern boundary of the stie. Groundwater will be extracted from the UA using a system of extraction wells installed to the east of, and hydrogeologically downgradient from, the EAP. Each extraction well is planned to be designed to intercept impacted groundwater from the UA at flow rates that are currently expected to be around 30 to 40 gallons per minute (gpm) per well with a maximum design extraction rate of 70 gpm per well. Extracted groundwater will be conveyed from the extraction wells to an equalization tank, then transferred by a single pump to the Settling Lagoon located at the southern end of the JPP before being discharged to the Ohio River via the facility's existing National Pollutant Discharge Elimination System (NPDES) Outfall 010.

3. CORRECTIVE MEASURES ASSESSMENT METHODOLOGY

This section describes the CMA methodology initiated in response to the identification of exceedances of the GWPSs for 35 I.A.C. § 845.600 constituents at the downgradient waste boundary of the EAP during the E001 groundwater monitoring event (Ramboll, 2023a). The CMA was initiated on November 20, 2023, within 90 days after the detection of exceedance(s) of GWPS. Under 35 I.A.C. § 845, owners and operators of existing CCR SIs 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 (*i.e.,* 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). The remaining technologies will be evaluated individually, or assembled into combined alternatives, and further evaluated under the CAP process per 35 I.A.C. § 845.670.

This CMA identified applicable corrective measure technologies and evaluated them for viability, given the site-specific conditions and considerations at the EAP, 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 EAP. 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 Assessment (CAAA).

4. DESCRIPTION OF POTENTIAL CORRECTIVE MEASURE TECHNOLOGIES

The potential groundwater corrective measures summarized below are applicable to the EAP 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** (hybrid consolidate-and-cap approach with a geomembrane final cover system). 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 an approximately 20 year timeframe. 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 EAP, as described in **Section 1.1**; all of the evaluated 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, 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 the significant planned source control effort at the site, which will consist of a hybrid consolidate-and-cap approach with a final cover system 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, 2015b). 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, 2015b):

Both physical and chemical processes can contribute to the reduction of the small amount of residual mass remaining after closure of the EAP, 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.

All inorganic compounds are subject to physical processes, and under typical environmental conditions the physical mechanisms most often exert the dominant control on the CCR constituents of interest. Chemical mechanisms are also likely to be active, though not dominant, such as adsorption, ion exchange, and organic complexations. 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, 2015b) 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 within the UA.

- 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 mixing with 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 and 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 or secant-pile drill rigs, 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 boron 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 ion exchange 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 placed 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 ZVI 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 boron at the downgradient waste boundary of the EAP identified during the E001 groundwater monitoring event (**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 1.2** 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 CAP; and
- Institutional requirements, such as State or local permit requirement or other environmental or public health requirements that may substantially affect implementation of the CAP.

Table 5-1 presents the qualitative CMA evaluation for each corrective technology relative to these requirements, as well as their ability to address boron GWPS exceedances. The following sections provide a summary of these evaluations and a summary 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 CAAA process for selecting the final remedy for the EAP per 35 I.A.C. § 845.670.

5.2 Groundwater Corrective Technology Assessment

Source control, consisting of CCR consolidation and CIP with a final cover system, will be the primary groundwater corrective measure for the EAP. In addition, the PCRM will be constructed in 2024 to control off-site migration of boron. Closure will be in accordance with the closure plan 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 boron GWPS exceedances. Technologies that are not viable for addressing exceedances of GWPS at the EAP will be eliminated from further evaluation and viable technologies will be advanced for further evaluation as part of the CAAA process per 35 I.A.C. § 845.600.

5.2.1 Source Control with Groundwater Polishing

Source control corrective measures (**Section 1.1**) will reduce the mass loading to the groundwater system and the groundwater polishing process could decrease the timeframe for attainment of GWPS in the UA. Groundwater flow and fate and transport modeling incorporating only physical processes indicate that source control would meet GWPS in approximately 14 to 24 years. 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 achieve regulatory approval. The sandy nature of the UA suggests good performance by physical processes in addressing the boron in the UA.

Naturally occurring geochemical processes are ongoing at the EAP and will continue to affect groundwater constituent concentrations during and after the EAP 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 long term monitoring of the remedial progress. Enhancements to the groundwater monitoring system may be required to ensure that groundwater polishing is occurring as predicted, consistent with the adaptive site management approach. 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 prior to, or concurrently with, site closure activities. Installing additional monitoring wells could begin as quickly as within a few months of CAP approval. The time required could be reduced if existing groundwater monitoring well systems could be utilized for monitoring.

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, which require detailed technical analysis which are ongoing and will be evaluated in connection with the CAAA. Selecting groundwater polishing as a corrective measure for the EAP 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 EAP, would require long-term 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.

Groundwater polishing processes will continue before and after source control implementation and may be a viable corrective measure for the boron exceedances at the EAP. Therefore, these processes are being advanced to the CAAA for further evaluation.

5.2.1 Source Control with Groundwater Extraction

Source control will reduce the mass loading to the groundwater system and implementing a groundwater extraction system may reduce the time required to attain the GWPS in the UA and reduce migration off-site. Groundwater extraction is a widely accepted corrective measure with a long track record of performance and reliability, especially when contaminants are migrating off-site. It is routinely approved by the IEPA. The PCRM to be constructed in 2024 to control off-site migration of boron could be used, or enhanced with additional extraction wells as needed, to maintain off-site migration and ultimately achieve the GWPS. The performance of a groundwater extraction system would be expected to be effective in the high permeability UA.

Implementation of a groundwater extraction system, or enhancement of the planned groundwater extraction system, if needed, is feasible and will provide control of boron migration in the UA. Extracted groundwater generated will be managed and discharged to the permitted outfall at the Settling Lagoon. Enhancements, if needed, to the 2024 extraction system (*i.e.,* additional wells to the south and increased total flow rate) may require modification to the existing NPDES permit. Specialized groundwater 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 some limited exposure to extracted groundwater. A new groundwater extraction system, or enhancements to the planned extraction system could be implemented within approximately 1 to 2 years after approval of the CAP permit, including characterization, design, permitting, and construction. An extraction system would reduce the time to attain GWPS in the UA relative to the post-closure timeframe predicted by the groundwater modeling (approximately 14 to 24 years).

Implementing a groundwater extraction system at the EAP as part of the CAP would require IEPA approval of the CAP permit and discharge of extracted groundwater may require a modification to the NPDES permit.

Groundwater extraction could be viable corrective measure for the boron exceedances at the EAP. Therefore, groundwater extraction is being advanced to the CAAA for further evaluation.

5.2.2 Source Control with Groundwater Cutoff Wall

Source control will reduce the mass loading to the groundwater system and implementing additional groundwater corrective measures may reduce the time required to attain the GWPS in the UA. 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 aquifer they are in contact with. A cutoff wall designed with hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s) would be several orders of magnitude lower than the UA, thus would be expected to be an effective containment method in the UA.

Constructing a cutoff wall in the UA may be challenging due to the physical site constraints (presence of multiple high-voltage electrical transmission lines) and specialized construction contractor(s) may be required, due to the depth to the bottom of the UA, which could delay implementation.

Additional data collection and analyses would be required to design a cutoff wall. Construction could be completed within 3 to 4 years, including characterization, design, permitting and construction. Construction could possibly 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.

Constructing a cutoff wall at the EAP would require IEPA approval of the CAP permit and, depending on the location, an Illinois Department of Natural Resources (IDNR) land disturbance permit. An IDNR land disturbance permit and potential permitting requirements related to wetlands and threatened and endangered species may also be required for construction.

A cutoff wall alone would not be a viable corrective measure for the boron exceedances at the EAP. However, a cutoff wall may serve to increase the efficiency of a groundwater extraction system. Therefore, the cutoff wall is being advanced to the CAAA for further evaluation.

5.2.3 Source Control with In-Situ Chemical Treatment

Source control will reduce the mass loading to the groundwater system and implementing additional groundwater corrective measures, including the groundwater extraction system to be constructed in 2024, may reduce the time required to attain the GWPS in the UA. 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 ion exchange (IX) to address boron 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 lenses of finer grained material within the coarse-grained UA. Specialized contractors may be required due to the depth to the bottom of the UA and 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 along with regulatory acceptance. It is not known whether in-situ treatment would reduce the time to attain GWPS in the UA relative to the post-closure timeframe predicted by the groundwater modeling.

Due to the uncertain performance, reliability, and potential for not attaining regulatory acceptance, in-situ chemical treatment is not a viable corrective measure for the boron exceedances at the EAP 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;
- Source control and with groundwater extraction; and
- Source control with a groundwater cutoff wall.

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TABLES

TABLE 5-1

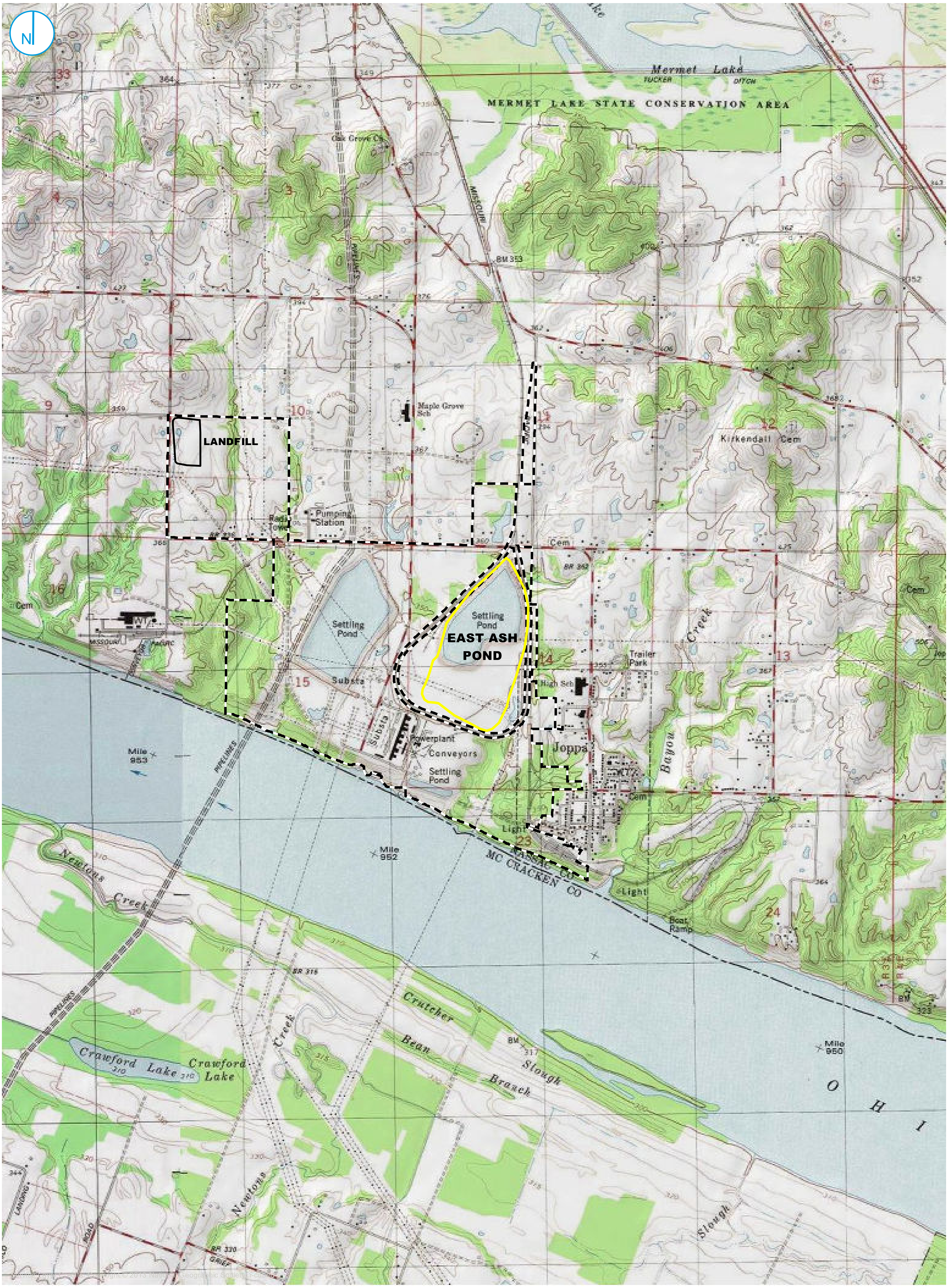
35 I.A.C. PART 845 CORRECTIVE MEASURES ASSESSMENT MATRIX
EAST ASH POND
JOPPA POWER PLANT
JOPPA , ILLINOIS
April 18, 2024

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, which is to be completed within 5 years of IEPA construction permit approval. Site conditions are favorable for physical processes, while chemical processes are limited under normal aquifer conditions.	Ongoing analysis will evaluate whether the attenuation mechanism has low reversibility, the aquifer has sufficient capacity, and the hydrogeology is favorable for physical processes.	Groundwater polishing evaluation is underway and is expected to be completed in 2024. Long-term monitoring would be required. Implementing would not require extensive specialized equipment or contractors.	None identified.	90 days after CAP permit approval.	Less than the 24 years predicted by the groundwater model.	IEPA approval of the CAP permit is required. The Village of Joppa does not have any specific requirements, but a county may require a land use permit to prevent downgradient well installation until GWPS are met.
Source Control with Groundwater Extraction	A widely accepted and routinely approved technology, groundwater extraction would provide hydraulic control of the contaminant plume and prevent off-site migration. Could be used to supplement the planned preliminary corrective remedial measure (PCRM), consisting of a groundwater extraction system to control off-site migration. Additional pumping wells may be needed to address onsite migration.	Reliable if properly designed, constructed and maintained. Groundwater treatment prior to discharge can be considered if indicated by performance monitoring.	Specialized contractors would not be necessary for construction of the groundwater extraction system. The extraction system would require ongoing routine operation and maintenance activities and extracted groundwater would require management, possibly including treatment. Groundwater treatment, if needed, may require specialized equipment/contractors and higher maintenance costs.	Groundwater extracted as part of the PCRM will be discharged to the permitted outfall at the West Lagoon. Groundwater extraction alters the groundwater flow system and there is the some limited potential for contact exposure to extracted groundwater.	The PCRM groundwater extraction to begin in 2024. If necessary, a groundwater extraction system to address onsite migration could be designed, permitted and constructed in 1 to 2 years after CAP approval.	Less than the 24 years predicted by the groundwater model.	IEPA approval of the CAP is required. Groundwater extracted as part of the PCRM will be discharged under a NPDES permit, which is currently pending approval. A larger groundwater extraction system may require an NPDES permit modification.
Source Control with Groundwater Cutoff Wall	Widely accepted and routinely approved technology with good performance if properly designed and constructed. Depth to the bottom of the UA may result in design and construction challenges and high cost. If not combined with extraction wells, a cutoff wall will provide directional control only, thus redirecting flow to other areas where GWPS may be exceeded.	Reliable for groundwater flow directional control if properly designed and constructed.	Widely used, established technology. Depth to the bottom of the UA and UCU would likely require specialized construction equipment and delay implementation (compared to groundwater extraction only). The presence of multiple energized high-voltage electrical transmission lines traversing the East Ash Pond and may cause construction related challenges.	Alters groundwater flow system but does not provide any treatment. Can result in unintended consequences resulting form redirecting contaminants to areas where they are not currently present.	Design, permitting and construction would take 3 to 4 years after CAP approval.	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.	IEPA approval of the CAP permit is required. An IDNR land disturbance permit and potential permitting requirements related to wetlands, threatened and endangered species may also be required for construction.
Source Control with In-Situ Chemical Treatment	Groundwater treatment using a permeable reactive barrier and ion exchange (IX) is not well established for boron, therefore performance is unknown.	Unknown reliability for boron.	Depth to the bottom of the UA and UCU would likely require specialized construction equipment. High permeability gravel layer found in the middle section of the UA might allow construction of a relatively shallow barrier system targeting a specific area within the UA. Could require periodic change-outs of IX resin media.	None identified.	May require bench scale and/or pilot scale testing as part of design. Design, permitting and construction would take 4 to 6 years after CAP approval.	There is uncertainty regarding whether a permeable reactive barrier would reduce boron 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 unproved solution may be challenging. An IDNR land disturbance permit and potential permitting requirements related to wetlands, threatened and endangered species may also be required for construction.

FIGURES

PROJECT: 169000XXXX | DATED: 10/14/2021 | DESIGNER: HOTCALD

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Joppa\Figure 1-1_Site Location Map.mxd



□ REGULATED UNIT (SUBJECT UNIT)

□ OTHER UNIT

⬚ PROPERTY BOUNDARY

SITE LOCATION MAP

FIGURE 2-1

0 1,000 2,000
Feet

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Joppa\GMP\Figure 1-2_Site Map.mxd

PROJECT: 169000XXXX | DATED: 10/15/2021 | DESIGNER: HOTCALD

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

▭ REGULATED UNIT (SUBJECT UNIT)
▭ OTHER UNIT
— CENTRAL DIKE
┅ PROPERTY BOUNDARY

0 375 750
Feet

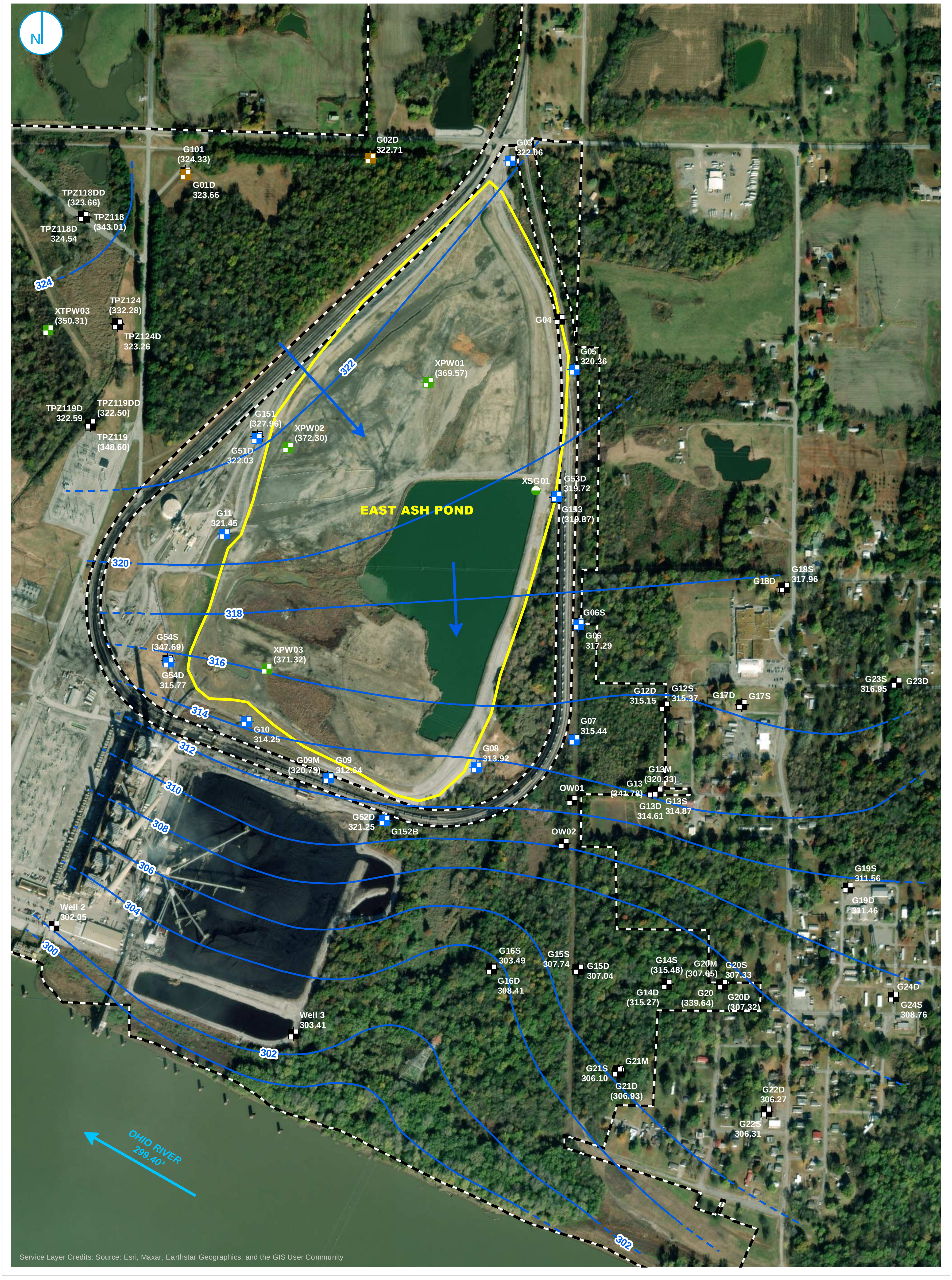
SITE MAP

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



▦ COMPLIANCE MONITORING WELL
▦ BACKGROUND MONITORING WELL
▦ PORE WATER WELL
▦ MONITORING WELL
◒ STAFF GAGE, CCR UNIT

— GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- - INFERRED GROUNDWATER ELEVATION CONTOUR
→ GROUNDWATER FLOW DIRECTION
▭ REGULATED UNIT (SUBJECT UNIT)
▭ PROPERTY BOUNDARY

0 275 550
Feet

NOTES
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
*GAGING DATA FROM USGS 03612600 OHIO RIVER AT OLMSTED, IL LOCATED APPROXIMATELY 12 MILES DOWNSTREAM OF JOPPA POWER PLANT.

MONITORING WELL LOCATION MAP
MAY 1, 2023

FIGURE 2-3

35 I.A.C. Ä845 CORRECTIVE MEASURES ASSESSMENT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

PROJECT: 169000XXXX | DATED: 10/18/2021 | DESIGNER: STOLZSD

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

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

▨ COMPLIANCE WELL
▨ BACKGROUND WELL
◒ STAFF GAUGE
▭ REGULATED UNIT (SUBJECT UNIT)
⬚ PROPERTY BOUNDARY

0 200 400
Feet

MONITORING WELL LOCATION MAP

FIGURE 2-4

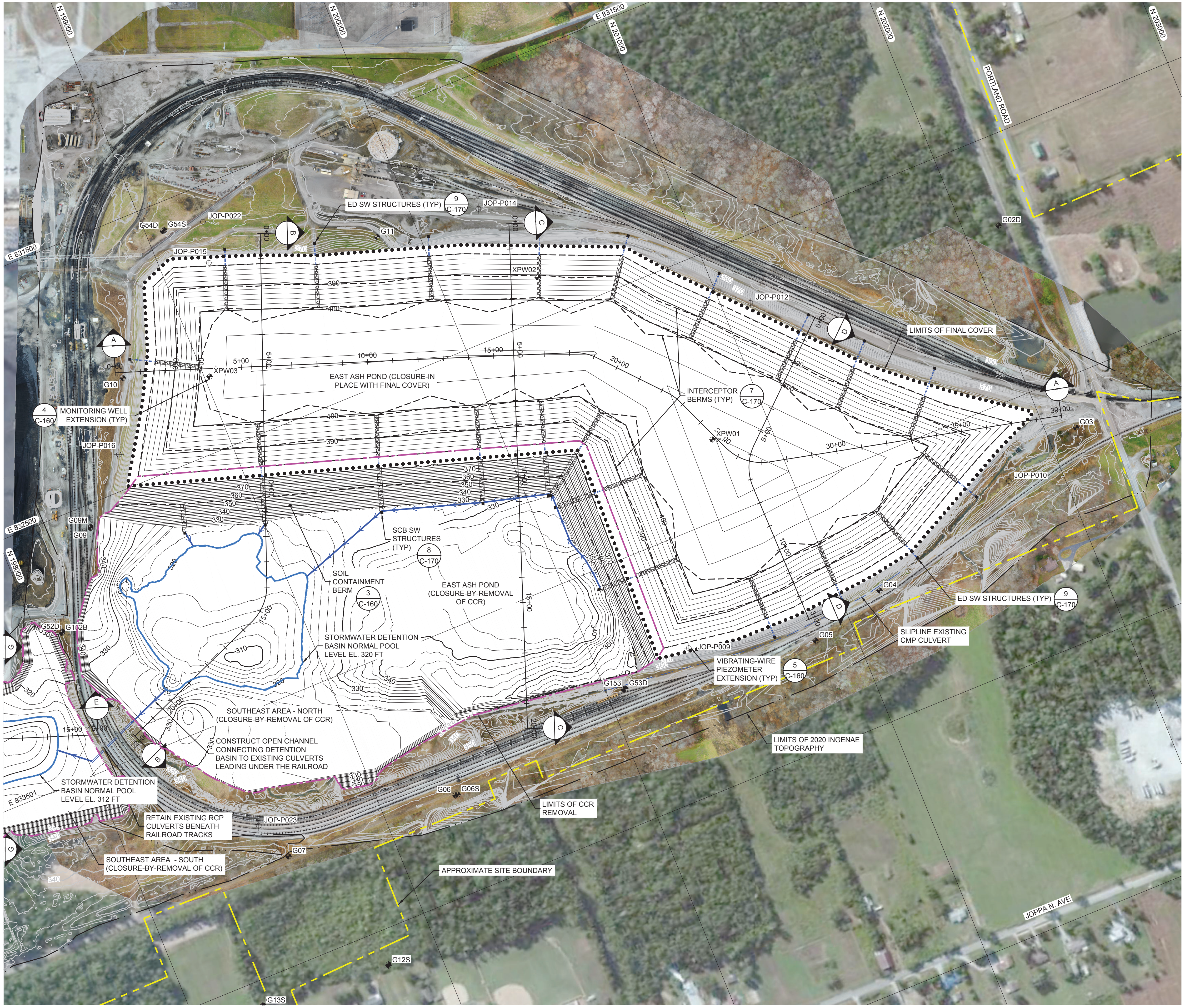
35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

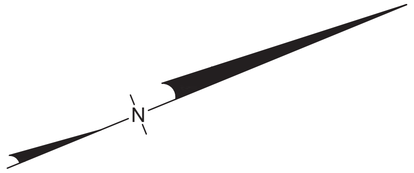
RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENTS

ATTACHMENT A
SELECTED CONSTRUCTION PERMIT APPLICATION PLANS





LEGEND

—— 350 ——	EXISTING GROUND SURFACE ELEVATION (MAJOR) (2-FT INTERVAL)
—— 400 ——	PROPOSED SURFACE ELEVATION (MAJOR) (2-FT INTERVAL)
—·—·—	LIMITS OF CCR REMOVAL
— — —	APPROXIMATE SITE BOUNDARY
—— · · ——	TOPOGRAPHIC SURVEY LIMITS
┼┼┼┼┼┼	RAILROAD
••••••••	LIMITS OF FINAL COVER
— — — —	INTERCEPTOR BERM
▨	ROCK CHUTE
- - - - - -	EXISTING BURIED CULVERT (LOCATION APPROXIMATE)
—> ——	STORMWATER CHANNEL
■	RIPRAP APRON
◓	EXISTING MONITORING WELL
⊕	EXISTING PIEZOMETERS
— — — —	EXISTING BURIED CULVERT (LOCATION APPROXIMATE)

NOTES:

1. SEE SHEET G-110 FOR NOTES REGARDING THE COORDINATE SYSTEM, SOURCES FOR EXISTING GROUND SURFACE ELEVATIONS, AND THE LIMITS OF CCR OUTSIDE OF THE EAP.
2. EXISTING AND RELOCATED UTILITY ALIGNMENTS ARE NOTE SHOWN ON THIS SHEET. SEE SHEET G-110 AND G-130 FOR UTILITY INFORMATION.
3. THE EXISTING PERIMETER DIKES ARE TO BE REMOVED WITHIN THE EAST ASH POND (CLOSURE-BY-REMOVAL OF CCR) AREA.
4. GRADES SHOWN WITHIN THE CLOSURE-BY-REMOVAL AREAS CORRESPOND TO 1 FT BELOW THE PRESUMED BOTTOM-OF-CCR GRADES, AS TAKEN FROM THE "CCR INVESTIGATION AND DELINEATION REPORT, JOPPA POWER PLANT, EAST ASH POND", DATED JULY 2022, BY GEOSYNTEC CONSULTANTS. ACTUAL GRADES MAY VARY BASED ON OBSERVATIONS PERFORMED DURING CCR EXCAVATION.
5. STORMWATER CHANNEL ALIGNMENTS AND DETENTION BASINS OUTSIDE OF THE FINAL COVER SYSTEM ARE APPROXIMATE AND WILL BE REFINED AT A LATER PHASE OF DESIGN.

0 200 400
SCALE IN FEET

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DRN	APP
0	7/26/2022	CONSTRUCTION PERMIT APPLICATION SUBMITTAL	DW/SRN	LPC

Geosyntec consultants

600 ROSELANE COURT,
FARMINGTON, MO 63640 USA
TELEPHONE: 573-242-4530

ELECTRIC ENERGY INCORPORATED
2100 PORTLAND ROAD
JOPPA, ILLINOIS 62953

TITLE:
FINAL GRADING PLAN - EAST ASH POND INSERT

PROJECT:
EAST ASH POND CONSTRUCTION PERMIT APPLICATION
CLOSURE DRAWINGS

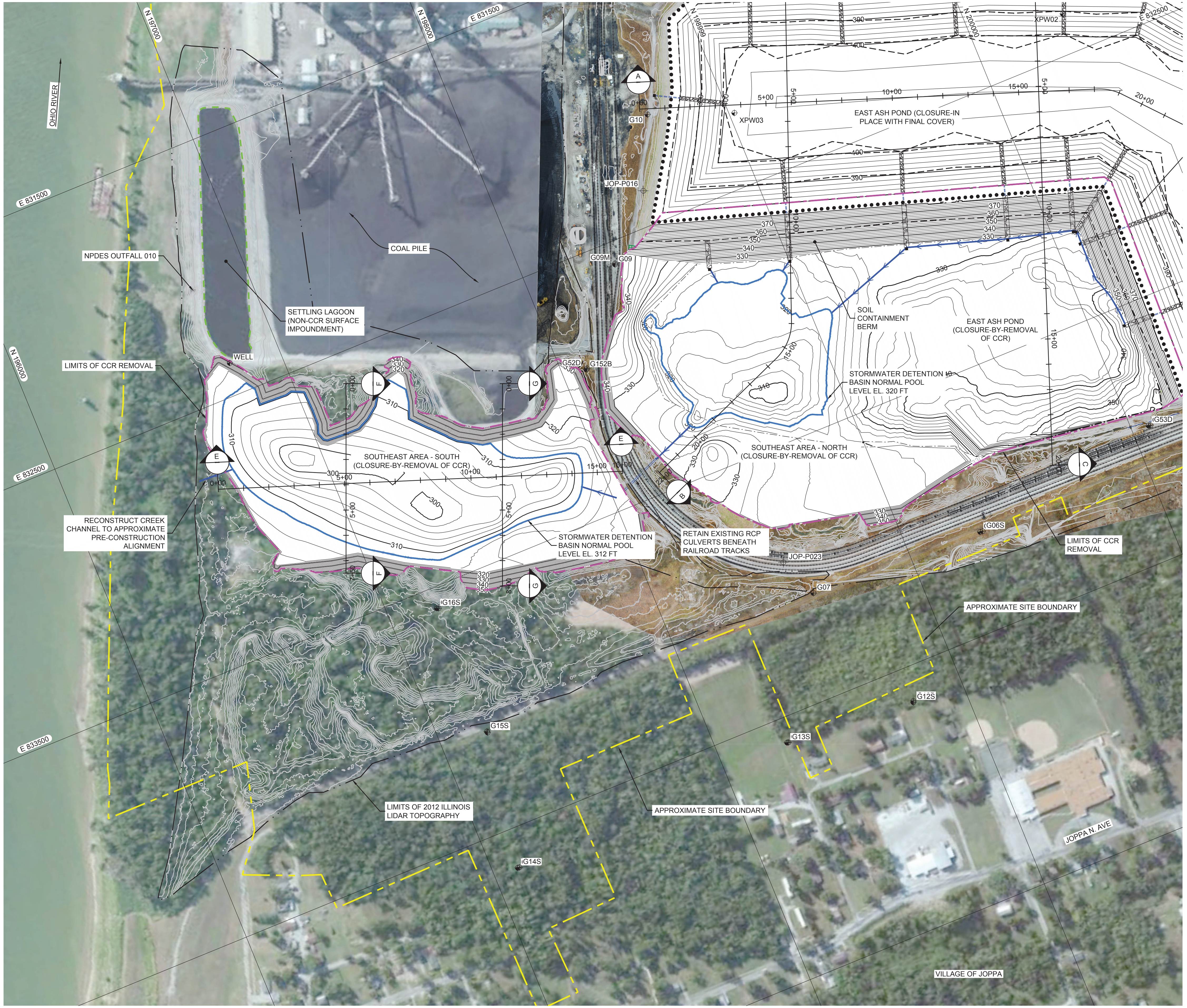
SITE:
JOPPA POWER PLANT
JOPPA, ILLINOIS

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

DESIGN BY:	LPC	DATE:	JULY 2022
DRAWN BY:	DW/SRN	PROJECT NO.:	GLP8025
CHECKED BY:	TWW	FILE:	GLP8025 C-120
REVIEWED BY:	JPS	DRAWING NO.:	C-120
APPROVED BY:	LPC		



LEGEND

350	EXISTING GROUND SURFACE ELEVATION (MAJOR) (2-FT INTERVAL)
400	PROPOSED SURFACE ELEVATION (MAJOR) (2-FT INTERVAL)
— · —	LIMITS OF CCR REMOVAL
— — —	APPROXIMATE SITE BOUNDARY
— ·· —	TOPOGRAPHIC SURVEY LIMITS
+++++	RAILROAD
••••••	LIMITS OF FINAL COVER
- - - -	INTERCEPTOR BERM
▨	ROCK CHUTE
=====	CULVERT
→	STORMWATER CHANNEL
■	PROPOSED RIPRAP APRON
⊕	EXISTING MONITORING WELL
⊕	EXISTING PIEZOMETERS
— — —	EXISTING BURIED CULVERT (LOCATIONS APPROXIMATE

NOTES:

1. SEE SHEET G-110 FOR NOTES REGARDING THE COORDINATE SYSTEM, SOURCES FOR EXISTING GROUND SURFACE ELEVATIONS.
2. EXISTING AND RELOCATED UTILITY ALIGNMENTS ARE NOT SHOWN ON THIS SHEET. SEE SHEET G-110 AND G-130 FOR UTILITY INFORMATION.
3. GRADES SHOWN WITHIN THE CLOSURE-BY-REMOVAL AREAS CORRESPOND TO 1 FT BELOW THE PRESUMED BOTTOM-OF-CCR GRADES. ACTUAL GRADES MAY VARY BASED ON OBSERVATIONS PERFORMED DURING CCR EXCAVATION.
4. STORMWATER CHANNEL ALIGNMENTS OUTSIDE OF THE FINAL COVER SYSTEM ARE APPROXIMATE AND WILL BE REFINED AT A LATER PHASE OF DESIGN.

0 200 400
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
0	7/26/2022	CONSTRUCTION PERMIT APPLICATION SUBMITTAL	DW/SRN	LPC

Geosyntec consultants

600 ROSELANE COURT,
FARMINGTON, MO 63640 USA
TELEPHONE: 573-242-4530

ELECTRIC ENERGY INCORPORATED
2100 PORTLAND ROAD
JOPPA, ILLINOIS 62953

TITLE:
FINAL GRADING PLAN - SOUTHEAST AREA INSERT

PROJECT:
EAST ASH POND CONSTRUCTION PERMIT APPLICATION
CLOSURE DRAWINGS

SITE:
JOPPA POWER PLANT
JOPPA, ILLINOIS

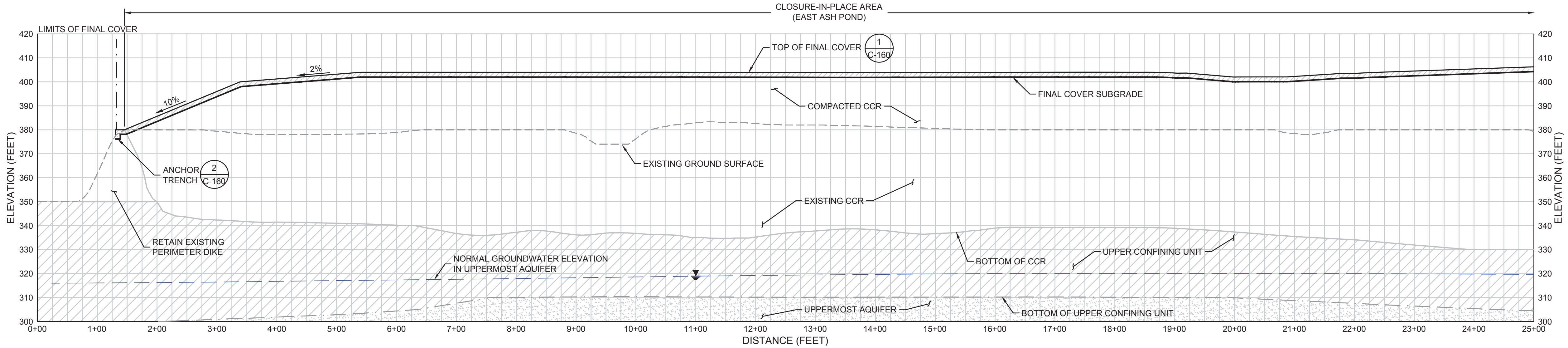
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

DESIGN BY:	LPC	DATE:	JULY 2022
DRAWN BY:	DW/SRN	PROJECT NO.:	GLP8025
CHECKED BY:	TWW	FILE:	GLP8025 C-130
REVIEWED BY:	JPS	DRAWING NO.:	C-130
APPROVED BY:	LPC		

DRAFT - NOT FOR CONSTRUCTION



A SECTION

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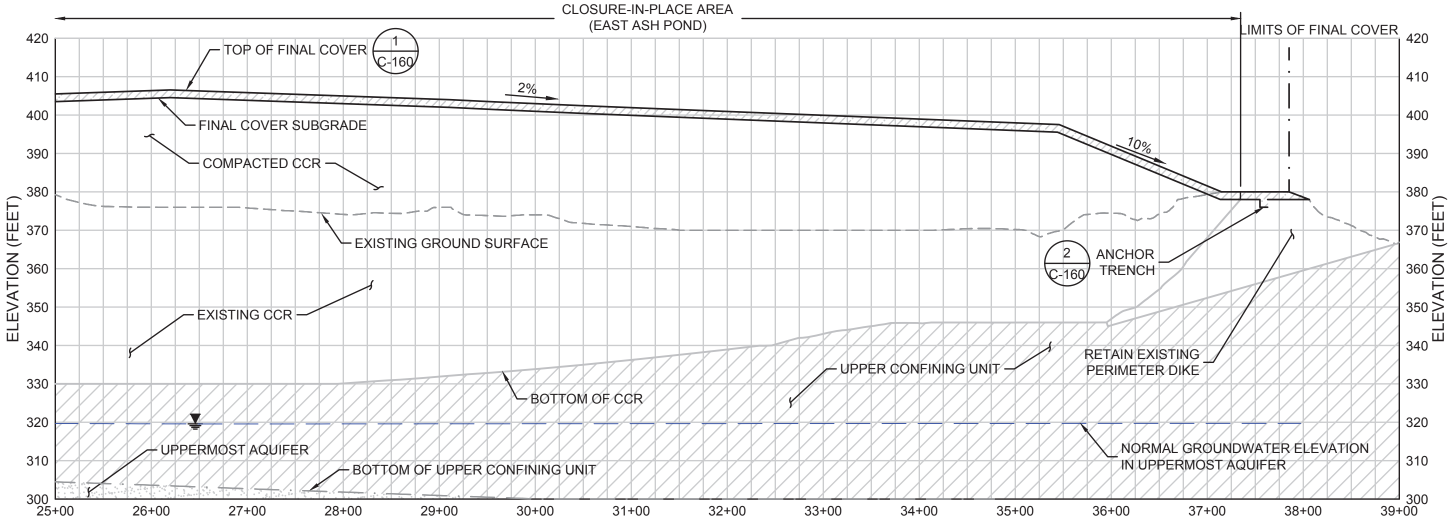
VERTICAL: 1" =25'



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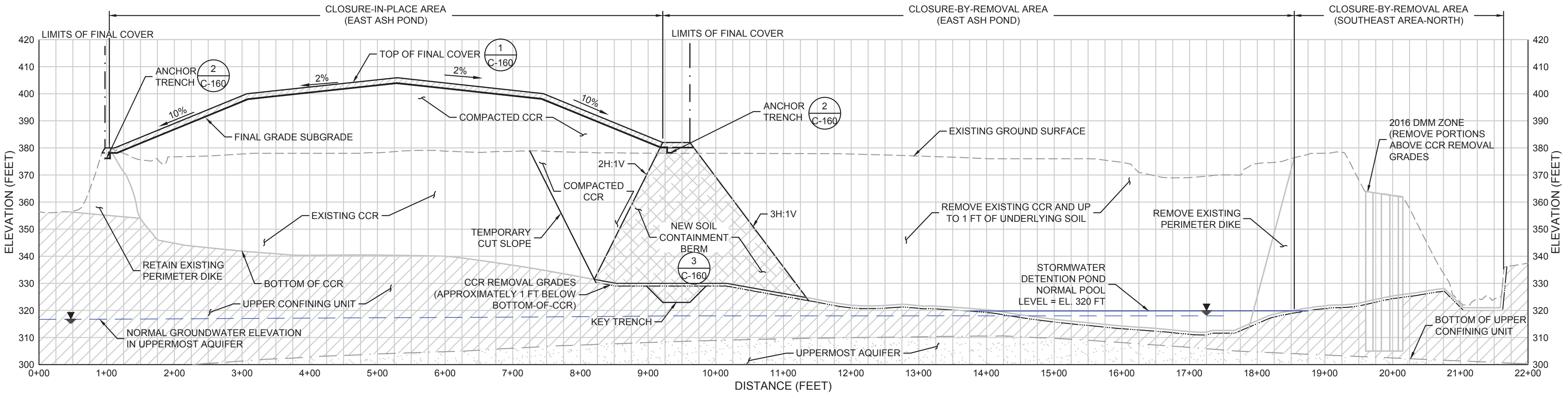

B SECTION

HORIZONTAL: 1" =100'
VERTICAL: 1" =25'

NOTES:

1. SEE SHEET G-110 FOR NOTES REGARDING COORDINATE SYSTEMS AND SOURCES FOR EXISTING GROUND SURFACE ELEVATIONS.
2. THE BOTTOM AND LIMITS OF CCR INSIDE AND OUTSIDE OF THE EAP WAS TAKEN FROM THE "CCR INVESTIGATION AND DELINEATION REPORT, JOPPA POWER PLANT, EAST ASH POND", DATED JULY 2022, BY GEOSYNTEC CONSULTANTS.
3. THE INTERFACE BETWEEN THE UPPER CONFINING UNIT AND UPPERMOST AQUIFER AND THE NORMAL GROUNDWATER LEVEL WITHIN THE UPPERMOST AQUIFER WAS TAKEN FROM THE HYDROGEOLOGIC SITE CHARACTERIZATION REPORT, EAST ASH POND, JOPPA POWER PLANT, JOPPA ILLINOIS", RAMBOLL, OCTOBER 25, 2021. THE INTERFACE IS NOT SHOWN OUTSIDE OF THE HORIZONTAL LIMITS PROVIDED BY RAMBOLL.
4. THE NORMAL GROUNDWATER ELEVATION IN THE UPPERMOST AQUIFER WAS CALCULATED BY RAMBOLL USING DATA COLLECTED FROM 2015-2022. THIS NORMAL ELEVATION IS NOT EXPECTED TO CHANGE UNDER POST-CLOSURE CONDITIONS. THE GROUNDWATER ELEVATION IS NOT SHOWN OUTSIDE OF THE HORIZONTAL LIMITS PROVIDED BY RAMBOLL.
5. THE EXTENTS OF THE DEEP MIXING METHOD STABILITY IMPROVEMENT ZONE (DMM ZONE) WERE TAKEN FROM THE AECOM REPORT TITLED HISTORY OF CONSTRUCTION, USEPA FINAL CCR RULE, 40 CFR § 257.73(C), JOPPA POWER STATION, JOPPA, ILLINOIS". THE EXTENTS SHOULD BE CONSIDERED APPROXIMATE AND MAY VARY.
6. GRADES SHOWN WITHIN THE CLOSURE-BY-REMOVAL AREAS CORRESPOND TO 1 FT BELOW THE PRESUMED BOTTOM-OF-CCR GRADES. ACTUAL GRADES MAY VARY BASED ON OBSERVATIONS PERFORMED DURING CCR EXCAVATION.

LEGEND

━	TOP OF FINAL COVER
- - -	EXISTING GROUND SURFACE
─	BOTTOM OF CCR
━	GEOMEMBRANE
─	STORMWATER POND WATER LEVEL
▨	PROTECTIVE COVER SOIL
▩	NEW SOIL CONTAINMENT BERM
▥	2016 DMM ZONE
▨	UPPER CONFINING UNIT
▒	PERMOST AQUIFER

0 100 200
SCALE IN FEET

0	7/26/2022	CONSTRUCTION PERMIT APPLICATION SUBMITTAL	DW/SRN	LPC
REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants

600 ROSELANE COURT,
FARMINGTON, MO 63640 USA
TELEPHONE: 573-242-4530

ELECTRIC ENERGY INCORPORATED
2100 PORTLAND ROAD
JOPPA, ILLINOIS 62953

TITLE:
SECTIONS - 1 OF 2

PROJECT:
EAST ASH POND CONSTRUCTION PERMIT APPLICATION
CLOSURE DRAWINGS

SITE:
JOPPA POWER PLANT
JOPPA, ILLINOIS

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SIGNATURE

DATE

DESIGN BY:	LPC	DATE:	JULY 2022
DRAWN BY:	DW/SRN	PROJECT NO.:	GLP8025
CHECKED BY:	TWW	FILE:	GLP8025 C-140
REVIEWED BY:	JPS	DRAWING NO.:	
APPROVED BY:	LPC		C-140

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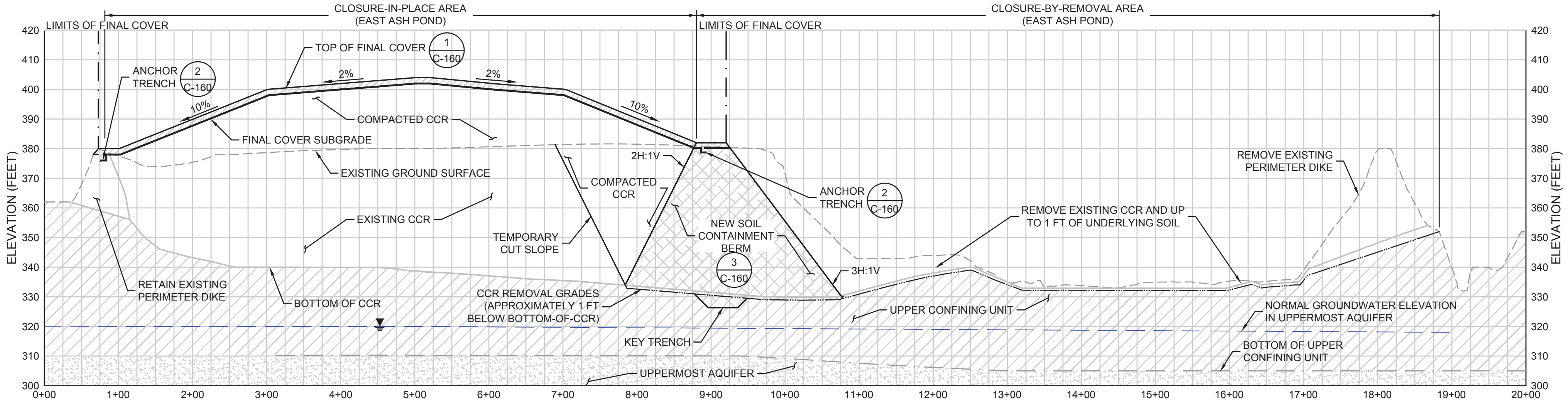

C SECTION
HORIZONTAL: 1" =100'
VERTICAL: 1" =25'

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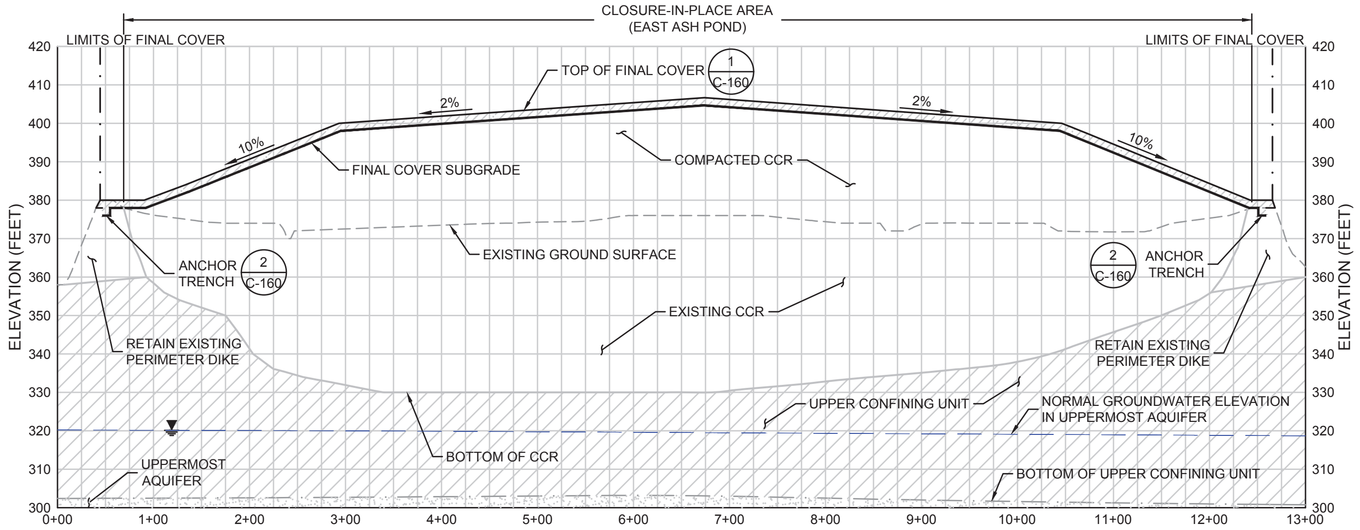
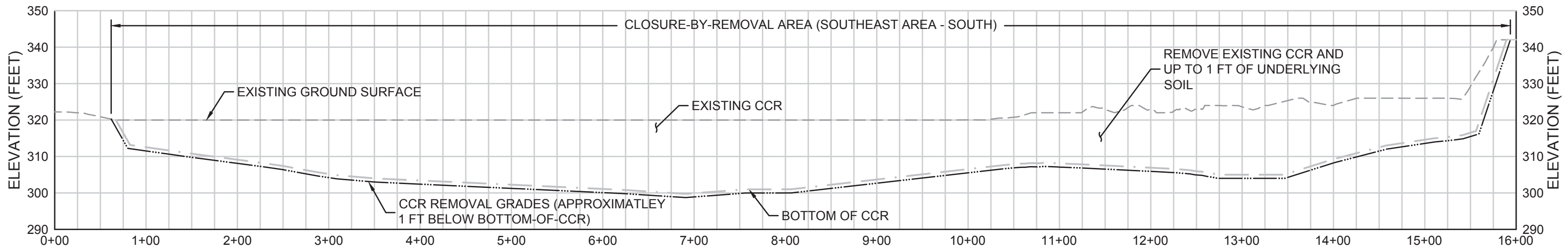


D SECTION
HORIZONTAL: 1" =100'
VERTICAL: 1" =25'

LEGEND

———	TOP OF FINAL COVER
— — —	EXISTING GROUND SURFACE
———	BOTTOM OF CCR
━━━	GEOMEMBRANE
— — —	NORMAL GROUNDWATER ELEVATION IN UPPERMOST AQUIFER
— · —	BOTTOM OF UPPER CONFINING UNIT
▨	PROTECTIVE COVER SOIL
▩	NEW SOIL CONTAINMENT BERM
▨	UPPER CONFINING UNIT
░	PERMOST AQUIFER



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VERTICAL: 1" =25'

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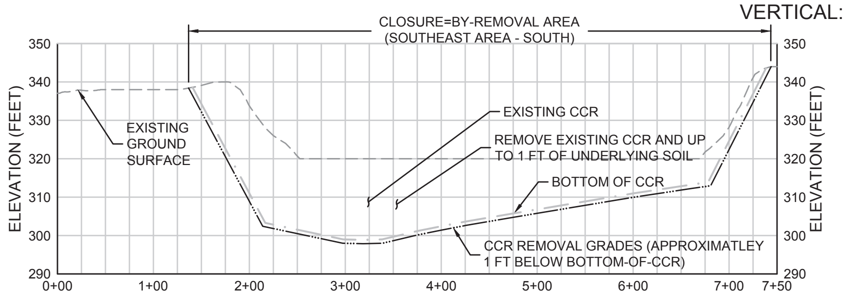
SCALE IN FEET



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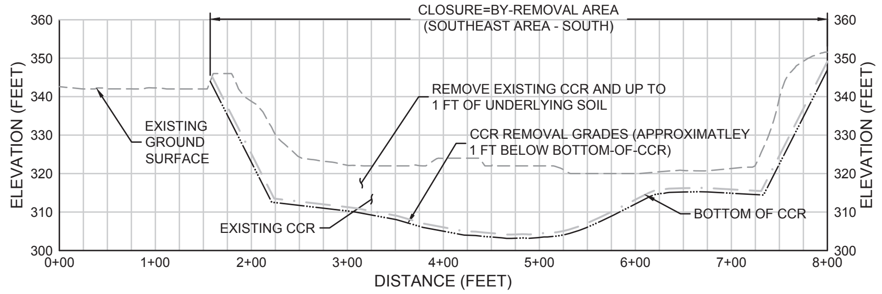

G SECTION
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VERTICAL: 1" =25'

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REV	DATE	DESCRIPTION	DRN	APP

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2100 PORTLAND ROAD
JOPPA, ILLINOIS 62953

TITLE:
SECTIONS - 2 OF 2

PROJECT:
EAST ASH POND CONSTRUCTION PERMIT APPLICATION
CLOSURE DRAWINGS

SITE:
JOPPA POWER PLANT
JOPPA, ILLINOIS

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

DESIGN BY:	LPC	DATE:	JULY 2022
DRAWN BY:	DW/SRN	PROJECT NO.:	GLP8025
CHECKED BY:	TWW	FILE:	GLP8025 C-150
REVIEWED BY:	JPS	DRAWING NO.:	C-150
APPROVED BY:	LPC		

Intended for
Electric Energy, Inc.
1500 Eastport Plaza Drive
Collinsville, IL 62234

Date
April 18, 2024

Project No.
1940103584-006

NATURE AND EXTENT REPORT

JOPPA POWER PLANT, EAST ASH POND, IEPA ID NO. W1270100004-02

Bright ideas. Sustainable change.

NATURE AND EXTENT REPORT
JOPPA POWER PLANT, EAST ASH POND, IEPA ID NO. W1270100004-02

Project name	**Joppa Power Plant East Ash Pond**
Project no.	**1940103584-0065**
Recipient	**Electric Energy, Inc.**
Document type	**Nature and Extent Report**
Revision	**FINAL**
Date	**April 18, 2024**
Prepared by	**Nathaniel Keller and Alison O'Connor**
Checked by	**Lauren Cook**
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CONTENTS

TABLES (ATTACHED)

FIGURES (ATTACHED)

APPENDICES

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
ASD	Alternative Source Demonstration
CCR	coal combustion residuals
cm/s	centimeters per second
CSM	conceptual site model
CWS	Community Water Supply
E001	Event 1
EAP	East Ash Pond
EEI	Electric Energy, Inc.
GCSM	geochemical conceptual site model
GWPS	groundwater protection standard
HCR	Hydrogeologic Site Characterization Report
HSU	hydrostratigraphic unit
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
JPP	Joppa Power Plant
LAU	lower aquifer unit
LCL	lower confidence limit
LCU	lower confining unit
mg/L	milligrams per liter
NAVD88	North American Vertical Datum 1988
SI	surface impoundment
UA	uppermost aquifer
UCU	upper confining unit
WAP	West Ash Pond

EXECUTIVE SUMMARY

Groundwater samples collected at the Joppa Power Plant (JPP) East Ash Pond (EAP) during May 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 wells in the Uppermost Aquifer (UA):

- Boron at wells G06, G07, G08, G09, G10
- Cobalt at well G05
- pH at wells G11 and G51D

An alternative source demonstration (ASD) was completed for the cobalt exceedance at UA monitoring well G05 and pH exceedances at UA monitoring wells G11 and G51D. The Illinois Environmental Protection Agency (IEPA) did not concur with the ASD. The non-concurrence was appealed, and the Illinois Pollution Control Board (IPCB) granted a stay on February 1, 2024.

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

Boron was encountered above the GWPS within the UA at monitoring wells G06, G07, G08, G09, and G10. Additional shallow and deep (S/D) nested wells, installed to delineate the extent of elevated boron concentrations, identified additional locations with boron above the GWPS (G12S/D, G13S/D, G14S, G15D, G16S/D, G17D, G20S/D, and G21S/D). In the UA, the extent of boron above the GWPS is defined laterally by the additional wells installed in 2022 and the Ohio River, and vertically by the presence of low permeability clay and silt that form the lower confining unit, or deeper wells that do not have GWPS exceedances. The boron concentrations within the UA are attenuated physically through dilution and dispersion; and may be geochemically attenuated by sorption to iron oxides and clays. Boron concentrations in the Ohio River were evaluated and they do not present unacceptable risk [1].

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 JPP EAP.

The groundwater data and analysis in this report includes results from historical sampling (initiated in 2015) through the E001 sampling event, which was completed on May 3, 2023. Results of the E001 sampling event were submitted and placed in the facility's operating record by August 22, 2023 as required by 35 I.A.C. § 845.800(d)(15), within 60 days of receiving final laboratory analytical data [2]. The statistical determination presented in the report identified the following exceedances of the GWPS at compliance groundwater wells in the UA:

- Boron at wells G06, G07, G08, G09, G10
- Cobalt at well G05
- pH at wells G11 and G51D

An ASD, as allowed by 35 I.A.C. § 845.650(e), was completed for the cobalt exceedance at UA monitoring well G05 and pH exceedances at UA monitoring wells G11 and G51D. IEPA did not concur with the ASD in a letter dated November 16, 2023 due to the following data gaps:

1. Source characterization of the CCR at the EAP must include total solids sampling in accordance with SW846.
2. Characterization to include sample and analysis in accordance with 35 I.A.C. § 845.640 of an alternative source must be provided with the ASD.

On December 22, 2023, Electric Energy, Inc. (EEI) submitted a petition for review [3] of the non-concurrence with the cobalt and pH ASD and motion for stay to the IPCB. The IPCB granted a stay on February 1, 2024. Therefore, the nature and extent of cobalt and pH is not discussed in this document. This Nature and Extent Report discusses in detail the extent of the boron exceedances as well as a geochemical conceptual site model (GCSM) describing the nature of these exceedances.

2. BACKGROUND

2.1 Site Location and Description

The JPP is west of the Village of Joppa in Massac County, Illinois, northeast of the Ohio River in Section 14, Township 15 South, Range 3 East (**Figure 2-1**). The JPP property is bordered by LaFarge North America cement plant to the west, Trunkline Gas Company-Joppa Compressor Station to the north and west, the Village of Joppa to the east, and the Ohio River to the south. The EAP is located in the west half of Section 14 directly north of the JPP and is bounded immediately to the east by the railway right-of-way, which is adjacent to forested portions of residential property in the Village of Joppa (**Figure 2-2**).

2.2 Description of CCR SI

The JPP operated the EAP for management of CCR waste streams between 1973 and 2022. Another inactive SI, referred to as the West Ash Pond (WAP), is present in the western portion of the JPP property, and a permit exempt landfill is present in the northwestern portion of the JPP property. The landfill and the WAP are not the subject of this report.

The EAP is an unlined CCR SI which was used to manage both fly ash and bottom ash. The EAP perimeter embankment height varies from approximately 15 to 45 feet above the outboard toe of slope and the crest is at an approximate elevation of 380 feet[1] [4].

2.3 Geology and Hydrogeology

The information used to describe the hydrogeology is based on the local geology obtained from published sources, hydrogeologic investigation data, and boring data collected during site investigations conducted from 1997 to 2022 [5, 6, 7].

2.3.1 Hydrostratigraphic Units

In addition to CCR, four hydrostratigraphic units (HSUs) have been identified at the EAP based on stratigraphic relationships, geologic composition, and common hydrogeologic properties. The units, listed from surface downward, are summarized as follows:

- **CCR:** CCR consisting of fly ash and bottom ash. Water elevations measured in early March 2021 within the EAP indicate the phreatic surface is approximately 370 to 374 feet. A maximum thickness of saturated fill and CCR of approximately 42 feet was observed at location XPW01 in April 2021. The thickness of saturated fill and CCR in the EAP is generally consistent, ranging from 35 to 45 feet from March through August 2021, based on an estimated base of ash from 425 to 435 feet (**Figure 2-3**) and the measured phreatic surface.

  During delineation activities in 2021, CCR material mixed with sand, silt, and/or clay was identified at the surface southeast of the unit in a drainage feature (**Appendix A**). The CCR material ranged from approximately 1 to 20 feet thick and occurred at elevations as low as approximately 296 feet.

- **Upper Confining Unit (UCU):** This unit consists of approximately 25 to 50 feet of low permeability clay, silt, and silty clay from the Equality and Metropolis Formations and was observed in almost all borings at the site. In the southeast portion of the site near the

---

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

drainage feature (**Appendix A**) the UCU material was present but intermixed with CCR material from historical activities. The UCU is also thin (~25 feet) near G15S, and boring logs indicate potential fill, likely placed for the railroad line, extending to approximately 20 feet below ground surface in G15S and 39 feet in G14S. This area was historically utilized as a water reservoir for steam engines and the elevations of fill versus the top of the UA indicate surface water has the potential to preferentially infiltrate in these areas.

- **Uppermost Aquifer (UA):** This unit is composed of sandy gravel deposits of the Mounds Gravel and sand/silty sand deposits of the McNairy Formation, which are in hydrologic communication. The UA is laterally continuous across the JPP and its lithologies range in thickness from 21 to 51 feet for the Mounds Gravel, and 17 to 50 feet for the McNairy Formation [7].
- **Lower Confining Unit (LCU):** This unit overlies the shallow bedrock in the study area and has been interpreted as part of the Lower McNairy Formation, Post Creek Formation, or weathered limestone residuum. This interval has been encountered in all borings advanced to bedrock and is generally described as having high clay and/or silt content with partial cementation. The observed interval ranges in thickness from 14 feet at G09M to 28 feet at G20M [7].
- **Lower Aquifer Unit (LAU):** This unit is composed of the Salem Limestone (bedrock) and is used for potable and non-potable water supply in the vicinity of the site. Monitoring wells installed in the LAU include G09M, G13M, G20M, and G21M. Packer testing completed during installation of G13M and G20M indicated permeability in the limestone was variable [7]. The Community Water Supply (CWS) well for the Village of Joppa obtains water from this unit. The CWS was sampled twice during 2022, and no concentrations above the GWPS were reported [7, 8].

2.3.2 Uppermost Aquifer

The UA is comprised of the sand and gravel of the Mounds Gravel and McNairy Formation. The unit was encountered at its shallowest elevation (>315 feet) at B006 near well G06 located on the east/ southeast edge of the EAP. **Figure 2-4** shows the top elevation of the UA. Where present, the Mounds Gravel is generally loose, wet, well graded/poorly sorted, subrounded, and consists of clasts up to 2-inches, with larger clasts noted periodically. The thickness of the Mounds Gravel varied from 21 to 51 feet within the advanced borings. The Mounds Gravel is generally thought to have been deposited by braided rivers within paleotopographic lows eroded into the McNairy Formation [9]. It is considered the upper portion of the UA at the site and is in hydrologic communication with the McNairy Formation.

The McNairy Formation was observed to be from 17 to 50 feet thick at borings that encountered its entire interval. The sand of the McNairy is characterized by the presence of mica flakes and is commonly loose, wet, tan to brown, medium grain sand. In combination with the Mounds Gravel, it makes up the UA at the site. Within the UA, lenses of silt and clay several feet thick were encountered in borings completed downgradient (*i.e.,* G12D, G13D, G14D, G15D, G16D). The lenses of clay and silt within the Upper McNairy are encountered at isolated locations and not interpreted to be laterally continuous but may locally limit the downward migration of impacted groundwater (*e.g.,* G14D).

This HSU at the site ranges from approximately 50 to 85 feet thick and extends down to the clay and silt of the Lower McNairy or Post Creek Formation which overlies the Mississippian Aged Salem Limestone.

2.3.3 Potential Migration Pathways

Based on a review of the lithology underlying the EAP, potential impacts to groundwater migrate downwards through the unlithified UCU into the UA (Mounds Gravel and Upper McNairy Formation). Further downward migration is limited by the Lower McNairy Formation, which is the LCU. Below the LCU is the LAU which is comprised of the Salem Limestone. The LAU has been identified as a potential migration pathway.

2.3.4 Regional Bedrock Geology

The regional bedrock consists of a sequence of Mississippian System sedimentary rocks hundreds of feet thick and consolidated prior to the Cretaceous Period. The bedrock dips gently northward toward the center of the Illinois Basin. The uppermost bedrock near the JPP generally consists of limestone. The total thickness of the Mississippian System in southern Illinois is greater than 3,200 feet [10].

The uppermost bedrock unit encountered in the vicinity of the JPP is the Salem Limestone (**Appendix B**). The Salem Limestone is described as fine-grained, fossiliferous limestone, and is approximately 200 to 500 feet thick in the area. The Salem Limestone overlies the Ullin Limestone which is described as a light-colored fine- to coarse-grained limestone. The overall thickness of the Ullin Limestone near the JPP is approximately 200 feet. The Fort Payne Formation, which is overlain by the Ullin Limestone, is described as a very fine-grained, siliceous, cherty limestone, and is approximately 200 to 600 feet thick in the study area [10, 11, 12].

2.3.5 Water Table Elevation and Groundwater Flow Direction

The EAP is located upgradient of the Ohio River and the groundwater elevation measured in wells surrounding the EAP in 2023 ranged from 309.46 feet in G09 (located along the southern portion of the EAP) to 343.91 feet in G51D (located along the western portion of the EAP). Groundwater elevation contours generally illustrate flow from northwest to southeast (**Figure 2-5**), although in periods of high river stage groundwater flow is more easterly (**Figure 2-6**).

The elevations of water within the EAP (as observed in XPW01, XPW02, XPW03, and XSG01) are greater than the surrounding areas. The phreatic surface within the EAP in 2023 averaged 368.57 feet, ranging from 359.78 feet in XSG01 (eastern edge of EAP) to 373.04 feet in XPW02 (western edge of the EAP) (**Figure 2-5**).

The groundwater elevation in wells within the UCU (G101, G151, G153, and G54S) in 2023 averaged 328.88 feet, with a range from 315.84 feet in G153 (eastern edge of the EAP) to 347.77 feet in G54S (southwestern edge of EAP). Well G54S, located southwest of the EAP, consistently recorded the highest groundwater elevation, with an average groundwater elevation of 345.56 feet. The elevated groundwater here is assumed to be a result of well G54S screen being situated in low conductivity materials. Groundwater elevations at well G151 (along the western edge of the EAP) were also consistently higher than the remaining UCU wells, with an average groundwater elevation of 325.01 feet.

The groundwater elevation in wells within the UA (G01D, G02D, G03, G05, G06, G07, G08, G09, G10, G11, G51D, G52D, G53D and G54D) in 2023 averaged 316.90 feet, with a range from 309.46 feet in G09 (southern edge of EAP) to 324.55 feet in G01D (background well, northwest of EAP). Elevations measured in G52D do not appear to be consistent with other UA locations near the southeast corner of the EAP. The boring log from this location indicates more heterogenous geology, and as a result the well may have less hydraulic connection with the UA.

The groundwater elevation within the LAU wells (G09M, G13M, G20M, and G21M) in 2023 averaged 319.00 feet, with a range from 307.65 to 323.89 feet (**Table 2-1)**.

Groundwater elevations are primarily controlled by river stage of the Ohio River near the JPP. Seasonal variation of groundwater levels has been observed, and the river has been observed at elevations higher than groundwater. Flow reversals associated with flooding of the Ohio River have not been observed to extend northward beneath the EAP (**Figure 2-5** and **Figure 2-6**).

Groundwater elevations vary seasonally and may fluctuate by about 10 feet. Slight seasonal variation in groundwater flow directions ranging from southeast to southwest are also observed; however, the major component of groundwater flow direction is consistently south toward the Ohio River [13].

2.3.5.1 Vertical Hydraulic Gradients

Vertical hydraulic gradients calculated using available groundwater elevation data from early March to July 2021 at nested well locations within the UCU, the UA, and LAU were previously summarized in the Hydrogeologic Site Characterization Report (HCR) [6]. Recent data collected through 2023 including the additional wells installed in 2022 [7] were evaluated and the results of the vertical gradient calculations for these HSUs are summarized below (**Appendix C**):

- UCU to UA:
  - Gradients calculated between G151 (UCU)/G51D (UA) and G152B (UCU)/G52D (UA), were consistently downward.
  - Variable gradients were measured at UCU/UA well pairs G101/G01D, G153/G53D, and G54S/G54D. On average, gradients were downward at G101/G01D and G54S/G54D, while they were flat at G153/G53D.
- UA (within):
  - Gradients calculated at nested UA wells G06S and G06 were slightly downward.
  - Gradients calculated at nested UA wells G12, G13, G14, G15, G16, G17, G18, G23, and G24 were variable to flat.
  - Gradients at nested UA wells G19 and G22 were consistently downward in 2023.
  - Gradients at nested UA wells G21S/G21D, which is located nearest the river, were consistently upward.
- UA to LAU:
  - Gradients calculated between G09 (UA)/G09M (LAU) and G21D (UA)/G21M (LAU) were consistently upward. Consistent upward gradients indicate that the Ohio River is a regional discharge point for the bedrock aquifer system and the LCU is continuous in the vicinity of the JPP.

Overall gradients are consistently upward between the LAU and the UA, and within the UA downward gradients are generally observed closer to the EAP with a transition to upward gradients near the Ohio River.

2.3.5.2 Impact of Surface Water Bodies on Groundwater Flow

The river basin typically experiences annual floods during the months of March, April, May, and occasionally June, while smaller floods occur less frequently in autumn. There have been no monitoring events in 2023 with observations that indicate groundwater flow reverses direction (*i.e.,* groundwater flows from the Ohio River north into the UA) beneath the EAP.

2.3.6 Hydraulic Conductivities

2.3.6.1 Field Hydraulic Conductivities

Field hydraulic conductivity tests performed on the UA and LAU materials at the EAP were completed as part of the 2021 field investigation [6] and supplemented with additional values from field investigations in 2022 [7]. The results are summarized in **Table 2-2**, and discussed below:

- **CCR**: Results of field hydraulic tests in wells screened within the CCR (XPW02 and XPW03) ranged 4.5 x 10^{-3} to 1.7 x 10^{-1} centimeters per second (cm/s), with a geometric mean of 1.3 x 10^{-2} cm/s.
- **UCU**: No field hydraulic conductivity tests were performed within the UCU.
- **UA**: Field hydraulic conductivity tests indicated that the horizontal hydraulic conductivity for the Mounds Gravel and McNairy Formation sands and gravels at the site are variable, but very permeable with measured hydraulic conductivity ranging from 4.8 x 10^{-4} to 1.4 x 10^{-1} cm/s and a geometric mean of 9.6 x 10^{-3} cm/s (**Table 2-2**). This is higher than measurements of the UA calculated in 2017 [5], which resulted in a geometric mean conductivity of 3.4 x 10^{-4} cm/s. The high hydraulic conductivity values occur in the poorly graded gravels.
- **LCU**: No hydraulic conductivities are available for the LCU as no wells are screened within this unit.
- **LAU**: Hydraulic conductivity within the LAU was measured at wells G09M, G13M, and G20M and ranged from 6.8 x 10^{-5} to 9.06 x 10^{-4} cm/s, with a geometric mean of 3.4 x 10^{-4} cm/s [6, 7].

2.3.6.2 Laboratory Hydraulic Conductivities

Falling head permeability tests (ASTM D5084 Method F) were performed in the laboratory on samples collected during the 2021 and 2022 investigations [6, 7]. The results are summarized in **Table 2-3** and discussed below.

- **CCR**: Three samples were analyzed from CCR Fill unit borings at XPW01 and XPW03. Laboratory falling head permeability test results in the CCR Fill unit indicated a geometric mean vertical hydraulic conductivity of 1.0 x 10^{-6} cm/s.
- **UCU**: Four UCU samples were analyzed from borings G03, G09M, and G11. Laboratory falling head permeability results in the UCU indicated a geometric mean vertical hydraulic conductivity of 1.7 x 10^{-7} cm/s.

- **UA**: No UA samples were analyzed.
- **LCU**: Four LCU samples were analyzed from borings G13M and G21M (**Appendix D**). Laboratory falling head permeability results in the LCU indicated a geometric mean vertical hydraulic conductivity of 3.8 x 10^{-8} cm/s.
- **LAU**: No LAU samples were analyzed.

2.4 Groundwater Monitoring

The monitoring system for the EAP is shown on **Figure 2-7** and consists of two background monitoring wells (G01D and G02D), 12 compliance monitoring wells (G03, G05, G06, G07, G08, G09, G10, G11, G51D, G52D, G53D, and G54D), and two temporary water level only surface water staff gages (XSG01 and SG02[2]) to monitor potential impacts from the EAP [14]. The following monitoring wells are screened within the UA (G01D, G02D, G03, G05, G06, G07, G08, G09, G10, G11, G51D, G52D, G53D, and G54D) along the perimeter of the EAP. Porewater samples are collected from locations XPW01 and XPW02 on the northern side of the EAP and from XPW03 on the southern side of the EAP (**Figure 2-7**).

2.5 Hydrogeologic Conceptual Site Model

The HCR [6] and information provided above forms the foundation of the EAP hydrogeological setting. In general, groundwater is recharged from surficial precipitation and from upgradient areas, flowing from northwest to southeast within the UA and LAU (bedrock) towards the regional discharge area of the Ohio River. Groundwater flow is predominantly vertical in the confining units (*i.e.,* UCU and LCU). Groundwater flow in the UA is south towards the river, with an easterly flow component along the east portion of the pond towards the eastern property boundary. Vertical gradients between the bedrock and the UA and within the UA are upward near the Ohio River.

Review of groundwater elevations from site monitoring wells screened within the UA indicates some variability in groundwater elevations over time. The degree of variability in the groundwater elevation record at each well is not consistent and varies by location. Evaluation of recent data collected between 2021 and 2023 suggested that the source for variation of groundwater elevations in the UA may be changes in river stage.

Generally, evaluation of synoptic (*i.e.*, site-wide) groundwater elevations within the UA indicates that the direction of groundwater flow near the EAP is towards the river from upgradient areas, with some easterly component of flow direction noted near the eastern boundary of the EAP and the site. This is evident in **Figure 2-5**, which presents groundwater elevations measured in the UA on May 1, 2023.

The geologic conceptual model for the site used for the groundwater modeling [15] consists of the following layers:

- Ash Material (CCR) – fly ash and bottom ash with a saturated thickness that varies upon the base elevation (ranges from approximately 310 to 350 feet) of the ash material from 0 to 45 feet. This includes both CCR within the EAP boundary and portions of the JPP property where CCR/ soil mixtures have been identified during investigation activities.

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[2] Staff gage SG02 was decommissioned. A new staff gage (SG03) was installed in January 2023.

- Silt and clay (UCU) – laterally continuous fine-grained clays, silts, and silty clays of the Equality Formation, Silt Unit, and Metropolis Formation, underlying the CCR fill at the EAP.
- Sand and gravel (UA) – permeable sands and gravels of the Mounds Gravel and McNairy Formation.
- Silt/Clay, weathered limestone residuum (LCU) – clay and silt of the Lower McNairy Formation or Post Creek Formation that form a continuous lower confining unit.
- Limestone Bedrock (LAU) – lowermost unit identified at the site and underlies all unlithified deposits. This unit is comprised of the Salem Limestone.

Porewater from the EAP can migrate downward through the UCU and mix with groundwater from upgradient of the EAP. Groundwater migrates towards the Ohio River primarily within the high permeability portions of the UA, which generally correspond to intervals where the Mounds Gravel is present. Monitoring wells screened near the top of the UA and/or in fine-grained portions of the UA have lower boron concentrations (*i.e.,* G06, G15S, G17S, etc.). Downward vertical migration of groundwater is limited locally by silt/clay lenses within the UA (*e.g.,* G14D), and regionally by the silt and clay of the LCU which has been observed in all borings advanced near the EAP.

3. OCCURRENCE AND DISTRIBUTION OF GROUNDWATER EXCEEDANCES (EXTENT)

Results from groundwater samples collected from the EAP during E001 were received on June 23, 2003. 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 [2]. Exceedances for which an ASD was not completed include the following parameters and wells in the UA:

- Boron at G06, G07, G08, G09, and G10

Exceedances for which an ASD was completed include the following parameters and wells in the UA:

- Cobalt at G05
- pH at G11 and G51D

As described in **Section 1**, an ASD was completed for the cobalt and pH exceedances. The IEPA did not concur with the ASD in a letter dated November 16, 2023. On December 22, 2023, EEI submitted a petition for review [3] of the non-concurrence with the ASD and motion for stay to the IPCB. The IPCB granted a stay on February 1, 2024. Therefore, the nature and extent of cobalt and pH is not discussed in this document.

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 [16]. Additional investigation was completed between 2021 and 2023 to further delineate the extent of boron in groundwater and investigate hydrogeologic conditions downgradient (south and east) of the EAP.

Three borings were advanced and solids samples were collected from the uppermost aquifer in three locations (G03, G07, and G08) during October 2021 to supplement previous samples collected in January 2021. The three solid samples were submitted for the following analyses:

- 7-step sequential extraction via EPA 6010B (arsenic, boron, cobalt, lithium, and molybdenum);
- Total Metals via EPA 6010B (§ 845.600 parameters plus silver, aluminum, bismuth, copper, iron, potassium, magnesium, manganese, sodium, nickel, phosphorus, sulfur, tin, strontium, titanium, uranium, vanadium, yttrium, and zinc);
- Bulk Mineralogy by Reitveld x-ray diffraction analysis;
- Total Organic Carbon Analysis; and,
- Loss on ignition.

A total of 31 monitoring wells were installed southeast of the EAP in two phases to further delineate the extent of boron concentrations above the GWPS. Ten wells were installed in the UA in September 2021 (G12S, G12D, G13S, G13D, G14S, G14D, G15S, G15D, G16S, and G16D). Based on three rounds of groundwater sampling conducted during the first quarter of 2022, additional data collection was needed [8]. A total of 21 additional monitoring wells were installed between March and September 2022, including three wells in the LAU (G13M, G20M, and G21M), 16 wells in the UA (G17S, G17D, G18S, G18D, G19S, G19D, G20S, G20D, G21S, G21D, G22S, G22D, G23S, G23D, G24S, and G24D), and two wells in the UCU (G13 and G20). Monitoring well construction details are summarized in **Table 3-1**. Data from this investigation were reported in the Geosyntec's Supplemental Site Investigation Report [7] and incorporated into this document.

3.2 Extent in the Uppermost Aquifer

Groundwater samples are evaluated quarterly and exceedances are identified 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 3-2**). The discussion below includes ranges of concentrations measured in wells with exceedances, because there is no single value for LCLs.

3.2.1 Boron

Boron exceedances in the UA are present south of the EAP at monitoring wells G09 and G10, and east of the EAP at monitoring wells G06, G07, and G08. Boron concentrations above the GWPS were also reported in monitoring wells installed for delineation (G12S/D, G13S/D, G14S, G15D, G16S/D, G17S/D, G20S/D, and G21S/D; **Table 3-3**). Concentrations of boron in monitoring wells south of the EAP (G09 and G10) range from 2.35 to 4.57 milligrams per liter (mg/L) and are defined laterally in the UA to the west by monitoring well G54D, to the east by G52D, and to the south by Well 2 and Well 3 where concentrations range from non-detect in G52D to 1.8 mg/L in Well 2 (**Figure 3-1**).

Boron concentrations in UA monitoring wells east of the EAP (G06, G07, G08, G12S/D, G13S/D G14S, G15D, G16S/D, G17S/D, G20S/D, and G21S/D) range from 2.16 mg/L in G20S to 10.6 mg/L in G16S, which is located immediately downgradient of the mixed CCR/soil material outside of the unit southeast of the site (**Appendix B**). Laterally, these exceedances are defined by the monitoring well nests installed to the east in 2022 including G18, G19, G22, G23, and G24. Concentrations of boron in groundwater collected from these monitoring wells ranged from non-detect in G24D to 2.26 mg/L in G18S.

Downward migration of boron in the UA is inhibited by the underlying LCU which has a thickness of greater than 10 feet. Vertical permeability tests completed on samples of the LCU beneath the UA indicate a geometric mean vertical hydraulic conductivity of 3.8×10^{-8} cm/s with a range from 1.9×10^{-8} to 8.3×10^{-8} cm/s. This is very low relative to the horizontal hydraulic conductivity measured within the UA (geomean 3×10^{-3} cm/s). The significant contrast in permeability (greater than two orders of magnitude) and upward gradients observed between the LAU and UA indicate groundwater will preferentially migrate horizontally in the UA and the elevated boron concentrations will not extend into the underlying LCU and LAU as evidenced by the results of groundwater samples collected from LAU wells (G09M, 13M, G20M, and G21M; [6, 7]) that have all been below the GWPS of 2 mg/L with the highest measured boron concentrations all below 0.05 mg/L.

4. GEOCHEMICAL CONCEPTUAL SITE MODEL (NATURE)

A GCSM was developed to describe the conditions of the groundwater in the vicinity of the JPP EAP and is summarized here (full analysis presented in **Appendix E**). The GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. This report describes the GCSM for parameters that have exceeded the GWPS in EAP groundwater and which will be addressed in the Corrective Action Plan. Boron is the only constituent with exceedances observed at the EAP. Boron exceedances are present in one HSU at the site: the UA, comprised of high permeability sands with gravel, silt, and clay lenses of the Upper McNairy Formation .

The primary source of boron to groundwater of the UA within the monitoring network is the EAP coal combustion residual porewater present within the unit and at the surface outside of the unit east and southeast of the site, based on boron concentrations within the source and relationships to hydrogeological patterns at the site. Boron was not identified within UA solids at concentrations that would suggest that aquifer solids could provide an additional potential natural geogenic source of boron to groundwater.

Boron in the groundwater system may be attenuated via adsorption and surface complexation reactions within portions of the UA, with conditions within groundwater from the UA typically predicted to favor amorphous iron oxide stability at most locations, and the presence of iron oxides in some site solids supporting the occurrence of this mechanism. Limited variability in pH or redox conditions is observed between upgradient background and downgradient locations. The presence of clay minerals (*e.g.,* kaolinite) in the UA solids material indicates that adsorption to clays may be another potential attenuation mechanism for boron at locations near the EAP.

5. COMBINED GEOCHEMICAL AND HYDROGEOLOGIC CONCEPTUAL SITE MODELS

5.1 Boron Conceptual Site Model

The conceptual site model (CSM) describing current conditions at the EAP combining the hydrogeologic and geochemical CSMs for boron is as follows. Surface water including historical sluice water and recharge within the EAP comes into contact with CCR, enters the pore spaces within the CCR material, and becomes porewater within the unlined CCR unit. Porewater containing elevated concentrations of boron can migrate into the UA, predominantly in the south/southeast portion of the EAP where there is less separation between the base of ash and the top of the UA.

Groundwater within the UA flows primarily to the south/southeast with occasional periods when flow is more easterly, and ultimately migrating toward the Ohio River. The lateral extent of boron concentrations above the GWPS has been defined following the installation of additional monitoring well nests G18, G19, G22, G23, and G24. The boron extent downgradient is defined by the additional groundwater monitoring wells as well as the Ohio River, which is downgradient of the EAP. Along the flow path boron concentrations are attenuated physically through dilution and dispersion and may be geochemically attenuated by sorption to iron oxides or clay minerals. Overall boron concentrations near the EAP decline from approximately 6 to 8 mg/L in G12S and G12D, to approximately 3 to 5 mg/L in G21S and G21D. Boron concentrations in the Ohio River were evaluated and they do not present unacceptable risk [1]. The presence or absence of exceedances within an individual well can be attributed to flow directions and attenuation along the length of the flow path from the EAP downgradient.

The vertical migration of boron within the UA is limited in areas by low conductivity clay and silt lenses (*i.e.,* G14D), and ultimately by the continuous clay and silt of the Lower McNairy Formation, Post Creek Formation, or weathered limestone residuum which is the lower confining unit across the JPP. Upward vertical gradients measured between the LAU and UA and the lack of elevated boron concentrations in LAU wells support that there is no downward migration of boron concentrations below the UA.

6. CONCLUSIONS AND FUTURE ACTIVITIES

In accordance with 35 I.A.C. § 845.650(d)(1), the nature and extent of GWPS exceedances of boron 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 EAP.

The lateral extents of exceedances are illustrated in **Figure 3-1**. As discussed in **Section 3.2.1**, the horizontal delineation of boron has been defined by monitoring wells installed and sampled in 2022 and 2023. Results from sampling of the Village of Joppa CWS during 2022 indicate the CWS is not impacted.

A groundwater extraction system that will eliminate the migration of groundwater from the EAP until groundwater at monitoring locations downgradient reaches the GWPS is currently being designed and implementation of that system will occur following completion of construction activities and pilot testing. Following initiation of the extraction system, a Groundwater Monitoring Plan will be prepared and submitted with the Corrective Action Plan application to the IEPA to identify locations and parameters to monitor system effectiveness and assess groundwater conditions during operation of the system.

7. REFERENCES

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[16] Ramboll Americas Engineering Solutions, Inc., "History of Potential Exceedances. Joppa Power Plant, East Ash Pond, Joppa, Illinois. Electric Energy, Inc.," October 17, 2021.

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TABLES

Table 2-1. Summary of Groundwater Elevation Data
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

DATE LOCATION	1/18/2023	1/23/2023 & 1/24/2023	2/14/2023	3/7/2023	3/10/2023	4/1/2023	5/1/2023	5/22/2023	6/10/2023	7/10/2023 & 7/11/2023	8/25/2023	9/25/2023	10/23/2023	11/07/2023 & 11/08/2023	12/12/2023
G01D	319.83	320.08	321.20	322.96	--	324.55	323.66	--	320.98	319.85	320.64	319.81	319.31	319.74	318.77
G02D	--	319.21	--	322.08	--	--	322.71	--	--	319.72	--	319.19	318.55	318.91	318.04
G03	--	--	--	321.46	--	322.65	322.06	--	320.35	319.06	319.45	318.47	317.89	318.23	317.31
G04	--	--	--	--	--	--	--	--	--	--	--	--	--	317.12	--
G05	--	--	--	320.16	--	321.97	320.36	--	--	317.83	--	316.90	316.29	316.49	315.69
G06	--	--	--	318.64	--	--	317.29	--	--	314.35	--	314.14	313.31	313.52	312.81
G06S	--	--	--	--	--	--	--	--	--	--	--	--	--	313.60	--
G07	--	--	--	317.29	--	318.35	315.44	--	313.54	312.55	312.66	312.01	311.53	311.70	311.07
G08	--	--	--	317.72	--	318.62	313.92	--	--	311.32	--	310.85	310.39	310.58	310.05
G09	311.31	--	311.88	318.86	--	319.04	312.64	--	311.29	310.60	310.79	310.22	309.78	309.98	309.46
G09M	319.05	--	320.13	323.89	--	--	320.73	--	--	318.83	--	318.55	318.17	318.35	--
G10	312.79	--	315.34	319.71	--	320.32	314.25	--	312.95	312.09	312.55	311.69	311.19	311.45	310.87
G11	318.60	--	319.75	322.29	--	323.46	321.45	--	318.38	317.75	318.34	317.86	317.25	317.55	316.75
G12D	--	313.04	--	317.58	--	--	315.15	--	313.74	312.84	312.82	312.17	311.84	311.94	--
G12S	--	313.05	--	318.04	--	--	315.37	--	313.79	312.84	312.81	312.24	311.83	311.94	--
G13	--	--	--	--	--	--	341.78	--	--	--	--	--	--	323.58	--
G13M	--	308.65	--	--	--	--	320.33	--	--	318.21	--	317.63	317.46	317.58	--
G13S	--	--	--	317.42	--	318.30	314.87	--	313.38	312.50	311.75	311.94	311.35	310.85	--
G14D	--	312.23	--	--	319.25	321.47	315.27	--	--	310.66	--	310.05	309.83	309.92	--
G14S	--	308.46	--	--	317.92	324.74	315.48	--	--	305.97	--	305.60	305.25	305.36	--
G15D	--	308.40	--	317.44	--	316.24	307.04	--	306.37	305.73	305.96	305.57	305.10	305.23	--
G15S	--	308.55	--	317.56	--	316.82	307.74	--	306.58	306.08	306.39	305.56	305.34	305.47	--
G16D	--	309.82	--	318.50	--	--	308.41	--	307.64	307.09	307.15	306.77	306.39	306.50	--
G16S	--	309.75	--	318.41	--	--	303.49	--	307.60	307.12	--	306.74	306.43	306.56	--
G17D	--	312.22	--	--	--	--	--	314.84	--	312.98	--	312.45	311.94	312.17	--
G17S	--	312.37	--	--	--	--	--	314.76	--	312.95	--	312.36	311.84	312.05	--
G18D	--	314.71	--	--	--	--	--	316.97	--	316.23	--	314.53	314.14	314.37	--
G18S	--	314.58	--	--	--	--	317.96	--	318.21	308.01	--	314.63	314.01	314.36	--
G19D	--	309.16	--	--	--	--	311.46	--	--	309.29	--	308.79	308.33	308.53	--
G19S	--	309.40	--	--	--	--	311.56	--	--	309.33	--	308.85	308.35	308.61	--
G20	--	--	--	--	--	--	339.64	--	--	--	--	--	--	331.28	--
G20D	--	307.01	--	--	--	--	307.32	--	--	305.98	--	305.65	305.29	305.43	--
G20M	--	322.05	--	--	--	--	307.65	--	--	321.87	--	321.42	321.38	321.10	--
G20S	--	306.89	--	--	--	--	307.33	--	--	305.98	--	305.69	305.30	305.41	--
G21D	--	309.37	--	--	--	--	306.93	--	--	321.05	--	305.45	305.04	305.19	--
G21M	--	322.71	--	--	--	--	--	323.85	--	308.14	--	322.34	322.09	321.96	--
G21S	--	308.55	--	--	--	--	306.10	--	--	305.48	--	305.18	304.78	304.89	--
G22D	--	304.88	--	--	--	--	306.27	--	--	304.99	--	304.63	304.36	304.44	--
G22S	--	304.92	--	--	--	--	306.31	--	--	305.06	--	304.73	302.36	304.51	--
G23D	--	314.18	--	--	--	--	--	316.06	--	314.16	--	--	313.12	313.39	--
G23S	--	--	--	--	--	--	316.95	--	--	314.24	--	313.61	313.08	313.38	--
G24D	--	308.64	--	--	--	--	--	308.40	--	306.97	--	306.57	306.12	306.36	--
G24S	--	308.89	--	--	--	--	308.76	--	--	306.81	--	306.56	307.08	306.33	--
G51D	343.91	--	319.96	322.22	--	--	322.03	--	320.00	318.94	316.87	318.45	317.81	318.21	317.32
G52D	--	--	--	320.41	--	318.79	321.25	--	321.51	321.59	319.31	319.60	317.30	314.31	318.01
G53D	--	--	--	320.12	--	--	319.72	--	317.85	316.79	316.97	316.25	315.65	316.09	315.24
G54D	314.09	--	314.73	321.04	--	321.46	315.77	--	314.37	313.51	--	313.18	312.65	312.98	312.29
G54S	342.17	--	344.18	345.47	--	346.09	347.69	--	347.77	346.19	346.11	345.86	345.02	344.62	--
SG03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Well 2	--	--	--	--	--	--	302.05	--	--	302.02	--	301.86	301.51	301.63	--
Well 3	--	--	--	303.88	--	--	303.41	--	301.73	301.78	--	301.65	301.23	301.43	--
XPW01	--	--	--	--	--	370.28	369.57	--	366.98	365.74	368.80	366.66	365.51	366.66	--
XPW02	--	--	--	--	--	373.04	372.30	--	369.48	368.32	371.58	369.54	367.92	369.47	--
XPW03	--	--	--	--	--	372.01	371.32	--	368.92	367.50	369.24	367.52	368.39	366.99	--

[O: NRK 04/10/2024]

Notes:
-- = Not Measured
All groundwater elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88).

Table 2-2. Field Hydraulic Conductivities
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

Well ID	Gradient Position	Bottom of Screen Elevation (ft NAVD88)	Screen Length[1] (ft)	Field Identified Screened Material	Slug Type	Analysis Method	Falling Head (Slug In) K (cm/s)			Rising Head (Slug Out) K (cm/s)			Average Hydraulic Conductivity (cm/s)	Minimum Hydraulic Conductivity (cm/s)	Maximum Hydraulic Conductivity (cm/s)	Hydraulic Conductivity Geometric Mean (cm/s)
							1	2	3	1	2	3				
Uppermost Aquifer																
G06	D	267.60	10.0	Gravely Silty Clay	Solid	Bouwer-Rice	1.20E-03	1.02E-03	---	1.03E-03	8.14E-04	---	1.02E-03	4.84E-04	1.41E-01	9.61E-03
G07	D	290.34	10.0	Sand	Solid	Bouwer-Rice	6.96E-03	1.18E-02	8.98E-03	8.22E-03	1.05E-02	1.02E-02	9.45E-03			
G08	D	256.72	10.0	Sand	Solid	Bouwer-Rice	5.51E-03	5.82E-03	---	2.92E-03	3.69E-03	---	4.49E-03			
G09	D	279.19	10.0	Sandy Gravel	Solid	Bouwer-Rice	2.62E-03	---	---	1.55E-03	---	---	2.08E-03			
G10	D	280.45	10.0	Sand and Sandy Gravel	Solid	Bouwer-Rice	1.36E-03	8.69E-04	---	4.84E-04	5.25E-04	---	8.08E-04			
G11	U	297.68	10.0	Sand	Solid	Bouwer-Rice	7.15E-03	6.36E-03	---	6.72E-03	7.23E-03	---	6.86E-03			
G12S	D	287.56	10.0	Sand	Pneumatic	Butler/ Bower-Rice	---	---	---	1.24E-01	8.75E-02	6.05E-02	9.07E-02			
G12D	D	267.26	10.0	Sandy Gravel	Pneumatic	Butler	---	---	---	1.37E-01	---	---	1.37E-01			
G13S	D	291.72	10.0	Sand	Solid	Butler	---	---	---	1.41E-01	---	---	1.41E-01			
G13D	D	261.31	10.0	Sand	Pneumatic	Butler	---	---	---	1.09E-01	---	---	1.09E-01			
G14S	D	282.50	10.0	Sandy Gravel	Pneumatic	Butler-Zhan	---	---	---	6.16E-02	---	---	6.16E-02			
G14D	D	215.30	10.0	Sand	Solid	Kansas Geological Survey	---	---	---	5.88E-04	---	---	5.88E-04			
G15S	D	283.80	10.0	Sand	Pneumatic	Kansas Geological Survey	---	---	---	1.43E-02	---	---	1.43E-02			
G15D	D	251.00	10.0	Sand	Solid	Butler	---	---	---	4.60E-02	4.70E-02	---	4.65E-02			
G16S	D	289.60	10.0	Sand	Solid	Kansas Geological Survey	---	---	---	2.41E-02	---	---	2.41E-02			
G16D	D	241.56	10.0	Sand	Solid	Kansas Geological Survey	---	---	---	9.98E-02	---	---	9.98E-02			
G17S	D	284.58	10.0	Gravel	Pneumatic	Kansas Geological Survey	---	---	---	6.02E-03	---	---	6.02E-03			
G17D	D	262.54	10.0	Sand	Pneumatic	Butler-Zhan	---	---	---	2.43E-02	---	---	2.43E-02			
G19S	D	284.17	10.0	Gravel	Pneumatic	Kansas Geological Survey	---	---	---	1.93E-02	---	---	1.93E-02			
G19D	D	259.10	10.0	Sandy Gravel	Pneumatic	Butler-Zhan	---	---	---	3.00E-02	---	---	3.00E-02			
G20S	D	277.50	10.0	Gravel	Pneumatic	Butler-Zhan	---	---	---	1.15E-01	---	---	1.15E-01			
G20D	D	252.67	10.0	Sand	Pneumatic	Kansas Geological Survey	---	---	---	1.66E-02	---	---	1.66E-02			
G21S	D	278.90	10.0	Gravel	Pneumatic	Butler-Zhan	---	---	---	4.54E-02	---	---	4.54E-02			
G21D	D	248.87	10.0	Sand	Solid	Kansas Geological Survey	---	---	---	1.46E-03	---	---	1.46E-03			
G22S	D	276.79	10.0	Gravel	Pneumatic	Butler-Zhan	---	---	---	1.00E-01	---	---	1.00E-01			
G22D	D	234.83	10.0	Sand	Pneumatic	Kansas Geological Survey	---	---	---	6.24E-03	---	---	6.24E-03			
Lower Aquifer Unit																
G09M	D	193.60	10.0	Bedrock	Solid	Bouwer-Rice	2.73E-04	5.82E-04	---	3.78E-04	4.16E-04	---	4.12E-04	6.84E-05	9.06E-04	3.40E-04
G13M	D	126.55	10.0	Bedrock	Solid	Kansas Geological Survey	---	---	---	9.06E-04	---	---	9.06E-04			
G20M	D	162.92	10.0	Bedrock	Solid	Cooper-Bredehoeft-Papadopulos	---	---	---	6.84E-05	---	---	6.84E-05			
CCR																
XPW02	NA	343.53	5.0	Ash	Solid	Bouwer-Rice	9.82E-03	9.25E-03	---	4.46E-03	5.39E-03	---	7.23E-03	4.46E-03	1.65E-01	1.29E-02
XPW03	NA	341.95	5.0	Ash	Solid	Springer-Gelhar	---	---	---	1.65E-01	---	---	1.65E-01			

Notes:

[O: XXX MM/DD/YY; U: CJC 08/24/21; C: LDC 08/30/21; KP 04/09/2024]

[1] All wells are constructed from 2 inch PVC with 0.01 inch slotted screens.
--- = Test not analyzed/performed
CCR = coal combustion residuals
cm/s = centimeters per second
D = downgradient
ft = foot/feet
NA = Not Applicable
NAVD88 = North American Vertical Datum of 1988
U = upgradient

Table 2-3. Geotechnical Results

Nature and Extent Report
Joppa Power Plant
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Joppa, Illinois

Sample ID	Field Location ID	Top of Sample (ft bgs)	Bottom of Sample (ft bgs)	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	Calculated Porosity [1] (%)	Vertical Hydraulic Conductivity (cm/s)	LL	PL	PI	Laboratory USCS	Gravel (%)	Sand (%)	Fines (%)
Equality Formation															
SB-G03-(32-34)-20210202	G03	32	34	15.5	112.7	2.659	32.1	4.7E-07	27	16	11	SC	0.6	53.8	45.6
SB-G09M-(16-18)-20210127	G09M	16	18	20.6	105.4	2.666	36.7	8.3E-08	39	16	23	CL	0	5.0	95.0
SB-G11-(24-26)-20210119	G11	24	26	18.5	109.1	2.688	35.0	5.6E-08	36	15	21	CL	0	11.5	88.5
Metropolis Formation															
SB-G09M-(46-48)-20210127	G09M	46	48	19.8	105.7	2.715	37.6	3.5E-07	35	15	20	CL	0	17.2	82.8
McNairy Formation															
SB-G03-(60-62)-20210202	G03	60	62	20.0	- -	2.671	- -	- -	- -	- -	- -	SP	1.5	94.4	4.1
SB-G09M-(82-84)-20210127	G09M	82	84	7.6	100.0	2.686	40.4	- -	- -	- -	- -	SP	22.7	75.4	1.9
SB-G09M-(112-114)-20210127	G09M	112	114	25.5	87.0	2.675	47.9	- -	- -	- -	- -	- -	0.7	84.1	15.2
SB-G11-(56-58)-20210119	G11	56	58	14.4	110.0	2.661	33.8	- -	NP	NP	NP	SM	0.2	87.7	12.1
Post Creek Formation															
G13M 117-119	G13M	117	119	17.5	110.0	2.680	34.3	8.30E-08	22	13	9	CL	0	25.9	74.1
G21M 126-128	G21M	126	128	16.1	112.5	2.632	31.5	4.90E-08	51	23	28	CH	0	14.9	85.1
G21M 132-133	G21M	132	133	20.2	102.0	2.537	35.6	2.60E-08	50	24	26	CH	0	6.3	93.7
G21M 136-138	G21M	136	138	23.3	100.2	2.638	39.2	1.90E-08	29	16	13	CL	0	0.7	99.3
CCR															
SB-XPW01-(6-8)-20210120	XPW01	6	8	34.7	85.6	2.711	49.4	2.1E-05	NP	NP	NP	SM	26.3	45.4	28.3
SB-XPW01-(46-48)-20210120	XPW01	46	48	31.7	87.7	2.675	47.5	2.8E-07	25	20	5	CL-ML	0	18.7	81.3
SB-XPW02-(24-26)-20210120	XPW02	24	26	47.6	74.0	2.567	53.8	- -	NP	NP	NP	SM	9.3	74.1	16.6
SB-XPW03-(22-24)-20210121	XPW03	22	24	45.4	- -	2.410	- -	- -	- -	- -	- -	- -	0	4.2	95.8
SB-XPW03-(36-38)-20210121	XPW03	36	38	46.5	65.7	1.999	47.4	1.8E-07	46	31	15	ML	0	9.4	90.6

[O: NMP 08/19/21; U: CJC 08/24/21; C: LDC 08/27/21; U:NRK 4/8/24; C: KRP 4/9/24]

Notes:

[1] Porosity calculated as relationship of bulk density (p_b) to particle density (p_d) ($n = 100[1- (p_b/p_d)]$)

- - = Not Applicable/Not Analyzed
% = Percent
bgs = below ground surface
CCR = coal combustion residuals
cm/s = centimeters per second
ft = foot/feet
LL = Liquid limit
NP = Non-Plastic
pcf = pounds per cubic foot
PI = Plasticity Index
PL = Plastic Limit

USCS = Unified Soil Classification System

CL = Lean Clay
CL-ML = Silty Lean Clay
SC = Clayey Sand
SM = Silty Sand
SP = Poorly-Graded Sand

Table 3-1. Monitoring Well Construction Details
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Joppa Power Plant
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Joppa, 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)
G01D	UA	2015-08-14	364.2	364.4	Top of Disk	361.5	54.19	63.85	307.3	297.6	64.4	297.1	9.7	2	37.22042921	-88.85717876
G02D	UA	2015-08-13	363.6	363.8	Top of Disk	360.8	62.21	71.84	298.6	289.0	72.4	288.5	9.6	2	37.2207148	-88.85331072
G03	UA	2021-02-02	357.9	358.0	Top of PVC	354.8	55	65	302.9	292.9	65	289.8	10	2	37.220682	-88.850376
G05	UA	2021-02-01	361.2	361.4	Top of PVC	358.4	50	60	311.2	301.2	60	298.5	10	2	37.21719	-88.849014
G06	UA	2021-01-29	355.2	355.4	Top of PVC	352.6	75	85	280.2	270.2	85	267.6	10	2	37.212929	-88.848893
G07	UA	2021-01-29	353.5	353.7	Top of PVC	350.3	50	60	303.5	293.5	60	290.3	10	2	37.211001	-88.848969
G08	UA	2021-01-28	343.5	343.7	Top of PVC	341.7	75	85	268.5	258.5	85	256.7	10	2	37.210531	-88.851015
G09	UA	2021-01-31	351.7	351.9	Top of PVC	348.7	59.5	69.5	292.2	282.2	69.5	279.2	10	2	37.210336	-88.854116
G09M	LAU	2021-01-28	351.5	351.5	Top of PVC	348.6	145	155	206.5	196.5	155	193.6	10	2	37.210341	-88.85413
G10	UA	2021-02-01	353.5	353.7	Top of PVC	350.8	60.3	70.3	293.2	283.2	70.3	280.5	10	2	37.211272	-88.855841
G11	UA	2021-01-19	366.6	366.7	Top of PVC	363.4	55.7	65.7	310.9	300.9	65.7	297.7	10	2	37.214408	-88.85633
G12S	UA	2021-09-23	360.3	360.5	Top of PVC	357.6	60	70	297.6	287.6	70	287.6	10	2	37.211564	-88.847086
G12D	UA	2021-09-23	360.2	360.4	Top of PVC	357.3	80	90	277.3	267.3	90	257.3	10	2	37.21157	-88.847103
G13S	UA	2021-09-23	354.8	354.9	Top of PVC	352.0	50	60	301.7	291.7	60	291.7	10	2	37.210142	-88.847213
G13M	LAU	2022-05-18	354.0	354.0	Top of PVC	351.6	215	225	136.6	126.5	225	122.5	10	2	37.210129	-88.847331
G13D	UA	2021-09-23	354.6	354.7	Top of PVC	351.7	80	90	271.3	261.3	90	241.3	10	2	37.210129	-88.847217
G14S	UA	2021-09-16	345.6	345.6	Top of PVC	345.5	53	63	292.5	282.5	63	282.5	10	2	37.206927	-88.847006
G14D	UA	2021-09-16	345.5	345.5	Top of PVC	345.3	120	130	225.5	215.3	130	202.3	10	2	37.206909	-88.847007
G15S	UA	2021-09-15	346.8	347.0	Top of PVC	343.8	50	60	293.8	283.8	60	283.8	10	2	37.20715	-88.848881
G15D	UA	2021-09-15	346.7	346.9	Top of PVC	344.0	83	93	261.0	251.0	93	219.0	10	2	37.207152	-88.848865
G16S	UA	2021-09-14	352.3	352.3	Top of PVC	349.6	50	60	299.6	289.6	60	289.6	10	2	37.207163	-88.850678
G16D	UA	2021-09-14	352.4	352.6	Top of PVC	349.6	98	108	251.6	241.6	108	219.6	10	2	37.207147	-88.850687
G17S	UA	2022-06-01	359.2	359.2	Top of PVC	359.6	65	75	294.6	284.6	75	282.6	10	2	37.2116	-88.845465
G17D	UA	2022-05-21	359.3	359.3	Top of PVC	359.5	87	97	272.5	262.5	97	262.5	10	2	37.211598	-88.845475
G19S	UA	2022-06-01	355.6	355.6	Top of PVC	355.9	61.75	71.75	294.2	284.2	71.75	283.9	10	2	37.208548	-88.84322
G19D	UA	2022-06-01	355.4	355.4	Top of PVC	355.8	86.75	96.75	269.1	259.1	96.75	258.8	10	2	37.208538	-88.843225
G20S	UA	2022-05-20	350.2	350.2	Top of PVC	347.5	60	70	287.5	277.5	70	275.5	10	2	37.206909	-88.845853
G20M	LAU	2022-05-19	351.1	351.1	Top of PVC	347.9	175	185	172.9	162.9	185	118.9	10	2	37.206909	-88.845833
G20D	UA	2022-05-20	350.7	350.7	Top of PVC	347.7	85	95	262.7	252.7	95	250.7	10	2	37.206909	-88.845842
G21S	UA	2022-03-31	352.0	352.0	Top of Casing	348.9	60	70	288.9	278.9	70	278.9	10	2	37.20544	-88.84803
G21M	LAU	2022-04-11	353.1	353.1	Top of Casing	349.0	156	166	193.0	183.0	166	183.0	10	2	37.205468	-88.848005
G21D	UA	2022-03-31	351.7	351.7	Top of Casing	348.9	90	100	258.9	248.9	100	248.9	10	2	37.205439	-88.84799
G22S	UA	2022-05-24	351.6	351.6	Top of PVC	351.8	65	75	286.8	276.8	75	274.8	10	2	37.204787	-88.844908
G22D	UA	2022-05-22	351.5	351.5	Top of PVC	351.8	107	117	244.8	234.8	117	234.8	10	2	37.204799	-88.844907
G51D	UA	2015-08-18	363.9	364.0	Top of PVC	361.1	49.61	59.27	311.5	301.8	59.9	301.2	9.7	2	37.216016	-88.855653
G52D	UA	2015-08-19	348.4	348.6	Top of PVC	345.9	69.85	79.55	276.0	266.3	80.01	265.9	9.7	2	37.20962587	-88.85294308
G53D	UA	2015-08-21	355.5	355.6	Top of PVC	352.2	47.29	56.89	304.9	295.3	57.33	294.2	9.6	2	37.21506911	-88.84936671
G54D	UA	2015-08-11	357.0	357.2	Top of PVC	353.7	69.96	79.66	283.8	274.1	80.14	273.6	9.7	2	37.21226413	-88.85748523
XPW01	CCR	2021-01-20	383.4	383.5	Top of PVC	380.8	48.7	53.7	334.7	329.7	53.7	327.1	5	2	37.216965	-88.852074
XPW02	CCR	2021-01-21	376.0	376.2	Top of PVC	373.2	24.7	29.7	351.3	346.3	29.7	343.6	5	2	37.215865	-88.855001
XPW03	CCR	2021-01-21	381.5	381.7	Top of PVC	378.6	31.7	36.7	349.8	344.8	36.7	342.0	5	2	37.212153	-88.85542

Notes:
All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
bgs = below ground surface
ft = foot or feet
HSU = Hydrostratigraphic Unit
UA = Uppermost Aquifer
CCR = Coal Combustion Residuals
LAU = Lower Aquifer Unit
PVC = polyvinyl chloride

Table 3-2. Exceedance Parameter Statistical Results
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

Location	Parameter	Unit	Groundwater Protection Standard	2023 Q2 LCL	2023 Q3 LCL	2023 Q4 LCL
G06	Boron, total	mg/L	2	3.05	3.08	3.11
G07	Boron, total	mg/L	2	4.26	4.29	4.34
G08	Boron, total	mg/L	2	4.08	4.10	4.18
G09	Boron, total	mg/L	2	3.15	3.64	3.19
G10	Boron, total	mg/L	2	3.65	3.61	2.17
G05	Cobalt, total	mg/L	0.006	0.00700	0.00601	0.000824
G11	pH (field)	SU	6.0/9.0	5.8/5.9	5.8/6.0	5.8/5.9
G51D	pH (field)	SU	6.0/9.0	5.2/5.5	5.2/5.4	5.1/5.4

Notes:
LCL = Lower Confidence Level
mg/L = Milligrams per Liter
SU = Standard Units

Table 3-3. Summary of Groundwater Data
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

HSU	Location	Well Type	Parameter	Unit	Sample Count	Non-Detect Results	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
CCR	XPW01	Porewater	Boron, total	mg/L	10	0	0	2021/03/05	2023/10/25	8.79	10	10	12.8
CCR	XPW01	Porewater	Cobalt, total	mg/L	10	7	70	2021/03/05	2023/10/25	0.000100	0.0010	0.00075	<0.0001
CCR	XPW01	Porewater	pH (field)	SU	10	0	0	2021/03/05	2023/10/25	7.3	8.4	8.2	8.5
CCR	XPW02	Porewater	Boron, total	mg/L	10	0	0	2021/03/04	2023/10/25	10.8	12	13	16.0
CCR	XPW02	Porewater	Cobalt, total	mg/L	10	8	80	2021/03/04	2023/10/25	<0.0001	0.0010	0.00076	<0.0001
CCR	XPW02	Porewater	pH (field)	SU	10	0	0	2021/03/04	2023/10/25	7.6	7.8	7.8	8.0
CCR	XPW03	Porewater	Boron, total	mg/L	10	0	0	2021/03/04	2023/10/25	8.06	11	10	12.2
CCR	XPW03	Porewater	Cobalt, total	mg/L	10	10	100	2021/03/04	2023/10/25	<0.0001	<0.0001	0.00064	<0.0001
CCR	XPW03	Porewater	pH (field)	SU	10	0	0	2021/03/04	2023/10/25	10.0	11	11	10.8
LAU	G13M	Delin	Boron, total	mg/L	4	0	0	2022/07/29	2023/01/26	0.0180	0.037	0.034	0.0456
LAU	G13M	Delin	Cobalt, total	mg/L	4	4	100	2022/07/29	2023/01/26	<0.0001	<0.0001	0.00010	<0.0001
LAU	G13M	Delin	pH (field)	SU	4	0	0	2022/07/29	2023/01/26	7.4	7.6	7.9	9.2
LAU	G20M	Delin	Boron, total	mg/L	4	0	0	2022/07/29	2023/01/26	0.0220	0.039	0.037	0.0487
LAU	G20M	Delin	Cobalt, total	mg/L	4	3	75	2022/07/29	2023/01/26	<0.0001	<0.0001	0.00012	0.000200
LAU	G20M	Delin	pH (field)	SU	4	0	0	2022/07/29	2023/01/26	7.5	8.0	7.9	8.3
LAU	G21M	Delin	Boron, total	mg/L	4	2	50	2022/07/29	2023/01/25	<0.0092	0.016	0.016	0.0240
LAU	G21M	Delin	Cobalt, total	mg/L	4	3	75	2022/07/29	2023/01/25	<0.0001	0.000200	0.00012	0.000200
LAU	G21M	Delin	pH (field)	SU	4	0	0	2022/07/29	2023/01/25	10.0	12	11	12.3
LAU	G09M	Delin	Boron, total	mg/L	8	0	0	2021/03/04	2022/11/01	0.0191	0.029	0.033	0.0544
LAU	G09M	Delin	Cobalt, total	mg/L	8	0	0	2021/03/04	2022/11/01	0.00160	0.0054	0.0055	0.0105
LAU	G09M	Delin	pH (field)	SU	8	0	0	2021/03/04	2022/11/01	6.8	7.0	7.2	8.3
UA	G01D	B	Boron, total	mg/L	32	22	69	2015/12/03	2023/10/23	0.0140	0.025	0.025	0.0416
UA	G01D	B	Cobalt, total	mg/L	31	10	32	2015/12/03	2023/10/23	0.000700	0.0015	0.0034	0.0136
UA	G01D	B	pH (field)	SU	32	0	0	2015/12/03	2023/10/23	6.2	6.6	6.6	7.2
UA	G02D	B	Boron, total	mg/L	32	0	0	2015/12/03	2023/10/23	0.0266	0.042	0.040	0.0552
UA	G02D	B	Cobalt, total	mg/L	31	28	90	2015/12/03	2023/10/23	<0.0001	0.0010	0.00091	0.00240
UA	G02D	B	pH (field)	SU	32	0	0	2015/12/03	2023/10/23	6.2	6.5	6.5	7.3
UA	G03	C	Boron, total	mg/L	13	0	0	2021/03/05	2023/10/23	0.213	0.27	0.32	0.603
UA	G03	C	Cobalt, total	mg/L	13	4	31	2021/03/05	2023/10/23	<0.0001	0.0025	0.0034	0.0146
UA	G03	C	pH (field)	SU	13	0	0	2021/03/05	2023/10/23	6.2	6.3	6.3	6.5
UA	G05	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	0.0436	0.14	0.12	0.195
UA	G05	C	Cobalt, total	mg/L	13	0	0	2021/03/04	2023/10/24	0.00200	0.0078	0.0074	0.0103
UA	G05	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/24	6.3	6.4	6.4	6.6
UA	G06	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	2.90	3.3	3.3	3.93
UA	G06	C	Cobalt, total	mg/L	13	6	46	2021/03/04	2023/10/24	0.000600	0.0010	0.0016	0.00400
UA	G06	C	pH (field)	SU	12	0	0	2021/03/04	2023/10/24	6.3	6.6	6.5	6.7

Table 3-3. Summary of Groundwater Data
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

HSU	Location	Well Type	Parameter	Unit	Sample Count	Non-Detect Results	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
UA	G07	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	3.91	4.5	4.7	5.80
UA	G07	C	Cobalt, total	mg/L	13	1	8	2021/03/04	2023/10/24	<0.0001	0.0023	0.0029	0.00780
UA	G07	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/24	6.0	6.4	6.4	7.1
UA	G08	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	3.77	4.6	4.7	6.30
UA	G08	C	Cobalt, total	mg/L	13	0	0	2021/03/04	2023/10/24	0.00220	0.0041	0.0051	0.0113
UA	G08	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/24	6.8	6.9	7.0	7.6
UA	G09	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/25	0.282	3.5	3.4	4.57
UA	G09	C	Cobalt, total	mg/L	13	0	0	2021/03/04	2023/10/25	0.00110	0.0086	0.0082	0.0159
UA	G09	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/25	6.0	6.2	6.3	7.6
UA	G10	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	2.35	4.2	4.0	4.98
UA	G10	C	Cobalt, total	mg/L	13	0	0	2021/03/04	2023/10/24	0.00210	0.0050	0.0062	0.0122
UA	G10	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/24	6.3	6.6	6.6	6.8
UA	G11	C	Boron, total	mg/L	13	0	0	2021/03/04	2023/10/24	0.247	0.31	0.33	0.420
UA	G11	C	Cobalt, total	mg/L	13	4	31	2021/03/04	2023/10/24	0.000600	0.0020	0.0037	0.0185
UA	G11	C	pH (field)	SU	13	0	0	2021/03/04	2023/10/24	5.8	5.9	5.9	6.3
UA	G51D	C	Boron, total	mg/L	24	0	0	2015/12/03	2023/10/25	0.0297	0.53	0.49	0.963
UA	G51D	C	Cobalt, total	mg/L	23	1	4	2015/12/03	2023/10/25	0.000600	0.0026	0.0060	0.0249
UA	G51D	C	pH (field)	SU	24	0	0	2015/12/03	2023/10/25	5.3	5.6	5.7	6.9
UA	G52D	C	Boron, total	mg/L	23	19	83	2015/12/03	2023/10/24	0.0110	0.025	0.053	0.682
UA	G52D	C	Cobalt, total	mg/L	22	0	0	2015/12/03	2023/10/24	0.00110	0.0038	0.0041	0.00930
UA	G52D	C	pH (field)	SU	23	0	0	2015/12/03	2023/10/24	5.9	6.3	6.3	6.7
UA	G53D	C	Boron, total	mg/L	24	0	0	2015/12/03	2023/10/25	0.138	0.36	0.35	0.431
UA	G53D	C	Cobalt, total	mg/L	23	4	17	2015/12/03	2023/10/25	<0.0002	0.0020	0.0026	0.00870
UA	G53D	C	pH (field)	SU	24	0	0	2015/12/03	2023/10/25	6.2	6.6	6.7	7.9
UA	G54D	C	Boron, total	mg/L	24	0	0	2015/12/03	2023/10/25	0.178	0.56	0.55	1.03
UA	G54D	C	Cobalt, total	mg/L	23	0	0	2015/12/03	2023/10/25	0.00450	0.013	0.013	0.0268
UA	G54D	C	pH (field)	SU	24	0	0	2015/12/03	2023/10/25	6.4	6.7	6.7	7.1
UA	G12S	Delin	Boron, total	mg/L	11	0	0	2022/01/20	2023/10/24	5.24	6.2	6.3	8.16
UA	G12S	Delin	Cobalt, total	mg/L	11	6	55	2022/01/20	2023/10/24	<0.0001	0.00030	0.00055	<0.0001
UA	G12S	Delin	pH (field)	SU	11	0	0	2022/01/20	2023/10/24	6.1	6.5	6.5	7.1
UA	G12D	Delin	Boron, total	mg/L	11	0	0	2022/01/20	2023/10/24	5.31	6.6	6.6	8.01
UA	G12D	Delin	Cobalt, total	mg/L	11	4	36	2022/01/20	2023/10/24	0.000100	0.00040	0.00057	0.00140
UA	G12D	Delin	pH (field)	SU	11	0	0	2022/01/20	2023/10/24	6.5	6.6	6.7	7.3
UA	G13S	Delin	Boron, total	mg/L	11	0	0	2022/01/20	2023/10/24	4.34	5.2	5.4	7.31
UA	G13S	Delin	Cobalt, total	mg/L	11	11	100	2022/01/20	2023/10/24	<0.0001	<0.0001	0.00039	<0.0001
UA	G13S	Delin	pH (field)	SU	11	0	0	2022/01/20	2023/10/24	6.0	6.5	6.6	7.3

Table 3-3. Summary of Groundwater Data
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

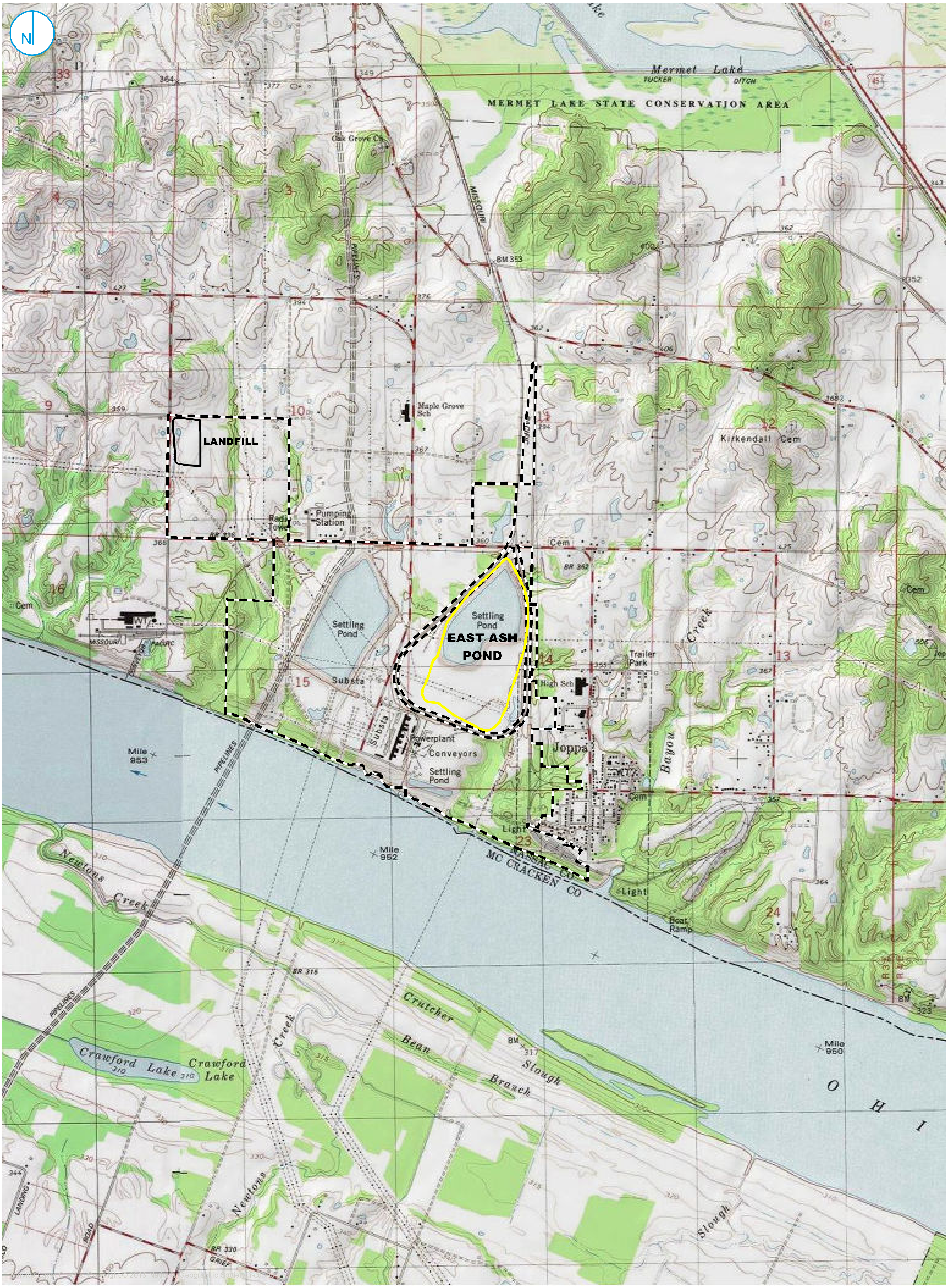
HSU	Location	Well Type	Parameter	Unit	Sample Count	Non-Detect Results	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
UA	G13D	Delin	Boron, total	mg/L	11	0	0	2022/01/20	2023/10/24	3.64	4.8	5.1	6.81
UA	G13D	Delin	Cobalt, total	mg/L	11	9	82	2022/01/20	2023/10/24	<0.0001	<0.0001	0.00045	0.00120
UA	G13D	Delin	pH (field)	SU	11	0	0	2022/01/20	2023/10/24	5.9	6.6	6.6	7.3
UA	G14S	Delin	Boron, total	mg/L	8	0	0	2022/01/19	2023/03/10	3.09	3.7	3.6	4.34
UA	G14S	Delin	Cobalt, total	mg/L	8	6	75	2022/01/19	2023/03/10	<0.0001	0.00025	0.00048	<0.0001
UA	G14S	Delin	pH (field)	SU	8	0	0	2022/01/19	2023/03/10	6.4	6.6	6.7	7.6
UA	G14D	Delin	Boron, total	mg/L	8	2	25	2022/01/19	2023/03/10	0.0180	0.025	0.043	0.101
UA	G14D	Delin	Cobalt, total	mg/L	8	4	50	2022/01/19	2023/03/10	0.000100	0.00045	0.00056	<0.0001
UA	G14D	Delin	pH (field)	SU	8	0	0	2022/01/19	2023/03/10	6.9	7.1	7.2	7.9
UA	G15S	Delin	Boron, total	mg/L	8	0	0	2022/01/19	2023/03/09	0.740	1.1	1.1	1.33
UA	G15S	Delin	Cobalt, total	mg/L	8	0	0	2022/01/19	2023/03/09	0.000400	0.0024	0.0027	0.00690
UA	G15S	Delin	pH (field)	SU	8	0	0	2022/01/19	2023/03/09	5.9	6.2	6.4	7.1
UA	G15D	Delin	Boron, total	mg/L	8	0	0	2022/01/19	2023/03/09	4.17	6.2	6.1	7.88
UA	G15D	Delin	Cobalt, total	mg/L	8	0	0	2022/01/19	2023/03/09	0.00400	0.0095	0.012	0.0238
UA	G15D	Delin	pH (field)	SU	8	0	0	2022/01/19	2023/03/09	6.7	6.8	7.1	8.2
UA	G16S	Delin	Boron, total	mg/L	11	0	0	2022/01/19	2023/10/24	5.85	7.2	7.3	10.6
UA	G16S	Delin	Cobalt, total	mg/L	11	0	0	2022/01/19	2023/10/24	0.00360	0.0046	0.0047	0.00710
UA	G16S	Delin	pH (field)	SU	11	0	0	2022/01/19	2023/10/24	6.5	6.7	6.9	8.0
UA	G16D	Delin	Boron, total	mg/L	8	0	0	2022/01/19	2023/03/09	2.89	6.8	6.2	7.79
UA	G16D	Delin	Cobalt, total	mg/L	8	3	38	2022/01/19	2023/03/09	0.000300	0.00050	0.00062	<0.0001
UA	G16D	Delin	pH (field)	SU	8	0	0	2022/01/19	2023/03/09	6.8	7.0	7.1	8.0
UA	G17S	Delin	Boron, total	mg/L	4	0	0	2022/07/24	2023/01/24	2.43	2.6	2.6	2.76
UA	G17S	Delin	Cobalt, total	mg/L	4	0	0	2022/07/24	2023/01/24	0.000300	0.00035	0.00065	0.00160
UA	G17S	Delin	pH (field)	SU	4	0	0	2022/07/24	2023/01/24	6.6	6.7	6.9	7.5
UA	G17D	Delin	Boron, total	mg/L	4	0	0	2022/07/24	2023/01/24	3.81	4.1	4.0	4.15
UA	G17D	Delin	Cobalt, total	mg/L	4	0	0	2022/07/24	2023/01/24	0.000400	0.00055	0.00092	0.00220
UA	G17D	Delin	pH (field)	SU	4	0	0	2022/07/24	2023/01/24	6.5	6.9	7.0	7.7
UA	G19S	Delin	Boron, total	mg/L	7	0	0	2022/07/27	2023/10/23	0.449	0.66	0.62	0.743
UA	G19S	Delin	Cobalt, total	mg/L	7	1	14	2022/07/27	2023/10/23	<0.0001	0.00050	0.00061	0.00160
UA	G19S	Delin	pH (field)	SU	7	0	0	2022/07/27	2023/10/23	6.2	6.4	6.8	7.8
UA	G19D	Delin	Boron, total	mg/L	7	0	0	2022/07/27	2023/10/23	0.496	0.64	0.66	0.809
UA	G19D	Delin	Cobalt, total	mg/L	7	4	57	2022/07/27	2023/10/23	0.000100	0.000100	0.00030	0.00120
UA	G19D	Delin	pH (field)	SU	7	0	0	2022/07/27	2023/10/23	6.2	6.7	6.7	7.5
UA	G20S	Delin	Boron, total	mg/L	7	0	0	2022/07/24	2023/10/24	3.24	3.8	4.0	4.84
UA	G20S	Delin	Cobalt, total	mg/L	7	6	86	2022/07/24	2023/10/24	<0.0001	0.000200	0.00011	0.000200
UA	G20S	Delin	pH (field)	SU	7	0	0	2022/07/24	2023/10/24	6.3	6.7	6.8	7.9

Table 3-3. Summary of Groundwater Data
Nature and Extent Report
Joppa Power Plant
East Ash Pond
Joppa, Illinois

HSU	Location	Well Type	Parameter	Unit	Sample Count	Non-Detect Results	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
UA	G20D	Delin	Boron, total	mg/L	7	0	0	2022/07/24	2023/10/24	2.16	2.5	2.6	2.93
UA	G20D	Delin	Cobalt, total	mg/L	7	3	43	2022/07/24	2023/10/24	<0.0001	0.00040	0.00046	<0.0001
UA	G20D	Delin	pH (field)	SU	7	0	0	2022/07/24	2023/10/24	6.7	7.0	7.2	8.1
UA	G21S	Delin	Boron, total	mg/L	7	0	0	2022/07/28	2023/10/23	3.39	4.3	4.2	5.00
UA	G21S	Delin	Cobalt, total	mg/L	7	1	14	2022/07/28	2023/10/23	<0.0001	0.00040	0.00046	0.000900
UA	G21S	Delin	pH (field)	SU	7	0	0	2022/07/28	2023/10/23	6.6	6.8	6.8	7.3
UA	G21D	Delin	Boron, total	mg/L	7	0	0	2022/07/28	2023/10/23	2.63	3.0	3.1	3.91
UA	G21D	Delin	Cobalt, total	mg/L	7	1	14	2022/07/28	2023/10/23	<0.0001	0.0021	0.0020	0.00280
UA	G21D	Delin	pH (field)	SU	7	0	0	2022/07/28	2023/10/23	6.8	7.1	7.2	7.7
UA	G22S	Delin	Boron, total	mg/L	8	0	0	2022/07/25	2023/10/23	1.10	1.3	1.3	1.39
UA	G22S	Delin	Cobalt, total	mg/L	8	7	88	2022/07/25	2023/10/23	0.000100	0.000100	0.00010	0.000100
UA	G22S	Delin	pH (field)	SU	8	0	0	2022/07/25	2023/10/23	5.7	6.7	6.8	7.6
UA	G22D	Delin	Boron, total	mg/L	7	0	0	2022/07/27	2023/10/23	0.562	0.68	0.70	0.896
UA	G22D	Delin	Cobalt, total	mg/L	7	1	14	2022/07/27	2023/10/23	<0.0001	0.00030	0.00033	0.000700
UA	G22D	Delin	pH (field)	SU	7	0	0	2022/07/27	2023/10/23	6.5	6.8	6.9	7.8

Notes:
B = Background
C = Compliance
CCR = Coal Combustion Residuals
Delin = Delineation
HSU = Hydrostratigraphic Unit
LAU = Lower Aquifer Unit
mg/L = Milligrams per Liter
UA = Uppermost Aquifer

FIGURES



🟨 REGULATED UNIT (SUBJECT UNIT)
☐ OTHER UNIT
⬚ PROPERTY BOUNDARY

0 1,000 2,000
Feet

SITE LOCATION MAP

FIGURE 2-1

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Joppa\GMP\Figure 1-2_Site Map.mxd

PROJECT: 169000XXXX | DATED: 10/15/2021 | DESIGNER: HOTCALD

🟨 REGULATED UNIT (SUBJECT UNIT)
☐ OTHER UNIT
— CENTRAL DIKE
⬚ PROPERTY BOUNDARY

0 375 750 Feet

SITE MAP

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

5FT TOPOGRAPHIC CONTOUR

1FT TOPOGRAPHIC CONTOUR

🟨 REGULATED UNIT (SUBJECT UNIT)

☐ SITE FEATURE

⬚ PROPERTY BOUNDARY

Note:
Elevation contours shown in feet, North American Vertical Datum of 1988 (NAVD88)

0 250 500 Feet

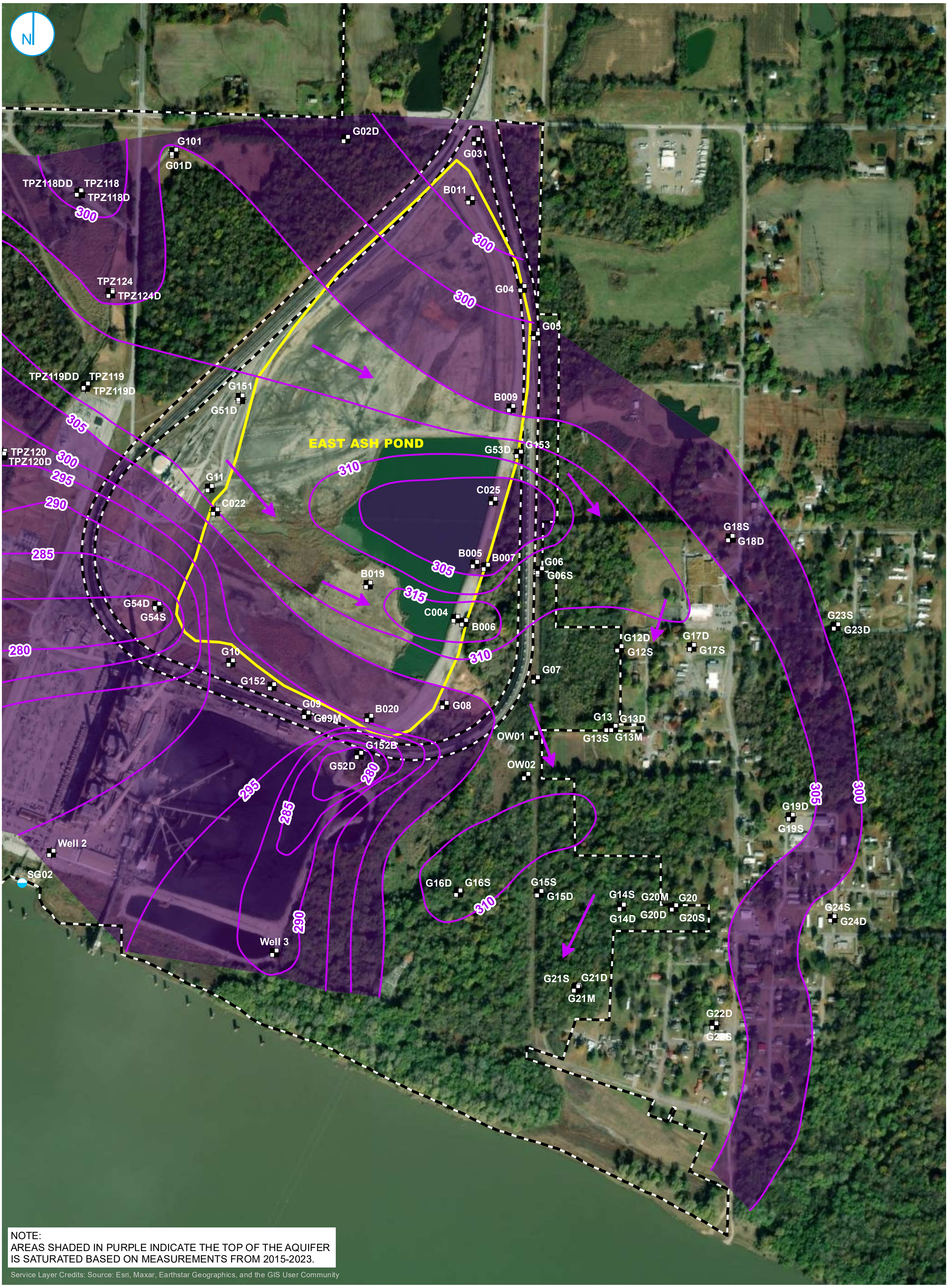
BASE OF CCR

FIGURE 2-3

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



NOTE:
AREAS SHADED IN PURPLE INDICATE THE TOP OF THE AQUIFER IS SATURATED BASED ON MEASUREMENTS FROM 2015-2023.

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- ▣ MONITORING WELL
- ◓ STAFF GAGE, RIVER
- — TOP OF MCNAIRY FORMATION ELEVATION (5-FT CONTOUR INTERVAL)
- → FLOW DIRECTION
- ⬬ AREA WHERE TOP OF AQUIFER IS SATURATED BASED ON MEASUREMENTS FROM 2015-2023
- ☐ REGULATED UNIT (SUBJECT UNIT)
- ⬚ PROPERTY BOUNDARY

0 300 600
Feet

TOP OF UPPERMOST AQUIFER

FIGURE 2-4

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

🟦	COMPLIANCE MONITORING WELL
🟫	BACKGROUND MONITORING WELL
🟩	PORE WATER WELL
⬛	MONITORING WELL
◒	STAFF GAGE, CCR UNIT
—	GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- -	INFERRED GROUNDWATER ELEVATION CONTOUR
→	GROUNDWATER FLOW DIRECTION
▭	REGULATED UNIT (SUBJECT UNIT)
⬚	PROPERTY BOUNDARY

NOTES

1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

*GAGING DATA FROM USGS 03612600 OHIO RIVER AT OLMSTED, IL LOCATED APPROXIMATELY 12 MILES DOWNSTREAM OF JOPPA POWER PLANT.

0 275 550
Feet

UPPERMOST AQUIFER POTENTIOMETRIC SURFACE MAP MAY 1, 2023 (E001)

FIGURE 2-5

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

PROJECT: 169000XXXX | DATED: 7/17/2023 | DESIGNER: GALARNMC

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Joppa\EAP_401\JOP 401 EAP Pot Surface 20230307.mxd

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

▣	COMPLIANCE MONITORING WELL
▣	BACKGROUND MONITORING WELL
▣	PORE WATER WELL
▣	MONITORING WELL
◒	STAFF GAGE, CCR UNIT
—	GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
- - -	INFERRED GROUNDWATER ELEVATION CONTOUR
→	GROUNDWATER FLOW DIRECTION
▭	REGULATED UNIT (SUBJECT UNIT)
▭	PROPERTY BOUNDARY

0 275 550 Feet

NOTES
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
*GAGING DATA FROM USGS 03612600 OHIO RIVER AT OLMSTED, IL LOCATED APPROXIMATELY 12 MILES DOWNSTREAM OF JOPPA POWER PLANT.

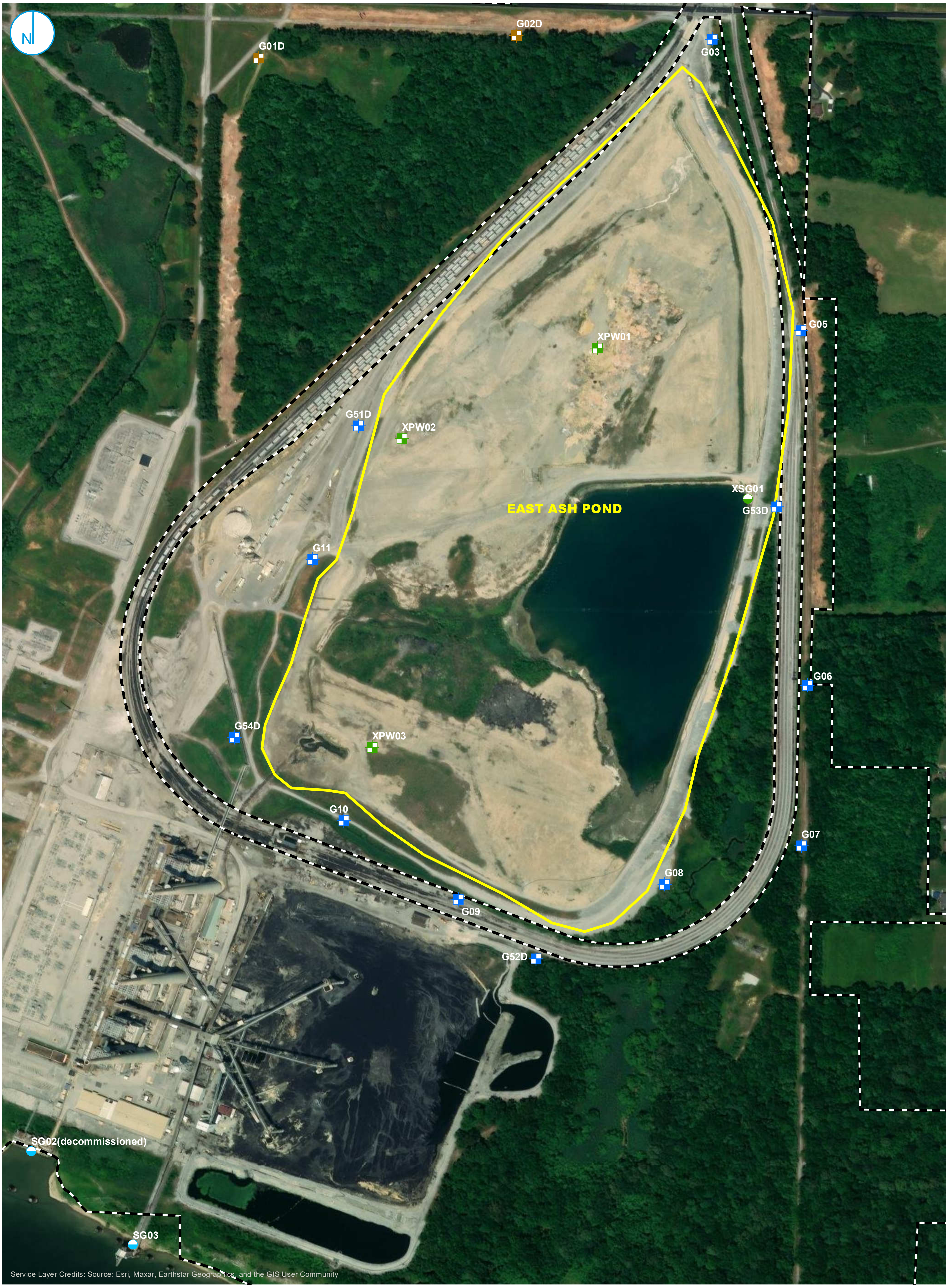
UPPERMOST AQUIFER POTENTIOMETRIC SURFACE MAP
MARCH 7 AND 10, 2023

FIGURE 2-6

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- 🟦 COMPLIANCE MONITORING WELL
- 🟫 BACKGROUND MONITORING WELL
- 🟩 PORE WATER WELL
- ◒ STAFF GAGE, CCR UNIT
- ◒ STAFF GAGE, RIVER
- ▭ REGULATED UNIT (SUBJECT UNIT)
- ⬚ PROPERTY BOUNDARY

0 200 400
Feet

MONITORING WELL LOCATION MAP

FIGURE 2-7

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT JOPPA,
ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

● TOTAL BORON EXCEEDANCE

● COMPLIANCE WELL WITHOUT EXCEEDANCE

▭ REGULATED UNIT (SUBJECT UNIT)

▭ PROPERTY BOUNDARY

0 275 550 Feet

GWPS EXCEEDANCE MAP
UPPERMOST AQUIFER

FIGURE 3-1

NATURE AND EXTENT REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

APPENDIX A
CCR Delineation Report

Prepared for

Electric Energy, Inc.
2100 Portland Road
Joppa, Illinois 62953

CCR INVESTIGATION AND DELINEATION REPORT

JOPPA POWER PLANT
EAST ASH POND
(IEPA ID W1270100004-02)
Joppa, Illinois

Prepared by

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engineers | scientists | innovators

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Project Number GLP8025

Revision 0

July 25, 2022

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1. INTRODUCTION AND BACKGROUND

Electric Energy, Inc. (EEI) is the owner of the coal-fired Joppa Power Plant (JPP), also referred to as Joppa Power Station, in Joppa, Illinois. The JPP is currently active, although EEI intends to cease the generation of electricity by September of 2022. EEI intends to complete closure of the East Ash Pond (EAP) at the JPP (IEPA ID No. W1270100004-02, EEI CCR Unit ID 401, and National Inventory of Dams Number IL50714). Closure of the EAP will be performed under the relevant Illinois Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (Part 845) [1] and the United States Environmental Protection Agency (USEPA) CCR Rule [2].

The evaluation of closure alternatives and closure design requires the delineation of the lateral and vertical extents of coal combustion residuals (CCRs) contained both within and outside of the limits of the EAP. The delineation is required to support groundwater modeling, the development of permit-level closure design drawings, supporting closure alternatives assessments that consider the total volume of CCR that must be either closed in-place or closed-by-removal, and performing geotechnical assessments. Additionally, the delineation of the interface between fine-grained clay and coarse-grained sand foundation soils beneath the EAP was required for performing geotechnical assessments.

This report summarizes the existing data sources, a subsurface investigation program completed by Geosyntec in 2022, and the procedures used to develop three-dimensional models of the bottom of CCR, top of CCR, and bottom of foundation clay (e.g., top of coarse-grained sand foundation soils) units within and outside of the limits of the EAP.

1.1. Report Contents

The following information is contained within this report:

- **Section 1** includes the introduction and background.
- **Section 2** includes a summary of existing data sources utilized by Geosyntec and areas where CCR is known to be present within and outside the limits of the EAP.
- **Section 3** includes a summary of subsurface investigations completed by Geosyntec in 2022 to support CCR delineation.
- **Section 4** includes an overview of the development of three-dimensional subsurface models for use in design and estimates of CCR volumes.
- **Section 5** includes a summary of this CCR delineation and recommendations for further phases of work.

2. EXISTING DATA SOURCES AND HISTORICAL CCR PLACEMENT

2.1. Existing Data Sources

Multiple existing data sources, including topographic data and subsurface explorations, were utilized as part of the CCR delineation. These data sources included:

- Topographic Ground Surface Data
    - Light detection and ranging (LIDAR) topographical and bathymetric survey data of the EAP and immediate surrounding areas collected in December 2020 by IngenAE, LLC (IngenAE) [3], representing existing topographical conditions.
    - LIDAR topographical data of the area outside of the EAP collected in 2012 by the State of Illinois [4], representing existing topographical conditions beyond the limits of the IngenAE survey.
    - United States Geological Survey (USGS) topographic maps dated 1932 [5], representing topographical conditions prior to construction of the EAP.
    - Design drawings for the EAP perimeter dike, dated 1973 and 1982, showing topographical conditions prior to construction of the EAP in some areas and conditions prior to construction of dike raises in other areas ([6], [7], [8]).
    - The topographic ground surface data is provided in **Attachment A**.
- Subsurface Explorations
    - Geotechnical borings and cone penetration tests (CPTs) performed in and around the EAP in 2015 and 2016 by AECOM [9].
    - Geotechnical borings and monitoring well installations performed in and around the EAP by Geosyntec in 2021 [10].
    - The existing subsurface explorations are summarized in **Table 1**, shown in plan on **Figure 1**, and provided in **Attachment A**.

2.2. CCR Outside of the EAP Dike Limits

CCR is known to be located both within and outside the limits of the existing EAP perimeter dikes. The CCR located outside of the EAP perimeter dikes is herein referred to as the “Southeast Area”, and is subdivided into the following sub-areas:

- The Southeast Area – North is approximately 21 acres in size and is located between the southeastern corner of the EAP perimeter dikes and the railroad loop embankment.

- The Southeast Area – South is approximately 11 areas in size and is located south of the Southeast Area – North, between the railroad loop embankment and the Ohio River.

The limits of the Southeast Area – North and Southeast Area – South are shown in plan on **Figure 1**.

3. 2022 GEOSYNTEC SUBSURFACE INVESTIGATION

While subsurface investigation data was available within the footprint of the existing EAP, limited subsurface investigation data was available for the Southeast Area – North and no subsurface investigation data was available for the Southeast Area – South. To support the delineation of the horizontal and vertical extents of CCR within these areas, Geosyntec completed a subsurface investigation program using hand augers and direct push technology (DPT) borings in March and April of 2022, as described in this section.

Hand auger and DPT information is summarized in **Table 2**; the locations of the investigations are shown on **Figure 1**; photographs collected during the investigation program, including photographs of soil samples, are provided in **Attachment B**. The subsurface investigation logs are provided in **Attachment C**.

3.1. Hand Augers

A total of 13 hand augers were completed by Geosyntec in March and April 2022 (HA-01 through HA-13). The hand augers were advanced using a 3-inch diameter auger to depths ranging from 2.5 to 7.5 ft below grade. The hand augers were generally advanced to below the bottom of observed CCR materials, or until either refusal or borehole collapse occurred. Material obtained from each hand auger was observed and photographed by Geosyntec to develop a log of subsurface conditions at each hand auger location. Hand auger locations backfilled with soil cuttings and their locations were surveyed by IngenAE.

3.2. DPT Borings

A total of 11 DPT borings were completed by Geosyntec in April 2022 (GEO-01 and GEO-06 through GEO-15[1]). The DPT borings were advanced using either a track-mounted or skid-steer mounted direct-push drilling rig subcontracted to Roberts Environmental Drilling, Inc., with a borehole diameter of 2.25 inches and a soil sample diameter of 1.5 inches. The DPTs were advanced to depth ranging from 17.0 to 23.9 ft below grade, until refusal occurred on dense or stiff subsurface materials that the DPT was unable to penetrate. Soil obtained from each DPT was observed and photographed by Geosyntec to develop a log of subsurface conditions at each boring location. DPT locations were backfilled with bentonite chips and their locations were surveyed by IngenAE.

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[1] DPT borings GEO-02 through GEO-05 were initially proposed and staked in the field but were unable to be accessed due to steep slopes and equipment access considerations. Therefore, DPTs were not advanced at these locations.

3.3. Summary of Subsurface Conditions

CCR and/or coal fines were encountered in hand augers HA-02, HA-03, and HA-04, but were not encountered in HA-01. CCR and/or coal fines were encountered in GEO-01 and GEO-09 through GEO-15), but not in GEO-06 through GEO-08.

Where the CCR and coal fines were encountered (which are herein jointly referred to as “CCR”), they were typically mixed and/or interbedded with soil and alluvial sediments into a single stratum. The CCR was generally observed to overly fine-grained native foundation soils, although CCR was encountered directly overlying alluvial sand in GEO-14. Photographs showing the interbedded and layered nature of the CCR and soil sediments are provided in **Attachment B**.

4. DEVELOPMENT OF THREE-DIMENSIONAL SUBSURFACE MODELS

Three-dimensional models of the bottom of CCR, top of CCR, and bottom of foundation clay were developed and volumes of CCR were estimated utilizing AutoCAD Civil 3D computer aided design (CAD) [11] and geographic information system (GIS) software. The three-dimensional models were generated utilizing available topographical and subsurface data obtained from others and collected by Geosyntec in 2021 and 2022. Where GIS was utilized, three-dimensional models were developed and interpolated from available data using a combination of the kriging method within Earth Volumetric Studio (EVS) [12] and the topo to raster method within ArcMap GIS software [13].

Three laterally-separate bottom of CCR surfaces were developed, including the Bottom of CCR within the EAP, the Bottom of CCR in the Southeast Area – North, Bottom of CCR in the Southeast Area – South. Additionally, a Top of CCR surface was developed in the Southeast Area – North, to delineate where the perimeter dike raise [6] was constructed over existing CCR. A Bottom of Clay surface was developed with lateral extents that were similar to all three of the Bottom of CCR surfaces.

4.1. Individual Surfaces

Four separate three-dimensional model surfaces, each representing the bottom of CCR that was indicated from the source data, were developed utilizing available topographic, bathymetric, and subsurface investigation data. Each of the surfaces included three separate sub-surfaces, with adjacent but not overlapping lateral extents, including the Bottom of CCR within the EAP, Bottom of CCR in the Southeast Area – North, and Bottom of CCR in the Southeast Area – South. Two Bottom of Clay surfaces were developed, including one surface for the EAP and the Southeast Area – North, and one surface for the Southeast Area – South. Procedures used to develop each of the four surfaces are described below.

- Existing Conditions Surface
    - The 2020 IngenAE LIDAR and bathymetric survey [3] was used to represent existing topographical conditions, including the ground surface beneath impounded water within the EAP.
    - The 2012 State of Illinois LIDAR survey [4] was used to represent existing topographical conditions in the Southeast Area – South, beyond the limits of the IngenAE survey.
        - It should be noted that this LIDAR survey was collected in an area of dense vegetation and may have been collected during a high-water event on the Ohio River, therefore the actual existing ground surface elevations may vary from this survey.

- Pre-Construction Surface
    - The 1932 USGS topographical map [5] was digitized and used to represent approximate conditions prior to construction of the EAP, and ground surface elevations and the presumed top-of-clay prior to the deposition of CCR into the EAP and the Southeast Area.
- Intermediate EAP Operations Surface
    - Design drawings for the construction of the EAP embankment and dike raises from 1973 [7] and 1982 [8] were digitized and were used to represent conditions during operation of the EAP.
        - These drawings showed pre-construction ground surfaces in some areas, but not all, of the EAP, and ground surface during intermediate operation of the EAP in other areas. Therefore, they represent the presumed top-of-clay prior to the deposition of CCR into these areas.
- Subsurface Investigation Surface
    - Composite surfaces were developed using observed bottom-of-CCR data, and, for the southeast Area – North, top-of-CCR data from subsurface investigations, including the sources listed below.
        - A total of 53 geotechnical borings and CPTs performed in and around the EAP in 2015 and 2016 by AECOM [9].
        - A total of three geotechnical borings and monitoring well installations performed in and around the EAP in 2021 by Geosyntec [10].
        - The 24 hand augers and DPTs advanced by Geosyntec in 2022, as described in **Section 3**.
- Each of the four surfaces were compared, and, where the surface intersected, the lowest elevation surface was conservatively assumed to represent the bottom of CCR.
- Where the CCR was adjacent to the earthen EAP dikes, the interior slopes of the interface between the dikes and CCR was assumed to be 1.5H:1V (horizontal to vertical) based on design drawings [7].
- Within the Southeast Area, the lateral limits of the CCR were developed based on the observed boring data (e.g., where CCR was no longer located in borings), and based on an

examination of the existing conditions topography (e.g., CCR was not assumed to be present beyond the horizontal limits of the valley floor outside of the creek channel).

  - Additionally, CCR was not assumed to be present beneath the rail loop, as CCR was not observed beneath the rail loop in limited subsurface investigations completed along the edges of the rail loop fill by AECOM in 2015 [9].

The resulting composite bottom-of-CCR and top-of-CCR surfaces were then constructed and are provided in **Figures 2**, **3**, and **4**.

4.2. Bottom of Clay

A composite Bottom-of-Clay surface was developed using bottom-of-clay observed from subsurface investigation data, using the same data sources as utilized for the bottom-of-CCR described in **Section 4.1**.

The bottom-of-clay was defined by Geosyntec by reviewing each boring or CPT log and identifying where the clay transitioned to a material which was sandier in nature and expected to behave in a drained manner during geotechnical loading conditions. It should be noted that Geosyntec's bottom-of-clay surface is similar, but not the same, as the top of the uppermost aquifer evaluated by others. This is because Geosyntec's surface is based on a geotechnical assessment of the foundation soils, considering shear strength, rather than a hydrogeological assessment, which would be based on permeability.

The resulting surface is provided in **Figure 5**. Similar to the CCR surfaces, Geosyntec did not extend the surface beneath the rail loop, due to relatively limited subsurface investigation data indicating the bottom of clay in that area.

4.3. Volume Estimates

The surfaces described in **Section 4.1** were used to estimate the volume of CCR present within the EAP, in the Southeast Area – North, and in the Southeast Area – South. Each volume estimate was performed using CAD. Estimated volumes are summarized is described below.

- The volume of CCR within the EAP was estimated to be 5.8 million cubic yards, by comparing the existing conditions topographic and bathymetric survey [3] and the bottom of CCR surface.

- The volume of CCR in the Southeast Area – North was estimated to be 80,000 cubic yards, by comparing the existing conditions topographic survey [3], the bottom of CCR surface, and the top of CCR surface.

- The volume of CCR in the Southeast Area – South was estimated to be 450,000 cubic yards, by comparing the existing conditions topographic survey [4] and the bottom of CCR surface.

5. SUMMARY AND RECOMMENDATIONS

Geosyntec developed three-dimensional models to delineate the vertical and horizontal extents of CCR within the EAP, the Southeast Area – North, and the Southeast Area – South using available:

- Existing subsurface investigation data;
- Subsurface investigation data collected by Geosyntec in 2022; and
- Available recent and historical topographical and bathymetric survey data.

These three-dimensional model surfaces were used to estimate volumes of CCR present within the EAP (5.8 million cubic yards), in the Southeast Area – North (80,000 cubic yards), and in the Southeast Area – South (450,000 cubic yards).

These three-dimensional models should be considered approximate and were based on the best available data. However, subsurface investigation data is not currently available to verify the surfaces within significant areas of the EAP, and the scope of the subsurface investigation for the Southeast Area – North and Southeast Area – South was limited due to site access concerns. Additionally, the existing ground surface elevations within the Southeast Area – South may vary from the 2012 State of Illinois LIDAR survey of the area. Therefore, the actual bottom of CCR, top of CCR, bottom of clay, and volumes of CCR may vary from these surfaces and estimates. If a refined estimate of the bottom of CCR and/or bottom of clay is required, additional subsurface investigation data should be collected and the surfaces presented in this report should be updated, as and if appropriate.

6. REFERENCES

[1] Illinois Environmental Protection Agency, "35 Ill. Adm. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments," Springfield, IL, 2021.

[2] United Stated Environmental Protection Agency, "40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 2015," 2015.

[3] IngenAE, LLC, Electric Engergy, Inc., Joppa Power Station, December 2020 Topography, 2021.

[4] Illinois Geospatial Data Clearinghouse, "Massac, 2012," 2012. [Online]. Available: Massac, 2012 | clearinghouse.isgs.illinois.edu.. [Accessed 2022].

[5] United States Geologic Survey (USGS), L.A. Center Kentucky-Illinois Quandrangle, 1932.

[6] AECOM, "History of Construciton, USEPA Final CCR Rule, 40 CFR § 257.73(c), Joppa Power Station, Joppa, Illinois," October 2016.

[7] Wapora, Inc., Electric Energy, Inc. East Ash Pond Plan, Sections and Details, 1973.

[8] Electric Energy, Inc., Joppa, IL, East Ash Pond, 4229-8211, 1982.

[9] AECOM, CCR Certification Report: Initial Structural Stability Assessment, Initial Factor of Safetey Assessment, and Initial Inflow Design Flood Control System Plan for East CCR Pond at Joppa Power Station, 2016.

[10] Geosyntec Consultants, Illinois Administrative Code Part 845 Data Gap Analysis - Site: Joppa East Pond-CCR Unit 401, 2021.

[11] Autodesk, *AutoCAD Civil3D,* San Rafael, CA, 2022.

[12] C Tech Development Corporation, *Earth Volumetric Studio, Version 2021.4.3,* Las Vegas, 2021.

[13] ESRI, *ArcMap, Version 10.8.1,* Redlands, California, 2020.

FIGURES

Legend

● Geosyntec Boring Locations

● AECOM Boring Locations

— Limits of EAP

— Limits of Southeast Area - North

— Litmits of Southeast Area - South

+ Rail Loop

NOTES:
1.COORDINATES AND DIRECTIONS SHOWN IN THESE DRAWINGS WERE BASED ON THE ILLINOIS STATE PLANE COORDINATE SYSTEM (NAD83, IN US FEET). ELEVATIONS WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88, IN US FEET). ALL ELEVATIONS FOR DATA SORUCES WHERE DATUMS WERE NOT LISTED WERE ASSUMED TO BE IN THESE DATUMS.
2.THE EXTENTS OF CCR PRESENTED IN THESE DRAWINGS SHOULD BE CONSIDERED APPROXIMATE, DUE TO LIMITED INVESTIGATION DATA TO CONFIRM THE EXTENTS OF CCR.

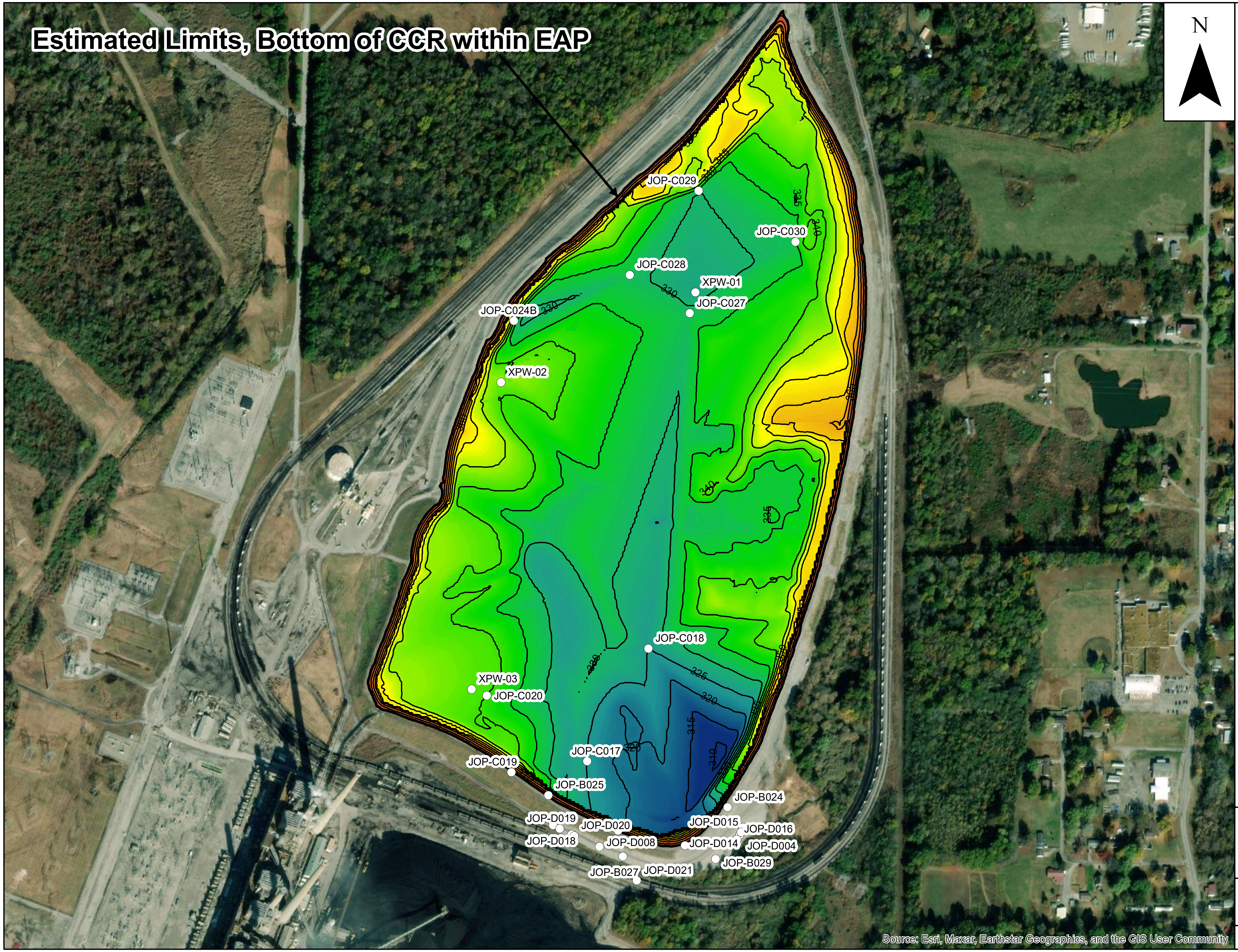
0 810 1,620
Feet

Site Plan
East Ash Pond
Joppa Power Plant
Joppa, Illinois

Geosyntec
consultants

Figure
1

GLP8025
6/1/2022



Legend

High : 377.2 (ft)

Low : 308.8 (ft)

○ Bottom of CCR Encountered in Subsurface Investigation

NOTES:

1.COORDINATES AND DIRECTIONS SHOWN IN THESE DRAWINGS WERE BASED ON THE ILLINOIS STATE PLANE COORDINATE SYSTEM (NAD83, IN US FEET). ELEVATIONS WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88, IN US FEET). ALL ELEVATIONS FOR DATA SORUCES WHERE DATUMS WERE NOT LISTED WERE ASSUMED TO BE IN THESE DATUMS.

2.THE BOTTOM-OF-CCR SURFACE PRESENTED IN THIS FIGURE IS BASED ON LIMITED SUBSURFACE INVESTIGATION DATA, MULTIPLE HISTORICAL TOPOGRAPHIC SURVEYS AND OTHER TYPES OF INFORMATION, AND SHOULD BE CONSIDERED APPROXIMATE. ACTUAL BOTTOM-OF-CCR ELEVATIONS MAY VARY FROM WHAT IS PRESENTED IN THIS FIGURE.

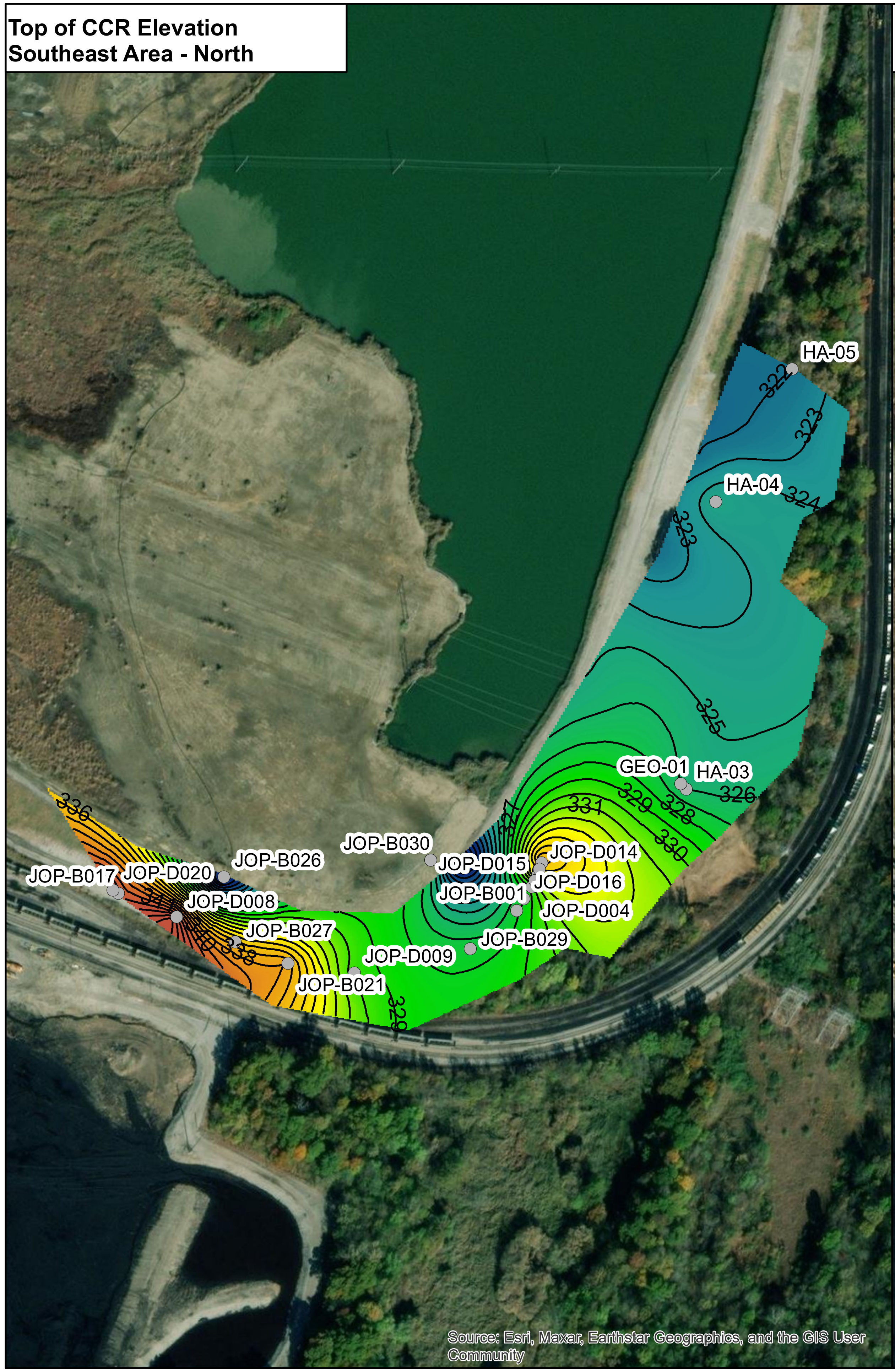
0 425 850
Feet

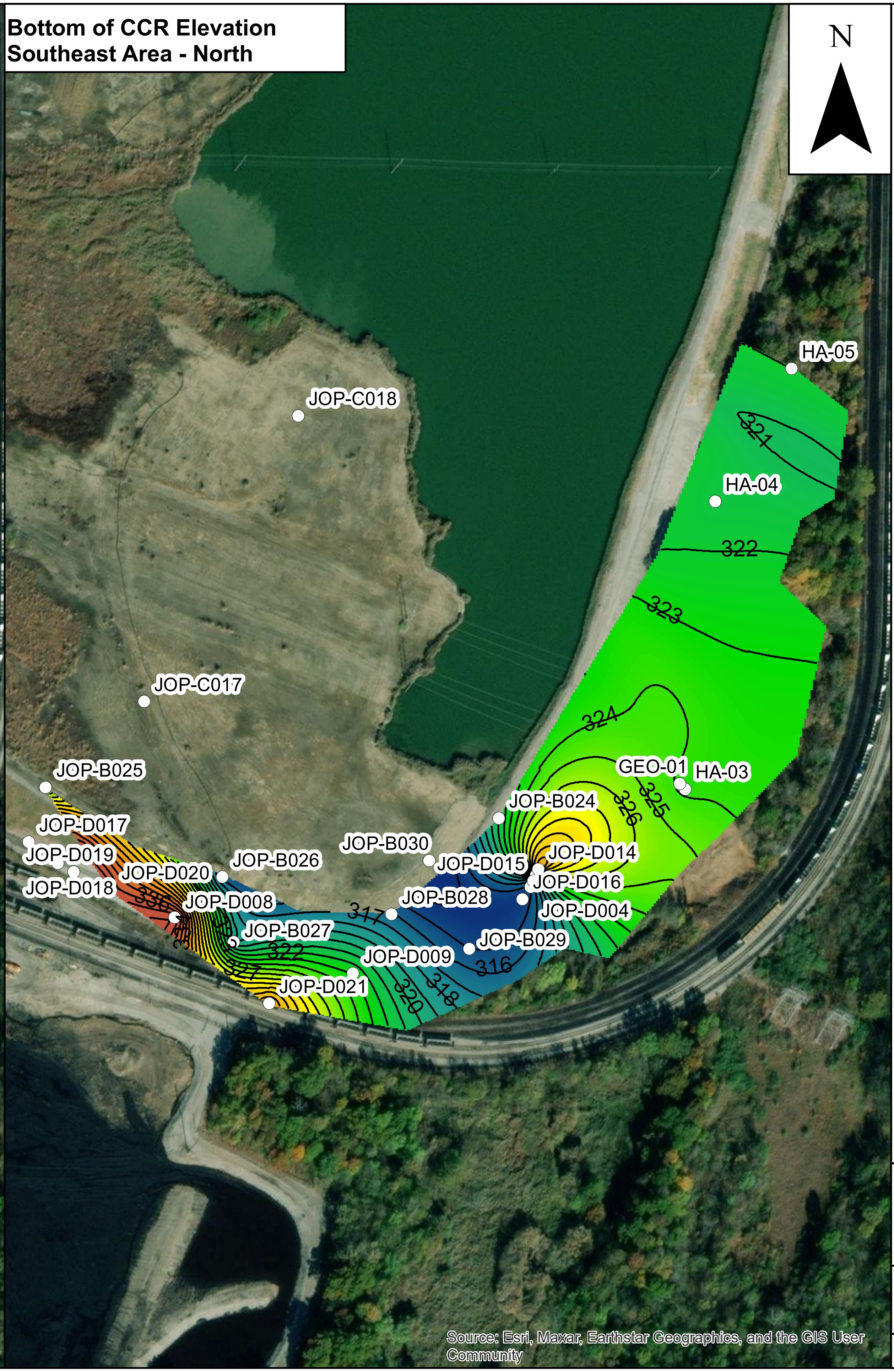
Bottom of CCR Elevations within EAP,
Joppa Power Plant
Joppa, Illinois

Geosyntec consultants

GLP8025
6/1/2022

Figure
2





Legend

● Top of CCR Encountered in Subsurface Investigation

○ Bottom of CCR Encountered in Subsurface Investigation

Top of CCR

Value

High : 345.6 (ft)

Low : 314.6 (ft)

Bottom of CCR

High : 338.3 (ft)

Low : 313.0 (ft)

NOTES:

1.COORDINATES AND DIRECTIONS SHOWN IN THESE DRAWINGS WERE BASED ON THE ILLINOIS STATE PLANE COORDINATE SYSTEM (NAD83, IN US FEET). ELEVATIONS WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88, IN US FEET). ALL ELEVATIONS FOR DATA SORUCES WHERE DATUMS WERE NOT LISTED WERE ASSUMED TO BE IN THESE DATUMS.

2.THE BOTTOM-OF-CCR AND TOP-OF-CCR SURFACES PRESENTED IN THIS FIGURE ARE BASED ON LIMITED SUBSURFACE INVESTIGATION DATA, MULTIPLE HISTORICAL TOPOGRAPHIC SURVEYS, AND OTHER TYPES OF INFORMATION, AND SHOULD BOTH BE CONSIDERED APPROXIMATE. ACTUAL BOTTOM-OF-CCR AND TOP-OF-CCR ELEVATIONS MAY VARY FROM WHAT IS PRESENTED IN THIS FIGURE.

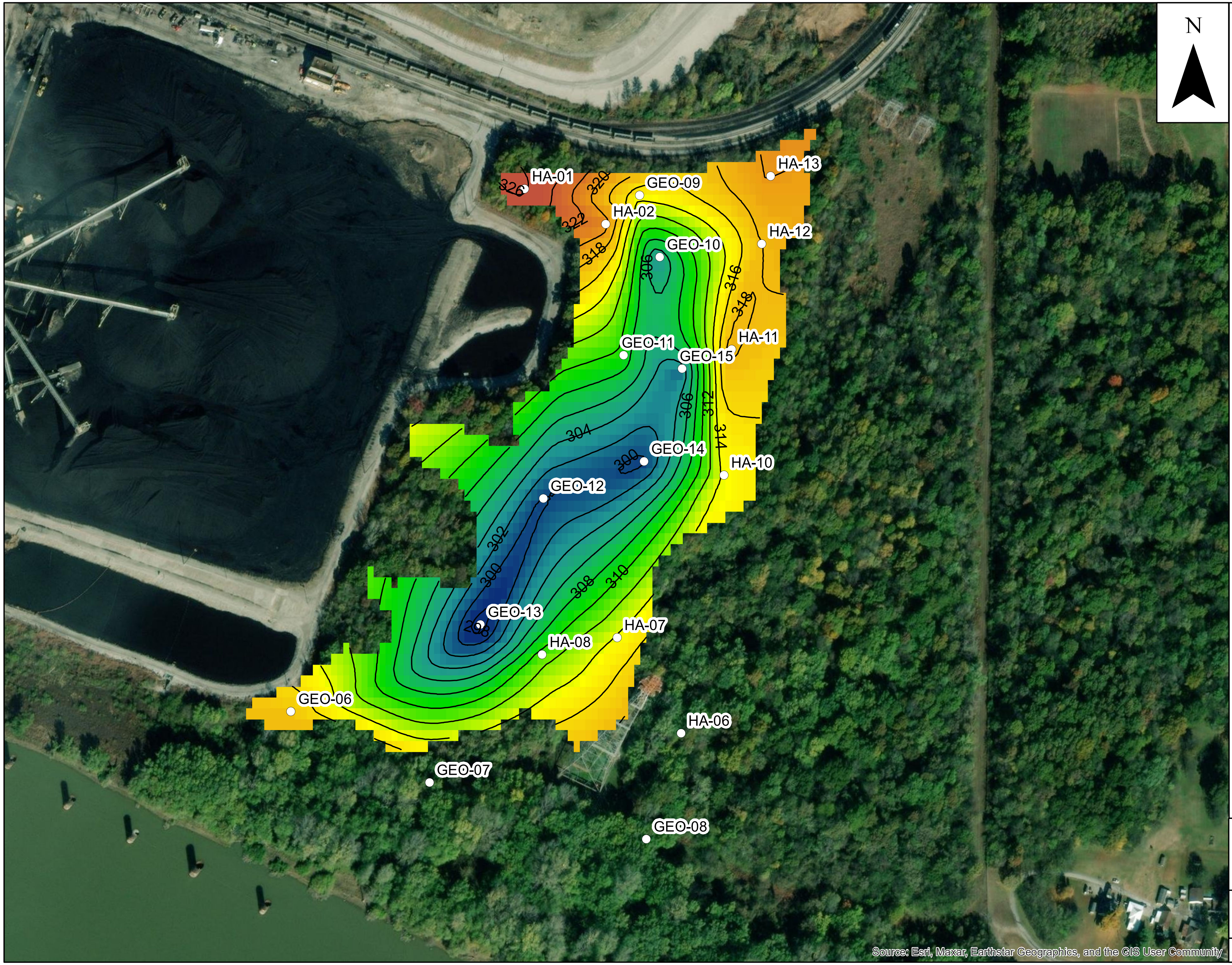
0 225 450 Feet

Top and Bottom of CCR Elevations within Southeast Area - North East Ash Pond, Joppa Power Plant, Joppa, Illinois

Geosyntec consultants

Figure 3

GLP8025 6/1/2022



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

○ Bottom of CCR Encountered in Subsurface Investigation

Bottom of CCR

High : 326.4 (ft)

Low : 296.7 (ft)

NOTES:

1.COORDINATES AND DIRECTIONS SHOWN IN THESE DRAWINGS WERE BASED ON THE ILLINOIS STATE PLANE COORDINATE SYSTEM (NAD83, IN US FEET). ELEVATIONS WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88, IN US FEET). ALL ELEVATIONS FOR DATA SORUCES WHERE DATUMS WERE NOT LISTED WERE ASSUMED TO BE IN THESE DATUMS.

2.THE BOTTOM-OF-CCR AND TOP-OF-CCR SURFACES PRESENTED IN THIS FIGURE ARE BASED ON LIMITED SUBSURFACE INVESTIGATION DATA, MULTIPLE HISTORICAL TOPOGRAPHIC SURVEYS AND OTHER TYPES OF INFORMATION, AND SHOULD BE CONSIDERED APPROXIMATE. ACTUAL BOTTOM-OF-CCR AND TOP-OF-CCR ELEVATIONS MAY VARY FROM WHAT ARE PRESENTED IN THIS FIGURE.

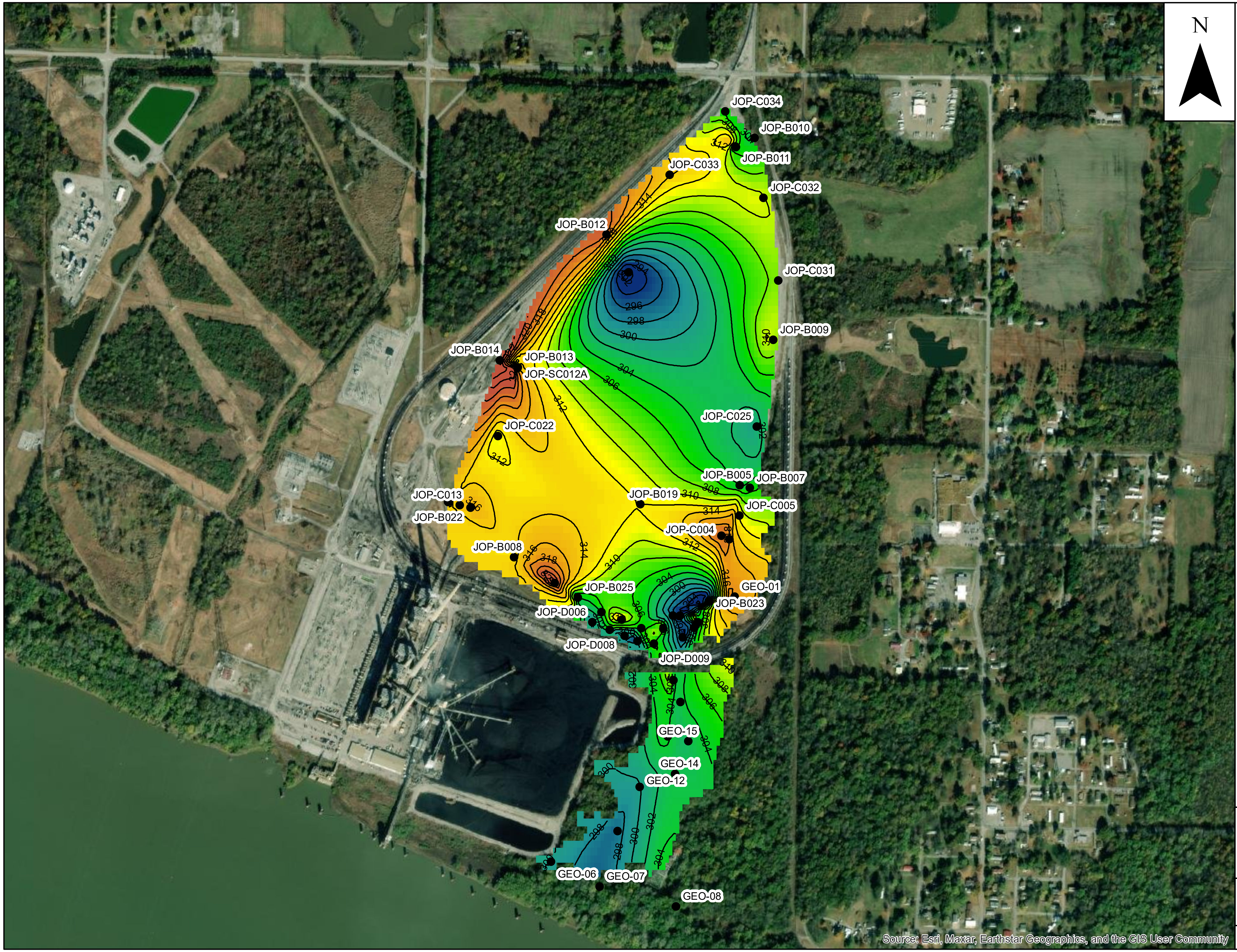
0 225 450 Feet

Bottom of CCR Elevations within Southeast Area - South East Ash Pond, Joppa Power Plant Joppa, Illinois

Geosyntec
consultants

GLP8025 6/1/2022

Figure 4



Legend

High : 328.7 (ft)

Low : 290.8 (ft)

● Bottom of Clay Encountered in Subsurface Investigation

NOTES:
1.COORDINATES AND DIRECTIONS SHOWN IN THESE DRAWINGS WERE BASED ON THE ILLINOIS STATE PLANE COORDINATE SYSTEM (NAD83, IN US FEET). ELEVATIONS WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88, IN US FEET). ALL ELEVATIONS FOR DATA SORUCES WHERE DATUMS WERE NOT LISTED WERE ASSUMED TO BE IN THESE DATUMS.
2.THE BOTTOM-OF-CLAY SURFACE PRESENTED IN THIS FIGURE IS BASED ON LIMITED SUBSURFACE INVESTIGATION DATA AND SHOULD BE CONSIDERED APPROXIMATE. ACTUAL BOTTOM-OF-CLAY ELEVATIONS MAY VARY FROM WHAT IS PRESENTED IN THIS FIGURE.

0 680 1,360 Feet

Bottom of Clay Elevations
East Ash Pond
Joppa Power Plant
Joppa, Illinois

Geosyntec consultants

GLP8025 6/1/2022

Figure 5

TABLES

Table 1: Existing Investigation Data

Exploration ID	Northing (ft NAD83)	Easting (ft NAD83)	Ground Surface Elevation (ft NAVD88)	Estimated Layer Elevations (ft NAVD88)		
				Bottom of CCR	Top of CCR in SE Dike	Bottom of Clay
2015 AECOM Investigation						
JOP-B001	198,339.4	833,368.3	333.6	315.6	327.6	290.1
JOP-B002	198,526.7	833,473.7	341.5	NE	NA	285.6
JOP-B004	198,426.3	833,270.9	379.0	310.0	314.5	290.5
JOP-B005	199,345.5	833,690.4	379.9	NE	NA	303.9
JOP-B006	198,964.5	833,617.0	357.1	NE	NA	320.1
JOP-B007	199,326.6	833,760.8	347.6	NE	NA	303.6
JOP-B008	198,838.5	832,101.2	380.4	NE	NA	312.4
JOP-B009	200,368.5	833,926.1	378.8	NE	NA	310.3
JOP-B010	201,791.2	833,794.1	350.0	NE	NA	303.5
JOP-B011	201,732.5	833,659.5	380.0	NE	NA	316.5
JOP-B012	201,111.0	832,753.5	379.6	NE	NA	321.6
JOP-B013	200,176.2	832,128.5	379.3	NE	NA	307.3
JOP-B014	200,225.8	832,001.4	361.8	NE	NA	329.8
JOP-B015	199,187.8	831,795.1	380.3	NE	NA	316.8
JOP-B017	198,369.4	832,674.8	347.2	339.2	342.2	NE
JOP-B018	198,450.7	832,716.5	378.6	NE	NA	303.1
JOP-B019	199,211.3	832,989.8	376.1	325.1	NA	312.1
JOP-B020	198,337.4	832,996.0	378.1	NE	NA	305.1
JOP-B021	198,247.4	832,969.4	344.0	330.5	338.0	296.0
JOP-B022	199,227.6	831,636.1	353.4	NE	NA	314.1
JOP-B023	198,526.7	833,473.7	341.5	300.5	NA	292.5
JOP-C004	198,989.8	833,562.6	380.6	NE	NA	320.8
JOP-C005	199,130.6	833,688.6	344.0	NE	NA	316.5
JOP-C013	199,204.9	831,720.2	354.0	NE	NA	314.0
JOP-C017	198,703.0	832,722.1	377.6	334.1	NA	NE
JOP-C018	199,199.8	832,990.7	376.2	325.2	NA	0.0
JOP-C019	198,655.5	832,387.7	380.0	380.0	NA	326.3
JOP-C020	198,992.1	832,279.5	378.8	345.3	NA	NE
JOP-C021	198,847.0	832,092.2	380.0	380.0	NA	0.0
JOP-C022	199,692.4	831,988.8	379.5	379.5	NA	310.7
JOP-C024	200,642.3	832,399.8	373.8	327.8	NA	NE
JOP-C024A	200,642.3	832,399.8	373.8	373.8	NA	NE
JOP-C024B	200,642.3	832,399.8	373.8	373.8	NA	NE
JOP-C025	199,758.8	833,810.6	380.3	380.3	NA	300.3
JOP-C027	200,675.5	833,173.1	380.5	331.5	NA	0.0
JOP-C028	200,844.1	832,909.1	373.4	331.4	NA	290.4
JOP-C029	201,214.5	833,211.5	373.0	330.0	NA	NE
JOP-C030	200,989.8	833,638.7	371.7	332.2	NA	NE
JOP-C031	200,786.5	833,960.8	378.7	NE	NA	308.2
JOP-C032	201,370.3	833,857.1	381.2	NE	NA	310.7
JOP-C033	201,531.9	833,197.9	379.4	NE	NA	314.9
JOP-C034	201,978.0	833,588.0	380.3	NE	NA	305.8
JOP-B027	198,284.6	832,878.2	343.5	330.5	337.0	297.5
JOP-B028	198,333.0	833,152.3	378.0	NE	NA	310.0
JOP-B030	198,426.6	833,218.3	381.0	312.0	NA	298.0
JOP-D006	198,380.9	832,653.7	346.4	NE	NA	298.9
JOP-D008	198,327.8	832,775.7	345.9	337.9	345.4	303.9
JOP-D009	198,230.3	833,085.6	341.6	322.8	NA	307.1
JOP-D012	198,422.2	833,411.4	337.5	336.5	337.0	NE
JOP-D013	198,400.8	833,404.0	335.9	332.9	335.4	NE
JOP-D014	198,411.3	833,407.5	336.0	332.7	333.7	NE
JOP-D015	198,391.0	833,399.3	335.3	315.8	332.3	NE
JOP-D016	198,359.4	833,380.5	333.4	NE	327.4	311.4
2021 Geosyntec Investigation						
XPW-01	200,767.2	833,197.3	380.7	326.7	NA	NE
XPW-02	200,371.3	832,342.6	373.2	345.4	NA	NE
XPW-03	199,020.7	832,213.2	378.6	341.6	NA	NE

NA = Not applicable
NE = Not encountered

Table 2 – SE Investigation Data

Exploration ID	Northing (ft NAD83)	Easting (ft NAD83)	Ground Surface Elevation (ft NAVD88)	Total Depth (ft NAVD88)	Estimated Layer Elevations (ft NAVD88)	
					Bottom of CCR	Bottom of Clay
GEO-01	198,560.1	833,653.8	328.9	19.9	323.4	318.4
GEO-06	196,693.9	832,361.5	319.2	22.5	317.7	300.2
GEO-07	196,518.8	832,703.9	319.1	23.9	NE	295.6
GEO-08	196,378.4	833,240.6	321.4	19.9	NE	306.9
GEO-09	197,970.7	833,223.6	323.0	17.0	314.5	309.5
GEO-10	197,817.7	833,273.4	321.6	19.4	303.6	302.6
GEO-11	197,575.3	833,184.1	320.0	19.1	309.5	305.0
GEO-12	197,220.8	832,985.3	318.0	19.5	299.5	NE
GEO-13	196,909.6	832,830.1	314.5	18.0	296.5	NE
GEO-14	197,312.2	833,234.8	319.1	19.9	299.2	303.1
GEO-15	197,541.7	833,329.0	321.1	19.8	301.3	302.1
HA-01	197,986.0	832,939.4	330.9	4.3	326.4	NE
HA-02	197,899.2	833,140.2	326.3	6.0	321.3	NE
HA-03	198,550.8	833,663.0	327.1	5.0	323.6	NE
HA-04	199,050.8	833,715.1	328.0	7.0	321.5	NE
HA-05	199,281.8	833,847.8	329.9	2.5	NE	NE
HA-06	196,640.7	833,326.7	322.2	7.0	NE	NE
HA-07	196,877.1	833,168.5	315.8	2.2	314.3	NE
HA-08	196,834.6	832,982.8	314.5	4.0	311.2	NE
HA-09	196,906.5	832,831.8	324.6	3.0	NE	NE
HA-10	197,278.7	833,432.3	319.1	6.5	314.1	NE
HA-11	197,589.6	833,451.3	321.2	7.5	318.7	NE
HA-12	197,849.9	833,526.1	322.5	4.8	317.7	NE
HA-13	198,018.0	833,548.3	323.1	4.0	320.1	NE

NE = Not encountered

APPENDIX B

Hydrogeologic Site Characterization Report and Supplemental Site Investigation Report Cross Sections

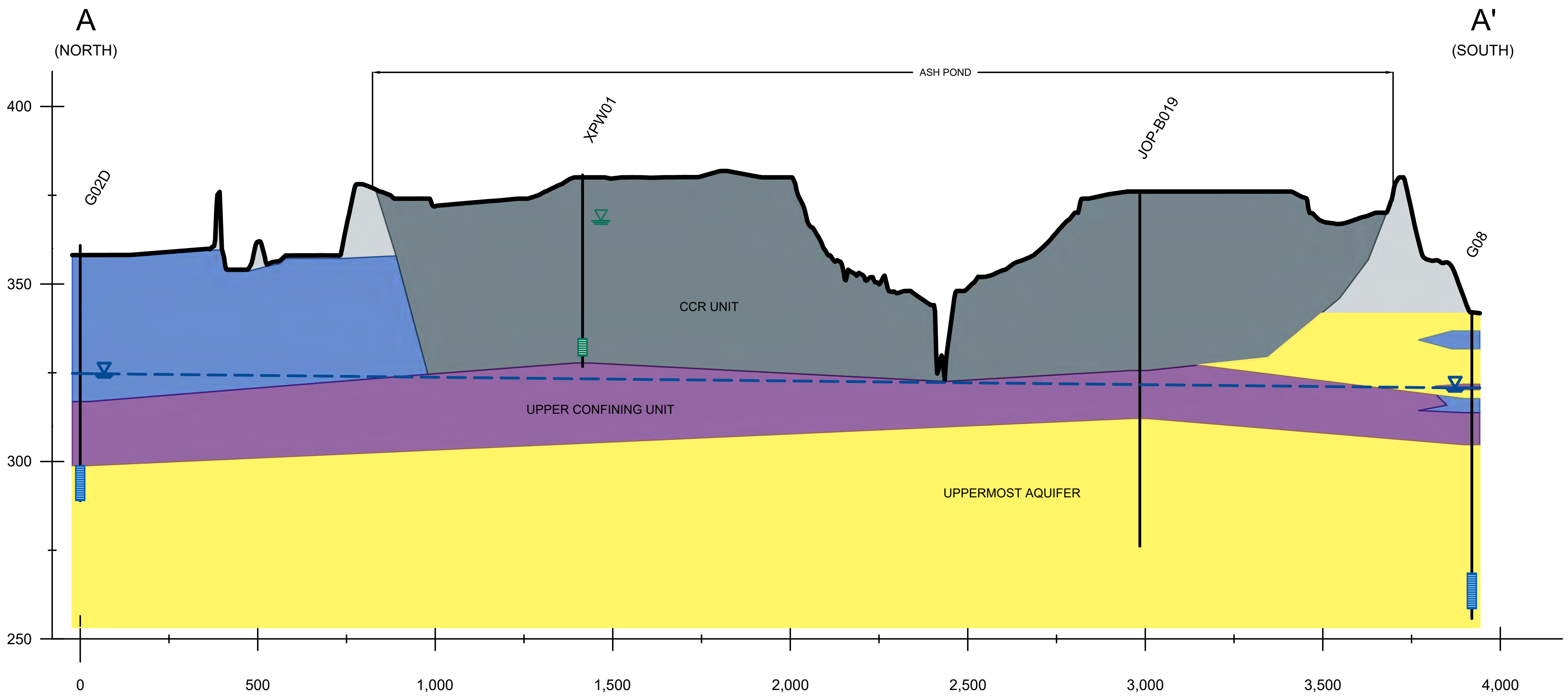
\\ramboll.sharepoint.com@SSL\DavWWWRoot\sites\vistra\Shared Documents\-CCR GW\Deliverables\Part 845 Operating Permits\Sites\Joppa\HCR\Figures\CAD working files\Joppa East Cross Sections.dwg

DATED: 10/5/2021 DESIGNER: ENGELHSA

PROJECT: 1940100806

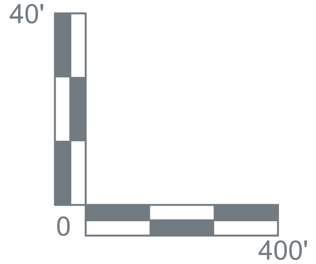
NOTES

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 April 13-14, 2021.



LEGEND

🟫	COAL COMBUSTION RESIDUALS (CCR)
⬜	FILL
🟪	CLAY (CL/CH)
🟦	SILT (ML)
🟨	SAND (SP/SM/SW)
▤	WELL SCREEN INTERVAL
- - -	UPPERMOST AQUIFER POTENTIOMETRIC SURFACE
▼	UPPERMOST AQUIFER GROUNDWATER ELEVATION
▽	POREWATER ELEVATION



GEOLOGIC CROSS SECTIONS

A-A'

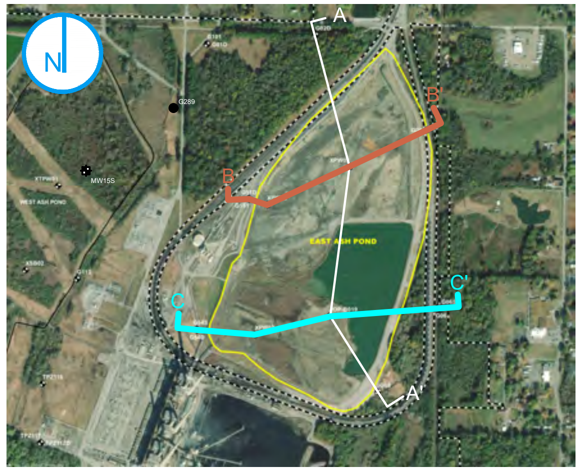
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT

EAST ASH POND

JOPPA POWER PLANT
JOPPA, ILLINOIS

FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.



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.
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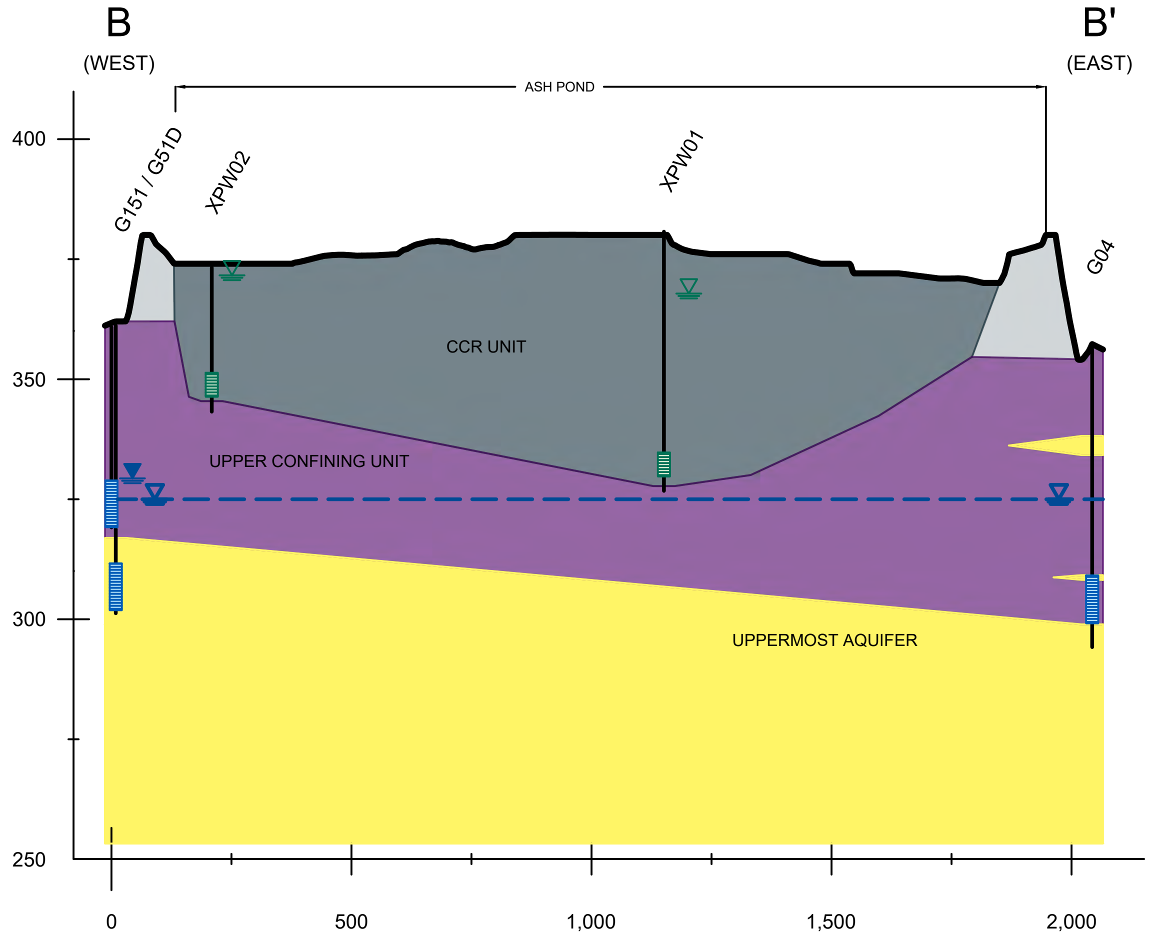
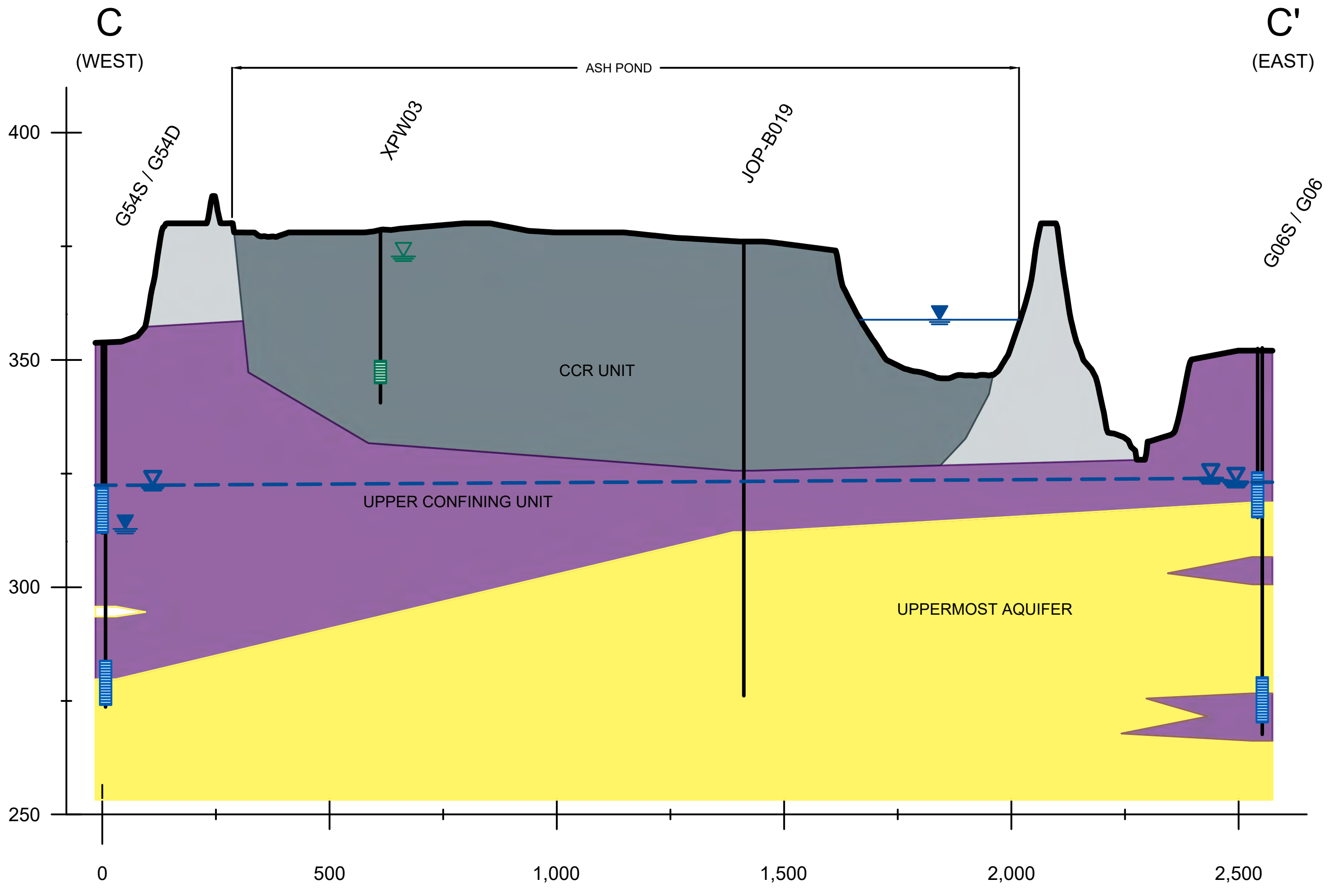
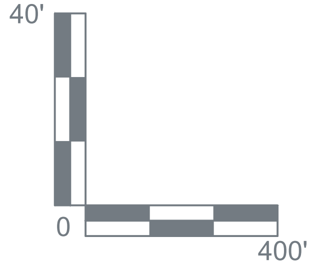




LEGEND

- ▇ COAL COMBUSTION RESIDUALS (CCR)
- ▢ FILL
- 🟪 CLAY (CL/CH)
- 🟨 SAND (SP/SM/SW)
- ▤ WELL SCREEN INTERVAL
- ‐ ‐ UPPERMOST AQUIFER POTENTIOMETRIC SURFACE
- ▼ UPPERMOST AQUIFER GROUNDWATER ELEVATION
- ▽ POREWATER ELEVATION
- ▼ BEDROCK GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)

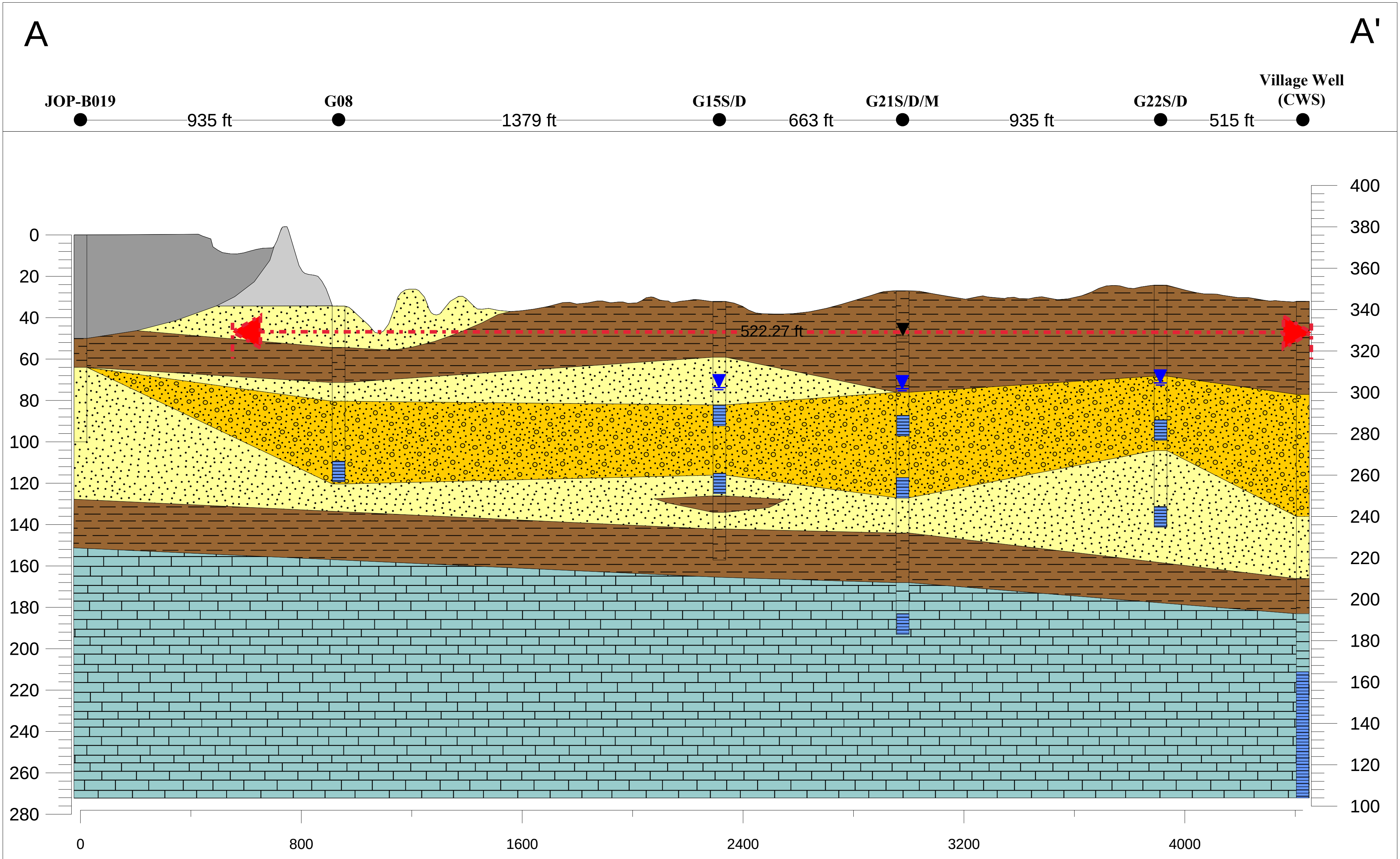


GEOLOGIC CROSS SECTIONS
B-B' & C-C'

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

FIGURE 2-8

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.



Lithology

▨	ASH	▨	CLAY	▨	GRAVEL
▨	FILL	▨	SAND	▨	LIMESTONE

Well Construction

▤ Screen

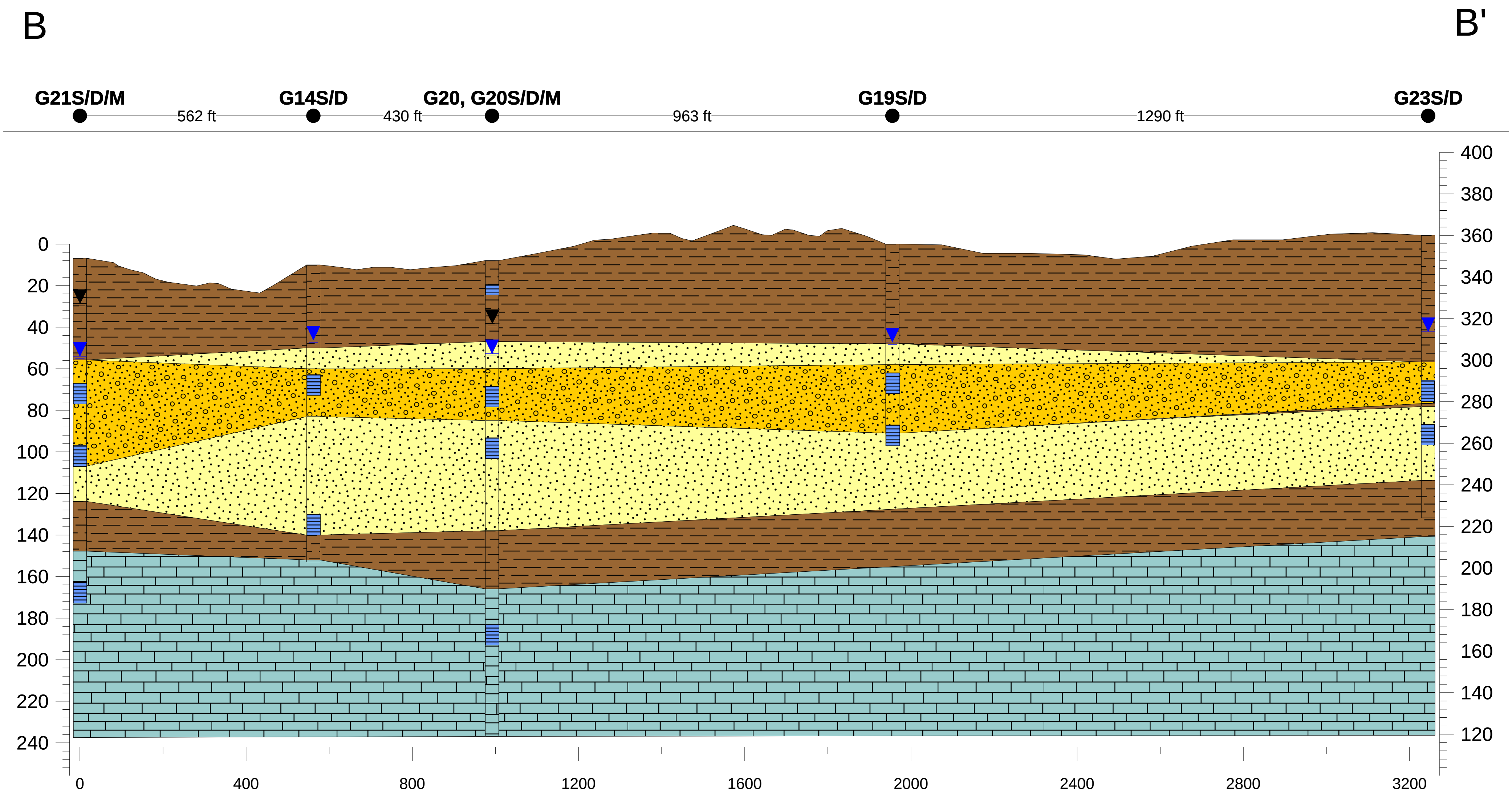
Notes:
1. Scale is approximate; all units of length are in feet.
2. Vertical exaggeration is 7.5x.
3. This section was created using widely spaced boreholes; thus, all interpretation away from borehole locations should be considered an approximate representation.
4. The elevation profile was derived from topographic data provided by Google Earth.
5. Water levels represent measured elevations in November of 2022. Blue symbols reflect UA potentiometric surface; measurements from the deeper UA wells are displayed. Black symbols reflect the LAU potentiometric surface.

Geosyntec consultants
engineers | scientists | innovators

Cross Section A-A'
Joppa Power Plant
Joppa, IL

Columbus, OH
January 2023

Figure
3



Lithology

▨ CLAY
▨ GRAVEL
▨ SAND
▨ LIMESTONE

Well Construction

▤ Screen

Notes:
1. Scale is approximate; all units of length are in feet.
2. Vertical exaggeration is 5x.
3. This section was created using widely spaced boreholes; thus, all interpretation away from borehole locations should be considered an approximate representation.
4. The elevation profile was derived from topographic data provided by Google Earth.
5. Water levels represent measured elevations in November of 2022. Blue symbols reflect UA potentiometric surface; measurements from the deeper UA wells are displayed. Black symbols reflect the LAU potentiometric surface.

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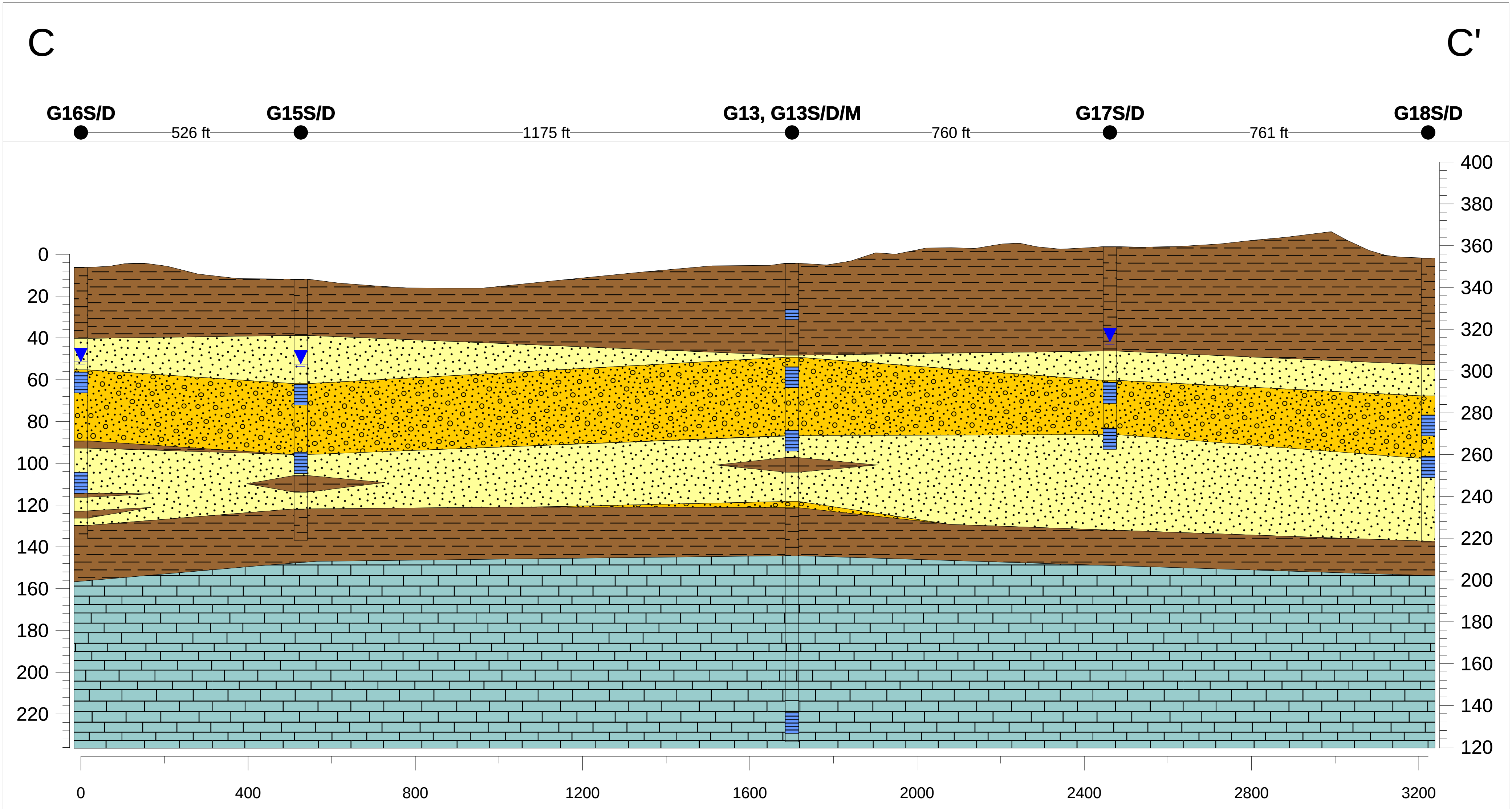
Cross Section B-B'
Joppa Power Plant
Joppa, IL

Columbus, OH

January 2023

Figure
4



Lithology

- CLAY
- GRAVEL
- SAND
- LIMESTONE

Well Construction

- Screen

Notes:
1. Scale is approximate; all units of length are in feet.
2. Vertical exaggeration is 5x.
3. This section was created using widely spaced boreholes; thus, all interpretation away from borehole locations should be considered an approximate representation.
4. The elevation profile was derived from topographic data provided by Google Earth.
5. Water levels represent measured elevations in November of 2022. Blue symbols reflect UA potentiometric surface; measurements from the deeper UA wells are displayed. Black symbols reflect the LAU potentiometric surface.

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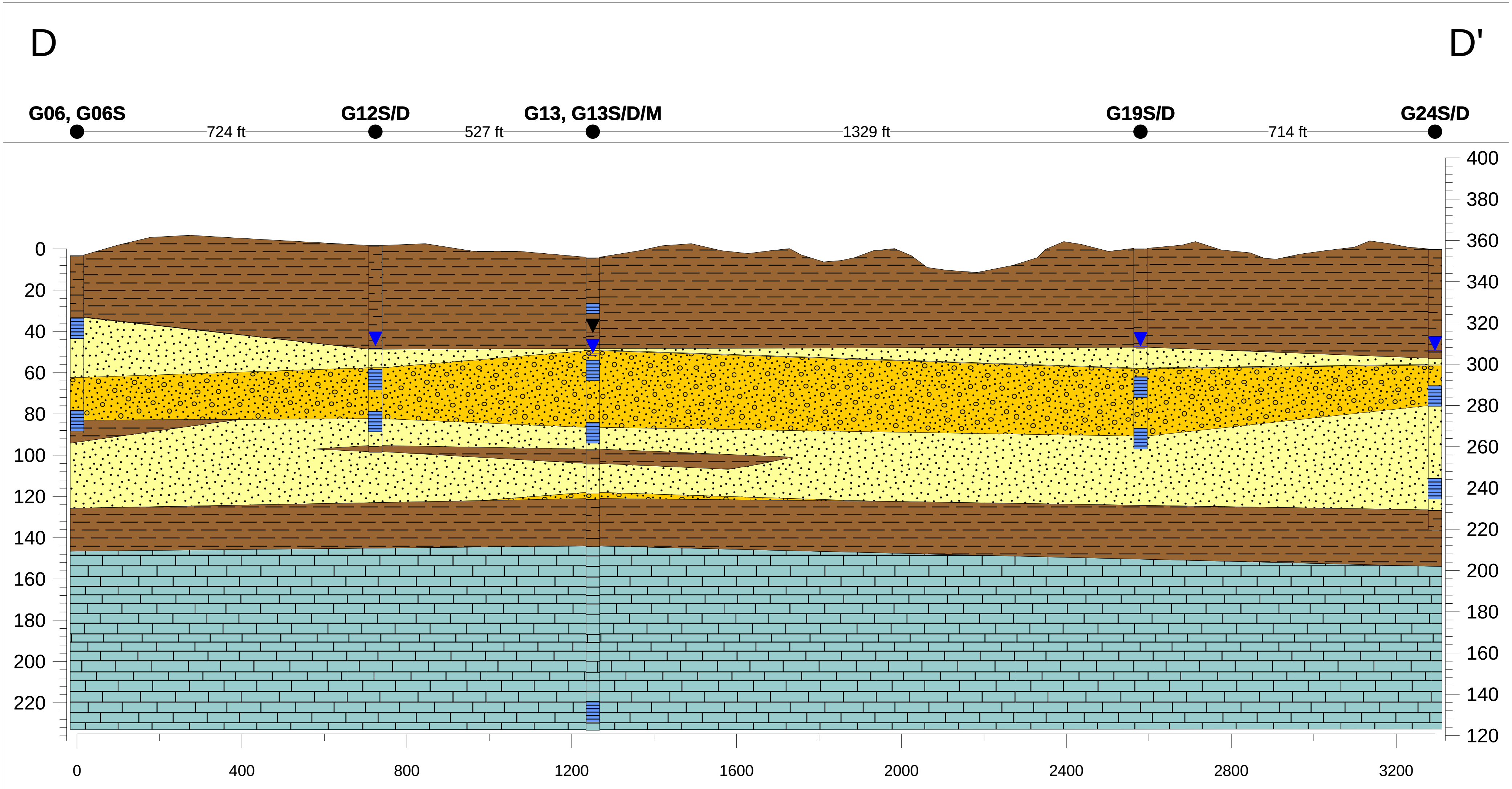
Cross Section C-C'
Joppa Power Plant
Joppa, IL

Columbus, OH

January 2023

Figure
5



Lithology

▤ CLAY

▨ GRAVEL

▨ SAND

▦ LIMESTONE

Well Construction

▤ Screen

Notes:
1. Scale is approximate; all units of length are in feet.
2. Vertical exaggeration is 5x.
3. This section was created using widely spaced boreholes; thus, all interpretation away from borehole locations should be considered an approximate representation.
4. The elevation profile was derived from topographic data provided by Google Earth.
5. Water levels represent measured elevations in November of 2022. Blue symbols reflect UA potentiometric surface; measurements from the deeper UA wells are displayed. Black symbols reflect the LAU potentiometric surface.

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Cross Section D-D'
Joppa Power Plant
Joppa, IL

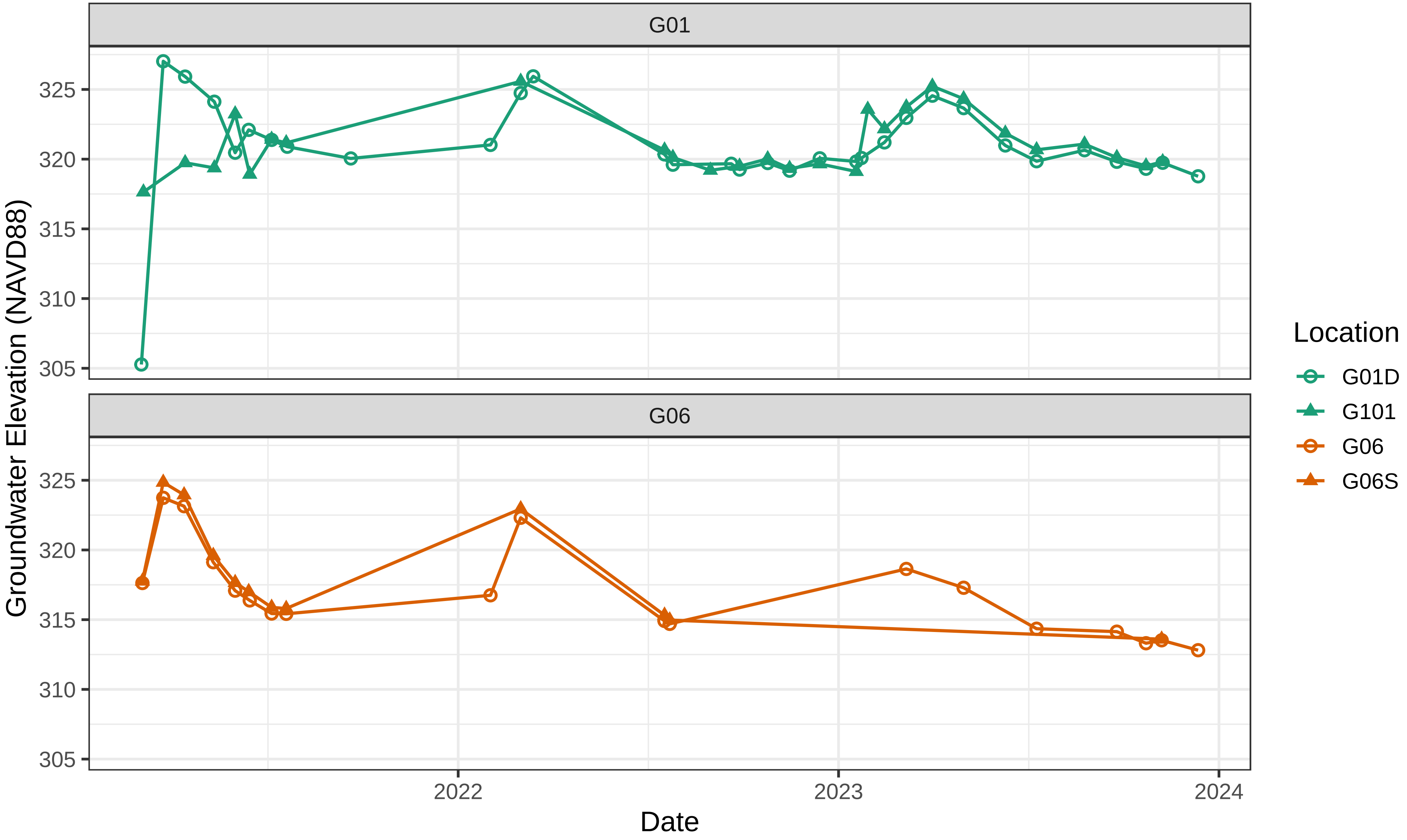
Columbus, OH

January 2023

Figure
6

APPENDIX C
Hydrographs Showing Vertical Gradients

APPENDIX C
Hydrographs Showing Vertical Gradients



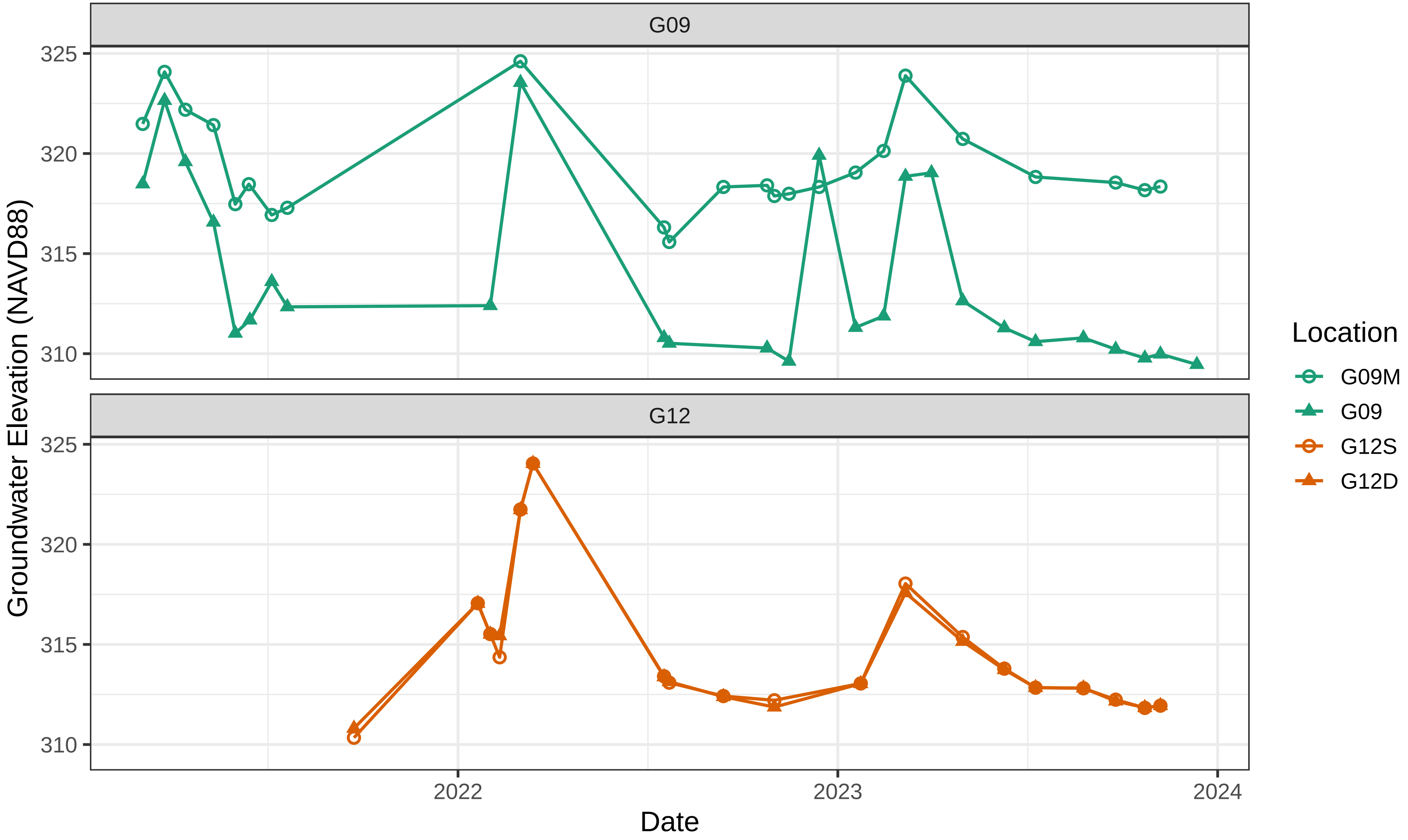
Hydrographs

Nature and Extent Report
Joppa East Ash Pond
Joppa, IL

Figure

1

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

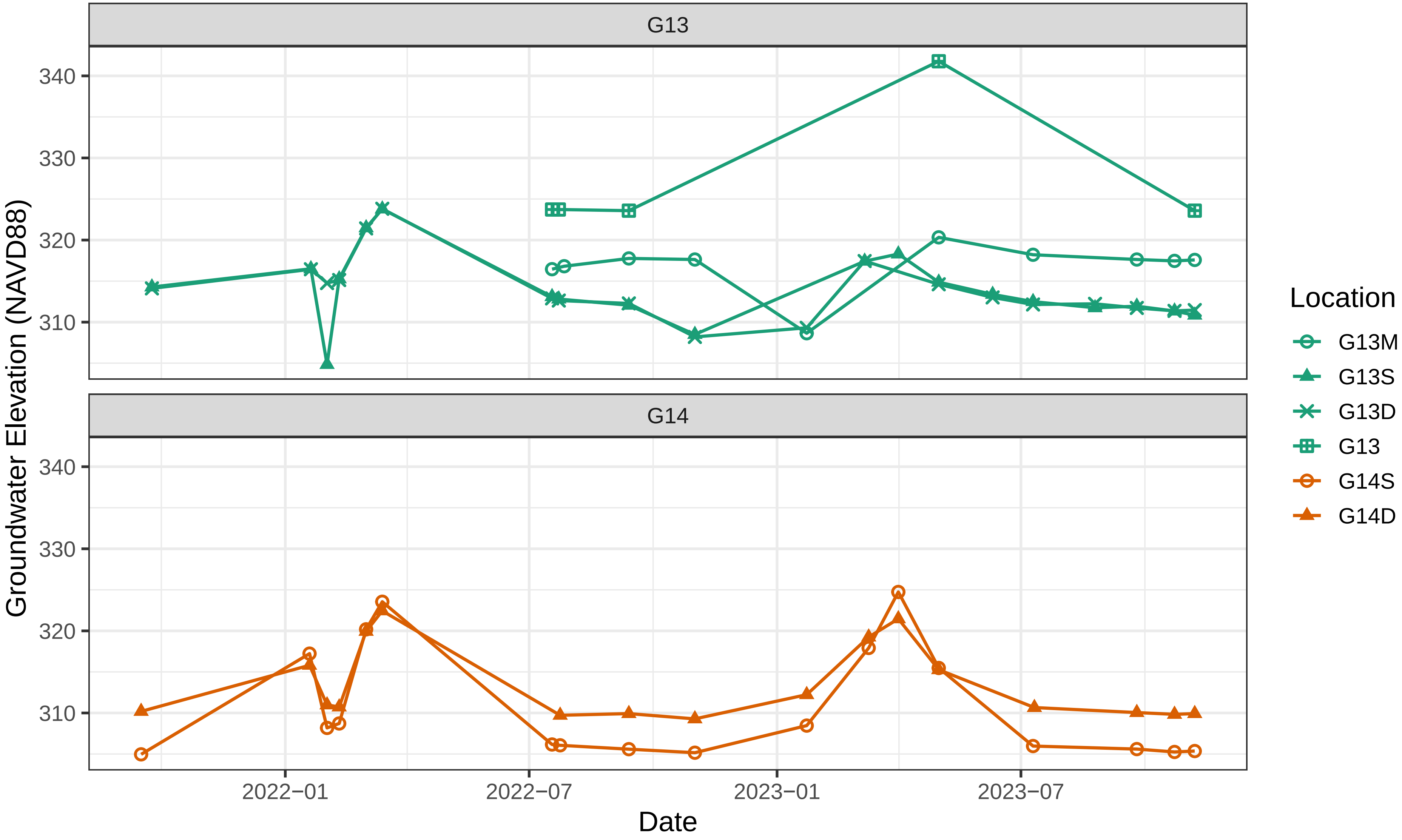


Hydrographs
Nature and Extent Report
Joppa East Ash Pond
Joppa, IL

Figure

2

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

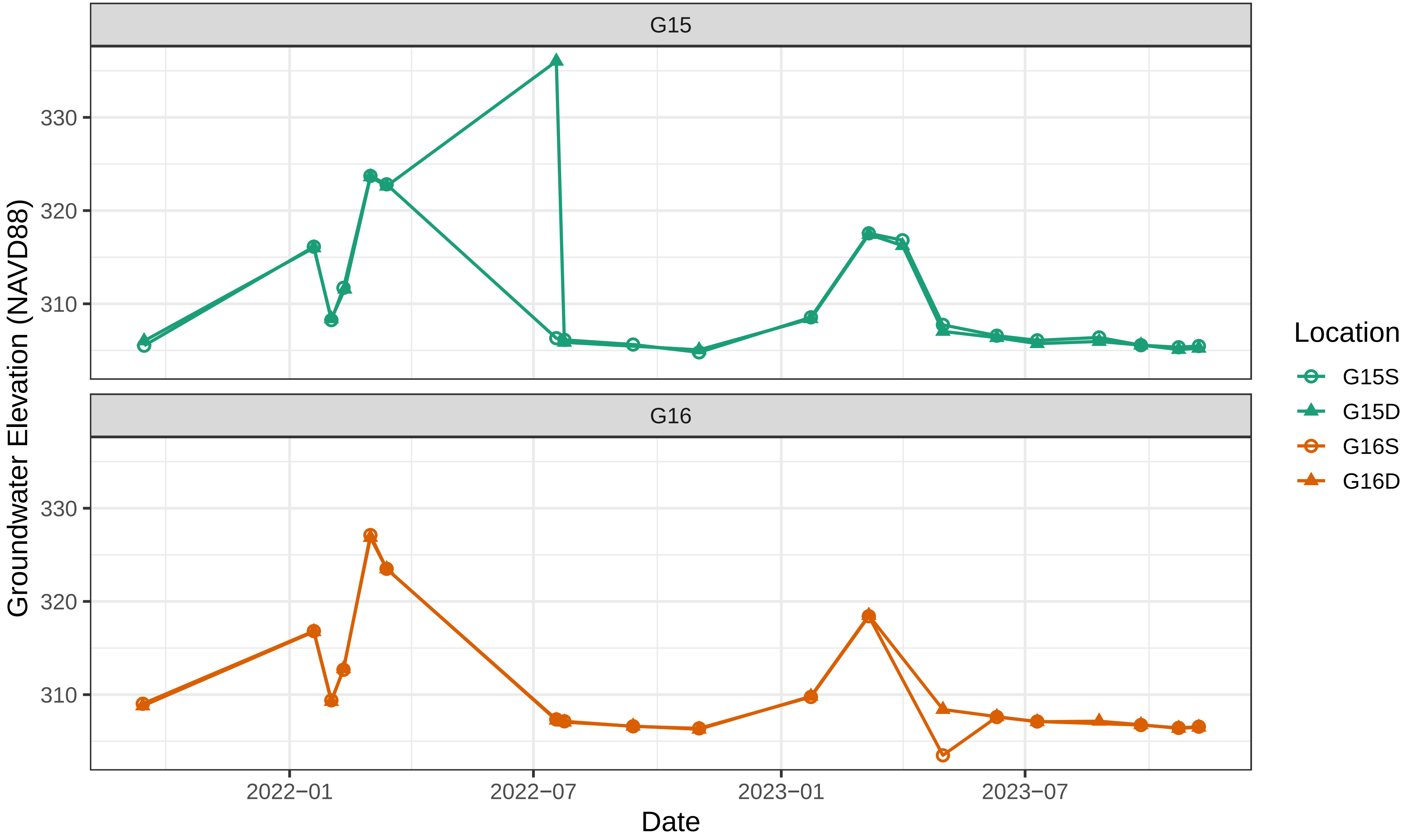


Hydrographs
Nature and Extent Report
Joppa East Ash Pond
Joppa, IL

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

Figure

3



Hydrographs

Nature and Extent Report

Joppa East Ash Pond

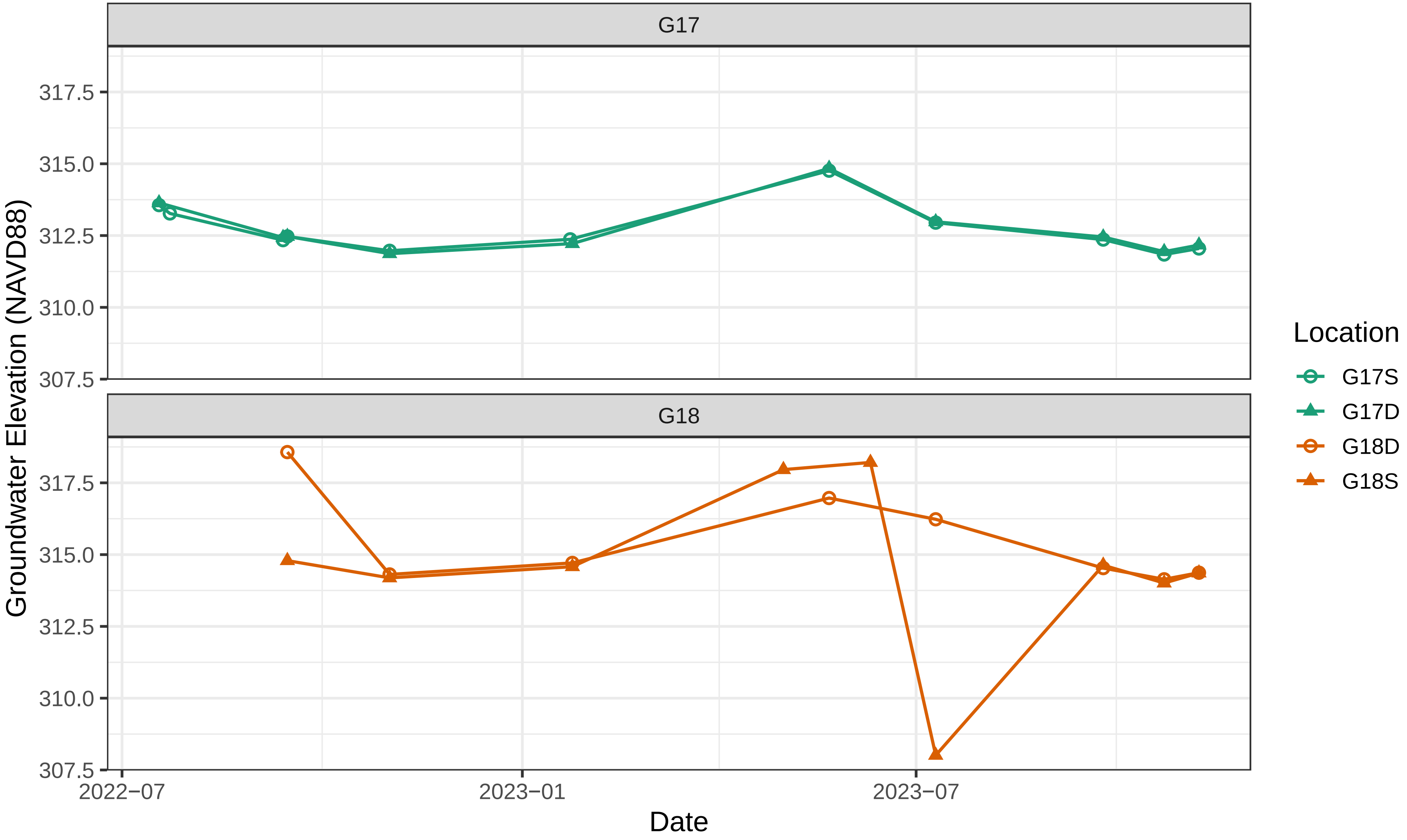
Joppa, IL

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

Figure

4

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



RAMBOLL

Hydrographs

Nature and Extent Report

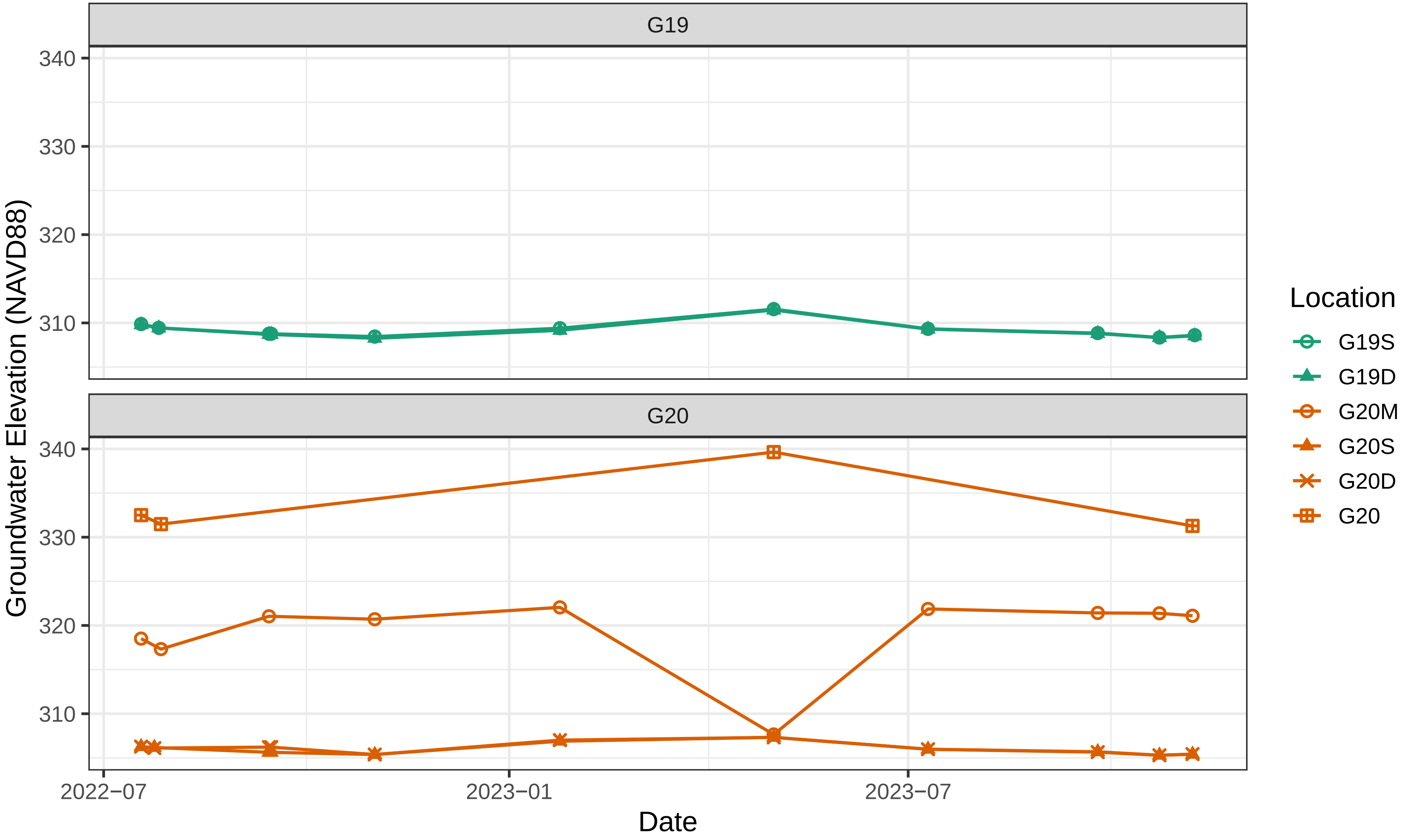
Joppa East Ash Pond

Joppa, IL

Figure

5

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584



Hydrographs

Nature and Extent Report

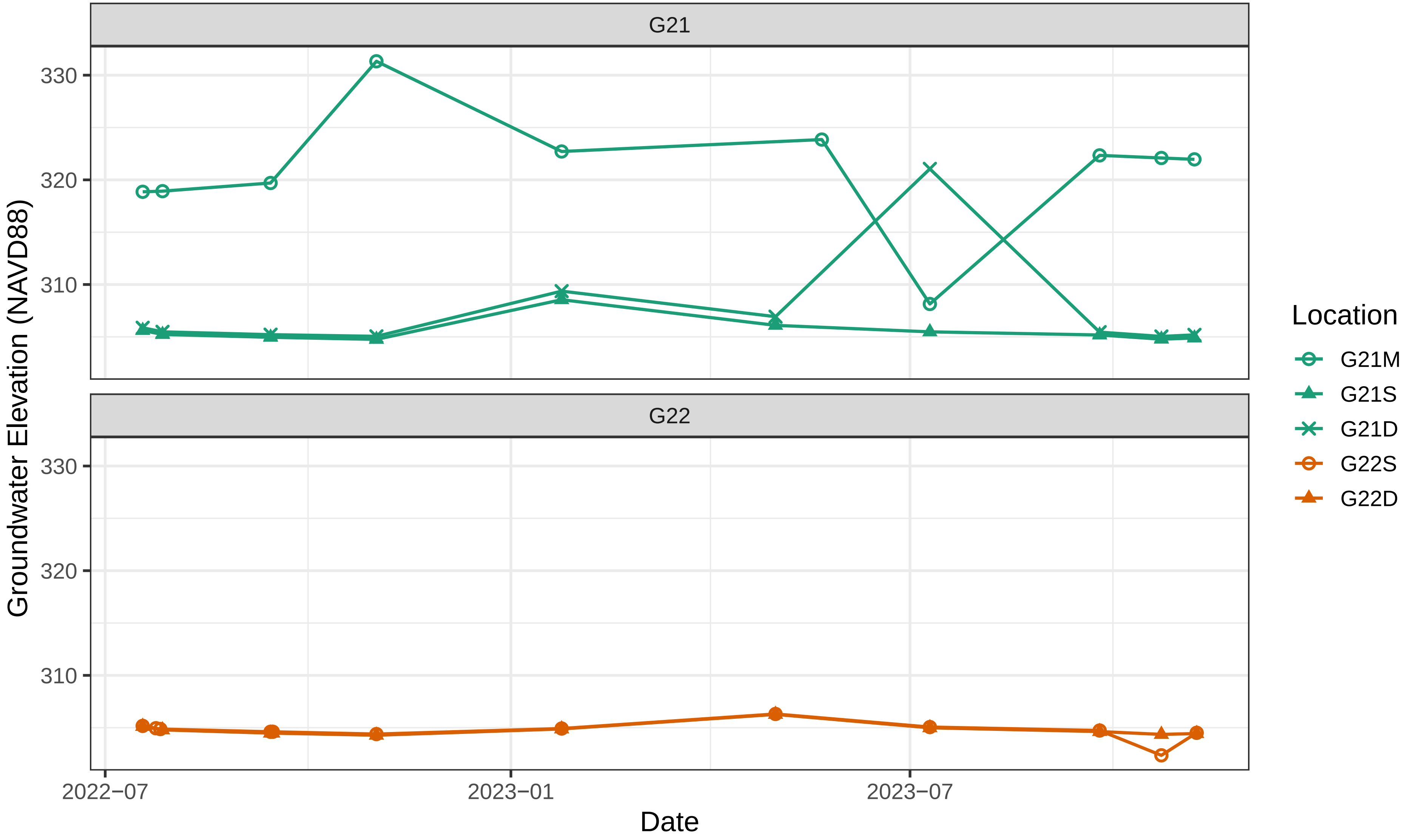
Joppa East Ash Pond

Joppa, IL

Figure

6

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

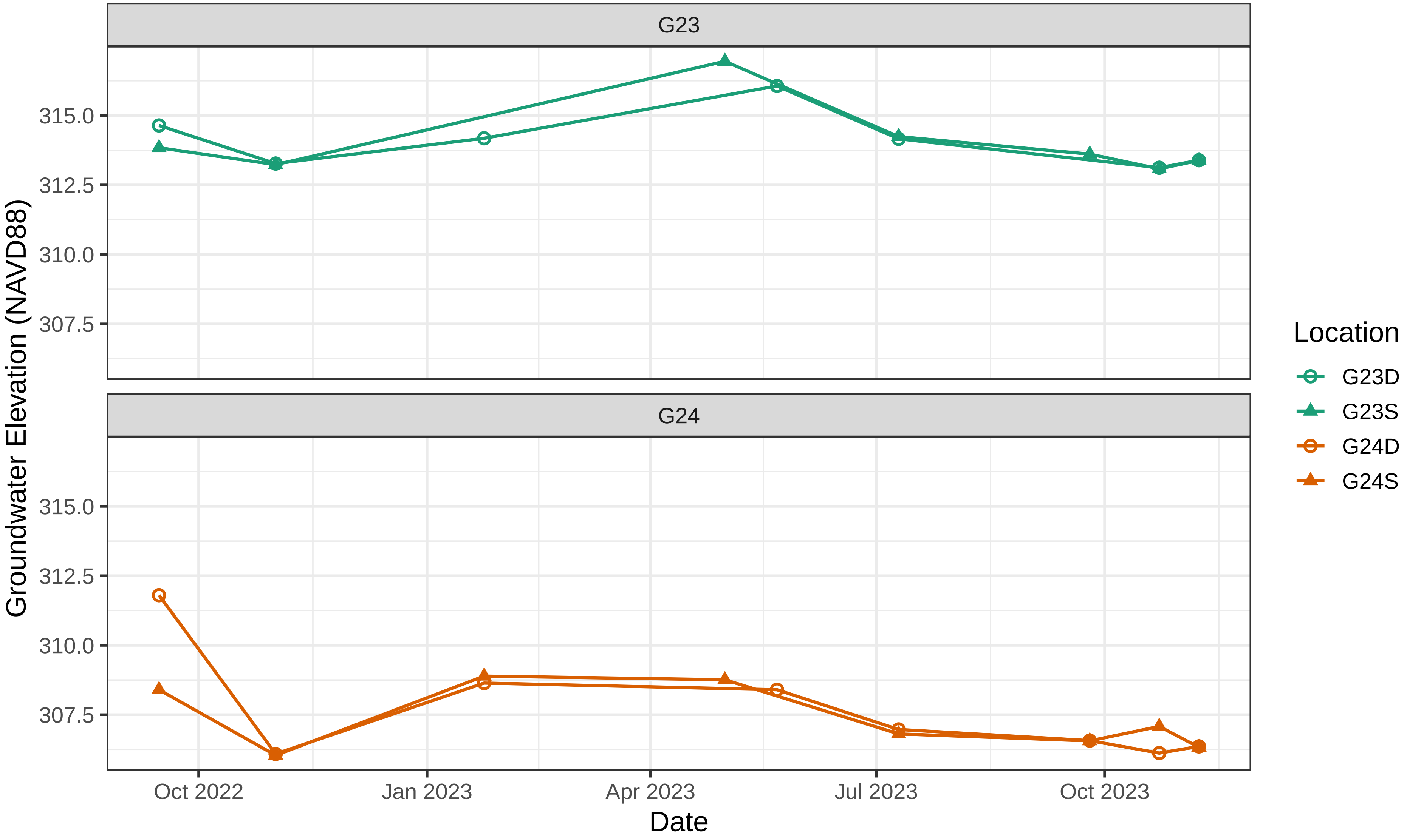


Hydrographs
Nature and Extent Report
Joppa East Ash Pond
Joppa, IL

Figure

7

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584



RAMBOLL

Hydrographs

Nature and Extent Report

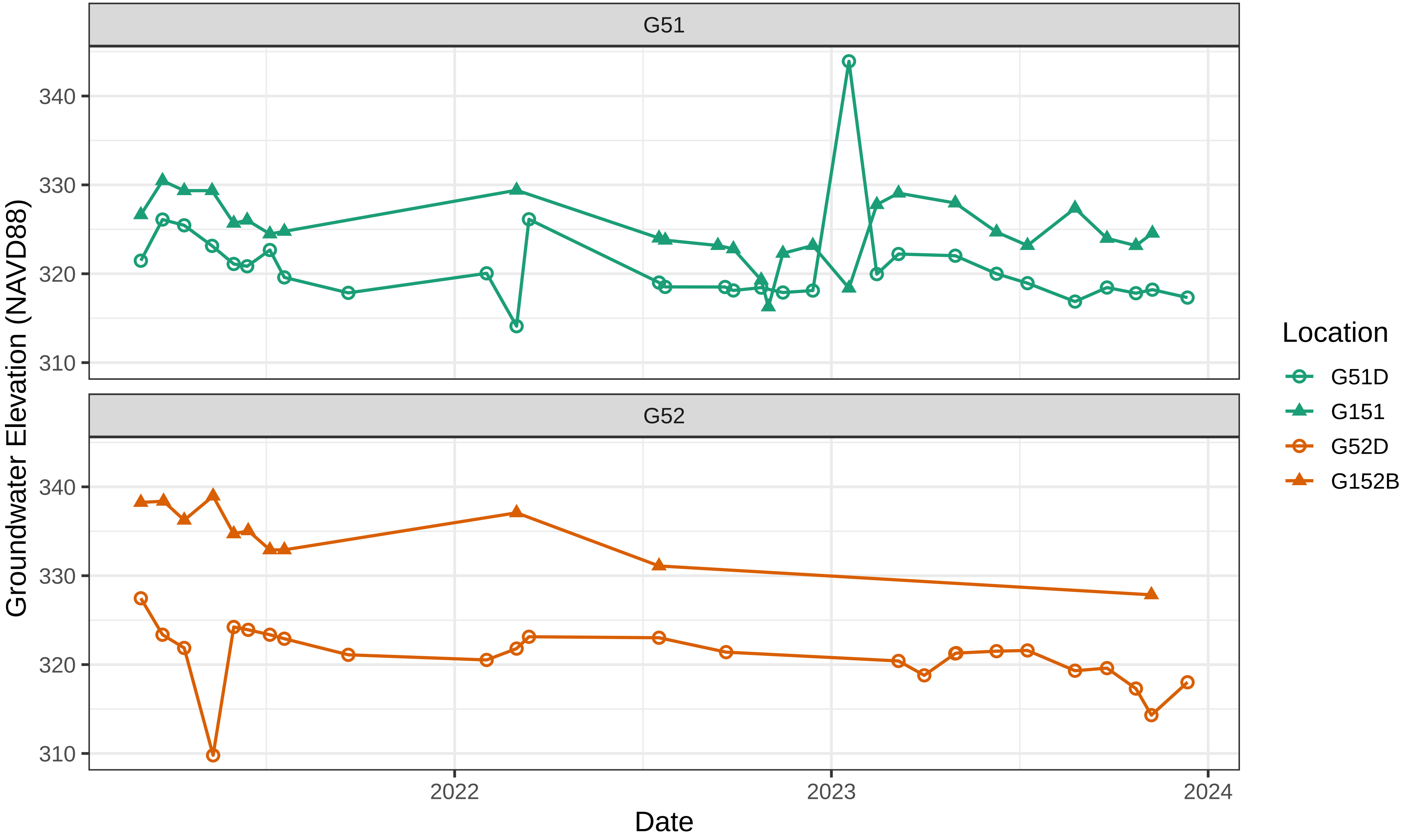
Joppa East Ash Pond

Joppa, IL

Figure

8

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

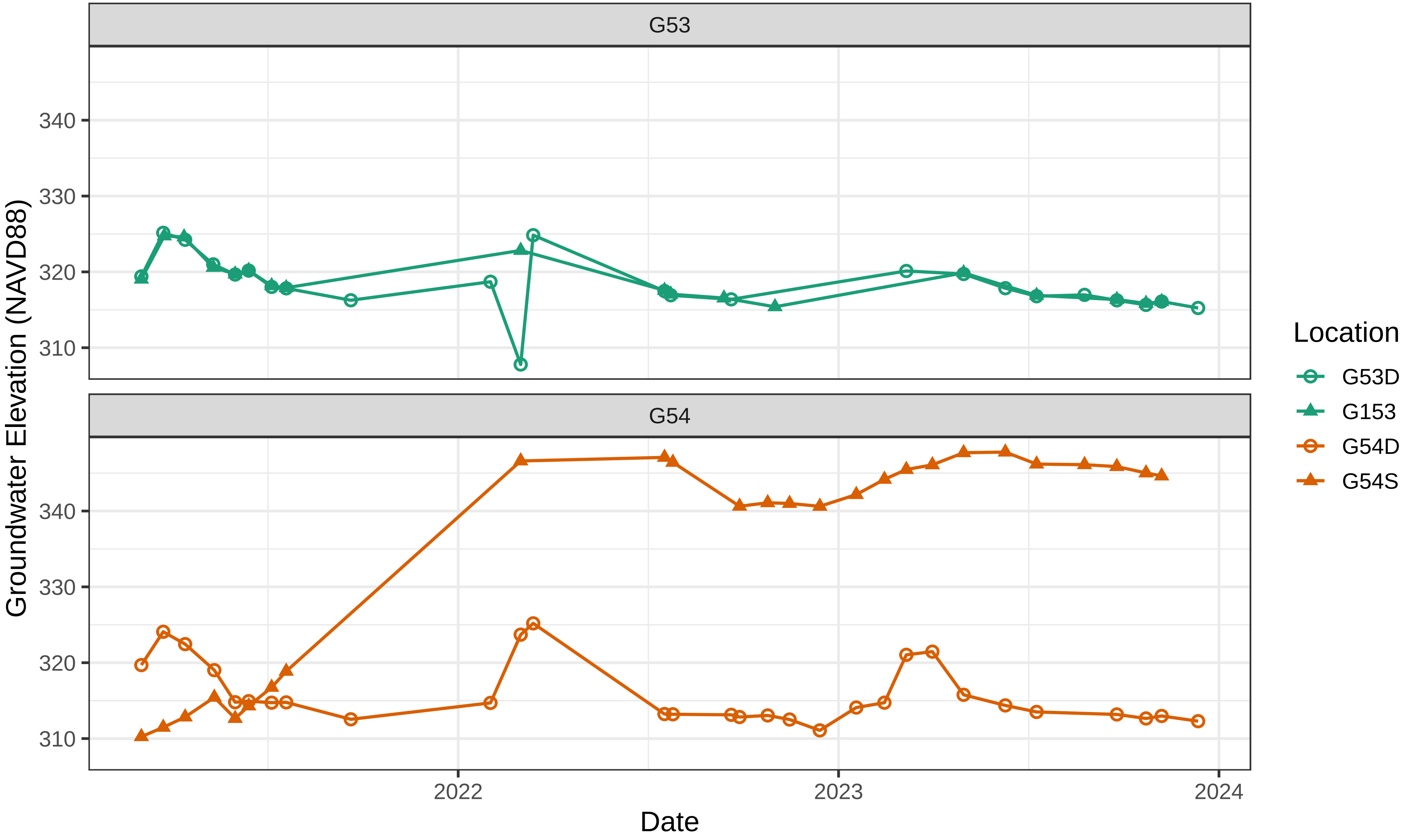


Hydrographs
Nature and Extent Report
Joppa East Ash Pond
Joppa, IL

Figure

9

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584



RAMBOLL

Hydrographs

Nature and Extent Report

Joppa East Ash Pond

Joppa, IL

Figure

10

Drafter: AOC Date: 2024−04−17 Contract Number: 1940103584

APPENDIX D
Lower Aquifer Unit Vertical Permeability Results

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Specimen Setup / Take Down

ASTM D 5084

Project Number: J040515.03 Test Station: 1 Cell No.: Perm 1 Dial No.: NA

Project Name: Joppa Specific Gravity, G_s: 2.680 ☐ Assumed; ☒ Measured

Thermometer Used: TM-003

Assigned effective stress: ☐ psi ☒ None assigned Balance Used: BA- 020

Assig. Remarks: Oven Used: OV- 009

☒ Tube	☐ Field Extruded	☐ Remolded	☐ Tamping	☐ Constant Effort:		Blows/Tamps per Layer =
Boring No.:	G13M		☐ Impact/Rammer	Rammer Wgt.(lbf)=		No. Layers =
Sample No.:		Specimen No.:	☐ Pluviated:	Tamper Force (lbf)=		Drop (in.) =
Depth (ft):	117-119	Composite No.:	☐ Kneading	☐ Undercompaction:	U_{ni} (%) =	Dia. (in.) =
			☐	Ref. Effort=	% Comp. =	± Opt. =

Type Consolidation:	☒ Isotropic	Piston:	☐ Yes ;	☒ No	☐ Attached to top cap
	☐ Anisotropic	Piston diameter:	☐ 1/2";	☐ 1/4";	☐ 1/8"; ☐

Water Content (WC);	Initial - Trimming Location			Final (W_{at})
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	(see below)
Container No	314	AX-7		101G
Mass Moist Soil + Cont. (g)	69.85	75.68		826.10
Mass Dry Soil + Cont. (g)	64.39	67.92		719.67
Mass Container (g)	29.11	28.13		151.89
Water Content, $W_{o,n}$ (%)	15.5	19.5		18.7
Avg. Initial WC, $W_{o,avg}$ (%)	17.5	Final (W_{at});	☐ Slice;	☒ Whole Spec.
☐ See attached data sheet(s) for additional water contents				

SOIL MASSES:	Initial	Final
Moist + Tare (g):	668.71	674.56
Tare (g):	0.00	0.00
Spec. Moist Mass (g):	668.71	674.56
EXCESS DRY SOIL (soil stuck to stones, filter paper, membrane, etc.)		
Container No:		
Mass Dry Soil + Container (g):		
Mass Container (g):		
Mass Excess Dry Soil (g):		0.00

Specimen Dimensions					
Height (in)			Diameter (in)		
	Initial (H_o)	Final (H_{at})		Initial (D_o)	Final (D_{at})
GB	0.000	0.000	T	2.878	2.875
1	3.047	3.032	M	2.876	2.875
2	3.027	3.026	B	2.875	2.878
3	3.024	3.046			
4					
5					
Avg.	3.033	3.035	Avg.	2.876	2.876

Measuring Devices:

Pi Tape: ☒ Dia. Calipers: ☒ Ht.; ☐ Dia.

Pi tape No.:

Caliper No.:

A_o (in^2) = 6.50

V_o (in^3) = 19.71

A_{at} (in^2)= 6.50

V_{at} (in^3) = 19.71

Estimated Initial Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 129.3	Dry, $\gamma_{d,o}$ (lb/ft^3)= 110.0
Estimated Final Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 130.4	Dry, $\gamma_{d,o}$ (lb/ft^3)= 109.8

Membrane / Filter Paper / Platens

Membrane (in)		Top	Bottom
Thickness:	☐ Single		
	☐ Double		
Circumference (C_{rm})			
Summary:		Thickness	Diameter
☐ Nominal Value	Average:	?Single, Double	? Cir. =

Filter Paper : Top + Bottom : ☒ Yes ; ☐ No

Whatman No. 54: ☒ Yes ; ☐ Other:

Mass top cap, M_{tc} (g) = 162 ; ÷ 454 = 0.36 lbf

Mass (cap, dial, piston, etc.) (g) = NA ; NA lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block

Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):

☐ Photo taken (internal sliced surface & outside surface)

Other Remarks

Setup By: EKG	Take Down By: JRC	Input by: EKG	Checked By: JRC
Date: 06/03/22	Date: 06/07/22	Date: 07/07/22	Date: 07/07/22

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Permeation
ASTM D 5084

Project Number: J040515.03
Test Station: 1
Dial No.: NA
Specific Gravity, G_s: 2.68 ☐ Assumed; ☒ Measured

Project Name: Joppa
Cell No.: Perm 1

☒ Tube ☐ Field Extruded ☐ Remolded
Boring No.: G13M
Sample No.:
Specimen No.:
Depth (ft): 117-119
Composite No.:

Cell Pressure: 68 psi
Back Pressure: 63 psi
Effective Stress: 5.0 psi
β value (%): 98
Pressure Difference (psi): 2

Burette Area: 1.00 cm^2
Area (cm^2): 41.92
Permeant liquid: deaired water
Initial gradient: 21
Final Gradient: 21

Pressure Head Settings (D 5084)

Estimated k_t (cm/sec)	Max. Initial Gradient, i_o
1.0E-4 to 1.0E-5	≤5
1.0E-5 to 1.0E-6	≤10
1.0E-6 to 1.0E-7	≤20
<1.0E-7 or <3.0E-2 (m/yr)	≤30
For Special Gradtient, i	

Trial Number	Date yr: 2022 (mm/dd)	Time (min)	Δ t (min)	Temp. °C	Inflow (cm^3)	Outflow (cm^3)	Ratio Inflow/Outflow 0.75 to 1.25	Elevation head, Δh_e (cm)	Avg. Total Head Loss Δh_e (cm)	Q (cm^3)	Q/t (cm^3/min)	k (cm/min)	k (cm/s)
NA	06/07	11:29	--	23.7	2.0	22.0	20.00	20.00	NA	NA	NA	NA	NA
1	06/07	11:42	13	23.7	2.1	21.7	0.33	19.60	160.5	0.20	0.0154	1.76E-05	2.93E-07
2	06/07	12:02	20	23.7	2.2	21.6	1.00	19.40	160.2	0.10	0.0050	5.73E-06	9.56E-08
3	06/07	12:31	29	23.7	2.3	21.5	1.00	19.20	160.0	0.10	0.0034	3.96E-06	6.6E-08
4	06/07	13:33	62	23.7	2.6	21.2	1.00	18.60	159.6	0.30	0.0048	5.57E-06	9.28E-08
5	06/07	15:02	89	23.7	3.0	20.8	1.00	17.80	158.9	0.40	0.0045	5.20E-06	8.66E-08
6	06/07	15:37	35	23.7	3.2	20.6	1.00	17.40	158.3	0.20	0.0057	6.63E-06	1.11E-07
7													
8													
9													
10													
11													
12													
13													
14													
15													

Tested By: EKG
Date: 06/07/22

Calculated By: EKG
Date: 07/07/22

Checked By: JRC
Date: 07/07/22

Average $k_{20°C}$: 8.3E-08 cm/s
8.3E-10 m/s

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Specimen Setup / Take Down
ASTM D 5084

Project Number: J040515.03 Test Station: 4 Cell No.: Perm 2 Dial No.: NA

Project Name: Joppa Specific Gravity, G_s: 2.632 ☐ Assumed; ☒ Measured

Thermometer Used: TM-003

Assigned effective stress: ☐ ____ psi ☒ None assigned Balance Used: BA- 020

Assig. Remarks: ____ Oven Used: OV- 009

☒ Tube	☐ Field Extruded	☐ Remolded	☐ Tamping	☐ Constant Effort:		Blows/Tamps per Layer =
Boring No.: G21M			☐ Impact/Rammer	Rammer Wgt.(lbf)=		No. Layers =
Sample No.:	Specimen No.:		☐ Pluviated:	Tamper Force (lbf)=		Drop (in.) =
Depth (ft): 126-128	Composite No.:		☐ Kneading	☐ Undercompaction:	U_{ni} (%) =	Dia. (in.) =
			☐	Ref. Effort=	% Comp. =	± Opt. =

Type	☒ Isotropic	Piston:	☐ Yes ;	☒ No	☐ Attached to top cap	
Consolidation:	☐ Anisotropic	Piston diameter:	☐ 1/2";	☐ 1/4";	☐ 1/8";	☐

Water Content (WC);	Initial - Trimming Location			Final (W_{at})
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	(see below)
Container No	W-2	H-3		T-08
Mass Moist Soil + Cont. (g)	120.90	127.17		825.35
Mass Dry Soil + Cont. (g)	108.35	113.27		724.35
Mass Container (g)	29.79	27.90		153.03
Water Content, $W_{o,n}$ (%)	16.0	16.3		17.7
Avg. Initial WC, $W_{o,avg}$ (%)	16.1	Final (W_{at});	☐ Slice;	☒ Whole Spec.
☐ See attached data sheet(s) for additional water contents				

SOIL MASSES:	Initial	Final
Moist + Tare (g):	666.34	672.72
Tare (g):	0.00	0.00
Spec. Moist Mass (g):	666.34	672.72
EXCESS DRY SOIL (soil stuck to stones, filter paper, membrane, etc.)		
Container No:		
Mass Dry Soil + Container (g):		
Mass Container (g):		
Mass Excess Dry Soil (g):		0.00

Specimen Dimensions					
Height (in)			Diameter (in)		
	Initial (H_o)	Final (H_{at})		Initial (D_o)	Final (D_{at})
GB	0.000	0.000	T	2.890	2.889
1	2.964	2.967	M	2.890	2.895
2	2.942	2.958	B	2.895	2.892
3	2.968	2.971			
4					
5					
Avg.	2.958	2.965	Avg.	2.892	2.892

Measuring Devices:

Pi Tape: ☒ Dia. Calipers: ☒ Ht.; ☐ Dia.

Pi tape No.: ____

Caliper No.:

A_o (in^2) = 6.57

V_o (in^3) = 19.43

A_{at} (in^2)= 6.57

V_{at} (in^3) = 19.48

Estimated Initial Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 130.7	Dry, $\gamma_{d,o}$ (lb/ft^3)= 112.5
Estimated Final Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 131.6	Dry, $\gamma_{d,o}$ (lb/ft^3)= 111.8

Membrane / Filter Paper / Platens

Membrane (in)		Top	Bottom
Thickness:	☐ Single		
	☐ Double		
Circumference (C_{rm})			
Summary:		Thickness	Diameter
☐ Nominal Value	Average:	?Single, Double	? Cir. =

Filter Paper : Top + Bottom : ☒ Yes ; ☐ No

Whatman No. 54: ☒ Yes ; ☐ Other:

Mass top cap, M_{tc} (g) = 162 ; ÷ 454 = 0.36 lbf

Mass (cap, dial, piston, etc.) (g) = NA ; NA lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block

Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):

☐ Photo taken (internal sliced surface & outside surface)

Other Remarks ____

Setup By: EKG	Take Down By: JRC	Input by: EKG	Checked By: JRC
Date: 04/19/22	Date: 04/27/22	Date: 05/09/22	Date: 05/09/22

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Permeation
ASTM D 5084

Project Number: J040515.03
Test Station: 4
Dial No.: NA
Specific Gravity, G_s: 2.632 ☐ Assumed; ☒ Measured

Project Name: Joppa
Cell No.: Perm 2

☒ Tube ☐ Field Extruded ☐ Remolded
Boring No.: G21M
Sample No.:
Specimen No.:
Depth (ft): 126-128
Composite No.:

Cell Pressure: 58 psi
Back Pressure: 53 psi
Effective Stress: 5.0 psi
β value (%): 96
Pressure Difference (psi): 2

Burette Area: 1.00 cm^2
Area (cm^2): 42.37
Permeant liquid: deaired water
Initial gradient: 21
Final Gradient: 20

Pressure Head Settings (D 5084)

Estimated k_t (cm/sec)	Max. Initial Gradient, i_o
1.0E-4 to 1.0E-5	≤5
1.0E-5 to 1.0E-6	≤10
1.0E-6 to 1.0E-7	≤20
<1.0E-7 or <3.0E-2 (m/yr)	≤30
For Special Gradtient, i	

Trial Number	Date yr: 2022 (mm/dd)	Time (min)	Δ t (min)	Temp. °C	Inflow (cm^3)	Outflow (cm^3)	Ratio Inflow/Outflow 0.75 to 1.25	Elevation head, Δh_e (cm)	Avg. Total Head Loss Δh_e (cm)	Q (cm^3)	Q/t (cm^3/min)	k (cm/min)	k (cm/s)
NA	04/25	15:09	--	23.7	2.0	22.0	20.00	20.00	NA	NA	NA	NA	NA
1	04/25	15:30	21	23.7	2.1	21.9	1.00	19.80	160.6	0.10	0.0048	5.26E-06	8.76E-08
2	04/26	9:18	1068	22.7	5.1	18.9	1.00	13.80	157.5	3.00	0.0028	3.16E-06	5.27E-08
3	04/26	10:31	73	22.8	5.2	18.8	1.00	13.60	154.5	0.10	0.0014	1.57E-06	2.62E-08
4	04/26	11:11	40	22.8	5.3	18.7	1.00	13.40	154.3	0.10	0.0025	2.87E-06	4.79E-08
5	04/26	13:09	118	23.1	5.6	18.4	1.00	12.80	153.9	0.30	0.0025	2.93E-06	4.88E-08
6	04/26	13:54	45	23.2	5.7	18.3	1.00	12.60	153.5	0.10	0.0022	2.57E-06	4.28E-08
7	04/26	14:25	31	23.2	5.8	18.2	1.00	12.40	153.3	0.10	0.0032	3.73E-06	6.22E-08
8													
9													
10													
11													
12													
13													
14													
15													

Tested By: EKG
Date: 04/25/22

Calculated By: EKG
Date: 05/09/22

Checked By: JRC
Date: 05/09/22

Average $k_{20°C}$: 4.9E-08 cm/s
4.9E-10 m/s

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Specimen Setup / Take Down
ASTM D 5084

Project Number: J040515.03 Test Station: 1 Cell No.: Perm 1 Dial No.: NA

Project Name: Joppa Specific Gravity, G_s: 2.537 ☐ Assumed; ☒ Measured

Thermometer Used: TM-003

Assigned effective stress: ☐ ____ psi ☒ None assigned

Balance Used: BA- 020

Assig. Remarks:

Oven Used: OV- 009

☐ Tube ☐ Field Extruded ☒ Remolded	☐ Tamping	☐ Constant Effort:	Blows/Tamps per Layer =
Boring No.: G21M	☐ Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =
Sample No.: Specimen No.:	☐ Pluviated:	Tamper Force (lbf)=	Drop (in.) =
Depth (ft): 132-133 Composite No.:	☐ Kneading	☐ Undercompaction: U_{ni} (%) =	Dia. (in.) =
	☐	Ref. Effort= % Comp. =	± Opt. =

Type	☒ Isotropic	Piston:	☐ Yes ; ☒ No	☐ Attached to top cap	
Consolidation:	☐ Anisotropic	Piston diameter:	☐ 1/2";	☐ 1/4";	☐ 1/8"; ☐

Water Content (WC);	Initial - Trimming Location			Final (W_{at})
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	(see below)
Container No	321	45		T-71
Mass Moist Soil + Cont. (g)	147.88	181.24		779.87
Mass Dry Soil + Cont. (g)	127.76	155.52		661.09
Mass Container (g)	28.76	29.38		152.84
Water Content, $W_{o,n}$ (%)	20.3	20.4		23.4
Avg. Initial WC, $W_{o,avg}$ (%)	20.4	Final (W_{at});	☐ Slice;	☒ Whole Spec.

☐ See attached data sheet(s) for additional water contents

SOIL MASSES:	Initial	Final
Moist + Tare (g):	610.23	627.27
Tare (g):	0.00	0.00
Spec. Moist Mass (g):	610.23	627.27
EXCESS DRY SOIL (soil stuck to stones, filter paper, membrane, etc.)		
Container No:		
Mass Dry Soil + Container (g):		
Mass Container (g):		
Mass Excess Dry Soil (g):		0.00

Specimen Dimensions

	Height (in)			Diameter (in)	
	Initial (H_o)	Final (H_{at})		Initial (D_o)	Final (D_{at})
GB	0.000	0.000	T	2.876	2.890
1	2.917	2.947	M	2.877	2.890
2	2.919	2.955	B	2.878	2.890
3	2.906	2.949			
4					
5					
Avg.	2.914	2.950	Avg.	2.877	2.890

Measuring Devices:

Pi Tape: ☒ Dia. Calipers: ☒ Ht.; ☐ Dia.

Pi tape No.:

Caliper No.:

A_o (in^2) = 6.50

V_o (in^3) = 18.94

A_{at} (in^2)= 6.56

V_{at} (in^3) = 19.35

NA - Not Applicable; UK - Unknown; GB - Gage Block

Estimated Initial Unit Weight:

Total, $\gamma_{t,o}$ (lb/ft^3) = 122.7 Dry, $\gamma_{d,o}$ (lb/ft^3)= 102.0

Estimated Final Unit Weight:

Total, $\gamma_{t,o}$ (lb/ft^3) = 123.5 Dry, $\gamma_{d,o}$ (lb/ft^3)= 100.1

Membrane / Filter Paper / Platens

Membrane (in)		Top	Bottom
Thickness:	☐ Single		
	☐ Double		
Circumference (C_{rm})			
Summary:		Thickness	Diameter
☐ Nominal Value	Average:	?Single, Double	? Cir. =

Filter Paper : Top + Bottom : ☒ Yes ; ☐ No

Whatman No. 54: ☒ Yes ;

☐ Other:

Mass top cap, M_{tc} (g) = 162 ; ÷ 454 = 0.36 lbf

Mass (cap, dial, piston, etc.) (g) = NA ; NA lbf

Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):

☐ Photo taken (internal sliced surface & outside surface)

Other Remarks

Setup By: EKG Take Down By: JRC Input by: EKG Checked By: JRC

Date: 05/02/22 Date: 05/10/22 Date: 05/11/22 Date: 05/11/22

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Permeation
ASTM D 5084

Project Number: J040515.03
Test Station: 1
Dial No.: NA
Specific Gravity, G_s: 2.537 ☐ Assumed; ☒ Measured

Project Name: Joppa
Cell No.: Perm 1

☐ Tube ☐ Field Extruded ☒ Remolded
Boring No.: G21M
Sample No.:
Specimen No.:
Depth (ft): 132-133
Composite No.:

Cell Pressure: 68 psi
Back Pressure: 63 psi
Effective Stress: 5.0 psi
β value (%): 97
Pressure Difference (psi): 3

Burette Area: 1.00 cm^2
Area (cm^2): 41.94
Permeant liquid: deaired water
Initial gradient: 31
Final Gradient: 30

Pressure Head Settings (D 5084)

Estimated k_t (cm/sec)	Max. Initial Gradient, i_o
1.0E-4 to 1.0E-5	≤5
1.0E-5 to 1.0E-6	≤10
1.0E-6 to 1.0E-7	≤20
<1.0E-7 or <3.0E-2 (m/yr)	≤30
For Special Gradtient, i	

Trial Number	Date yr: 2022 (mm/dd)	Time (min)	Δ t (min)	Temp. °C	Inflow (cm^3)	Outflow (cm^3)	Ratio Inflow/Outflow 0.75 to 1.25	Elevation head, Δh_e (cm)	Avg. Total Head Loss Δh_e (cm)	Q (cm^3)	Q/t (cm^3/min)	k (cm/min)	k (cm/s)
NA	05/09	13:27	--	23.6	2.0	22.0	20.00	20.00	NA	NA	NA	NA	NA
1	05/09	14:20	53	23.6	2.1	21.6	0.25	19.50	230.9	0.25	0.0047	3.61E-06	6.01E-08
2	05/09	14:56	36	23.7	2.2	21.5	1.00	19.30	230.5	0.10	0.0028	2.13E-06	3.54E-08
3	05/09	15:38	42	23.7	2.3	21.4	1.00	19.10	230.3	0.10	0.0024	1.82E-06	3.04E-08
4	05/10	9:15	1057	23.3	4.7	19.0	1.00	14.30	227.8	2.40	0.0023	1.76E-06	2.93E-08
5	05/10	10:06	51	23.3	4.8	18.9	1.00	14.10	225.3	0.10	0.0020	1.54E-06	2.56E-08
6	05/10	11:08	62	23.4	4.9	18.8	1.00	13.90	225.1	0.10	0.0016	1.26E-06	2.11E-08
7													
8													
9													
10													
11													
12													
13													
14													
15													

Tested By: EKG
Date: 05/09/22

Calculated By: EKG
Date: 05/11/22

Checked By: JRC
Date: 05/11/22

Average $k_{20°C}$: 2.6E-08 cm/s
2.6E-10 m/s

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Specimen Setup / Take Down
ASTM D 5084

Project Number: J040515.03 Test Station: 2 Cell No.: Perm 3 Dial No.: NA

Project Name: Joppa Specific Gravity, G_s: 2.638 ☐ Assumed; ☒ Measured

Thermometer Used: TM-003

Assigned effective stress: ☐ psi ☒ None assigned

Balance Used: BA- 020

Assig. Remarks:

Oven Used: OV- 009

☒ Tube	☐ Field Extruded	☐ Remolded	☐ Tamping	☐ Constant Effort:		Blows/Tamps per Layer =
Boring No.: G21M			☐ Impact/Rammer	Rammer Wgt.(lbf)=		No. Layers =
Sample No.:	Specimen No.:		☐ Pluviated:	Tamper Force (lbf)=		Drop (in.) =
Depth (ft): 136-138	Composite No.:		☐ Kneading	☐ Undercompaction:	U_{ni} (%) =	Dia. (in.) =
			☐	Ref. Effort=	% Comp. =	± Opt. =

Type	☒ Isotropic	Piston:	☐ Yes ;	☒ No	☐ Attached to top cap	
Consolidation:	☐ Anisotropic	Piston diameter:	☐ 1/2";	☐ 1/4";	☐ 1/8";	☐

Water Content (WC);	Initial - Trimming Location			Final (W_{at})	**SOIL MASSES:**	Initial	Final
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	(see below)	Moist + Tare (g):	632.78	651.03
Container No	306	33		B	Tare (g):	0.00	0.00
Mass Moist Soil + Cont. (g)	89.37	97.84		808.40	Spec. Moist Mass (g):	632.78	651.03
Mass Dry Soil + Cont. (g)	77.85	84.74		668.12	EXCESS DRY SOIL (soil stuck to stones, filter paper, membrane, etc.)		
Mass Container (g)	29.23	27.49		157.73	Container No:		
Water Content, $W_{o,n}$ (%)	23.7	22.9		27.5	Mass Dry Soil + Container (g):		
Avg. Initial WC, $W_{o,avg}$ (%)	23.3	Final (W_{at});	☐ Slice;	☒ Whole Spec.	Mass Container (g):		
☐ See attached data sheet(s) for additional water contents					Mass Excess Dry Soil (g):		0.00

Specimen Dimensions					
	Height (in)			Diameter (in)	
	Initial (H_o)	Final (H_{at})		Initial (D_o)	Final (D_{at})
GB	0.000	0.000	T	2.885	2.930
1	2.972	3.043	M	2.890	2.950
2	2.993	3.047	B	2.885	2.920
3	2.981	3.036			
4					
5					
Avg.	2.982	3.042	Avg.	2.887	2.933

Measuring Devices:

Pi Tape: ☒ Dia. Calipers: ☒ Ht.; ☐ Dia.

Pi tape No.:

Caliper No.:

A_o (in^2) = 6.54

V_o (in^3) = 19.52

A_{at} (in^2)= 6.76

V_{at} (in^3) = 20.56

NA - Not Applicable; UK - Unknown; GB - Gage Block

Estimated Initial Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 123.5	Dry, $\gamma_{d,o}$ (lb/ft^3)= 100.2
Estimated Final Unit Weight:	
Total, $\gamma_{t,o}$ (lb/ft^3) = 120.6	Dry, $\gamma_{d,o}$ (lb/ft^3)= 94.6

Membrane / Filter Paper / Platens			
Membrane (in)		Top	Bottom
Thickness:	☐ Single		
	☐ Double		
Circumference (C_{rm})			
Summary:		Thickness	Diameter
☐ Nominal Value	Average:	?Single, Double	? Cir. =

Filter Paper : Top + Bottom : ☒ Yes ; ☐ No

Whatman No. 54: ☒ Yes ;

☐ Other:

Mass top cap, M_{tc} (g) = 162 ; ÷ 454 = 0.36 lbf

Mass (cap, dial, piston, etc.) (g) = NA ; NA lbf

Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):

☐ Photo taken (internal sliced surface & outside surface)

Other Remarks

Setup By: EKG Take Down By: JRC Input by: EKG Checked By: JRC

Date: 04/19/22 Date: 04/27/22 Date: 05/09/22 Date: 05/09/22

HYDRAULIC CONDUCTIVITY (PERMEABILITY) TEST: Permeation
ASTM D 5084

Project Number: J040515.03 Test Station: 2 Dial No.: NA Specific Gravity, G_s: 2.638 ☐ Assumed; ☒ Measured

Project Name: Joppa Cell No.: Perm 3

☒ Tube ☐ Field Extruded ☐ Remolded

Boring No.: G21M

Sample No.: Specimen No.:

Depth (ft): 136-138 Composite No.:

Cell Pressure: 58 psi

Back Pressure: 53 psi

Effective Stress: 5.0 psi

β value (%): 96

Pressure Difference (psi): 3

Burette Area: 1.00 cm^2

Area (cm^2): 42.22

Permeant liquid: deaired water

Initial gradient: 30

Final Gradient: 29

Pressure Head Settings (D 5084)

Estimated k_t (cm/sec)	Max. Initial Gradient, i_o
1.0E-4 to 1.0E-5	≤5
1.0E-5 to 1.0E-6	≤10
1.0E-6 to 1.0E-7	≤20
<1.0E-7 or <3.0E-2 (m/yr)	≤30
For Special Gradtient, i	

Trial Number	Date yr: 2022 (mm/dd)	Time (min)	Δ t (min)	Temp. °C	Inflow (cm^3)	Outflow (cm^3)	Ratio Inflow/Outflow 0.75 to 1.25	Elevation head, Δh_e (cm)	Avg. Total Head Loss Δh_e (cm)	Q (cm^3)	Q/t (cm^3/min)	k (cm/min)	k (cm/s)
NA	04/25	15:16	--	23.7	2.0	22.0	20.00	20.00	NA	NA	NA	NA	NA
1	04/26	9:16	1080	22.7	3.9	19.7	0.83	15.80	229.0	2.10	0.0019	1.52E-06	2.54E-08
2	04/26	10:32	76	22.8	4.0	19.6	1.00	15.60	226.9	0.10	0.0013	1.04E-06	1.73E-08
3	04/26	13:08	156	23.1	4.2	19.4	1.00	15.20	226.6	0.20	0.0013	1.02E-06	1.69E-08
4	04/26	13:53	45	23.1	4.3	19.3	1.00	15.00	226.2	0.10	0.0022	1.76E-06	2.94E-08
5	04/26	15:28	95	23.3	4.4	19.2	1.00	14.80	226.0	0.10	0.0011	8.35E-07	1.39E-08
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

Tested By: EKG Calculated By: EKG Checked By: JRC **Average $k_{20°C}$:** 1.9E-08 cm/s

Date: 04/25/22 Date: 05/09/22 Date: 05/09/22 1.9E-10 m/s

APPENDIX E
Geochemical Conceptual Site Model

Geosyntec consultants

engineers | scientists | innovators

Geochemical Conceptual Site Model

Joppa Power Plant – East Ash Pond

(CCR Unit #401)

Prepared for

Electric Energy Inc
2100 Portland Road
Joppa, Illinois 62953

Prepared by

Geosyntec Consultants, Inc.
134 N. Lasalle Street, Suite 300
Chicago, Illinois 60602

Project Number: GLP8030C

April 2024

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ACRONYMS AND ABBREVIATIONS

CCR	Coal Combustion Residuals
COCs	Constituents of Concern
EAP	East Ash Pond
GCSM	Geochemical Conceptual Site Model
GWPS	Groundwater Protection Standards
HSU	hydrostratigraphic unit
I.A.C.	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
JPP	Joppa Power Plant
LOI	loss on ignition
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
N&E	nature and extent
ORP	oxidation-reduction potential
SEP	sequential extraction procedure
TOC	total organic carbon
UA	uppermost aquifer
XRD	X-Ray diffraction

1. EXECUTIVE SUMMARY

A geochemical conceptual site model (GCSM) has been developed to describe subsurface conditions at the Joppa Power Plant (JPP) East Ash Pond (EAP) coal combustion residuals unit (Unit #401). A GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. This report describes the GCSM for parameters that have exceeded the GWPS in EAP groundwater and which will be addressed in the corrective action plan. Boron is the only constituent with exceedances observed at the EAP. COC exceedances are present in one hydrostratigraphic unit (HSU) at the site: the uppermost aquifer (UA), comprised of high permeability sands with gravel, silt, and clay lenses of the Upper McNairy Formation .

The primary source of boron to groundwaters of the UA within the monitoring network is the EAP coal combustion residual porewater, based on COC concentrations within the source and relationships to hydrogeological patterns at the site. Boron was not identified within UA solids at concentrations that would suggest that aquifer solids could provide an additional potential natural geogenic source of boron to groundwater.

Boron in the groundwater system may be attenuated via adsorption and surface complexation reactions within portions of the UA, with conditions within groundwater from the UA typically predicted to favor amorphous iron oxide stability at most locations, and the presence of iron oxides in some site solids supporting the occurrence of this mechanism. Limited variability in pH or redox conditions is observed between upgradient background and downgradient locations. The presence of clay minerals (e.g., kaolinite) in the UA solids material indicates that adsorption to clays may be another potential attenuation mechanism for boron at locations near the EAP.

2. INTRODUCTION

This report documents the development of a geochemical conceptual site model (GCSM) to describe conditions at the Joppa Power Plant (JPP) East Ash Pond (EAP). A GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. The GCSM was prepared in support of an evaluation of the nature and extent (N&E) of exceedances of constituents of concern (COCs) above the GWPS at the EAP. This document has been prepared as an appendix to the JPP EAP N&E Report prepared by Ramboll Americas Engineering Solutions. Inc. (Ramboll). Boron is the only constituent with exceedances above the GWPS at Joppa EAP addressed in this GCSM following completion of an alternative source demonstration (ASD) to address cobalt and pH exceedances (Ramboll 2023). The Illinois Environmental Protection Agency (IEPA) did not concur with the ASD. The non-concurrence was appealed, and the Illinois Pollution Control Board granted a stay on February 1, 2024. Exceedances of boron were observed at compliance monitoring wells G06, G07, G08, G09, and G10 during the second, third, and fourth quarters of 2023 (Q2 2023, Q3 2023, and Q4 2023) sampling events completed under 35 Illinois Administrative Code (IAC) § 845. Boron exceedances identified at the EAP are present exclusively in the UA.

3. SITE BACKGROUND

3.1 Site Overview

An overview of site characteristics is presented in the JPP EAP N&E Report. A site layout figure is provided in Attachment A.[1] Briefly, the Joppa EAP impoundment is located directly north of the JPP. The JPP property is bordered by LaFarge North America cement plant to the west, Trunkline Gas Company-Joppa Compressor Station to the north, the Village of Joppa to the east, and the Ohio River to the south.

A Phase I Hydrogeologic Site Assessment Report (NRT 2013), a Hydrogeologic Monitoring Plan (NRT 2017), and a Hydrogeologic Site Characterization Report (Ramboll 2021) have previously described the geologic units present in the vicinity of the Joppa EAP. These previous investigations concluded that the Joppa EAP impoundment is underlain by up to 50 ft of clay-rich deposits of the Equality and Metropolis Formations. The UA consists of high permeability sands with gravel, silt, and clay lenses of the Upper McNairy Formation. The UA is described as a hydrostratigraphic unit (HSU) of greater permeability than the overlying clay-rich deposits (NRT 2013). The UA is laterally continuous across the JPP and is approximately 85 ft thick beneath the EAP.

3.2 Groundwater Monitoring Network

A groundwater monitoring network was proposed in accordance with IAC Title 35 Section 845.630 to monitor groundwater quality which passes the waste boundary as part of the Operating Permit Application to Illinois Environmental Protection Agency (IEPA) for the EAP. The proposed groundwater monitoring network is described in the Groundwater Monitoring Plan (Ramboll 2021) and shown in Attachment B.[2] Additional wells were installed in 2021 and 2022 to delineate downgradient conditions and are shown in Attachment C. Well construction details are provided in Attachment D.[3] To aid in interpretation within this document, delineation wells are further designated as being onsite if they are located within the property boundary of the JPP, or offsite if they are located outside of the JPP property boundary.

Groundwater flow within the UA beneath the EAP is predominantly to the south, towards the Ohio River. An easterly groundwater flow component is present along the east portion of the EAP, flowing towards the eastern property boundary. A detailed discussion of the hydrology of the Site is presented in Section 2 of the JPP EAP N&E Report.

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

[2] This figure is also provided as Figure 2-6 of the JPP EAP N&E Report.

[3] This table is also provided as Table 3-1 of the JPP EAP N&E Report.

4. GEOCHEMICAL SITE CONDITIONS

4.1 Constituent Transport and Fate

Boron is frequently present and detectable in groundwater impacted by coal combustion residuals (CCR) and typically occurs as neutrally charged boric acid H_3BO_3 at pH values up to 9.2 standard units (SU) or as the borate ion ($B[OH]^{4-}$) (Bolan et al. 2023). The speciation of boron in groundwater is controlled by pH-dependent reactions, and boron is not subject to oxidation/reduction reactions (EPRI 2017, Lemarchand et al. 2015). Boron primarily sorbs to positively charged sites on solid metal oxide phases, including iron and aluminum oxides. Adsorption to these phases increases with increasing pH, and maximum adsorption occurs between pH 7 and 9 SU (Goldberg and Glaubig 1985; Bolan et al. 2023). Boron can also sorb to organic surfaces such as humic acids or coal under favorable conditions, most extensively between pH 8 and 10 SU (LeMarchand et al. 2015). Clay minerals have been correlated with boron sorption in soils (Goldberg 1997), with this sorption mechanism presenting an additional potential attenuation mechanism for boron under favorable geochemical conditions.

4.2 CCR Characterization

Samples of the CCR solid material within the EAP were collected at three locations (co-located with the three EAP porewater wells XPW01, XPW02, and XPW03) and analyzed for boron and total metals. At each location, CCR solids were analyzed for total metals from two intervals - near the impoundment surface (4-8 ft bgs) and a deeper interval (varying between 24-48 ft bgs) (Table 1; Attachment E). Boron was present in the ash, with concentrations ranging between 35.1 to 542 mg/kg, consistent with the expectation of boron presence within CCR materials (EPRI 2005). At the three EAP locations, boron concentrations were greater in the interval near the impoundment surface.

4.3 Site Solids Characterization

Aquifer solids were characterized to determine the type and abundance of minerals present in the UA, 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 3. Solids were collected from five locations within the UA adjacent to existing wells in the compliance monitoring network:

- G03, located sidegradient of the EAP to the east and expected to be unimpacted by the unit in both shallow and deeper intervals within the UA.

- G07, G08, and G09, located directly downgradient of the EAP to the south/southeast.

- G11, located sidegradient of the EAP to the west.

Sample depths are listed in Tables 1 through 3, and boring logs for these locations are provided in Attachment E. G07, G08, and G09 had identified exceedances of boron above the GWPS during the Q2 through Q4 2023 statistical evaluations.

4.3.1 Organic Carbon Content

Total organic carbon (TOC) represents only the carbon component of organic matter within a solid material, while loss on ignition (LOI) represents the combustible portions of a solid material and is often used as an approximation of organic matter in a sample. The TOC and LOI values for aquifer solids from G03, G07, and G08 are presented in Table 1. TOC and LOI values are consistently low across the site (TOC: 0.039 – 0.049 percent weight [%wt]; LOI: 0.93 – 1.58% wt), indicating that the UA solids have limited organic matter. These data are available in Attachment F.

4.3.2 Total Metals and Boron via Bulk Characterization

Total metals and boron were analyzed to determine the major and trace metal content of the aquifer solids. Boron was not detected in solids from G03, G09, and G11, and solids from G07 and G08 were not analyzed for boron (Table 2). Total iron concentrations measured in the aquifer solids sampled from across the Site range from 830 milligrams per kilogram [mg/kg] to 99,000 mg/kg, while total manganese concentrations are relatively low (6.1 mg/kg to 1,000 mg/kg) in comparison to iron concentrations (Table 2; Attachment F). Concentrations of both iron and manganese are lowest at G03 and highest at G08. Differences in iron concentrations between samples likely represent the degree of heterogeneity in iron distribution within UA material The abundance of iron within the bulk solids matrix indicates that iron-bearing minerals are present within the system. The presence of these iron-bearing minerals was confirmed via x-ray diffraction (XRD) as discussed in Section 4.3.3.

An additional sample of composited material from each boring location was submitted to Eurofins TestAmerica (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 specific metal phases in a soil/aquifer matrix, they do provide a means to evaluate the class of solids and relative stability in relation to 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 interpret the mechanism and potential reversibility of attenuation processes. The 7-step extraction procedure is briefly described, and the results of the SEP analysis are provided in Attachment G.

Concentrations of boron were below the detection limit in SEP extractions of the aquifer solids samples, limiting interpretation of boron solid phase associations, but consistent with the lack of total boron detected in the bulk aquifer solids (Table 2).

4.3.3 Mineralogical Analysis

X-Ray diffraction (XRD) with Rietvelt refinement was conducted for identification of minerals in aquifer 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. The three analyzed solid samples were predominantly composed of quartz, ranging from 88.4 – 92.0% of the minerals present (Table 3; Attachment H). These results are consistent with the field observations documented in the boring logs provided in Attachment E. Crystalline iron oxides, including goethite and hematite were identified in the analyzed aquifer solids (goethite: 3.1 – 8.2%; hematite: 0.1 – 0.5%) (Table 3). Abundances of goethite and hematite do not correlate well with observations of total iron in the solids (i.e., samples with higher iron concentrations do not necessarily have higher abundances of iron oxide minerals as identified in the XRD results), which may be related to sample heterogeneity or the presence of non-crystalline, amorphous iron oxides that are not detected by XRD.

The aquifer solids samples also had measurable proportions of kaolinite, ranging from 0.7 – 1.6% (Table 3). Kaolinite, a clay mineral, has been correlated with boron sorption in soils (Goldberg 1997) and presents an additional potential attenuation mechanism for boron within the UA solids should geochemical conditions develop to favor adsorption to clay minerals.

4.4 Aqueous Geochemistry

EAP porewater and UA groundwater from wells across the compliance and delineation networks were analyzed for a range of geochemical parameters and presented in Figures 1 through 6. Porewater is evaluated as a mobile source endmember representing conditions within the unit since collection began in 2021. For clarity in interpretation, figures present data from the compliance well network, onsite delineation network, and offsite delineation well network locations separately. Delineation well symbology for both onsite and offsite networks generally becomes more purple further along the downgradient flow path. As boron exceedances are limited to the UA, only wells screened in the UA are included in this evaluation for clarity. The aqueous phase data used in the site evaluation is summarized in Attachment I.

4.4.1 Exceedance Parameters

EAP porewater exhibited boron concentrations from 8.06 to 16.0 milligrams per liter (mg/L), consistent with leachate from CCR units (Figures 1a - 1c) (EPRI 2017). These results are higher than concentrations reported in UA groundwater.

Boron concentrations in groundwater remained stable through time across the site and were consistent along groundwater flow paths. In background wells G01D and G02D, boron concentrations were consistently low (between 0.01 and 0.06 mg/L). Compliance wells which are generally sidegradient of the unit (i.e., G03, G11, G51D, G53D, and G54D) consistently exhibited boron concentrations slightly above background but below the GWPS of 2.0 mg/L, with reported results ranging from 0.11 to 1.03 mg/L. Boron concentrations in groundwater downgradient of the EAP were generally elevated, but exhibited a wide range of concentrations from 0.01 to 10.6 mg/L. Wells G06, G07, G08, G09, and G10 within the compliance network exhibit boron concentrations that are consistently above the GWPS and vary between 2.9 to 5.4 mg/L (Figure 1a).

Wells within both the onsite and offsite delineation networks typically exhibited higher concentrations closer to the source and decreasing concentrations downgradient (Figures 1b & 1c, respectively). Boron concentrations below the GWPS were typically observed in the farthest downgradient wells located further offsite (i.e., G23S/D, G24S/D; Figure 1c) consistent with delineation of the plume. All offsite delineation well locations are below the GWPS for boron, except G17S/D, which are closest to the EAP boundary (Figure 1c).

4.4.2 Redox/pH Summary

The oxidation-reduction (redox) potential (ORP) and pH in aqueous systems are major controls on the speciation of redox-active chemicals such as iron and manganese.

In wells across the groundwater monitoring network, pH values appear to be stable and circumneutral (Figures 2a - 2c). In upgradient background wells G01D and G02D, pH is consistently around 6.5. Similarly, downgradient compliance wells exhibit pH values between 6.5 – 7 (Figure 2a). Wells G11 and G51D, which are generally sidegradient to the west of the EAP, exhibit lower pH values near 5.5 – 6. These lower pH values are attributed to the effect of iron oxidation in groundwater west of the EAP (Ramboll 2023). Within the EAP, CCR porewater exhibits a wider range of pH values, from 7.3 to 10.7, with XPW03 exhibiting pH values consistently above 10. Further downgradient, groundwater pH is generally consistent with the observed background conditions (Figure 2a), with both onsite delineation wells (Figure 2b) and offsite delineation wells (Figure 2c) generally exhibiting pH values between 6.5 – 7.

Wells upgradient or sidegradient of the EAP (G01D, G03, G11, and G51D) typically exhibit consistently oxidizing conditions. There is an apparent redox gradient between upgradient and downgradient wells at the EAP. Upgradient groundwater is generally oxidized, while groundwater downgradient of the unit is mixed: wells directly downgradient of the EAP have a range of redox conditions, and some are observed to fluctuate between reducing and oxidizing conditions (i.e., ORP values ranging from +200 to -200 millivolts [mV]) (Figures 3a and 3b). This may be due to the influence of porewater at select locations, with more reducing conditions potentially correlated to locations with higher boron concentrations (i.e., G08, G09). The EAP CCR porewater is consistently reducing (ORP values below 0 millivolts) relative to groundwater (Figure 3a). This relationship is observed at onsite delineation wells, with wells with higher boron concentrations (i.e, G16D) also exhibiting more reducing conditions (Figure 3b). Further downgradient, higher ORP values consistent with the background are observed (Figure 3c).

4.4.2.1 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., in cases where mineral formation is not anticipated to be kinetically favored), except when identified in XRD data from solids at the Site. Using conditions observed at well G08 on 2 May 2023 (Table 4) to represent wells directly downgradient of the EAP with observations of boron exceedances, goethite is predicted to be stable under aquifer conditions at both upgradient and downgradient locations (Figure 4a).[4] The stability of goethite would provide a potential mineral surface for sorption of boron within the aquifer. The predicted stability of goethite is consistent with the detections of goethite in aquifer solids at abundances ranging between 3.1% and 8% (Table 3). Amorphous iron oxyhydroxides (represented by the mineral ferrihydrite in Figure 4b) are also generally stable under conditions immediately downgradient of the EAP. Ferrihydrite is a crystalline iron oxyhydroxide mineral that can precipitate over a wide range of geochemical conditions and often functions as a precursor for a range of more stable iron (oxyhydr)oxides; it can provide additional adsorptive capacity in the UA.

Similar aquifer conditions are predicted at locations further downgradient, as modeled using groundwater characteristics from G20D and G22D sampled on 3 May 2023 to represent onsite delineation wells and offsite delineation wells, respectively (Table 4). Goethite is favored at all onsite and offsite delineation network locations (Figure 4c and Figure 4e, respectively). While ferrihydrite stability is variable at the downgradient onsite delineation wells (Figure 4d), it increases as groundwater migrates offsite (Figure 4f), consistent with the observed increase in redox conditions offsite. The conditions favoring goethite and amorphous ferrihydrite stability downgradient of the EAP suggest the potential at most locations for continued attenuation capacity via sorption to iron oxides as boron migrates along the groundwater flow path.

A review of Eh-pH conditions for manganese found that solid phase manganese minerals, including manganese oxides, are not predicted to be stable under conditions either immediately downgradient of the EAP or further downgradient (Figures 5a – 5c, respectively).

4.4.2.2 Total and Dissolved Iron and Manganese Concentrations

The distribution of iron and manganese between total and dissolved phases can provide insights on site redox conditions and constituent behavior. Dissolved iron and manganese data are only available for the Q2 and Q3 2023 sampling events at select locations. A comparison of the total and dissolved iron and manganese data for this event is provided in Table 5. Total iron was detected at 28 of 29 locations analyzed, with reported values ranging from 0.0476 mg/L at delineation well G12D to 24.3 mg/L at downgradient well G07. Dissolved iron was detected at 8 of 29 locations analyzed, with reported values ranging from 0.214 mg/L to 1.36 mg/L. Where dissolved iron was

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[4] Field ORP measurements were converted to Eh by adding +200 millivolts to correct for the Ag/AgCl electrode.

detected, the dissolved concentration was at least 50% less than the total value. The lower dissolved iron values suggest that aqueous iron is largely associated with particles in the colloidal size fraction and is not readily undergoing true dissolution from solid mineral phases to reduced aqueous iron (Fe^{2+}). This aligns with the conditions expected based on the Pourbaix diagrams (Figures 4a, 4c, & 4e), which predicted that goethite is stable.

Total manganese was detected at 25 of 29 locations analyzed, with reported values ranging from 0.0033 mg/L at background well G02 to 10.2 mg/L at delineation well G16S (Table 5). Dissolved manganese was detected at 27 of 29 locations analyzed, with reported values ranging from 0.0032 mg/L at background well G02 to 11.1 mg/L at delineation well G16S. The reported total and dissolved manganese concentrations were generally much more similar at each monitoring location than iron, suggesting that most manganese is present within the dissolved phase. This is consistent with the predicted mobilization of manganese to the aqueous phase based on the Pourbaix diagrams (Figures 5a – 5c) and the lack of observed crystalline manganese-bearing minerals (like rhodochrosite) across the site.

4.4.3 Major Ion Distribution and Groundwater Signatures

Piper diagrams were constructed using data from both the compliance and delineation networks to visualize major ion distributions in UA groundwater. Piper diagrams are a common tool for assessing geochemical similarities or differences in terms of the major ion distributions between aqueous samples. The groundwater at monitoring wells with elevated boron concentrations (i.e., G06, G07, G08, G09, G10) tend to be more similar in their major ion distribution (Figure 6a) to EAP CCR porewaters (XPW01, XPW02, and XPW03) compared to background samples (G01D and G02D). There is an increasing contribution of sulfate and decreasing contribution of alkalinity to the ion balance when moving from upgradient wells G01 and G02, which are representative of background conditions, to downgradient wells. EAP CCR porewaters have a lower abundance of magnesium than groundwater across the monitoring network. A groundwater composition more similar to EAP CCR porewaters is observed at delineation wells with high boron concentrations (i.e., G12D, G12S; Figure 6b) compared to locations further downgradient (i.e., MW-24S, MW-24D; Figure 6c).

5. LABORATORY BATCH TESTING

Batch test studies combine soil and groundwater collected from the site to evaluate the sorption and desorption of chemical constituents. A draft memorandum discussing batch attenuation testing at the Joppa site was included as an appendix to the *Groundwater Modeling Report* (Ramboll 2022) and is provided as Attachment J to this document.

5.1 Batch Attenuation Testing

Batch attenuation testing was conducted for boron to evaluate sorption and generate site-specific distribution coefficients between the solid and aqueous phase. Aquifer solids from sample G03 and groundwater from well G07 were used for the batch attenuation tests. Each test was set up in duplicate and five soil to water ratios were evaluated (Table 6). The groundwater was spiked with boric acid to a target concentration of 5 mg/L. At the end of the test, the samples were filtered through a 0.45 micron filter and dissolved boron concentrations in the aqueous phase were analyzed. Analysis of the dissolved phase is important to adequately measure the partitioning of mass between the solid and liquid fractions of the experiment. The mass of boron in the water versus in the solids of each sample were plotted according to three sorption models: linear, Langmuir, and Freundlich. The linear data output is provided as Figure 7.

Data obtained from the batch attenuation tests was used to construct linear and non-linear isotherms and calculate attenuation distribution coefficients (K_d). The K_d values for boron for linear, Langmuir, and Freundlich isotherms are provided in Table 7. The results of one of the soil to water ratios (1 to 27.3) was excluded when calculating the distribution coefficients, because these values consistently reduced the goodness-of-fit of each isotherm and resulted in unrealistic values for K_d and isotherm fitting parameters. Removing the 1:27.3 soil to water ratio also resulted in a more conservative linear K_d.

The linear K_d of 2.4 L/kg was selected for G07 based on its goodness-of-fit ($R^2 > 0.99$) and compatibility with values reported in literature (which range from 0.19 to 1.3 L/kg; EPRI 2005, Strenge and Peterson 1989). While the Langmuir and Freundlich isotherms also had a high goodness-of-fit, they generated K_d values orders of magnitude higher than those reported in the literature. The boron K_d value of 2.4 L/kg selected for the site indicates that there may be some sorption of boron to UA solids.

5.2 Batch Desorption Testing

The loaded soil material from G03 following the adsorption phase of the testing was combined with groundwater from unimpacted downgradient well G03 to evaluate the reversibility of boron attenuation with the aquifer solids. The soil material which was used in the 1:5 soil:water ratio adsorption set up was used for the desorption tests. The soil was combined with G03 water at a 1:10 ratio and incubated for seven days. Batch reactors were set up in duplicate, with one set incubated under ambient conditions, one set incubated with daily hydrogen sparging to represent reducing conditions, and one set incubated with daily oxygen sparging to represent more oxidizing conditions.

Desorption of boron was observed under all redox conditions (Figure 8). There were no substantial differences in desorption under different redox conditions, which may be due to the limited range of redox conditions which were achieved under the experimental design (all relatively oxidizing with average ORP values from 110-189 mV; Table 8). While these redox conditions are generally reflective of background conditions (Figure 3a) and off-Site conditions (Figure 3c), current conditions at onsite delineation locations are generally more reducing (Figure 3b).

6. GEOCHEMICAL CONCEPTUAL SITE MODEL

6.1 Source and Mobilization Mechanisms

Boron is naturally abundant in coals and is concentrated within CCR, primarily as mobile polyborate (B_2O_3) surface coatings on particles (EPRI 1998). Boron was identified in the CCR solids at concentrations up to 542 mg/kg. Boron was not detected within UA aquifer solids at elevated concentrations that would indicate a natural source of boron to groundwater, and groundwater from background wells consistently exhibited very low boron concentrations. The primary source of boron to the UA is likely the EAP CCR porewater.

6.2 Potential Attenuation Mechanisms

Boron is anticipated to largely be present as the neutral $B(OH)_3$ species as groundwater pH values are below the pK_a for boric acid (9.2). The presence of iron oxyhydroxides in aquifer solids (Table 2) suggests a portion of the boron in the groundwater system may be attenuated via surface complexation reactions within the UA. Given the low abundance of total manganese in the aquifer solids (Table 1) and the predicted instability of solid manganese phases (Figures 5a – 5c), manganese oxides are not expected to be an important source of adsorption sites. Boron is also known to be slightly attenuated via interactions with clay minerals (Goldberg 1997); the XRD results identified the presence of the clay mineral kaolinite at downgradient locations where samples were collected (Table 4). Together, this suggests that chemical attenuation of boron is possible at locations downgradient of the EAP.

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TABLES

Table 1 - CCR Solid Phase Characterization
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Field Boring Location	XPW-01			XPW-02		XPW-03	
Sample Depth (ft bgs)	**4-6**	**46-48**	**46-48**	**4-6**	**24-26**	**6-8**	**34-36**
Constituent	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Antimony	2.8	0.38 U	0.4 U	3.25	2.19	4.07	0.41 SR
Arsenic	16.4 B	8.77 B	7.31 B	21.1 B	44.1 B	55.8 B	52.7 B
Barium	3080 B	105 B	105 B	2690 B	193 B	976 B	149 B
Beryllium	3.7	0.72	0.72	3.18	3.86	3.3	1.49
Boron	542	35.1	36.3	536	334	308	92.6
Cadmium	1.41	0.19 U	0.19 U	1.61	2.37	0.95	0.65
Calcium	141000	3280	3530	152000	34600	34700	4010 S
Chromium	49.4	18.3	18.8	57.7	55.8	44.8	31.2
Cobalt	22	8.46	8.99	22.9	11.8	11.8	8.26
Iron	31600	17900	18400	33800	57000	23200	26200 S
Lead	34.2	15.1	15.5	32	22.4	60.3	42.8
Lithium	30.9	12.2	12.3	28.2	10.4	16.2	17.5
Manganese	95.2 B	125 B	133 B	153 B	342 B	124 B	95.6 B
Mercury	0.758	0.015	0.016	0.583	0.014 U	0.029	0.33
Molybdenum	7.42	32.2	47.9	9.93	7.99	11.6	213 SR
Selenium	8.29	0.94 U	0.96 U	6.65	2.23	2.15	6.94
Thallium	0.93 U	0.32	0.26	1.13	2.11	1.33	0.46 SR

Notes

ft. bgs - feet below ground surface

mg/kg - milligrams per kilogram

U - Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

B - Analyte was detected in associated Method Blank

S - Spike Recovery was outside the recovery limits

R - Relative Percent Difference (RPD) was outside the accepted recovery limits

Total metals samples prepared via method SW 3050 and analyzed via USEPA method 6020A.

CCR - Coal Combustion Residuals

Table 2 - Bulk Characterization of Aquifer Solids
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Field Boring Location	**G03**				**G07**	**G08**	**G09M***			**G11**	
Sample Depth (ft bgs)	**30-32**	**58-60**	**58-60**	**57.5-62.5, 63.5-70**	**50-56**	**75-80**	**10-12**	**82-84**	**110-112**	**22-24**	**58-60**
Location	**Sidegradient**				**Downgradient**	**Downgradient**	**Downgradient**			**Downgradient**	
Sample Collection Date	**2/2/2021**	**2/2/2021**	**2/2/2021**	**10/14/2021**	**10/14/2021**	**10/14/2021**	**1/26/2021**	**1/27/2021**	**1/27/2021**	**1/19/2021**	**1/19/2021**
Field Boring Log Description	**Sandy Silt**	**Sand with few gravel**		**Sand and gravelly sand**	**Sand with fine to coarse gravel**	**Sand and fine to coarse gravel**	**Lean Clay**	**Gravel with little sand**	**Fine-grained sand**	**Lean clay**	**Sand with trace gravel**
Antimony	0.37 U	0.37 U	0.39 U	NA			0.39 U	0.38 U	0.38 U	0.79	0.37 U
Arsenic	2.59	0.3	0.26	7.8	5.8	28	3.34	6.34	4.44	3.5 B	1.15 B
Barium	347 B	6.01 B	5.06 B	100	170	180	93.6 B	19.6 B	11.5 B	173 B	21.6 B
Beryllium	0.71	0.28 U	0.29 U	1	1	1	0.46	0.89	0.29 U	0.74	0.3
Boron	4.63 U	4.72 U	4.81 U	NA			4.55 U	4.55 U	4.9 U	4.55 U	4.55 U
Cadmium	0.18 U	0.19 U	0.19 U	0.08	0.06	0.31	0.18 U	0.18 U	0.2 U	0.43	0.18 U
Calcium	1590	153	121	3100	1500	900	1740	277	420	1370	430
Chromium	18.7	4.69	3.91	41	43	30	16.6	19.4	7.43	15.7	6.05
Cobalt	110 SR	0.82	1.85	6	8	29	5.68	7.69	0.8	2.72	1.29
Iron	13900 S	1060	830	40000	44000	99000	13100	32000	6470	12000	2800
Lead	27.8	1.3	0.99	7	7	6	7.76	3.48	3.76	8.64	3
Lithium	12.6	0.86	0.8	7	7.6	6.7	9.67	0.78	1.72	5.69	2.03
Manganese	1320 SR	6.1	8.51	190	320	1000	338	270	57.2	60.9 B	11.6 B
Mercury	0.012 U	0.012 U	0.012 U	NA			0.021	0.012 U	0.012 U	0.011 U	0.011 U
Molybdenum	0.38	0.19 U	0.19 U	1	0.6	2.8	0.37	1.04	0.51	0.36	0.18 U
Selenium	0.91 U	0.94 U	0.96 U	0.7 U	0.7 U	0.7 U	0.91 U	0.91 U	0.98 U	0.91 U	0.91 U
Thallium	0.26	0.19 U	0.19 U	0.08	0.08	0.12	0.18 U	0.18 U	0.2 U	0.41	0.18 U
TOC%	NA			0.039	0.039	0.049	NA			NA	
LOI%	NA			1.05	0.93	1.58	NA			NA	

Notes

Sample depth is shown in feet below ground surface (ft bgs).

All results shown in mg/kg (milligram per kilogram)

NA - not analyzed

TOC - total organic carbon

LOI - loss on ignition

U - Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

B - Analyte was detected in associated Method Blank

J - Estimated value. Parameter was detected in concentrations below the reporting limit

S - Spike Recovery was outside the recovery limits

R - Relative Percent Difference (RPD) was outside the accepted recovery limits

Total metals samples prepared via method SW 3050 and analyzed via USEPA method 6020A.

* Samples from G09M were co-located with screened interval for G09.

Table 3 - X-Ray Diffraction Analysis of Aquifer Solids
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Field Boring Location			**G-03**	**G-07**	**G-08**
Sample Depth (ft bgs)			**(57.5-62.5, 63.5-70)**	**(50-56)**	**(75-80)**
Location			**Sidegradient**	**Downgradient**	**Downgradient**
Field Boring Log Description			**Sand and gravelly sand**	**Sand with fine to coarse gravel**	**Sand and fine to coarse gravel**
Mineral/Compound	**Formula**	**Mineral Type**	**(wt %)**	**(wt %)**	**(wt %)**
Quartz	SiO_2	Silicate	90.6	92.0	88.4
Microcline	$KAlSi_3O_8$	Feldspar	1.1	1.7	1.3
Albite	$NaAlSi_3O_8$	Feldspar	1.3	1.5	1.2
Geothite	$\alpha FeO.OH$	Oxide	4.9	3.1	8.2
Hematite	Fe_2O_3	Oxide	0.5	0.2	0.1
Magnetite	Fe_3O_4	Oxide	0.0	0.0	0.0
Pyrite	FeS_2	Sulfide	0.0	0.0	0.0
Kaolinite	$Al_2Si_2O_5(OH)_4$	Clay	1.6	1.6	0.7
Clay Minerals Total			1.6	1.6	0.7

Notes

Sample depth is shown in feet below ground surface (ft bgs).

wt %: percentage by weight

Table 4 - Eh-pH Diagram Input
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Well ID		**G08**	**G20D**	**G22S**
Sample Collection Date		**2-May-23**	**3-May-23**	**3-May-23**
Input Parameter	**Units**			
pH	SU	6.88	7.05	6.88
Bicarbonate Alkalinity	mg/L $CaCO_3$	154	171	161
Calcium	mg/L	140	77.7	55.4
Chloride	mg/L	16.0	14.0	22.0
Iron	mg/L	16.8	0.10	0.0255
Magnesium	mg/L	32.2	21.0	16.4
Manganese	mg/L	2.62	0.01	0.0031
Potassium	mg/L	1.67	1.8	1.22
Sodium	mg/L	41.7	23.6	31.3
Sulfate	mg/L	363	140.0	63.0
Temperature	℃	17.3	15.4	17.0

Notes

mg/L - milligram per liter

SU - standard units

Table 5 - Total and Dissolved Aqueous Iron and Manganese Results
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Well ID	Well Classification	Sample Date	Dissolved Iron (mg/L)	Total Iron (mg/L)	Dissolved Manganese (mg/L)	Total Manganese (mg/L)
G01D	Background	5/2/2023	0.214	4.09	0.33	0.345
		9/25/2023	0.0492	2.41	0.0273	0.0562
G02D	Background	5/3/2023	<0.02	0.049	0.0033	0.0032
		9/25/2023	0.0338	0.319	0.009	0.0169
G03	Downgradient	5/3/2023	<0.02	22.3	0.0193	0.234
		9/26/2023	0.0257	2.18	0.003	0.0233
G05	Downgradient	5/3/2023	0.342	1.5	0.166	0.191
		9/27/2023	0.429	1.98	0.104	0.0814
G06	Downgradient	5/3/2023	<0.02	7.34	0.0155	0.102
		9/27/2023	0.0452	1.68	0.0127	0.0403
G07	Downgradient	5/3/2023	<0.02	24.3	1.85	2.72
		9/27/2023	0.177	1.22	3.1	3.84
G08	Downgradient	5/3/2023	1.07	16.8	1.84	2.62
		9/26/2023	0.751	3.37	2.25	2.78
G09	Downgradient	5/3/2023	2.5	15.6	1.01	1.27
		9/26/2023	1.53	5.35	1.01	1.27
G10	Downgradient	5/3/2023	0.325	13.2	0.121	0.189
		9/26/2023	0.534	2.26	0.184	0.276
G11	Downgradient	5/3/2023	<0.04	3.35	0.033	0.37
		9/26/2023	0.171	0.106	0.0059	0.0115
G12D	Delineation	5/2/2023	<0.02	0.0476	0.005	0.0085
		9/28/2023	0.0599	0.065	0.0051	0.0043
G12S	Delineation	5/2/2023	<0.02	2.34	0.0064	0.0297
		9/28/2023	<0.0115	0.0957	0.0082	0.0107
G13D	Delineation	5/2/2023	<0.02	<0.02	<0.007	<0.007
		9/27/2023	0.0374	0.0621	0.0008	0.0016
G13S	Delineation	5/2/2023	<0.02	0.0461	<0.007	<0.007
		9/27/2023	0.035	0.219	0.0008	0.0018
G14D	Delineation	1/26/2023	--	1.32	--	0.0638
G14S	Delineation	1/25/2023	--	0.31	--	0.0101
G15D	Delineation	1/25/2023	--	2.16	--	0.592
G15S	Delineation	1/25/2023	--	0.112	--	0.0178
G16D	Delineation	1/25/2023	--	2.43	--	2.72
G16S	Delineation	5/2/2023	<0.02	0.428	10.2	11.1
		9/27/2023	0.084	0.921	8.75	11.7
G17D	Delineation	1/24/2023	--	0.483	--	0.0328
G17S	Delineation	1/24/2023	--	0.794	--	0.0263
G18D	Delineation	1/24/2023	--	3.4	--	0.529
G18S	Delineation	5/3/2023	<0.02	0.441	0.0028	0.0086
		9/27/2023	<0.0115	0.153	0.0012	0.0035
G19D	Delineation	5/3/2023	<0.02	1.14	0.0036	0.0286
		9/28/2023	<0.0115	0.474	0.0014	0.0312
G19S	Delineation	5/3/2023	<0.02	0.0984	0.0225	0.0344
		9/28/2023	0.487	0.205	0.0105	0.0108
G20D	Delineation	5/3/2023	<0.02	0.104	0.0138	0.0134
		9/27/2023	<0.0115	0.0589	0.0012	0.002
G20S	Delineation	5/3/2023	<0.02	0.0628	0.0031	0.0057
		9/27/2023	0.051	0.0366	0.0012	0.0015
G21D	Delineation	5/3/2023	1.36	2.65	0.197	0.261
		9/27/2023	0.985	1.36	0.14	0.208
G21S	Delineation	5/3/2023	<0.02	1.12	<0.007	0.0147
		9/27/2023	<0.0115	0.178	0.0012	0.0027
G22D	Delineation	5/3/2023	<0.02	1.13	0.0417	0.0645
		9/28/2023	0.183	0.957	0.0532	0.0551
G22S	Delineation	5/3/2023	<0.02	0.255	<0.007	0.0031
		9/28/2023	<0.0115	0.191	0.0012	0.0015
G23D	Delineation	1/24/2023	--	0.55	--	0.0757
G23S	Delineation	5/3/2023	<0.02	0.998	0.0218	0.0368
		9/27/2023	0.0544	0.411	0.0059	0.0272
G24D	Delineation	1/24/2023	--	4.54	--	0.323
G24S	Delineation	5/2/2023	<0.02	0.136	0.104	0.0943
		9/28/2023	0.0751	0.187	0.0377	0.0411
G51D	Downgradient	5/3/2023	0.785	0.823	0.29	0.324
		9/25/2023	1.31	0.542	0.0239	0.0221
G53D	Downgradient	5/3/2023	<0.02	0.33	0.126	0.133
		9/27/2023	0.101	0.232	0.172	0.118
G54D	Downgradient	5/3/2023	0.716	1.39	1.04	1.19
		9/26/2023	0.669	0.855	0.96	1.05

Notes
mg/L: milligrams per liter
Non-detect values are shown as less than the method detection limit.
For locations where Q2-Q4 2023 iron and manganese data are not available, the most recent sampling event is shown.

Table 6 - Batch Attenuation Testing Results
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Date	Day	Replicate	Dissolved Boron	pH	ORP
						mg/L	SU	mV
G07	--	Water Control Only	23-Dec-21	0	G07-1a	5.8	7.23	81
					G07-2a	5.4	7.30	73
					Average Result	**5.6**	**7.3**	**77**
			30-Dec-21	7	G07-1	4.1	7.14	193
					G07-2	4.3	7.09	168
					Average Result	**4.2**	**7.1**	**181**
	G03 (Sample depth (ft bgs) 57.6-62.5, 63.5-70.0)	2:1.3 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	G03:G07 2:1-1	2.5	6.85	148
					G03:G07 2:1-2	3.1	6.75	132
					Average Result	**2.8**	**6.8**	**140**
		1:1.2 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	G03:G07 1:1-1	3.1	6.84	146
					G03:G07 1:1-2	3.1	6.95	142
					Average Result	**3.1**	**6.9**	**144**
		1:5.6 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	G03:G07 1:5-1	3.8	6.96	134
					G03:G07 1:5-2	4.3	6.91	135
					Average Result	**4.1**	**6.9**	**135**
		1:11 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	G03:G07 1:10-1	4.4	6.98	136
					G03:G07 1:10-2	4.4	6.89	131
					Average Result	**4.4**	**6.9**	**134**
		1:27.3 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	G03:G07 1:20-1	4.5	7.08	146
					G03:G07 1:20-2	4.4	6.92	150
					Average Result	**4.5**	**7.0**	**148**

Notes

mg/L - milligrams per liter
mV - millivolts
SU -Standard Units
ORP - oxidation/reduction potential
ft bgs - feet below ground surface

Table 7 - Boron Partition Coefficients
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Groundwater Sample ID	Geologic Material Sample ID	Analyte	Isotherm	Variable	Value
G07	**G03 (Sample depth (ft bgs) 57.6-62.5, 63.5-70.0)**	**Boron**	Linear	R^2	0.998
				K_d (L/kg)	**2.40**
			Langmuir	R^2	0.982
				q_m (mg/g)	0.06
				K_L (L/kg)	**5.66E+04**
			Freundlich	R^2	0.999
				1/n	0.83
				K_F (L/kg)	**86.4**

Notes

K_d - linear partition coefficient

K_L - Langmuir partition coefficient

K_F - Freundlich partition coefficient

q_m - inverse of the slope of the linearized Langmuir isotherm

n - non-linearity constant of the Freundlich isotherm

ft bgs - feet below ground surface

L/kg - liters per kilogram

mg/g - milligrams of boron per gram of soil

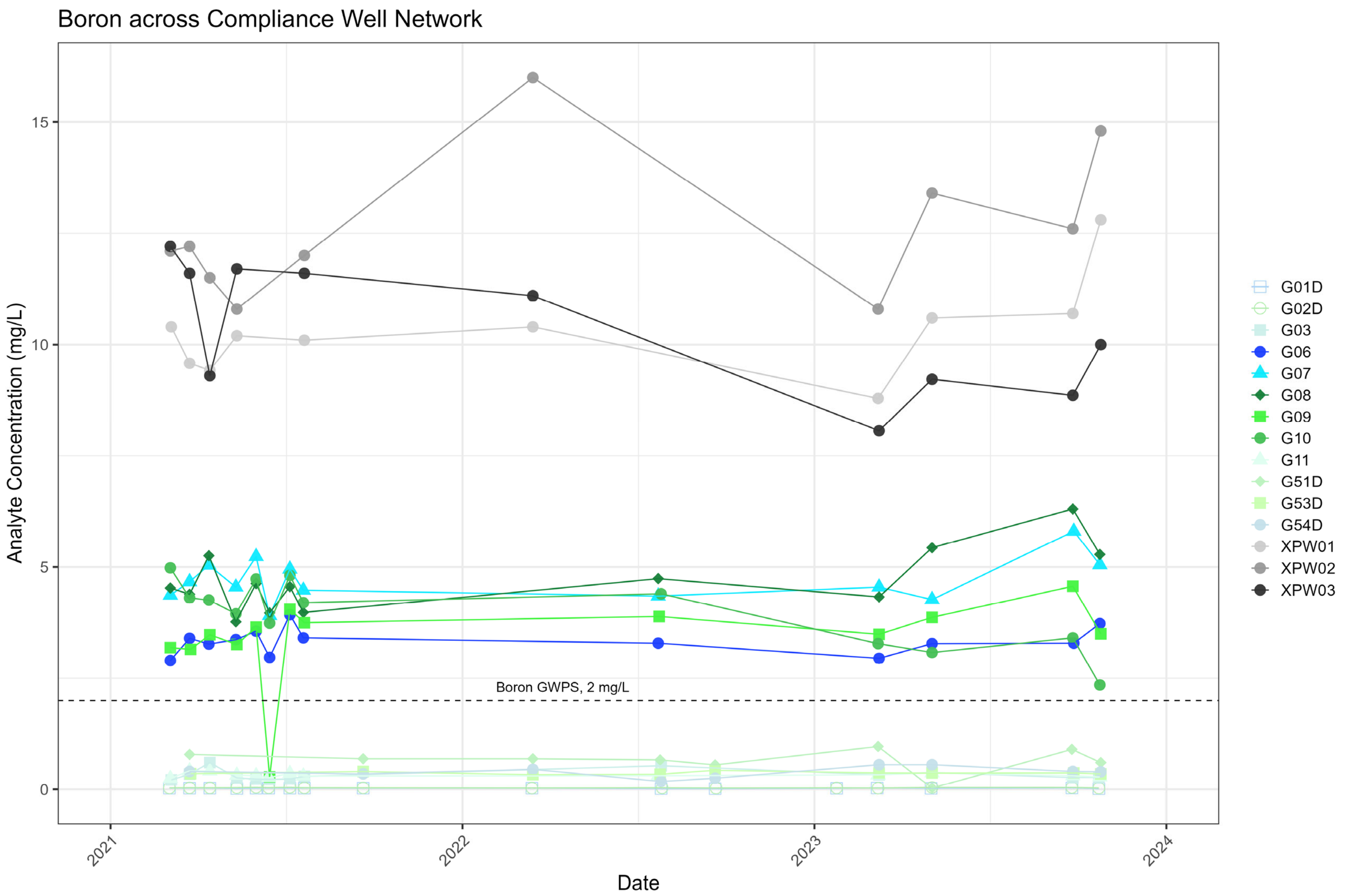
Table 8 - Batch Desorption Testing Results
Geochemical Conceptual Site Model
Joppa Power Plant - East Ash Pond

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Date	Day	Replicate	Dissolved Boron	pH	ORP
						mg/L	SU	mV
G03	**G03 (Sample depth (ft bgs) 57.6-62.5, 63.5-70.0) - following loading as the 1:5 soil:water attenuation incubator**	**Ambient Control**	8-Mar-22	0				
			15-Mar-22	7	Unamended 1	1.2	6.62	195
					Unamended 2	0.87	6.6	183
					Average Result	**1.0**	**6.6**	**189**
		Oxygen Sparged	8-Mar-22	0				
			15-Mar-22	7	Oxygen 1	0.95	6.90	171
					Oxygen 2	0.90	6.94	170
					Average Result	**0.92**	**6.9**	**171**
		Hydrogen Sparged	8-Mar-22	0				
			15-Mar-22	7	Hydrogen 1	0.94	6.60	157
					Hydrogen 2	0.97	6.61	62
					Average Result	**0.96**	**6.6**	**110**

Notes

mg/L - milligrams per liter
mV - millivolts
SU -Standard Units
ORP - oxidation/reduction potential
ft bgs - feet below ground surface

FIGURES



Notes:
1. Background wells shown with open symbols
mg/L: milligrams per liter
GWPS: Groundwater Protection Standard

Boron Concentration Time Series –
Compliance Network
Joppa Power Plant – East Ash Pond

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Figure 1a

Columbus, Ohio | April 2024

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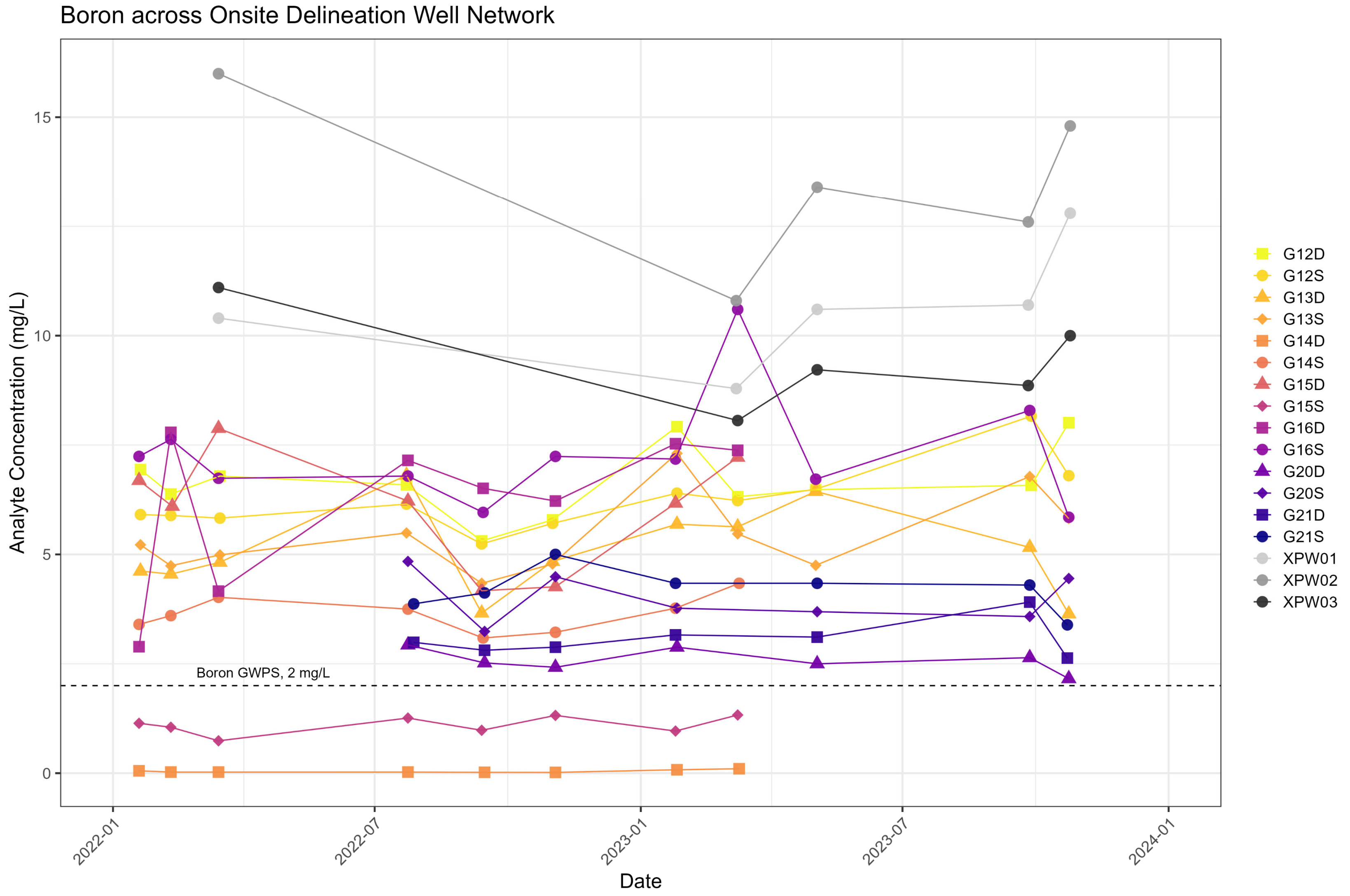

Notes:
mg/L: milligrams per liter
GWPS: Groundwater Protection Standard

Boron Concentration Time Series –
Onsite Delineation Network
Joppa Power Plant – East Ash Pond

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Figure
1b

Columbus, Ohio
April 2024

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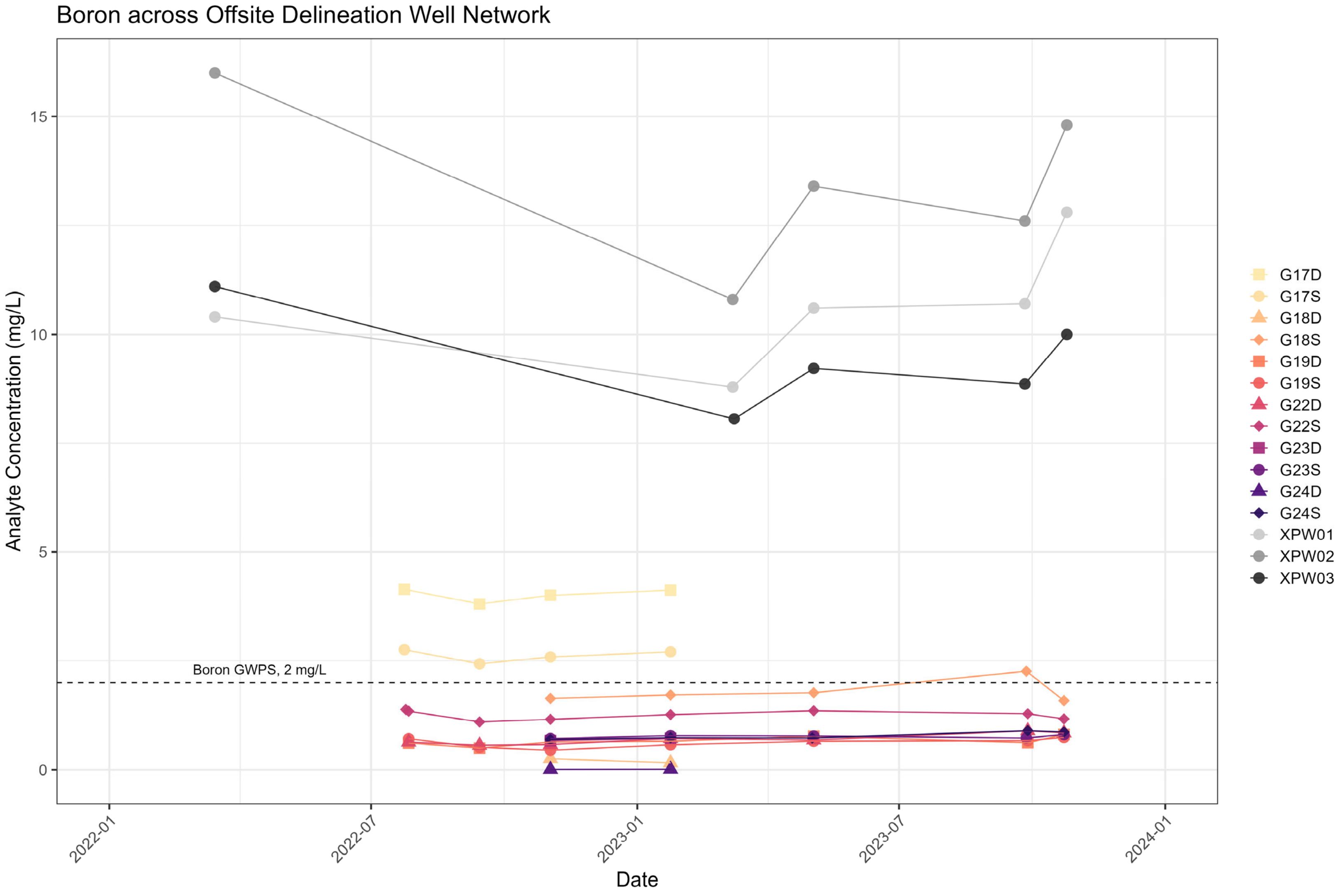
Boron across Offsite Delineation Well Network

Boron Concentration Time Series – Offsite Delineation Network

Joppa Power Plant – East Ash Pond

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Figure
1c

Columbus, Ohio

April 2024

Notes:
mg/L: milligrams per liter
GWPS: Groundwater Protection Standard

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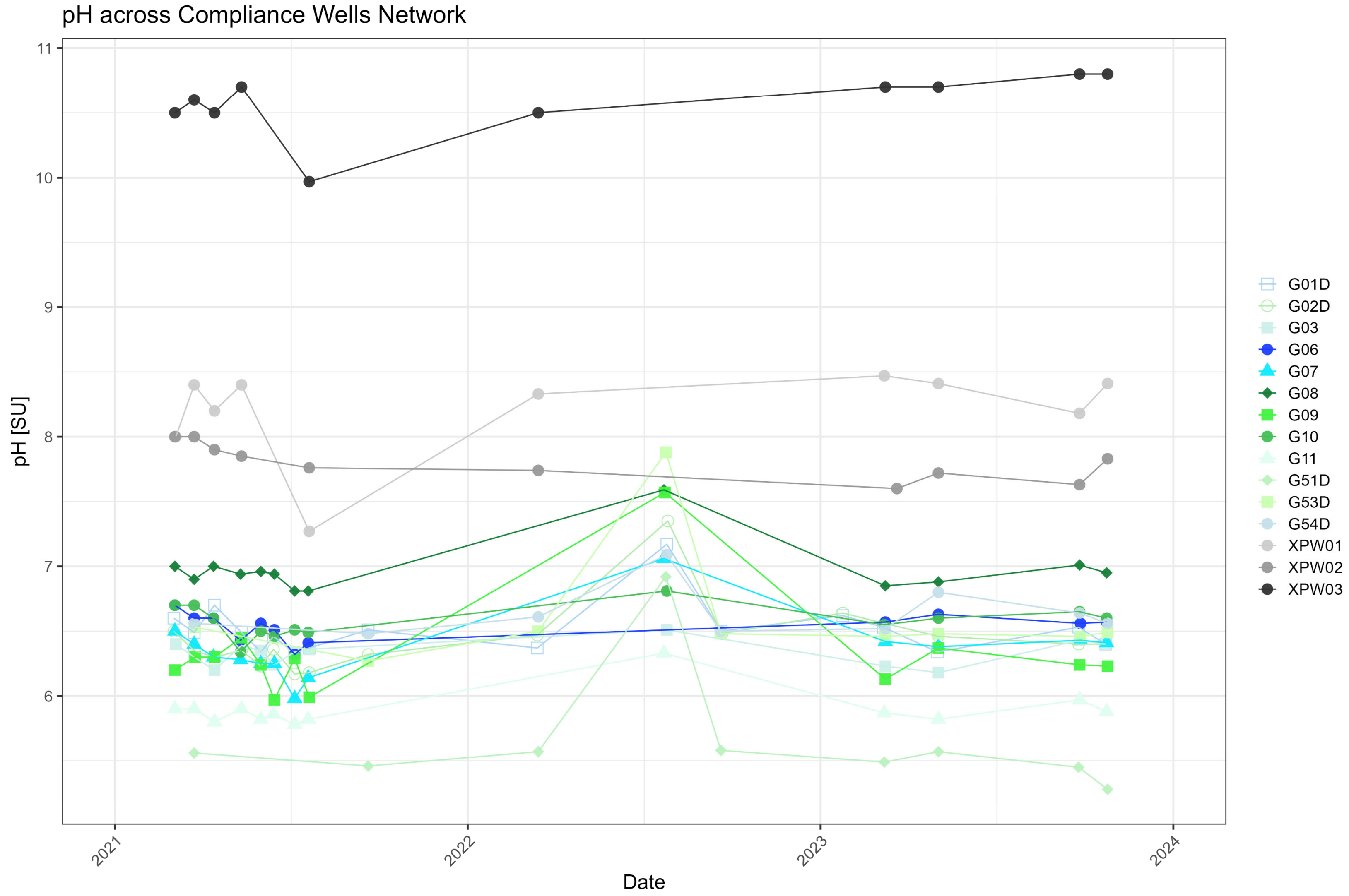

Notes:
1. Background wells shown with open symbols
2. Results shown in standard units (SU)

pH Time Series –
Compliance Network

Joppa Power Plant – East Ash Pond

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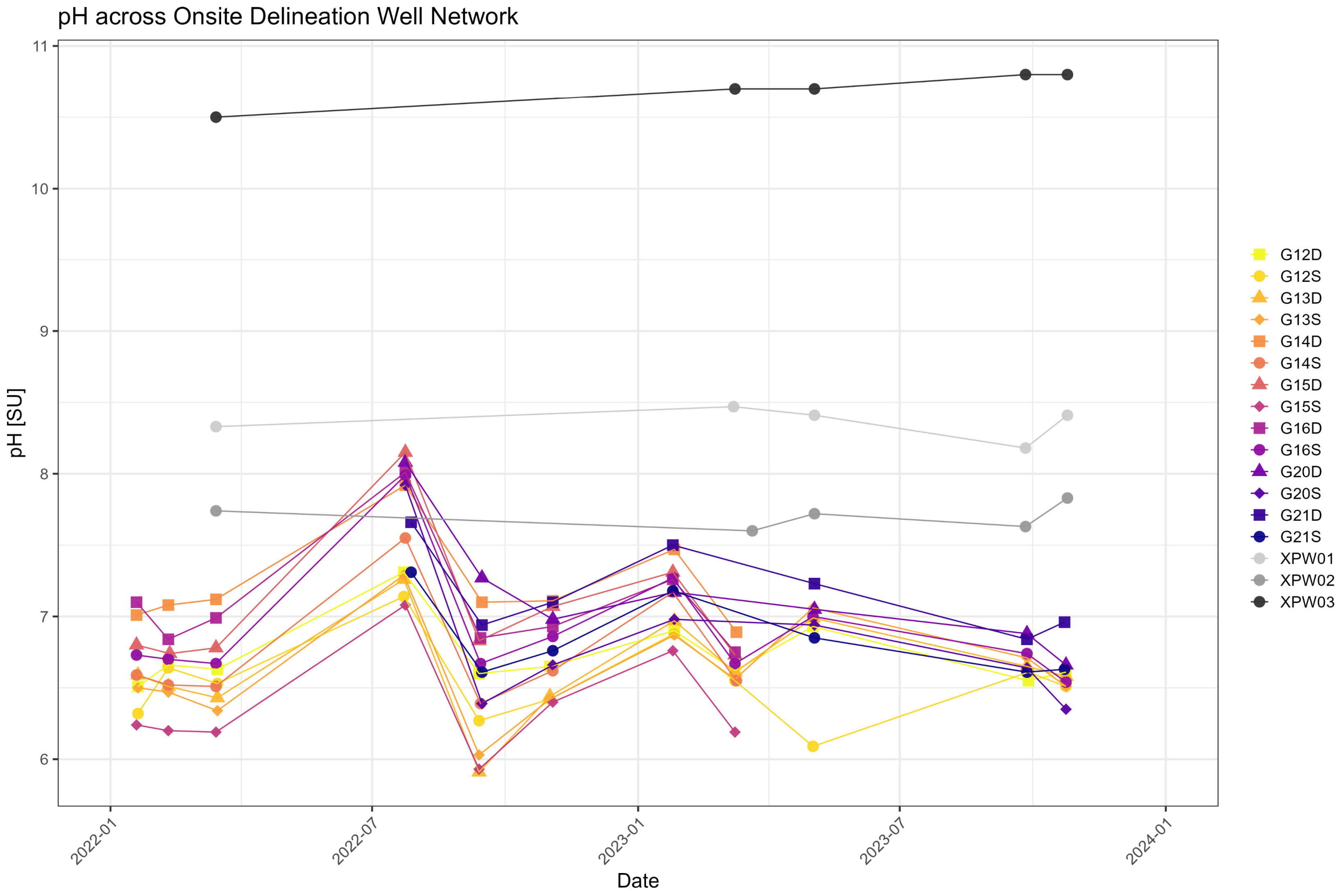
Figure
2a

Columbus, Ohio

April 2024



Notes:
1. Results shown in standard units (SU)

pH Time Series –
Onsite Delineation Network
Joppa Power Plant – East Ash Pond

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Figure
2b

Columbus, Ohio

April 2024

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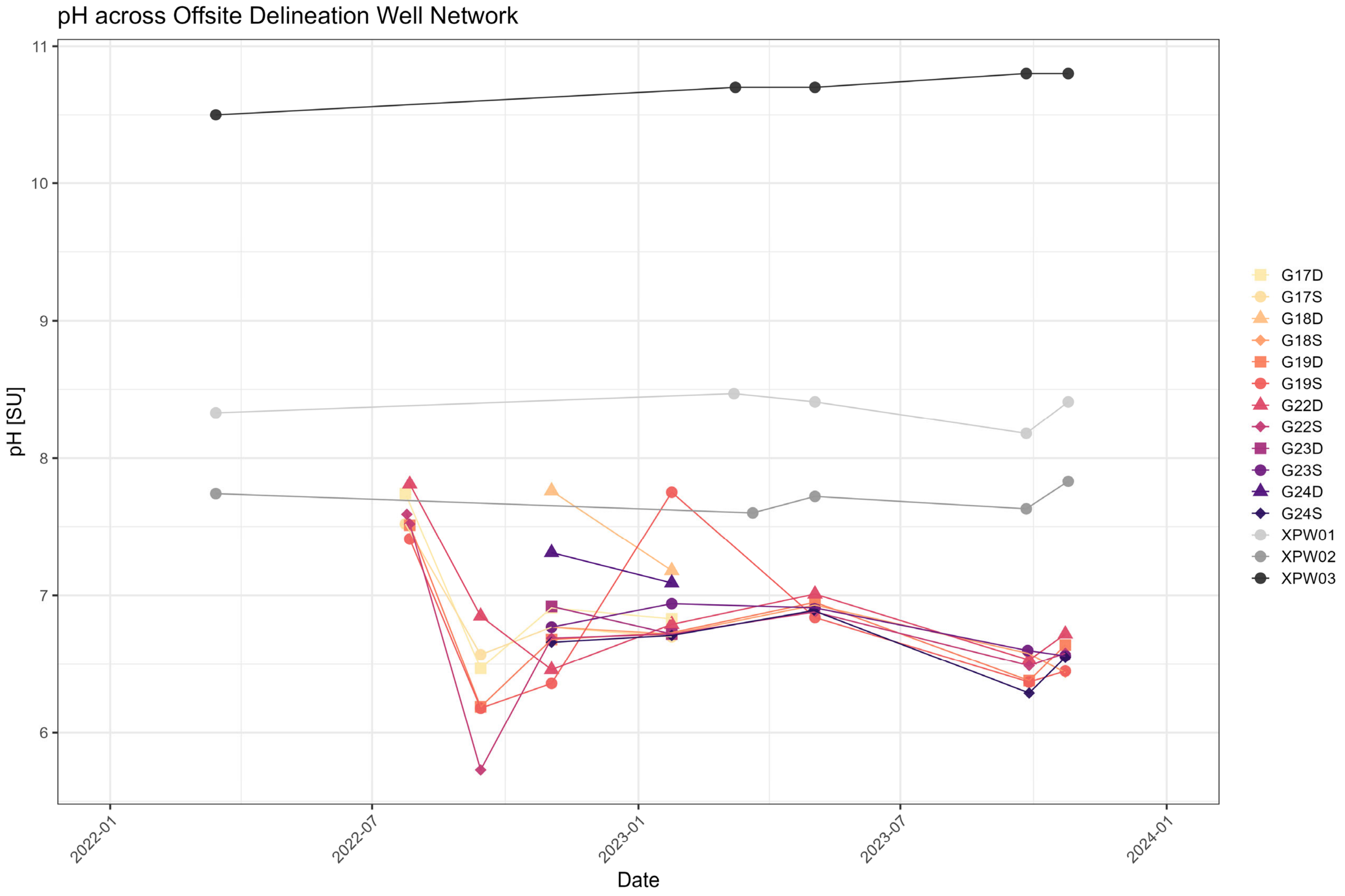

Notes:
1. Results shown in standard units (SU)

pH Time Series –
Offsite Delineation Network
Joppa Power Plant – East Ash Pond

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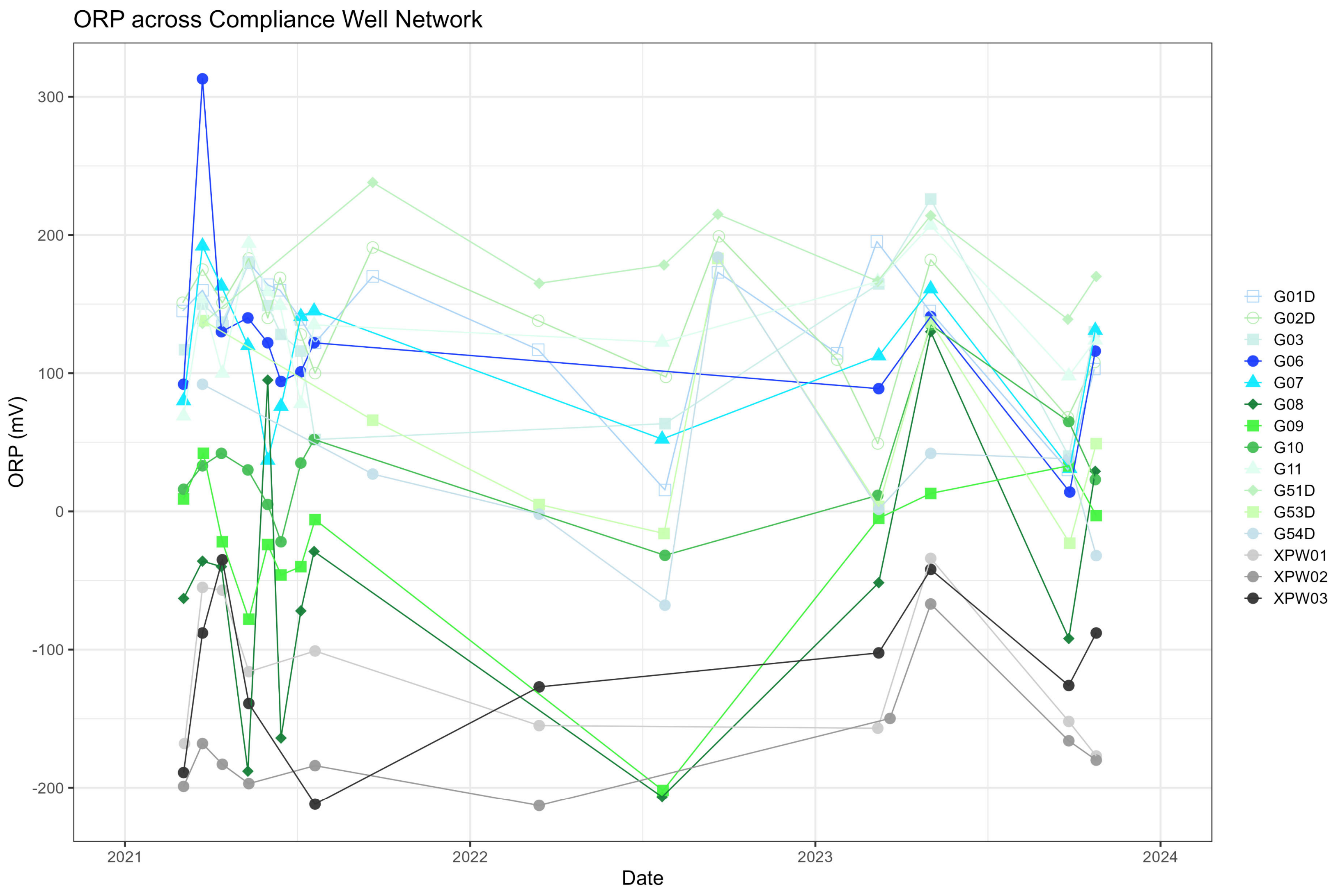
Figure
2c

Columbus, Ohio

April 2024



ORP Time Series –
Compliance Network
Joppa Power Plant – East Ash Pond

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Figure
3a

Columbus, Ohio

April 2024

Notes:
1. Background wells shown with open symbols
ORP: Oxidation reduction potential
mV: millivolt

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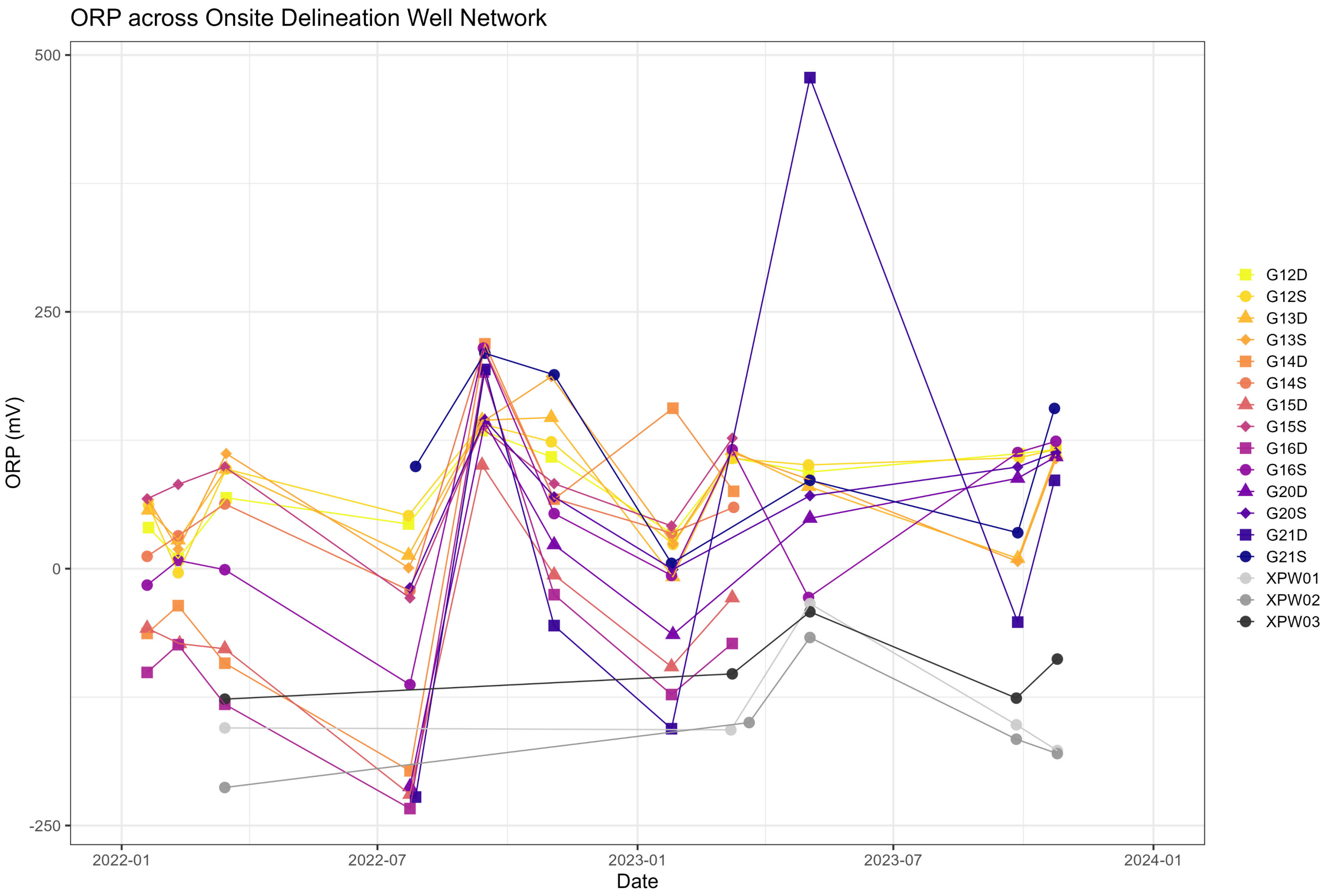

ORP Time Series –
Onsite Delineation Network

Joppa Power Plant – East Ash Pond

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Figure
3b

Columbus, Ohio

April 2024

Notes:
ORP: Oxidation reduction potential
mV: millivolt

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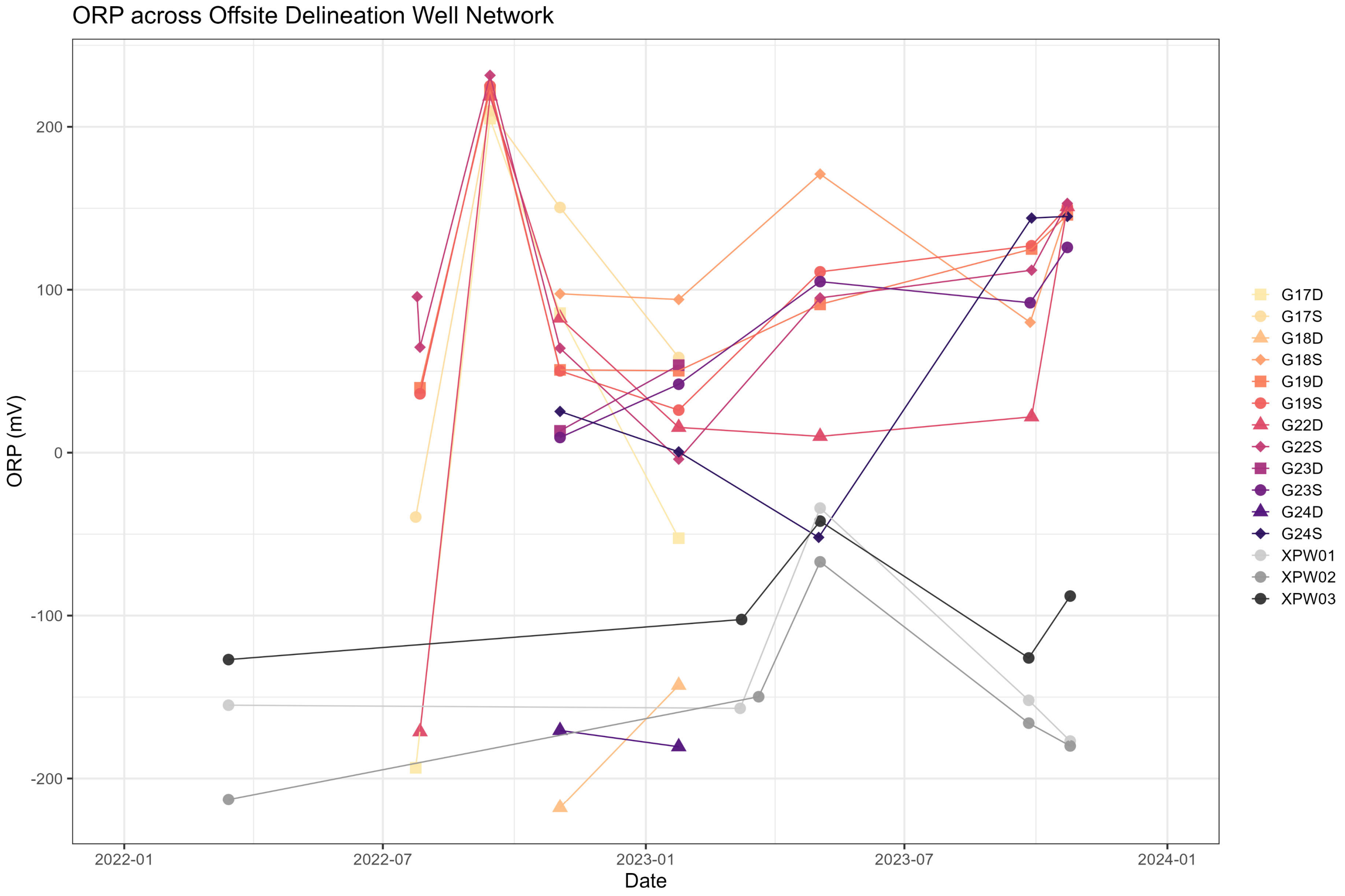

Notes:
ORP: Oxidation reduction potential
mV: millivolt

ORP Time Series –
Offsite Delineation Network
Joppa Power Plant – East Ash Pond

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Figure
3c

Columbus, Ohio
April 2024

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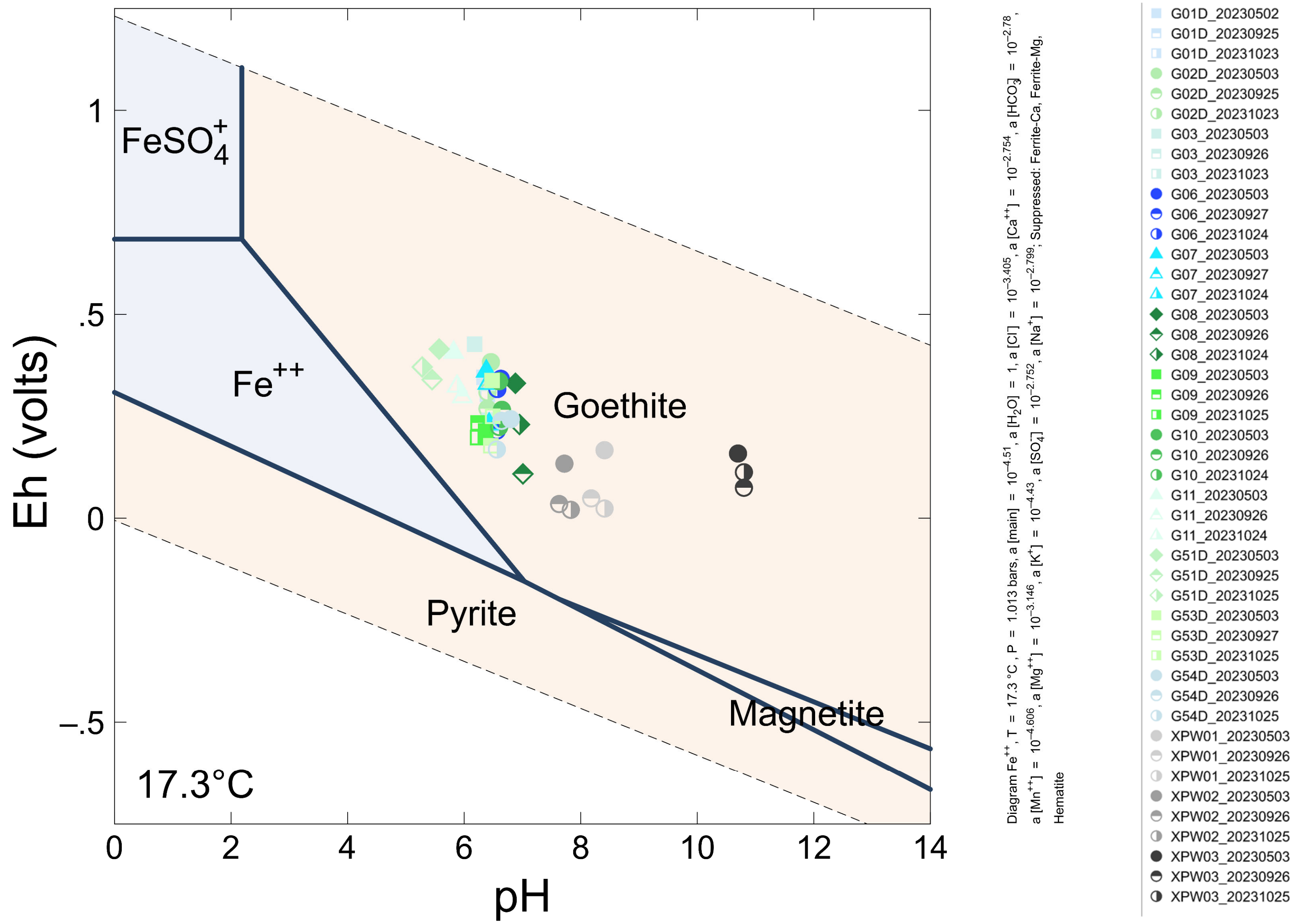

Notes:
1. Diagram was generated using conditions observed at well G08 on 5/2/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

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Iron Pourbaix Diagram, Goethite – Compliance Network
Joppa Power Plant – East Ash Pond

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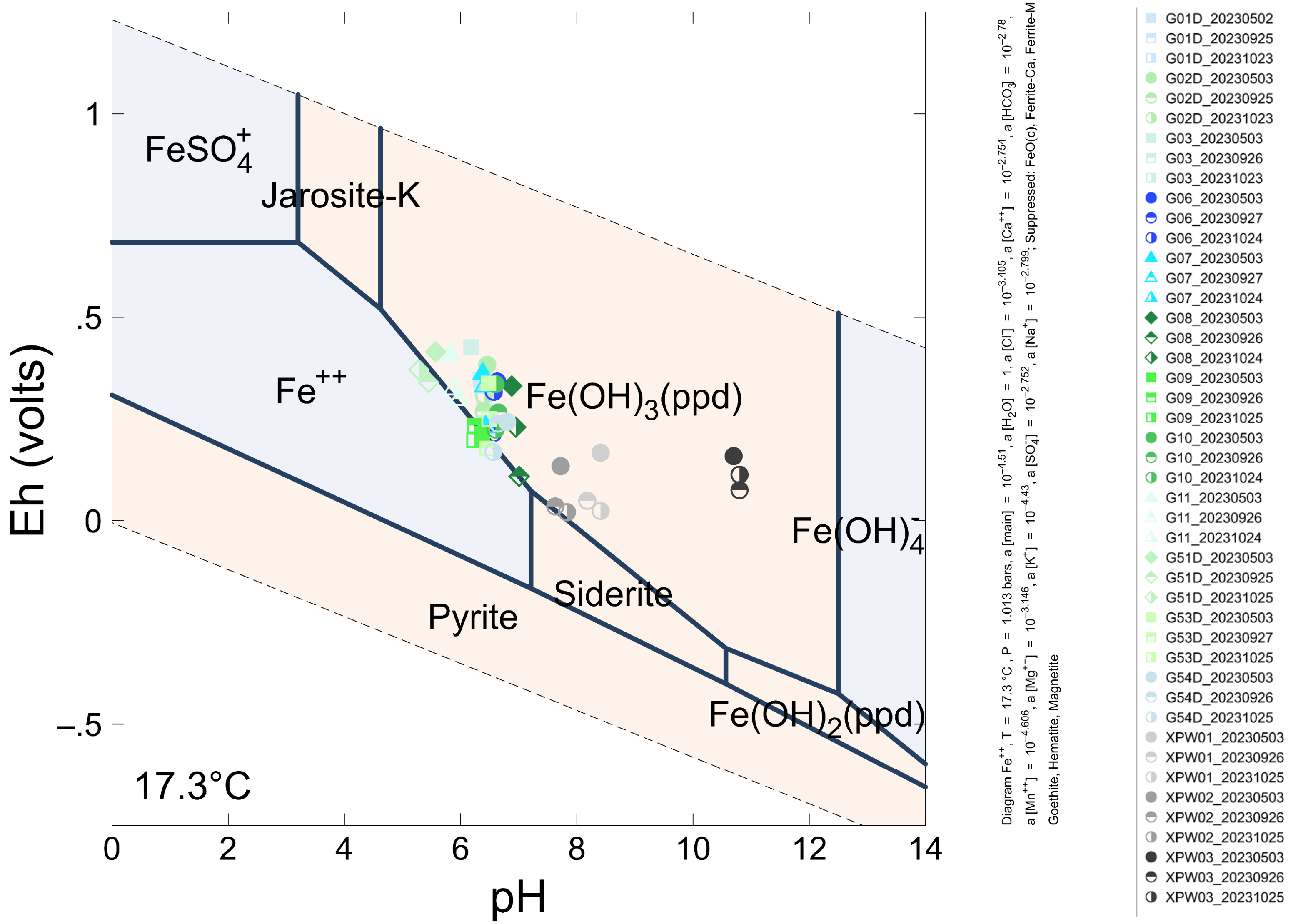
Figure
4a

Columbus, Ohio
April 2024



Notes:

1. Diagram was generated using conditions observed at well G08 on 5/2/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, goethite, FeO(c), ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Iron Pourbaix Diagram, Ferrihydrite –
Compliance Network
Joppa Power Plant – East Ash Pond

Geosyntec
consultants

Figure
4b

Columbus, Ohio
April 2024

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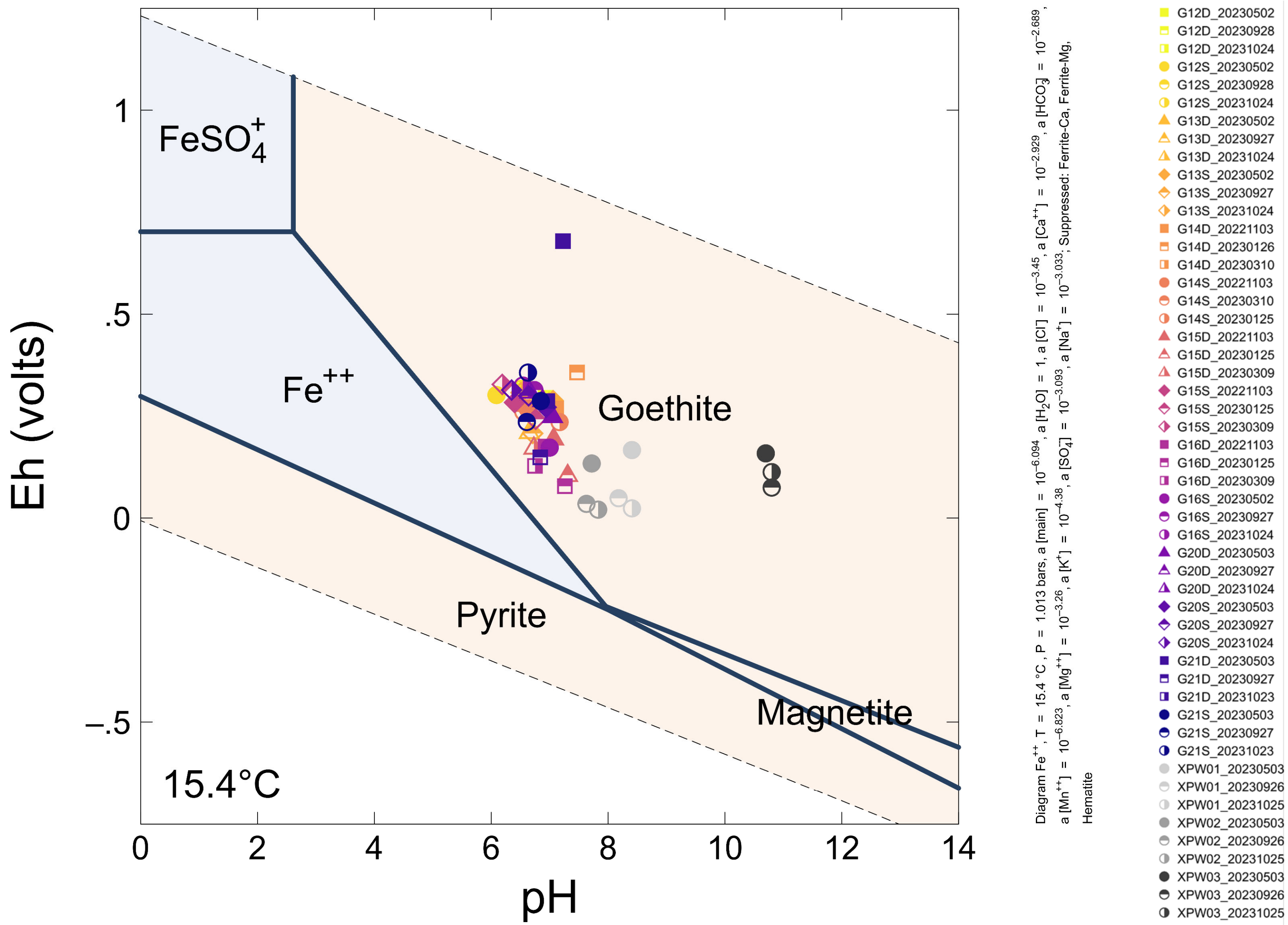

Notes:
1. Diagram was generated using conditions observed at well G20D on 5/3/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Iron Pourbaix Diagram, Goethite –
Onsite Delineation Network
Joppa Power Plant – East Ash Pond

Geosyntec
consultants

Figure
4c

Columbus, Ohio
April 2024

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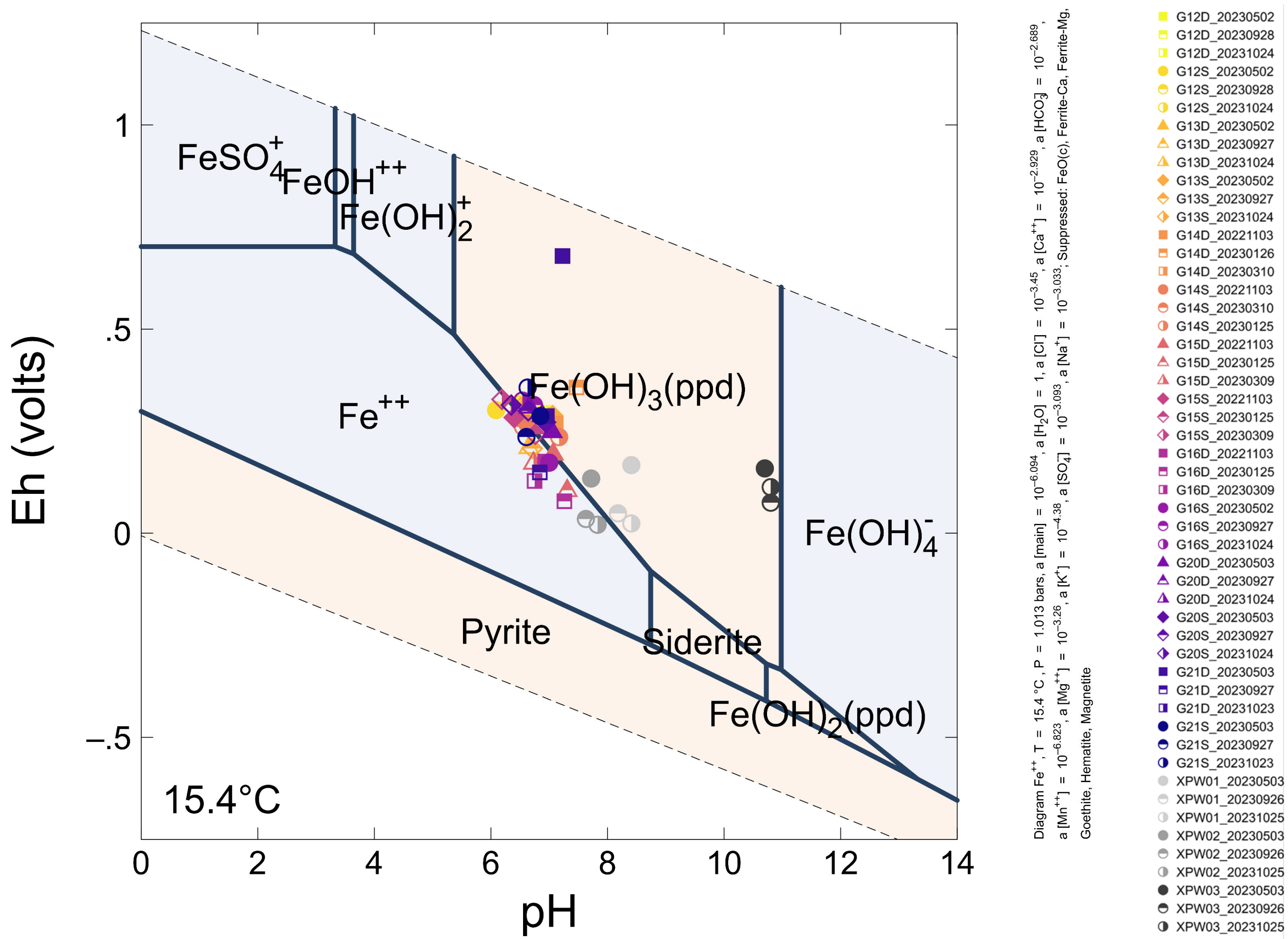

Notes:

1. Diagram was generated using conditions observed at well G20D on 5/3/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, goethite, magnetite, FeO(c), ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Iron Pourbaix Diagram, Ferrihydrite – Onsite Delineation Network

Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure 4d

Columbus, Ohio | April 2024

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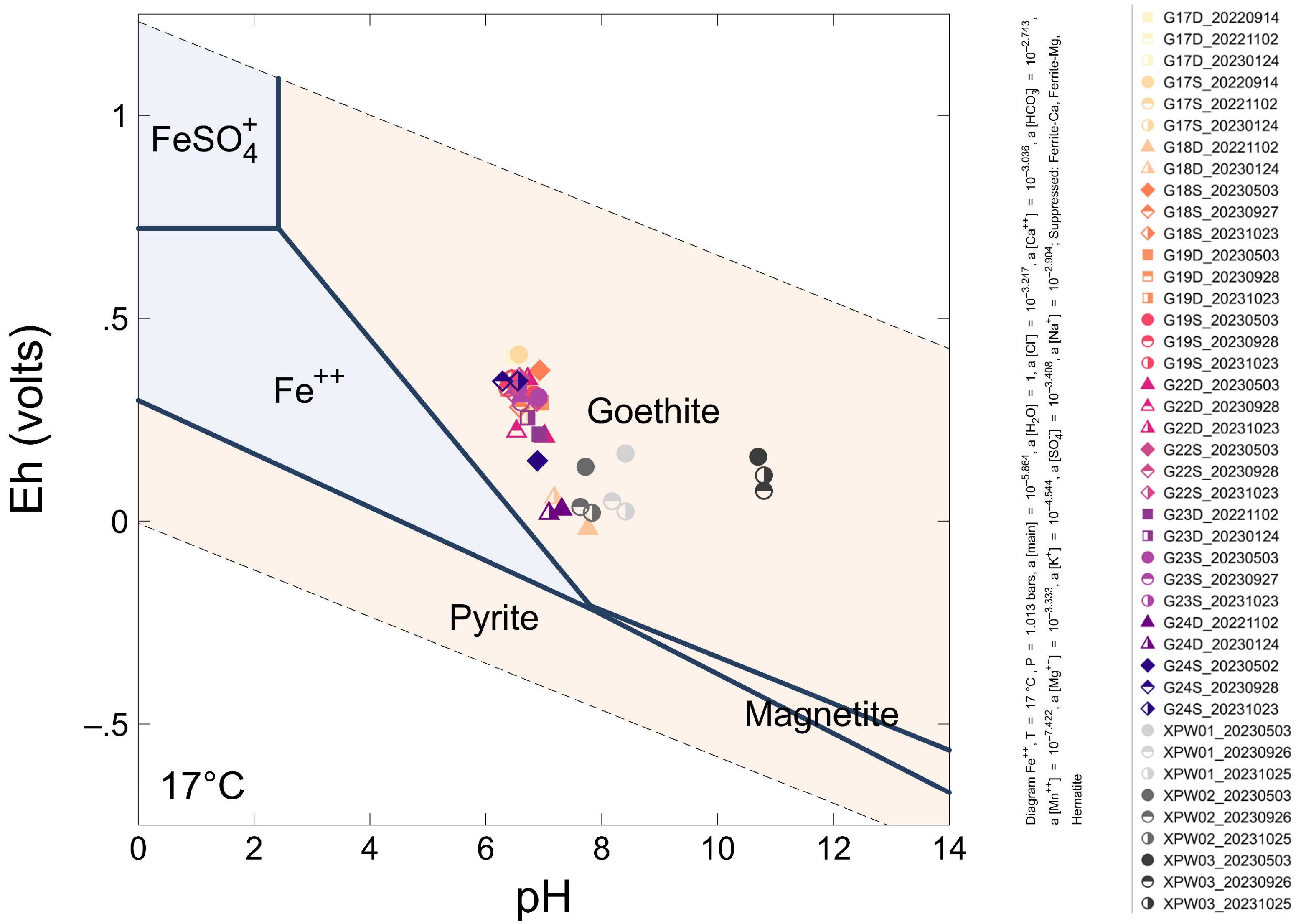

Iron Pourbaix Diagram, Goethite – Offsite Delineation Network

Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure
4e

Columbus, Ohio | April 2024

Notes:
1. Diagram was generated using conditions observed at well G22S on 5/3/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

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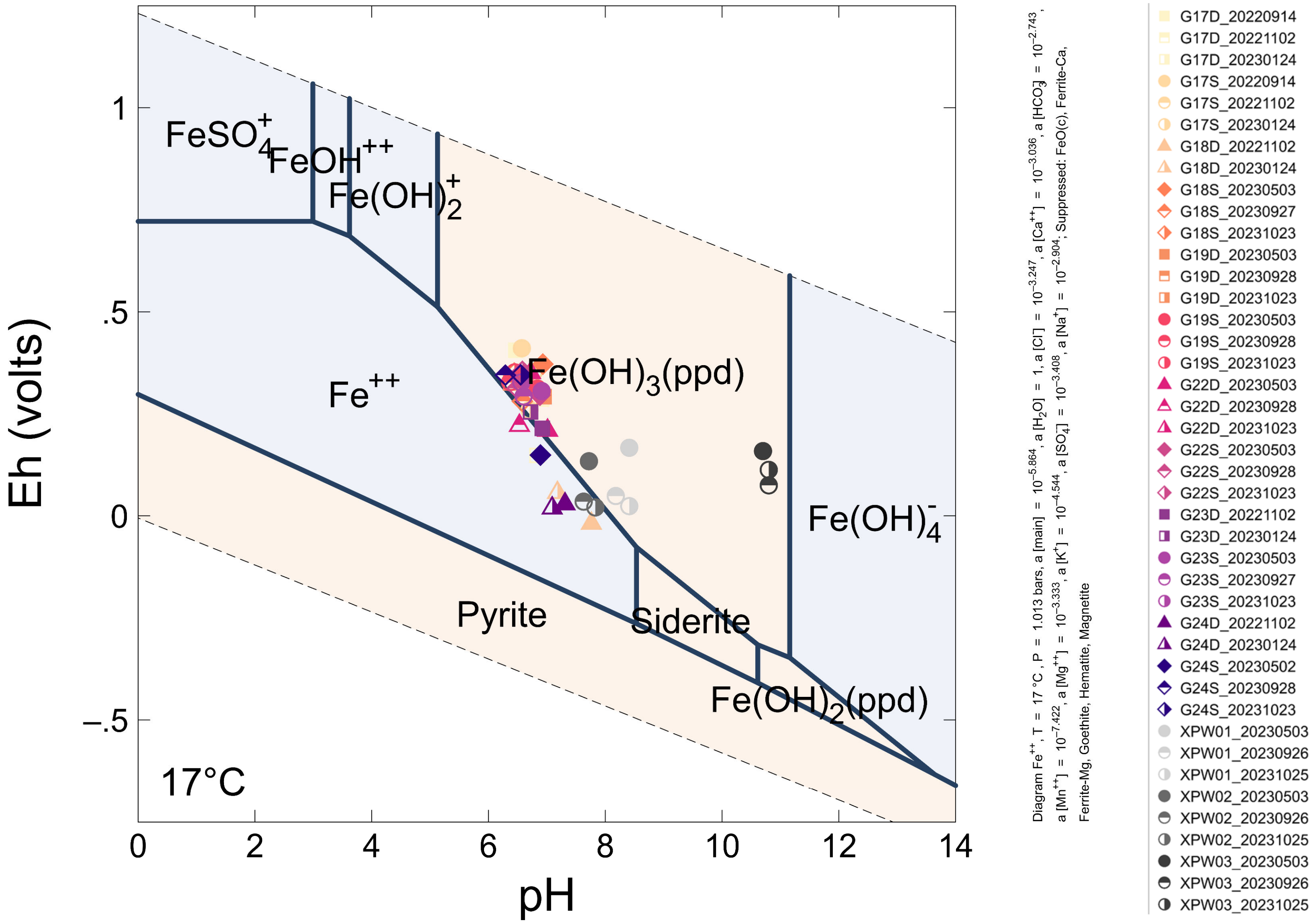

Notes:
1. Diagram was generated using conditions observed at well G22S on 5/3/23
 The most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Hematite, goethite, magnetite, FeO(c), ferrite-Ca, and ferrite-Mg were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Iron Pourbaix Diagram, Ferrihydrite – Offsite Delineation Network

Joppa Power Plant – East Ash Pond

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Figure 4f

Columbus, Ohio

April 2024

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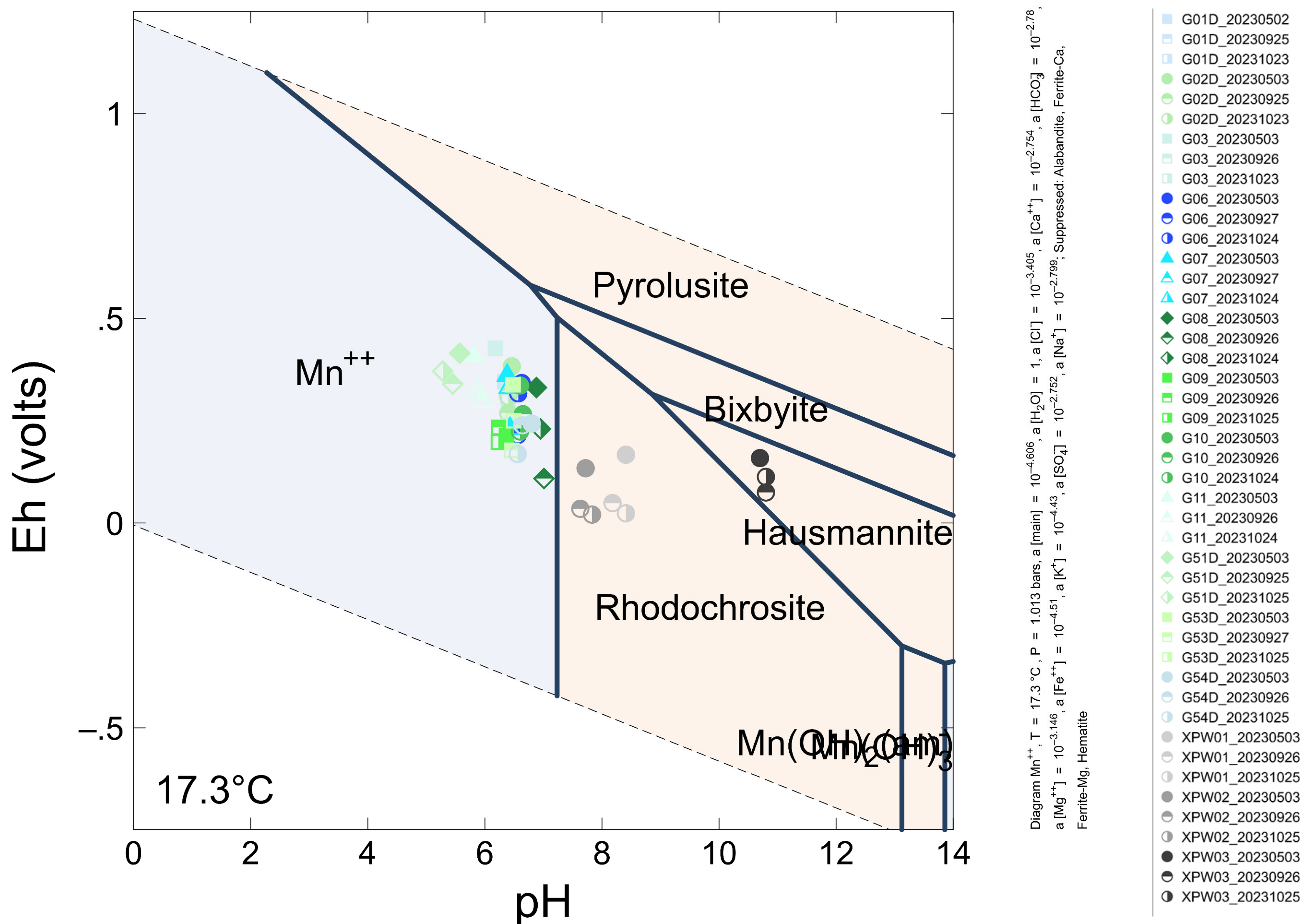

Notes:

1. Diagram was generated using conditions observed at well G08 on 5/2/23
2. The three most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Alabandite, ferrite-Ca, ferrite-Mg, and hematite were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Manganese Pourbaix Diagram – Compliance Network

Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure 5a

Columbus, Ohio

April 2024

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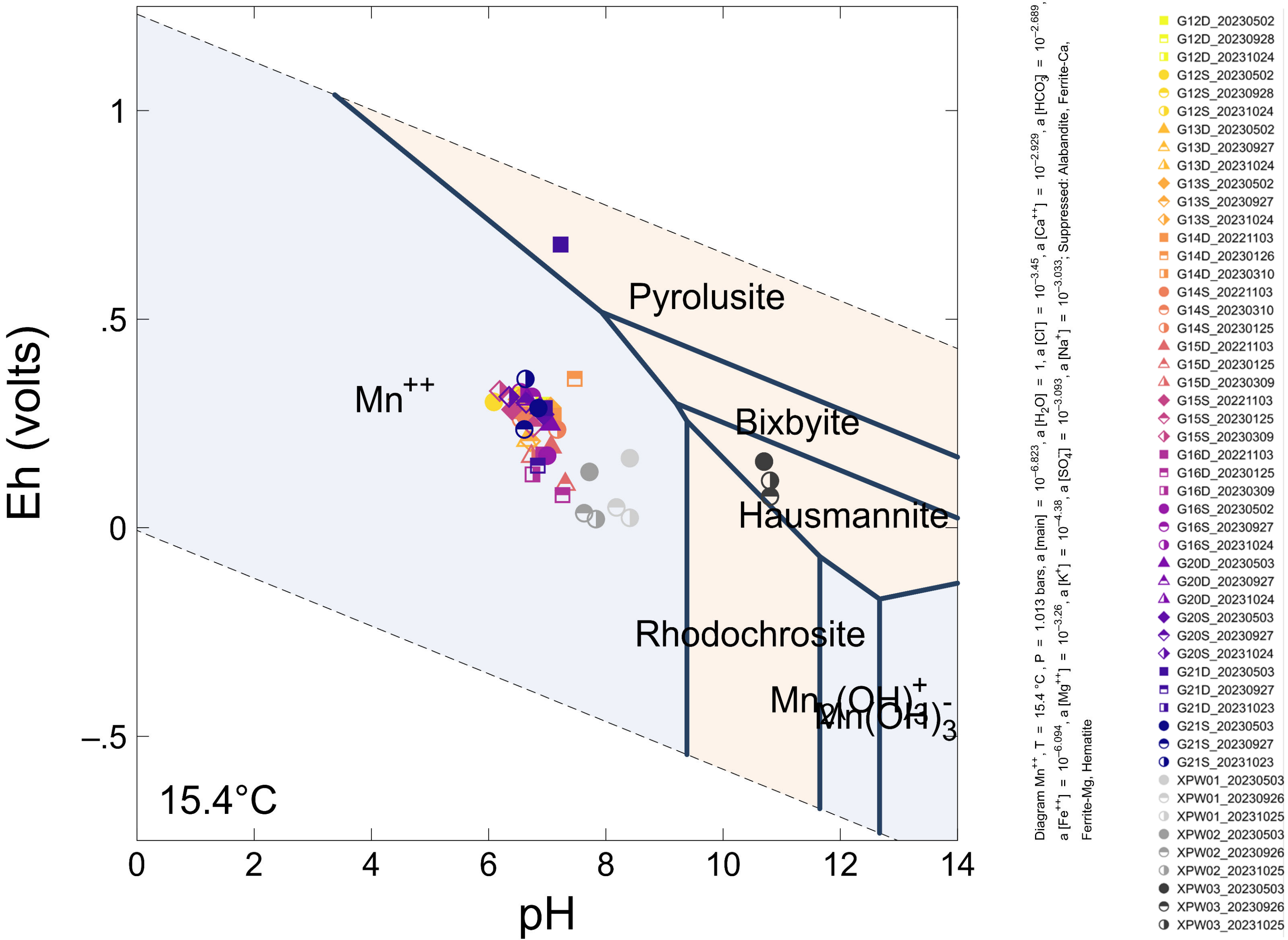

Manganese Pourbaix Diagram –
Onsite Delineation Network
Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure
5b

Columbus, Ohio | April 2024

Notes:
1. Diagram was generated using conditions observed at well G20D on 5/3/23
2. The most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Alabandite, ferrite-Ca, ferrite-Mg, and hematite were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

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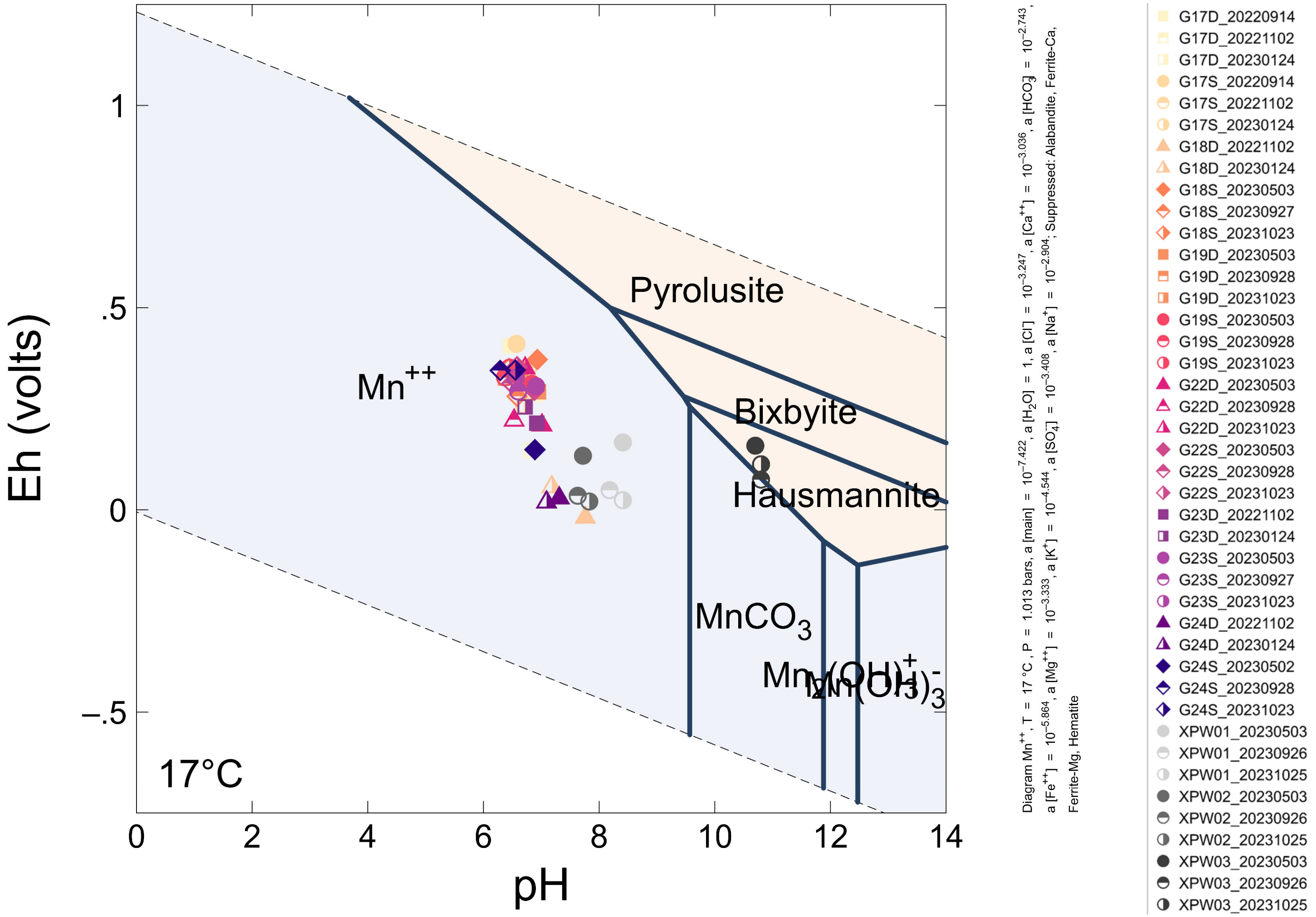

Notes:
1. Diagram was generated using conditions observed at well G22S on 5/3/23
2. The most recent available pH and ORP data points for each location are displayed. Eh is calculated as field ORP + 200 millivolts
3. Alabandite, ferrite-Ca, ferrite-Mg, and hematite were suppressed during model generation
4. Porewater locations XPW01, XPW02, and XPW03 are also shown

Manganese Pourbaix Diagram –
Offsite Delineation Network
Joppa Power Plant – East Ash Pond

Geosyntec
consultants

Figure
5c

Columbus, Ohio

April 2024

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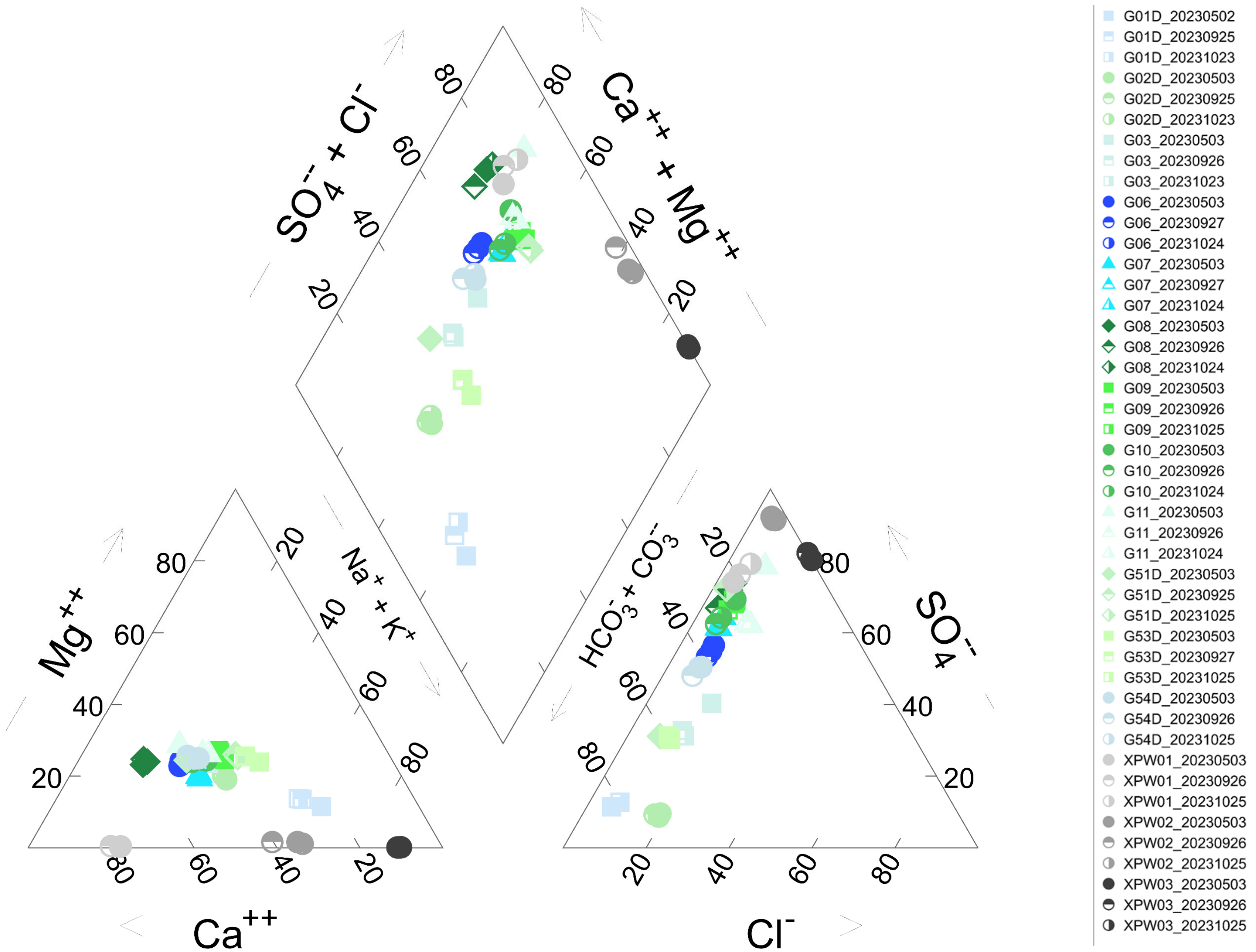

Piper Diagram – Compliance Network

Joppa Power Plant – East Ash Pond

Geosyntec
consultants

Figure
6a

Columbus, Ohio

April 2024

Notes:
1. The three most recent available data points for each location are displayed
2. Porewater locations XPW01, XPW02, and XPW03 are shown with gray coloring

% meq/kg: percent milliequivalents per kilogram

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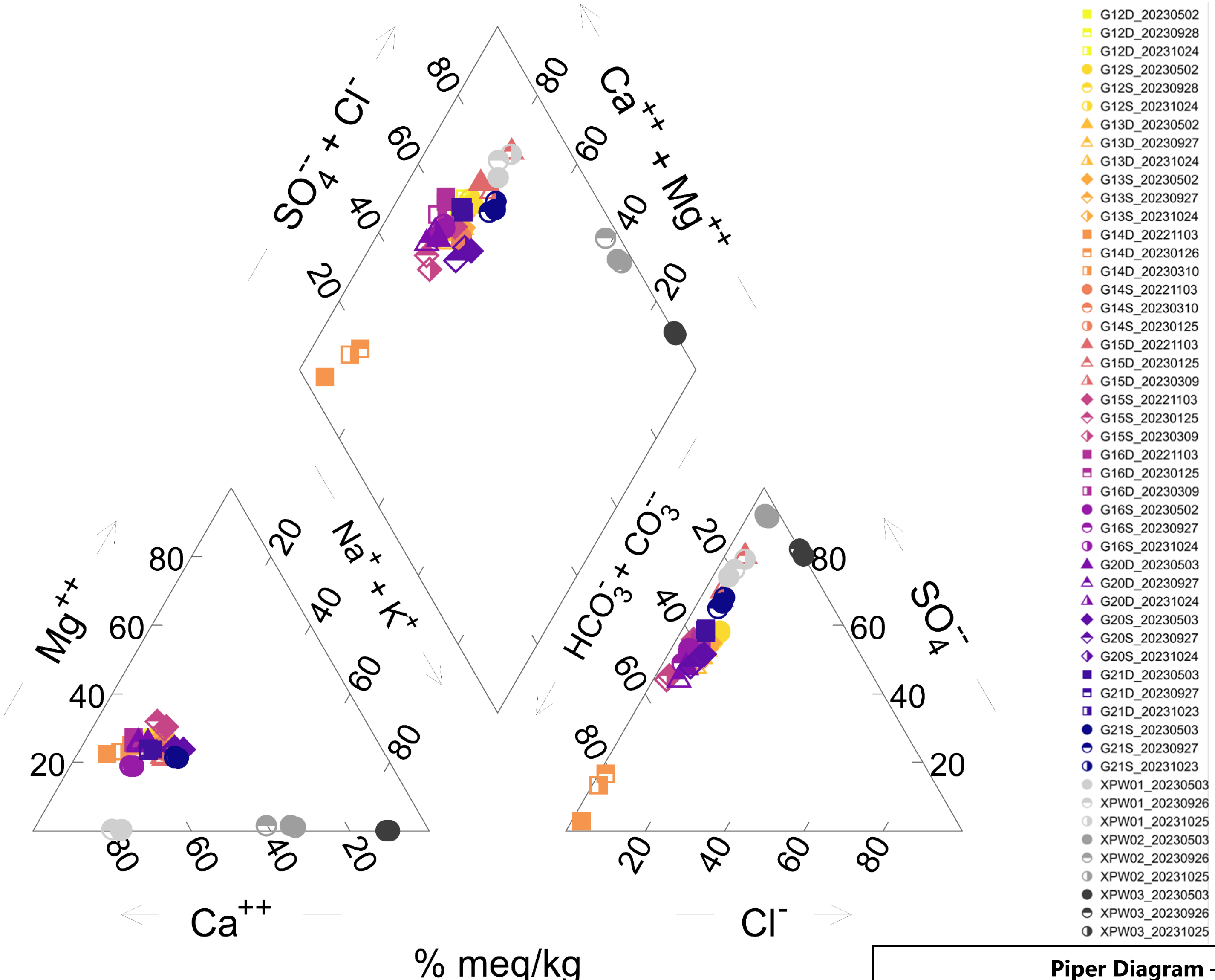

Notes:
1. The three most recent available data points for each location are displayed
2. Porewater locations XPW01, XPW02, and XPW03 are shown with gray coloring

% meq/kg: percent milliequivalents per kilogram

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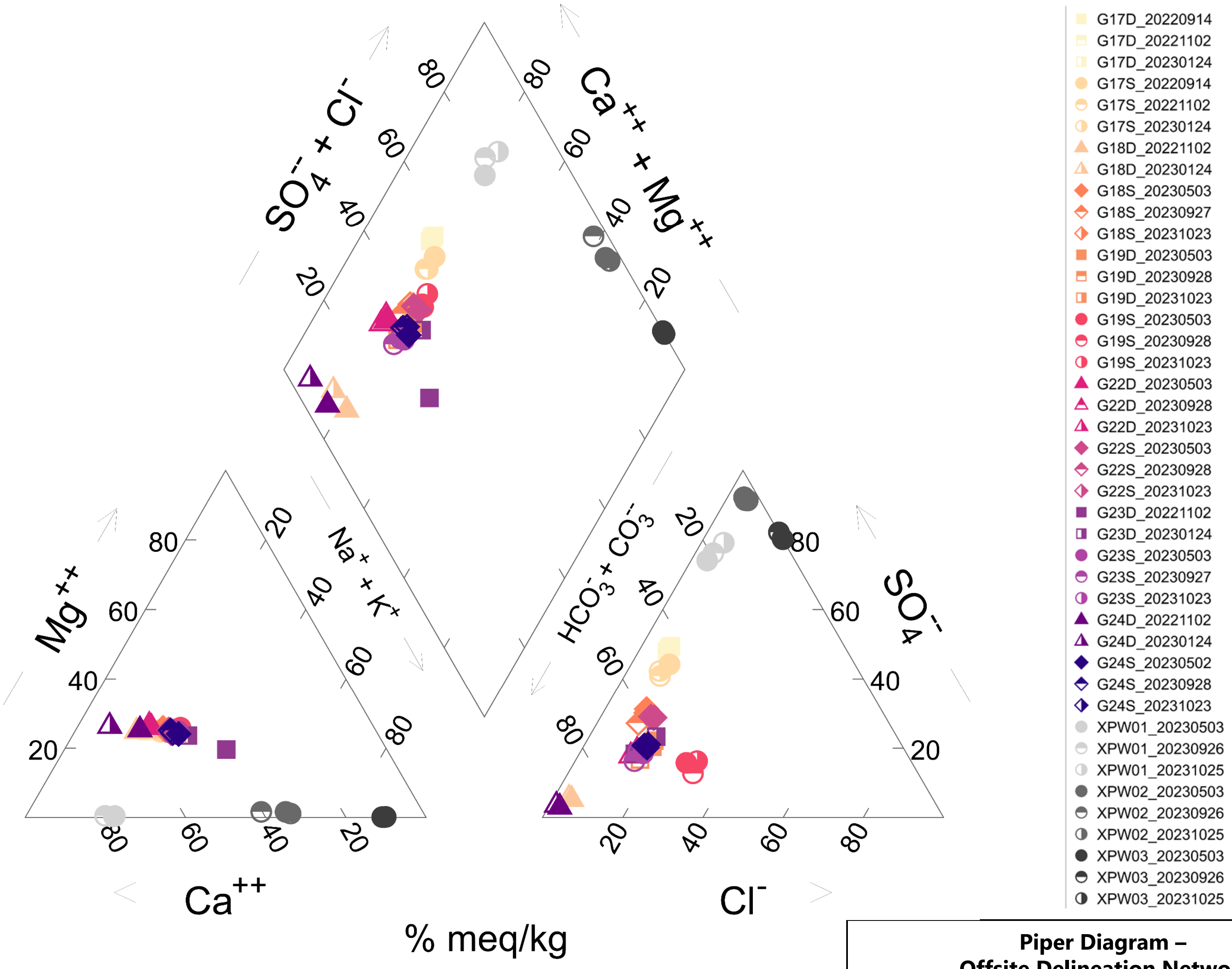
Piper Diagram –
Onsite Delineation Network
Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure
6b

Columbus, Ohio

April 2024



Notes:
1. The three most recent available data points for each location are displayed.
2. Porewater locations XPW01, XPW02, and XPW03 are shown with gray coloring

% meq/kg: percent milliequivalents per kilogram

Piper Diagram –
Offsite Delineation Network
Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure
6c

Columbus, Ohio

April 2024

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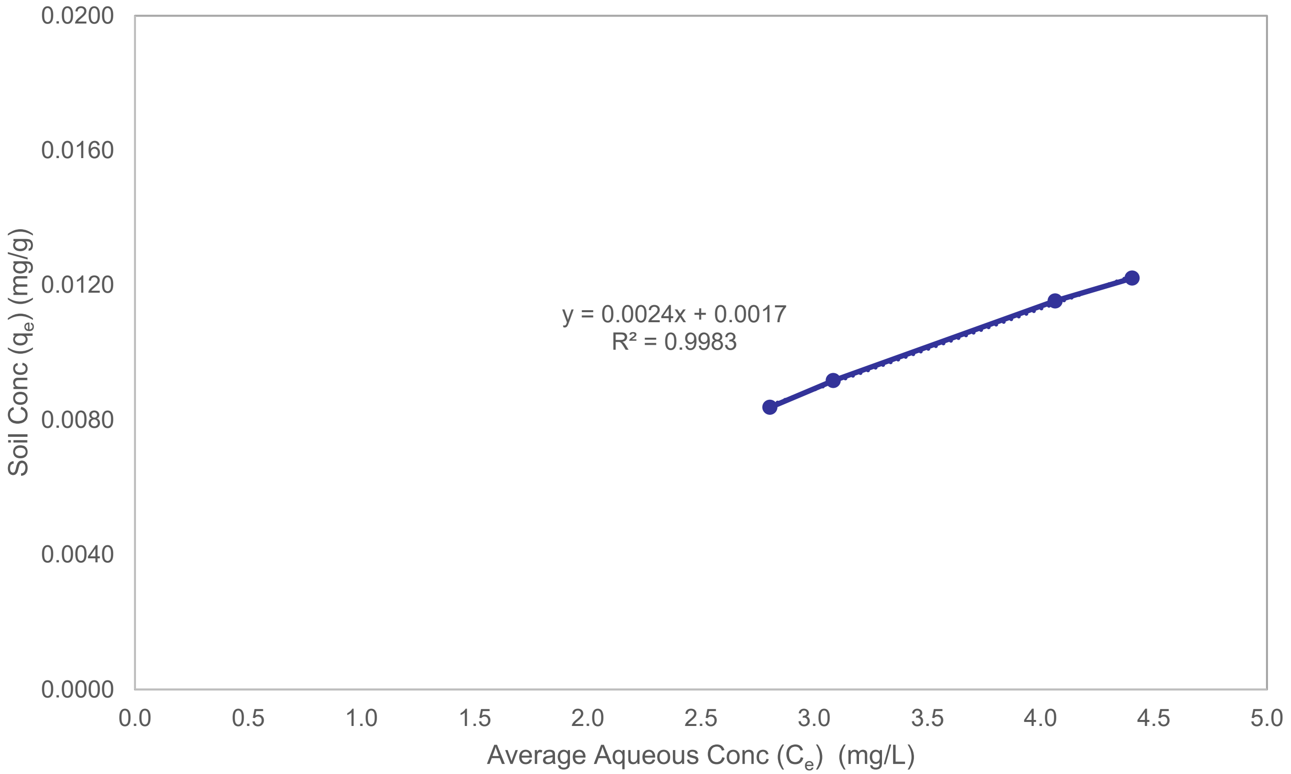

Notes:
1. The 1:27.3 soil:water average result is not shown due to the anomalous results.
mg/L: milligrams per liter
mg/g: milligrams of boron per gram of soil

Batch Adsorption Testing – Linear Isotherm

Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure
7

Columbus, Ohio

April 2024

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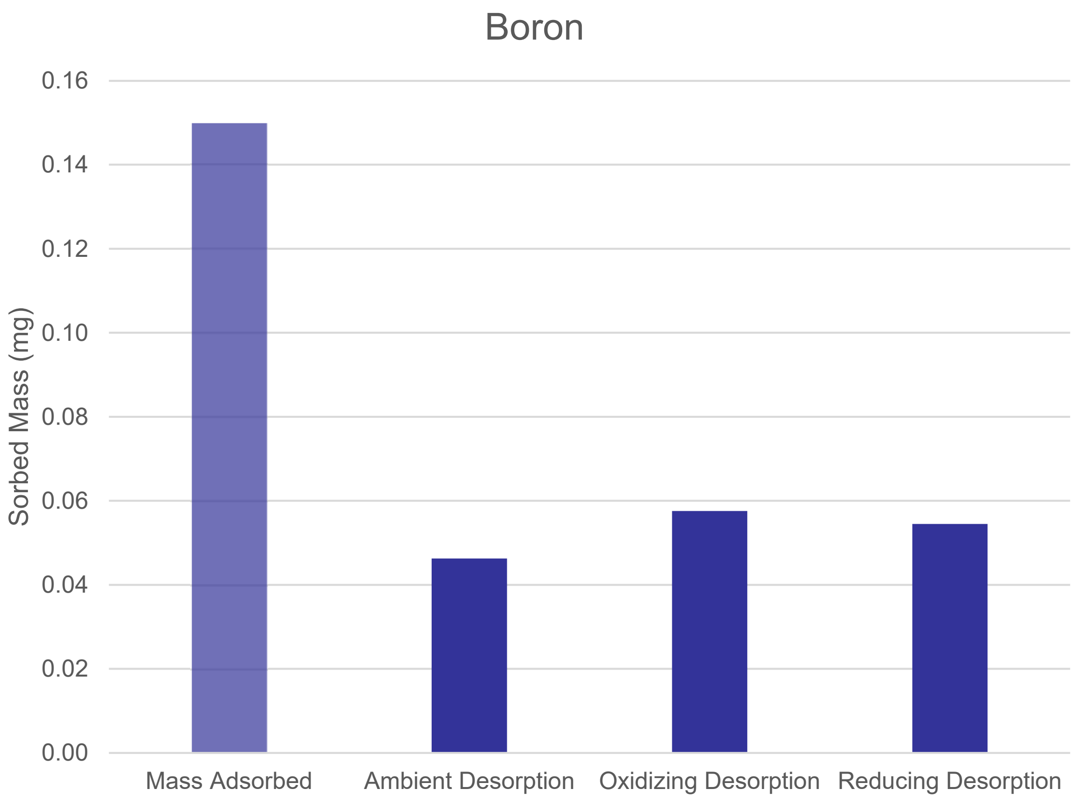

Notes:
mg – milligrams of boron

Batch Desorption Testing

Joppa Power Plant – East Ash Pond

Geosyntec consultants

Figure 8

Columbus, Ohio

April 2024

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ATTACHMENT A

Site Map

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Joppa\GMP\Figure 1-2_Site Map.mxd

PROJECT: 169000XXXX | DATED: 10/15/2021 | DESIGNER: HOTCALD

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

▢ PART 845 REGULATED UNIT (SUBJECT UNIT)
▢ OTHER UNIT
— CENTRAL DIKE
⬚ PROPERTY BOUNDARY

0 375 750 Feet

SITE MAP

GEOCHEMICAL CONCEPTUAL
SITE MODEL
EAST ASH POND

JOPPA POWER PLANT
JOPPA, ILLINOIS

ATTACHMENT A

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT B

Proposed Part 845 Groundwater Monitoring Network

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

🟦	COMPLIANCE WELL
🟫	BACKGROUND WELL
◒	STAFF GAUGE
🟨	PART 845 REGULATED UNIT (SUBJECT UNIT)
⬚	PROPERTY BOUNDARY

0 200 400 Feet

PROPOSED PART 845 GROUNDWATER MONITORING WELL NETWORK

ATTACHMENT B

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

GEOCHEMICAL CONCEPTUAL SITE MODEL
EAST ASH POND
JOPPA POWER PLANT
JOPPA, ILLINOIS

ATTACHMENT C

Delineation Monitoring Well Location Map

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

▪ MONITORING WELL

🟨 REGULATED UNIT (SUBJECT UNIT)

▭ PROPERTY BOUNDARY

0 300 600 Feet

DELINEATION MONITORING WELL LOCATION MAP

ATTACHMENT C

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

GEOCHEMICAL CONCEPTUAL SITE MODEL
EAST ASH POND
JOPPA POWER PLANT JOPPA, ILLINOIS

ATTACHMENT D

Monitoring Well Construction Details

Attachment D. Monitoring Well Construction Details

Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, 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)
G01D	UA	2015-08-14	364.2	364.4	Top of Disk	361.5	54.19	63.85	307.3	297.6	64.4	297.1	9.7	2	37.22042921	-88.85717876
G02D	UA	2015-08-13	363.6	363.8	Top of Disk	360.8	62.21	71.84	298.6	289.0	72.4	288.5	9.6	2	37.2207148	-88.85331072
G03	UA	2021-02-02	357.9	358.0	Top of PVC	354.8	55	65	302.9	292.9	65	289.8	10	2	37.220682	-88.850376
G05	UA	2021-02-01	361.2	361.4	Top of PVC	358.4	50	60	311.2	301.2	60	298.5	10	2	37.21719	-88.849014
G06	UA	2021-01-29	355.2	355.4	Top of PVC	352.6	75	85	280.2	270.2	85	267.6	10	2	37.212929	-88.848893
G07	UA	2021-01-29	353.5	353.7	Top of PVC	350.3	50	60	303.5	293.5	60	290.3	10	2	37.211001	-88.848969
G08	UA	2021-01-28	343.5	343.7	Top of PVC	341.7	75	85	268.5	258.5	85	256.7	10	2	37.210531	-88.851015
G09	UA	2021-01-31	351.7	351.9	Top of PVC	348.7	59.5	69.5	292.2	282.2	69.5	279.2	10	2	37.210336	-88.854116
G09M	LAU	2021-01-28	351.5	351.5	Top of PVC	348.6	145	155	206.5	196.5	155	193.6	10	2	37.210341	-88.85413
G10	UA	2021-02-01	353.5	353.7	Top of PVC	350.8	60.3	70.3	293.2	283.2	70.3	280.5	10	2	37.211272	-88.855841
G11	UA	2021-01-19	366.6	366.7	Top of PVC	363.4	55.7	65.7	310.9	300.9	65.7	297.7	10	2	37.214408	-88.85633
G12S	UA	2021-09-23	360.3	360.5	Top of PVC	357.6	60	70	297.6	287.6	70	287.6	10	2	37.211564	-88.847086
G12D	UA	2021-09-23	360.2	360.4	Top of PVC	357.3	80	90	277.3	267.3	90	257.3	10	2	37.21157	-88.847103
G13S	UA	2021-09-23	354.8	354.9	Top of PVC	352.0	50	60	301.7	291.7	60	291.7	10	2	37.210142	-88.847213
G13M	LAU	2022-05-18	354.0	354.0	Top of PVC	351.6	215	225	136.6	126.5	225	122.5	10	2	37.210129	-88.847331
G13D	UA	2021-09-23	354.6	354.7	Top of PVC	351.7	80	90	271.3	261.3	90	241.3	10	2	37.210129	-88.847217
G14S	UA	2021-09-16	345.6	345.6	Top of PVC	345.5	53	63	292.5	282.5	63	282.5	10	2	37.206927	-88.847006
G14D	UA	2021-09-16	345.5	345.5	Top of PVC	345.3	120	130	225.5	215.3	130	202.3	10	2	37.206909	-88.847007
G15S	UA	2021-09-15	346.8	347.0	Top of PVC	343.8	50	60	293.8	283.8	60	283.8	10	2	37.20715	-88.848881
G15D	UA	2021-09-15	346.7	346.9	Top of PVC	344.0	83	93	261.0	251.0	93	219.0	10	2	37.207152	-88.848865
G16S	UA	2021-09-14	352.3	352.3	Top of PVC	349.6	50	60	299.6	289.6	60	289.6	10	2	37.207163	-88.850678
G16D	UA	2021-09-14	352.4	352.6	Top of PVC	349.6	98	108	251.6	241.6	108	219.6	10	2	37.207147	-88.850687
G17S	UA	2022-06-01	359.2	359.2	Top of PVC	359.6	65	75	294.6	284.6	75	282.6	10	2	37.2116	-88.845465
G17D	UA	2022-05-21	359.3	359.3	Top of PVC	359.5	87	97	272.5	262.5	97	262.5	10	2	37.211598	-88.845475
G19S	UA	2022-06-01	355.6	355.6	Top of PVC	355.9	61.75	71.75	294.2	284.2	71.75	283.9	10	2	37.208548	-88.84322
G19D	UA	2022-06-01	355.4	355.4	Top of PVC	355.8	86.75	96.75	269.1	259.1	96.75	258.8	10	2	37.208538	-88.843225
G20S	UA	2022-05-20	350.2	350.2	Top of PVC	347.5	60	70	287.5	277.5	70	275.5	10	2	37.206909	-88.845853
G20M	LAU	2022-05-19	351.1	351.1	Top of PVC	347.9	175	185	172.9	162.9	185	118.9	10	2	37.206909	-88.845833
G20D	UA	2022-05-20	350.7	350.7	Top of PVC	347.7	85	95	262.7	252.7	95	250.7	10	2	37.206909	-88.845842
G21S	UA	2022-03-31	352.0	352.0	Top of Casing	348.9	60	70	288.9	278.9	70	278.9	10	2	37.20544	-88.84803
G21M	LAU	2022-04-11	353.1	353.1	Top of Casing	349.0	156	166	193.0	183.0	166	183.0	10	2	37.205468	-88.848005
G21D	UA	2022-03-31	351.7	351.7	Top of Casing	348.9	90	100	258.9	248.9	100	248.9	10	2	37.205439	-88.84799
G22S	UA	2022-05-24	351.6	351.6	Top of PVC	351.8	65	75	286.8	276.8	75	274.8	10	2	37.204787	-88.844908
G22D	UA	2022-05-22	351.5	351.5	Top of PVC	351.8	107	117	244.8	234.8	117	234.8	10	2	37.204799	-88.844907
G51D	UA	2015-08-18	363.9	364.0	Top of PVC	361.1	49.61	59.27	311.5	301.8	59.9	301.2	9.7	2	37.216016	-88.855653
G52D	UA	2015-08-19	348.4	348.6	Top of PVC	345.9	69.85	79.55	276.0	266.3	80.01	265.9	9.7	2	37.20962587	-88.85294308
G53D	UA	2015-08-21	355.5	355.6	Top of PVC	352.2	47.29	56.89	304.9	295.3	57.33	294.2	9.6	2	37.21506911	-88.84936671
G54D	UA	2015-08-11	357.0	357.2	Top of PVC	353.7	69.96	79.66	283.8	274.1	80.14	273.6	9.7	2	37.21226413	-88.85748523
XPW01	CCR	2021-01-20	383.4	383.5	Top of PVC	380.8	48.7	53.7	334.7	329.7	53.7	327.1	5	2	37.216965	-88.852074
XPW02	CCR	2021-01-21	376.0	376.2	Top of PVC	373.2	24.7	29.7	351.3	346.3	29.7	343.6	5	2	37.215865	-88.855001
XPW03	CCR	2021-01-21	381.5	381.7	Top of PVC	378.6	31.7	36.7	349.8	344.8	36.7	342.0	5	2	37.212153	-88.85542

Notes:

All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
bgs = below ground surface
ft = foot or feet
HSU = Hydrostratigraphic Unit
UA = Uppermost Aquifer
CCR = Coal Combustion Residuals
LAU = Lower Aquifer Unit
PVC = polyvinyl chloride

ATTACHMENT E
Relevant Boring Logs

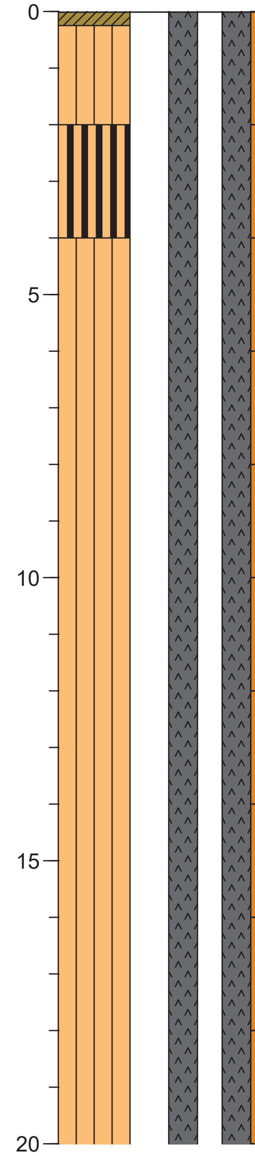
Geosyntec consultants
engineers | scientists | innovators

Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G03
Page: 1 of 4

Drilling Start Date:	**02/02/2021**	Boring Depth (ft):	**67**	Well Depth (ft):	**67**
Drilling End Date:	**02/02/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**38.23**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**358.56**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**354.84**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.22078, -88.85045**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample	DEPTH (ft)
0	SS	14/24	2 2 3 6	5	(0') CLAY (CL); some silt, high organics/roots, brown (10YR 4/3). (0.25') CLAYEY SILT (ML); brownish yellow (10YR 6/6), soft, dry, some light gray mottling.		
	SS	20/24	2 3 4 5	7	(2') As above: higher plasticity. (MH)		
5	SS	23/24	2 3 5 6	8	(4') As above: few sand, lower plasticity. (ML)		
	SS	24/24	2 3 4 6	7	(6') SILT (ML); few sand and clay, yellowish brown (10YR 5/6), medium dense, dry, some light gray mottling.		
	SS	23/24	1 4 6 7	10	(8') As above.		
10	SS	23/24	2 6 6 8	12	(11') As above: trace fine gravel from 11 to 11.5' bgs.		
	SS	24/24	2 6 7 10	13	(12') As above: brownish yellow (10YR 6/6).		
15	SS	24/24	2 3 5 5	8	(14') As above: more light gray (10YR 7/2) mottling.		
	SS	24/24	2 3 5 6	8	(16') As above: trace sand.		
20	SS	24/24	3 4 5 9	9	(18') As above: light gray (10YR 7/2) becomes dominant.		

NOTES:

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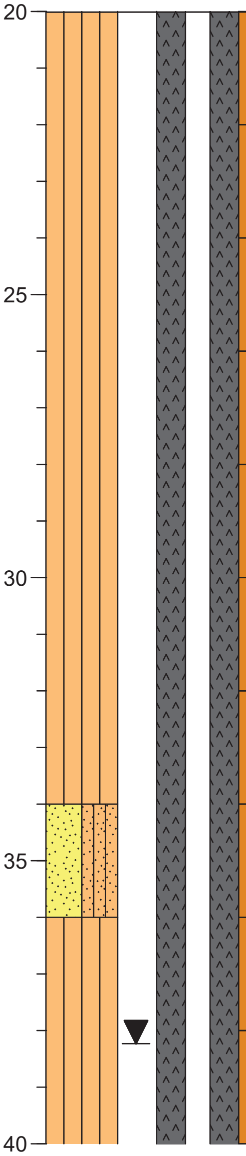
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G03
Page: 2 of 4

Drilling Start Date:	**02/02/2021**	Boring Depth (ft):	**67**	Well Depth (ft):	**67**
Drilling End Date:	**02/02/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**38.23**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**358.56**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**354.84**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.22078, -88.85045**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT: Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: Lab Sample
20	SS	24/24	1 4 8 10	12	(20') SILT (ML); few clay, brownish yellow (10YR 6/6), very stiff, dry.	
	SS	24/24	4 6 7 4	13	(22') SANDY SILT (ML); yellowish brown (10YR 5/6), soft, dry.	
	SS	24/24	2 5 5 8	10	(24') As above: becomes moist, few red (2.5YR 4/6) silt.	
25	SS	24/24	1 5 5 6	10	(26') As above: red silt disappears.	
	SS	24/24	1 3 4 6	7	(28') As above: becomes grayish brown (10YR 5/2).	
30	SS	24/24	1 4 4 5	8	(30') As above.	30-32 Chem
	SH	24/24				32-34 Geotech
	SS	24/24	3 4 5 6	9	(34') POORLY GRADED SAND (SP-SM); fine grained, few silt, brownish yellow (10YR 6/6), loose, moist to wet.	
35	SS	24/24	2 2 3 5	5	(36') SANDY SILT (ML); light yellowish brown (10YR 6/4), soft, moist, medium plasticity.	
	SS	24/24	2 2 3 5	5	(38') As above: becomes evenly mottled with light gray (10YR 7/2).	
40						

NOTES: SBG03- (32-34)-20210202: 15.5% moisture content, 730 U mg/kg total organic carbon, 112.7 pcf dry unit weight, 2.659 specific gravity, 4.7x 10^{-7}, 27 LL, 16 PL, 11 PI, 0.6% gravel, 53.8% sand, 45.6% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

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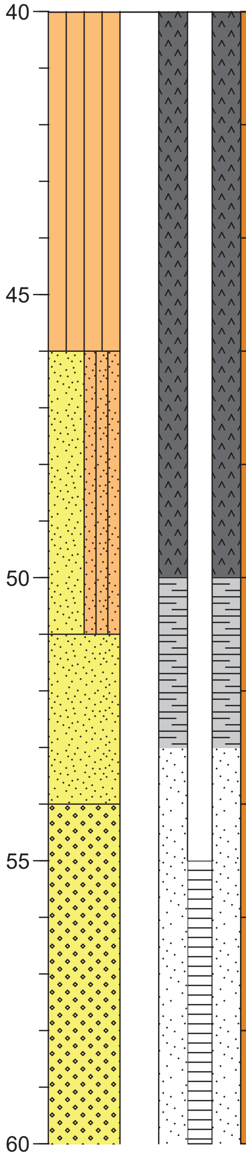
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G03
Page: 3 of 4

Drilling Start Date:	**02/02/2021**	Boring Depth (ft):	**67**	Well Depth (ft):	**67**
Drilling End Date:	**02/02/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**38.23**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**358.56**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**354.84**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.22078, -88.85045**	Filter Pack:	**Sand**



COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE
Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample
SS	24/24	1 4 4 4	8	(40') SILT (ML); little sand, brownish yellow (10YR 6/6), soft, moist, medium plasticity.	
SS	24/24	1 3 4 5	7	(42') As above.	
SS	24/24	2 4 6 6	10	(44') As above: becomes dry, stiff.	
SS	24/24	2 4 13 13	17	(46') SILTY SAND (SP-SM); very pale brown (10YR 7/3), loose, moist.	
SS	23/24	8 10 10 9	20	(48') As above: becomes brownish yellow (10YR 6/8).	
SS	20/24	1 6 10 13	16	(50.5') Wet at 50.5 to 50.8' bgs. (51') SAND (SP); fine grained, light gray (10YR 7/2), loose, moist.	
SS	24/24	1 1 1 5	2	(52') As above: brownish yellow (10YR 6/6).	
SS	12/24	1 1 1 3	2	(54') GRAVELLY SAND (SW); very pale brown (10YR 7/4), loose, wet.	
SS	24/24	1 1 1 3	2	(56') As above: moist, very loose.	
SS	11/24	1 1 1 7	2	(58') WELL-GRADED SAND (SW); medium to coarse grained, few gravel, very pale brown (10YR 7/4), very loose, moist.	58-60 Chem and Geotech (not tested)

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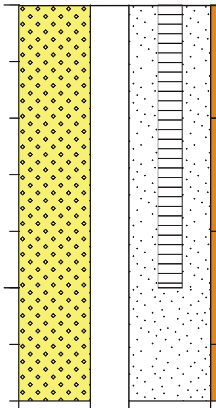
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG
Well No. G03
Page: 4 of 4

Drilling Start Date:	**02/02/2021**	Boring Depth (ft):	**67**	Well Depth (ft):	**67**
Drilling End Date:	**02/02/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**38.23**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**358.56**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**354.84**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.22078, -88.85045**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample	DEPTH (ft)
60				SS	20/24	2 6 10 11	16	(60') WELL-GRADED SAND (SW); medium to coarse grained, few gravel, very pale brown (10YR 7/4), wet, loose.	60-62 Geotech	
				SS	24/24	1 3 13 12	16	(62') As above: reddish yellow (7.5YR 6/6).		
65				SS	24/24	1 15 14 13	29	(64') GRAVELLY SAND (SW); reddish yellow (7.5YR 6/8), wet, loose.		
				SS	8/12	1 4		(66') As above: brownish yellow (10YR 6/6).		
70								(67') End of Boring.		

NOTES: SBG03- (60-62)-20210202: 20.0% moisture content, 740 U mg/kg total organic carbon, 2.671 specific gravity, 1.5% gravel, 94.4% sand, 4.1% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

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Project: GLP0821, Joppa Ash Pond
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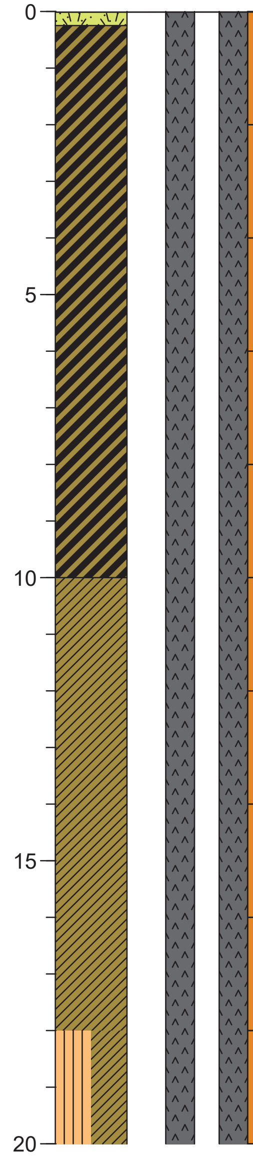
WELL LOG

Well No. G07
Page: 1 of 4

Drilling Start Date:	**01/29/2021**	Boring Depth (ft): **62**		Well Depth (ft):	**60**
Drilling End Date:	**01/29/2021**	Boring Diameter (in): **7.25**		Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft): **353.86**		Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft): **352.47**		Seal Material(s):	**Grout & Bentonite**
Logged By:	**BA & CL**	Location (Lat/Long): **37.21116, -88.8492**		Filter Pack:	**Sand**



COLLECT					MEASURE	
Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
SS	24/24	4 8 6 6	14	(0') TOPSOIL. (0.25') FAT CLAY (CH); light brown (5YR 6/8), stiff, dry.		
SS	12/24	4 5 5 6	10	(2') As above.		
SS	24/24	4 4 7 5	11	(4') As above.		
SS	24/24	4 6 7 8	13	(6') As above.		
SS	24/24	4 3 3 5	6	(8') As above: medium stiffness.		
SS	24/24	4 4 7 8	11	(10') LEAN CLAY (CL); light brown (5YR 7/4) to gray (mottled), stiff, dry.		
SS	24/24	4 5 5 6	10	(12') As above: top 6" soft with plant material.		
SS	24/24	3 3 4 4	7	(14') As above.		
SS	24/24			(16') As above.		
SS	24/24	3 4 5 7	9	(18') As above: silt and clay, some fine sand, stiff, dry. (ML-CL)		

NOTES:

Client: **Dynegy**
Project: **GLP0821, Joppa Ash Pond**
Address: **Unnamed Road, Metropolis, IL 62960**

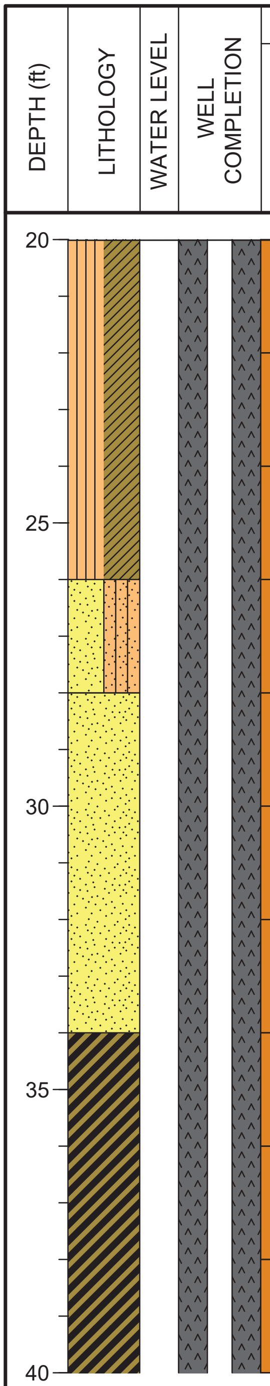
WELL LOG

Well No. **G07**
Page: **2 of 4**

Drilling Start Date: **01/29/2021**
Drilling End Date: **01/29/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **BA & CL**

Boring Depth (ft): **62**
Boring Diameter (in): **7.25**
DTW During Drilling (ft):
DTW After Drilling (ft):
Top of Casing Elev. (ft): **353.86**
Ground Elev. (ft): **352.47**
Location (Lat/Long): **37.21116, -88.8492**

Well Depth (ft): **60**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



COLLECT					MEASURE	
Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
SS	24/24	3 4 6 7	10	(20') As above: rust spots.		
SS	24/24	3 3 4 6	7	(22') As above: moist.		
SS	24/24	3 3 4 5	7	(24') As above: mottled (10R 8/1).		
SS	24/24	3 4 7 7	11	(26') SILTY SAND (SP-SM); mostly silt, fine grained sand, some mottling as previous, poorly graded, tight, moist.		
SS	24/24	3 6 7 7	13	(28') POORLY GRADED SAND (SP); very fine to fine grained sand, light gray (10R 8/1), tight, moist.		
SS	24/24	9 20 21 26	41	(30') As above. (31') POORLY GRADED SAND (SP); medium to coarse grained, loose, moist, (10R 8/1).		
SH	18/24	10 6 9 9	15	(32') As above: color change to orange (5YR 6/8), clay at bottom.		
SS	24/24	4 5 6 7	11	(34') FAT CLAY (CH); stiff, moist, light gray/orange mottled (10R 8/1 to 5YR 6/8).		
SS	24/24	3 3 5 5	8	(36') As above: medium stiffness.		
SS	24/24	2 2 2 3	4	(38') As above.		

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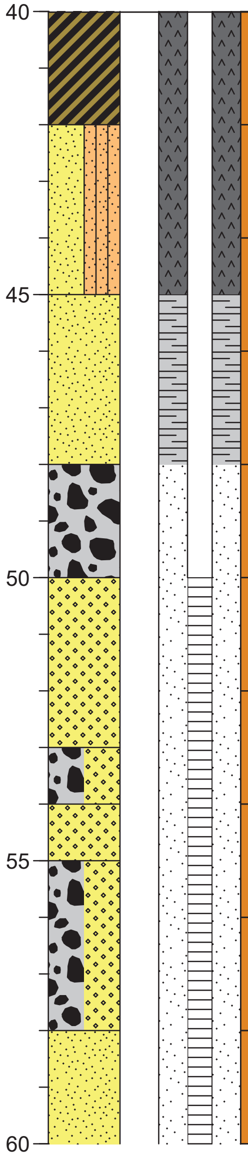
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG
Well No. G07
Page: 3 of 4

Drilling Start Date: **01/29/2021**
Drilling End Date: **01/29/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **BA & CL**

Boring Depth (ft): **62**
Boring Diameter (in): **7.25**
DTW During Drilling (ft):
DTW After Drilling (ft):
Top of Casing Elev. (ft): **353.86**
Ground Elev. (ft): **352.47**
Location (Lat/Long): **37.21116, -88.8492**

Well Depth (ft): **60**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



COLLECT					MEASURE
Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
SS	24/24	3 3 5 8	8	(40') As above.	
SS	24/24	6 12 23 24	35	(42') SILTY SAND (SP-SM); very fine grained sand and silt, tight, moist, poorly graded, light gray (10R 8/1).	
SS	18/24	7 18 27 33	45	(44') As above.	
				(45') POORLY GRADED SAND (SP); very fine to fine grained sand, tight, moist, (10R 8/1).	
SS	24/24	7 18 43 47	61	(46') POORLY GRADED SAND (SP); fine to medium grained sand, loose, wet, interbedded gray to reddish orange (5YR 6/8) - seams 2cm.	
SS	18/24	14 17 18 7	35	(48') DIAMICTON (GW); mostly fine to coarse gravel and medium to coarse sand, saturated, very loose, well graded, (5YR 7/8).	
SS	24/24	12 22 36 39	58	(50') WELL-GRADED SAND (SW); medium to coarse grained with fine gravel, saturated, loose.	
SS	24/24	9 11 14 18	25	(52') As above: (5YR 7/6).	
				(53') DIAMICTON (GW-SW); same as above, (5YR 6/8).	
SS	24/24	19 31 53	84	(54') Same as above (SW).	
				(55') WELL-GRADED GRAVEL and SAND (GW-SW); mostly fine to coarse grained gravel and fine to medium sand, loose, wet, light gray (10R 8/1), orangish tan chert nodules.	
SS	24/24	7 21 14 8	35	(57') As above: top 1' tan (5YR 6/8) bottom gray (10R 8/1), wet.	
SS	24/24	6 9 11 16	20	(58') POORLY GRADED SAND (SP); mostly very fine to fine grained sand, wet, loose, tan (7.5YR 8/4).	

DEPTH (ft)

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Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G07
Page: 4 of 4

Drilling Start Date:	**01/29/2021**	Boring Depth (ft):	**62**	Well Depth (ft):	**60**
Drilling End Date:	**01/29/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**353.86**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**352.47**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**BA & CL**	Location (Lat/Long):	**37.21116, -88.8492**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
60				SS	24/24	32 48 38 8	86	(60') As above. (62') DIAMICTON (GW-SW); same as above.		
								(62') End of Boring.		
65										

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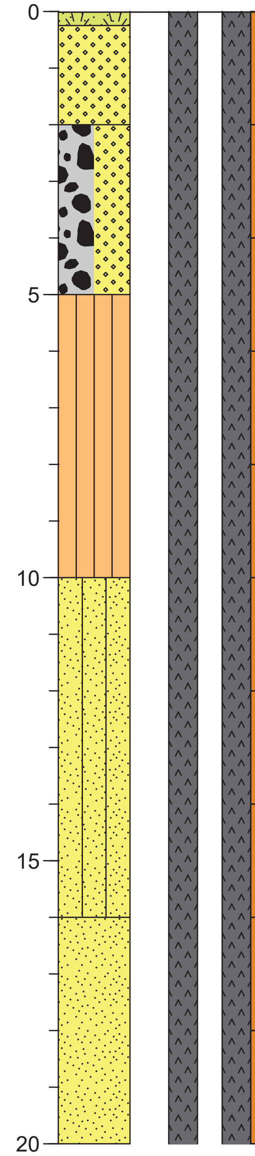
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG
Well No. G08
Page: 1 of 5

Drilling Start Date: **01/27/2021**
Drilling End Date: **01/28/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **BA**

Boring Depth (ft): **86**
Boring Diameter (in): **7.25**
DTW During Drilling (ft):
DTW After Drilling (ft):
Top of Casing Elev. (ft): **344.22**
Ground Elev. (ft): **341.72**
Location (Lat/Long): **37.20984, -88.85066**

Well Depth (ft): **85**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



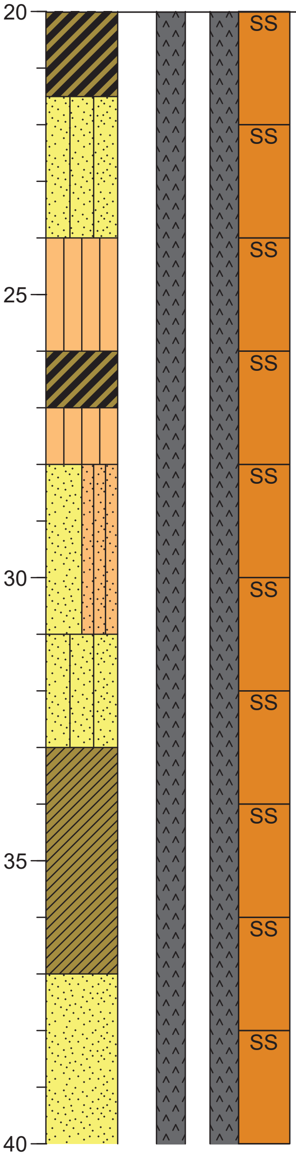
DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
0	SS		7 3 4 6	7	(0') TOPSOIL. (0.25') WELL-GRADED SAND (SW); light brown/gray, loose, dry.		
	SS		14 11 7 6	18	(2') GRAVELLY SAND (GW-SW); loose, dry, mostly fine to coarse grained gravel and sand.		
5	SS		4 3 4 4	7	(5') SILT (ML); low plasticity, dark gray, dry, trace coarse gravel.		
	SS		3 2 2 4	4	(6') As above.		
	SS		2 2 2 2	4	(8') As above: trace fine gravel.		
10	SS		3 4 4 4	8	(10') SILTY SAND (SM); dark gray, loose, dry, well-graded.		
	SS		2 2 3 3	5	(12') As above.		
15	SS		2 3 2 4	5	(14') As above: clay seam at 15' (1-2").		
	SS		2 2 2 2	4	(16') POORLY GRADED SAND and CLAY (SP/CL); dark gray interbedded with dark gray, medium stiff, clay - 2" beds alternating.		
	SS		1 2 1 1	3			
20							

NOTES:

Drilling Start Date: **01/27/2021**
Drilling End Date: **01/28/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **BA**

Boring Depth (ft): **86**
Boring Diameter (in): **7.25**
DTW During Drilling (ft):
DTW After Drilling (ft):
Top of Casing Elev. (ft): **344.22**
Ground Elev. (ft): **341.72**
Location (Lat/Long): **37.20984, -88.85066**

Well Depth (ft): **85**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
20	SS		1 1 1 2	2	(20') CLAY (CH); high plasticity, soft, moist, gray to green. (21.5') SILTY SAND (SM); wet, loose, gray to green.		
	SS		1 1 1 1	2	(22') As above.		
25	SS		3 2 2 2	4	(24') SILT (ML); loose, dark gray, black clay seam - 2".		
	SS		2 2 1 2	3	(26') CLAY (CH); gray to green, saturated, high plasticity. (27') SILT (ML); soft, moist, gray to green.		
	SS		1 1 1 2	2	(28') SILTY SAND (SM-SP); light gray, firm, saturated, mostly poorly graded fine to medium grained sand and silt.		
30	SS		3 2 3 4	5	(30') As above. (31') SILTY SAND (SM); tight, light gray, poorly graded, fine to medium grained sand.		
	SS		3 3 4 4	7	(32') As above. (33') CLAY (CL); light gray, hard, low plasticity, dry.		
35	SS		4 4 3 3	7	(35') As above: some fine grained sand.		
	SS		3 4 4 5	8	(36') As above: gradually grades to fine to medium sand. (37') POORLY GRADED SAND (SP); fine to medium grained sand, tight, trace gravel, mottled with rusty red color.		
	SS		3 3 3 3	6	(38') As above.		
40							

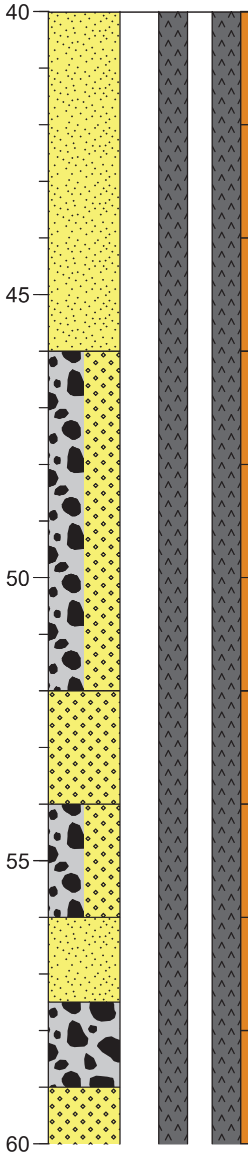
NOTES:

Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G08
Page: 3 of 5

Drilling Start Date:	**01/27/2021**	Boring Depth (ft): **86**		Well Depth (ft):	**85**
Drilling End Date:	**01/28/2021**	Boring Diameter (in): **7.25**		Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft): **344.22**		Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft): **341.72**		Seal Material(s):	**Grout & Bentonite**
Logged By:	**BA**	Location (Lat/Long): **37.20984, -88.85066**		Filter Pack:	**Sand**



DEPTH (ft)	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample	DEPTH (ft)
40	SS		5 10 12 12	22	(40') POORLY GRADED SAND (SP); fine to medium grained, tight, light gray, mottled with rust color. (41') As above: saturated.		
	SS		3 5 8 8	13	(42') As above: some fine to coarse gravel. (43.5') As above: nodule (red chert), saturated.		
45	SS		3 6 7 7	13	(44') As above: lots of fine to coarse gravel, yellow/orange/red, gravel/nodules.		
	SS		5 7 7 11	14	(46') GRAVELLY SAND (GW-SW); mostly fine grained sand and fine to coarse gravel, light gray, gravel bits are red/yellow, saturated.		
	SS		1 5 5 5	10	(48') As above: very loose.		
50	SS		9 9 5 14	14	(50') As above. (51.5') As above: some silt.		
	SS		3 11 11 10	22	(52') WELL-GRADED SAND (SW); fine to coarse grained, trace fine gravel, tan, very loose.		
55	SS		9 14 12 10	26	(54') WELL-GRADED GRAVELLY SAND (GW-SW); tan, moist, coarse grained gravel, fine to coarse sand, very loose, wet. (55') As above: light gray.		
	SS		17 19 17 17	36	(56') POORLY GRADED SAND (SP); fine to medium grained, wet, loose, dark tan. (57.5') WELL-GRADED GRAVELLY SAND (GW); dark tan, loose.		
60	SS		6 8 11 12	19	(58') As above. (59') WELL-GRADED SAND (SW); dark tan, wet, loose, trace fine gravel.		

NOTES:

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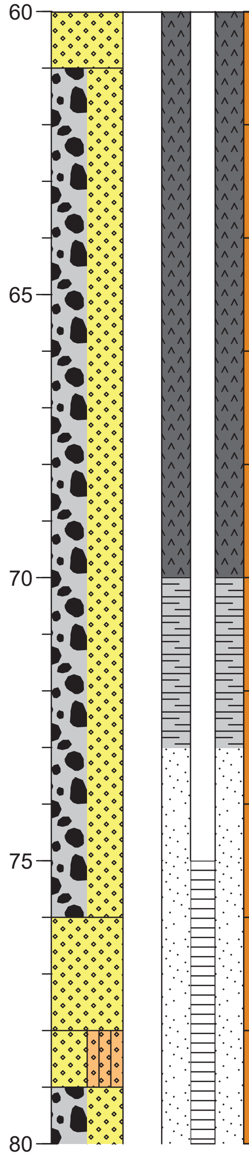
Client: **Dynegy**
Project: **GLP0821, Joppa Ash Pond**
Address: **Unnamed Road, Metropolis, IL 62960**

WELL LOG

Well No. **G08**
Page: **4 of 5**

Drilling Start Date:	**01/27/2021**	Boring Depth (ft):	**86**	Well Depth (ft):	**85**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**344.22**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**341.72**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**BA**	Location (Lat/Long):	**37.20984, -88.85066**	Filter Pack:	**Sand**



DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
60	SS	24/24	14 10 14 11	24	(60') As above. (61') GRAVELLY SAND (GW-SW); dark tan, well-graded, coarse chert nodules, wet, loose.		
	SS	18/24	5 3 4 5	7	(62') As above.		
	SS	12/24	4 8 5 8	13	(64') As above.		
65	SS	18/24	5 8 8 7	16	(66') As above.		
	SS	18/24	5 7 7 8	14	(68') As above: saturated.		
70	SS	12/24	5 6 7 7	13	(70') As above.		
	SS	18/24	7 9 9 11	18	(72') As above.		
	SS	24/24	7 7 8 9	15	(74') As above: mostly silt and gravel, (5YR 6/8).		
75	SS	18/24	10 16 17 25	33	(76') WELL-GRADED SAND (SW); mostly medium to coarse grained sand, wet, loose, (5YR 6/8).		
	SS	24/24	8 15 39 42	54	(78') DIAMICTON (SW-SM); mostly coarse grained gravel, fine sand, silt, wet, medium density, (5YR 6/8). (79') Same fine to coarse gravel, more coarse gravel, (5YR 6/8). (GW-SW)		
80							

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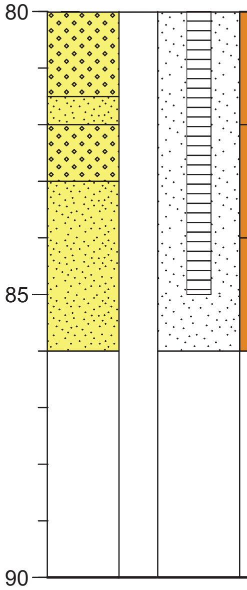
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G08
Page: 5 of 5

Drilling Start Date:	**01/27/2021**	Boring Depth (ft):	**86**	Well Depth (ft):	**85**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**344.22**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**341.72**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**BA**	Location (Lat/Long):	**37.20984, -88.85066**	Filter Pack:	**Sand**



DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample	DEPTH (ft)
80	SS	18/24	6 11 12 14	23	(80') As above. (SW) (81.5') 1/2" seam - orangish sand, medium packing, moist, (7.5YR 8/6). (SP)		
	SS	24/24	7 14 19 21	33	(82') Same as above. (SW) (83') Same as above, top 3" (10R 6/6), tight, moist. (SP)		
85	SS	12/24	19 27 15 5	42	(84') As above. (85') 2cm seam of reddish/oxidized fine grained sand, dry.		
90					(86') End of Boring.		

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Client:	**Dynegy**
Project:	**GLP0821, Joppa Ash Pond**
Address:	**Unnamed Road, Metropolis, IL 62960**

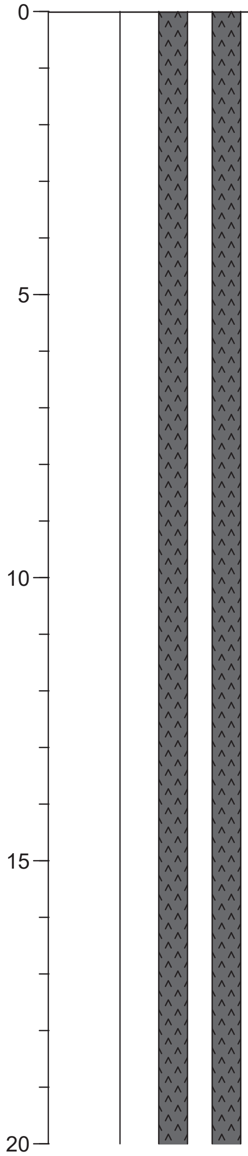
WELL LOG

Well No. **G09**

Page: **1 of 4**

Drilling Start Date:	**01/31/2021**	Boring Depth (ft):	**72**	Well Depth (ft):	**70**
Drilling End Date:	**01/31/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**36.31**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.99**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.69**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.21039, -88.54247**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
0								(0') Blind drilled.		



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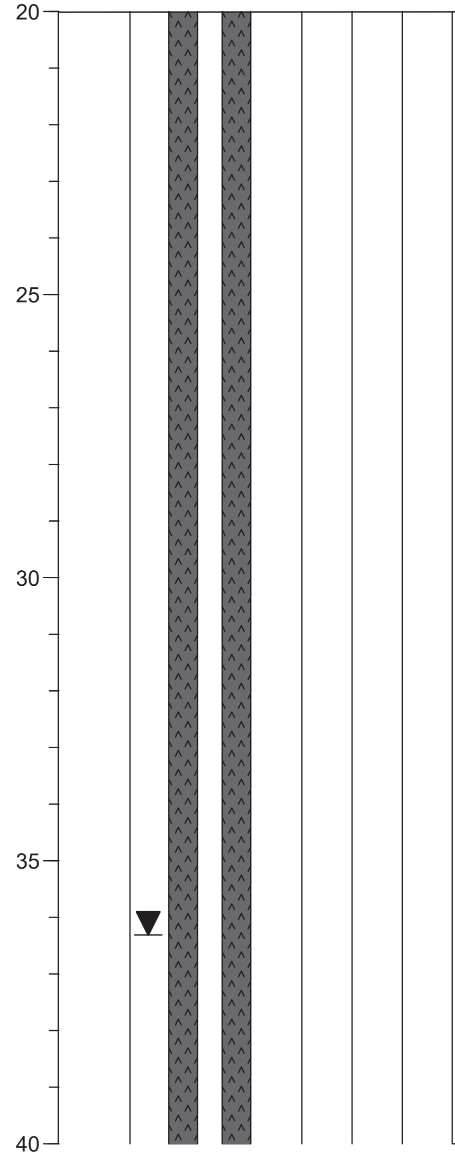
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G09
Page: 2 of 4

Drilling Start Date:	**01/31/2021**	Boring Depth (ft):	**72**	Well Depth (ft):	**70**
Drilling End Date:	**01/31/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**36.31**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.99**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.69**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.21039, -88.54247**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	



(20') Blind drilled.

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Project: GLP0821, Joppa Ash Pond
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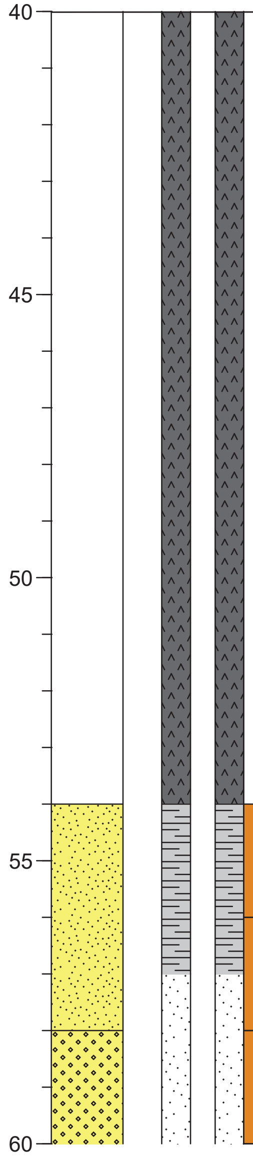
WELL LOG

Well No. G09
Page: 3 of 4

Drilling Start Date:	**01/31/2021**	Boring Depth (ft):	**72**	Well Depth (ft):	**70**
Drilling End Date:	**01/31/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**36.31**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.99**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.69**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.21039, -88.54247**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample	DEPTH (ft)
40								(40') Blind drilled.		
54				SS	13/24	1 1 5 15	6	(54') POORLY GRADED SAND (SP); fine to medium grained sand, light gray (2.5Y 7/1), medium dense, dry, few coarse gravel.		
56				SS	23/24	8 13 15 20	28	(56') As above.		
58				SS	15/24	4 9 17 16	26	(58') WELL-GRADED SAND (SW); coarse grained with gravel, reddish yellow (7.5YR 6/6), loose, moist. (59') Becomes wetter.		

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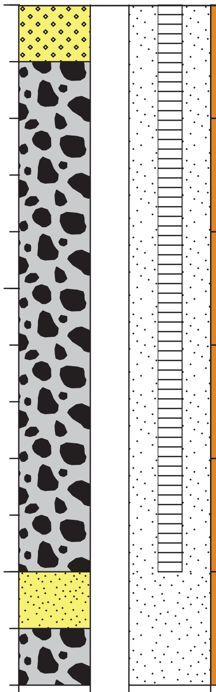
WELL LOG

Well No. G09
Page: 4 of 4

Drilling Start Date:	**01/31/2021**	Boring Depth (ft):	**72**	Well Depth (ft):	**70**
Drilling End Date:	**01/31/2021**	Boring Diameter (in):	**7.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**36.31**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.99**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.69**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK**	Location (Lat/Long):	**37.21039, -88.54247**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
60				SS	19/24	13 24 48 25	72			
								(61') SANDY GRAVEL (GW); yellow (10YR 7/8), loose, wet.		
				SS	11/24	9 17 17 22	34	(62') Becomes sandier.		
				SS	13/24	4 18 19 16	37			
65								(65') As above: brownish yellow (10YR 6/8).		
				SS	13/24	4 17 23 50	40			
								(67') As above.		
				SS	2/24	50/5				
								(69') As above.		
70				SS	14/24	6 18 18 13	36	(70') POORLY GRADED SAND (SP); fine to medium grained, yellow (10YR 7/6), loose, moist.		
								(71') SANDY GRAVEL (GW); yellowish brown (10YR 5/6), loose, wet, well-graded.		
								(72') End of Boring.		
75										

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Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

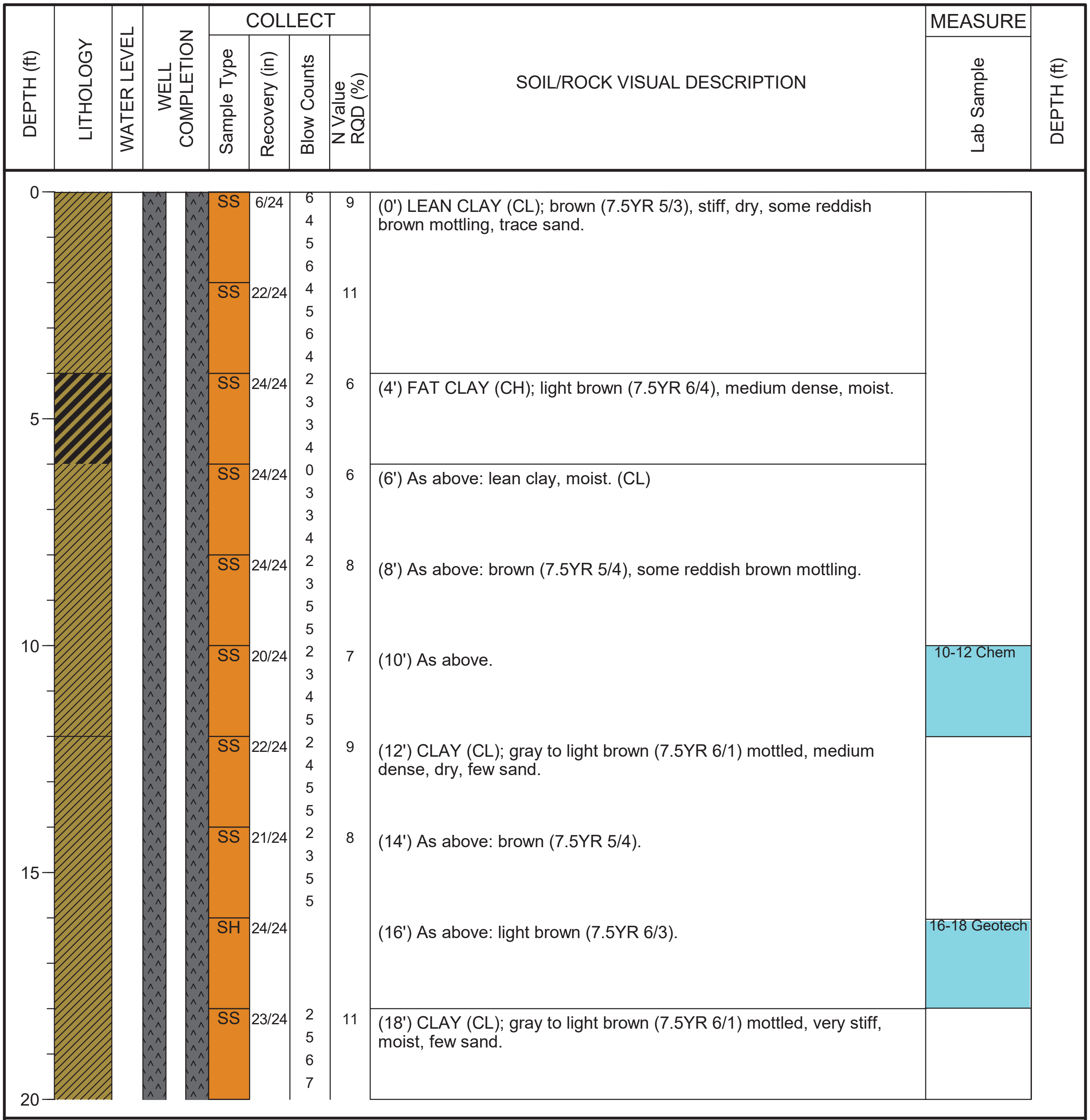
WELL LOG

Well No. G09M
Page: 1 of 8

Drilling Start Date: **01/26/2021**
Drilling End Date: **01/28/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **SK & AT**

Boring Depth (ft): **158**
Boring Diameter (in): **4.25**
DTW During Drilling (ft):
DTW After Drilling (ft): **51.93**
Top of Casing Elev. (ft): **351.53**
Ground Elev. (ft): **348.60**
Location (Lat/Long): **37.21040, -88.85422**

Well Depth (ft): **155**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 80 PVC**
Screen Material: **Sch 80 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
SS	6/24	6 4 5 6	9	(0') LEAN CLAY (CL); brown (7.5YR 5/3), stiff, dry, some reddish brown mottling, trace sand.	
SS	22/24	4 5 6 4	11		
SS	24/24	2 3 3 4	6	(4') FAT CLAY (CH); light brown (7.5YR 6/4), medium dense, moist.	
SS	24/24	0 3 3 4	6	(6') As above: lean clay, moist. (CL)	
SS	24/24	2 3 5 5	8	(8') As above: brown (7.5YR 5/4), some reddish brown mottling.	
SS	20/24	2 3 4 5	7	(10') As above.	10-12 Chem
SS	22/24	2 4 5 5	9	(12') CLAY (CL); gray to light brown (7.5YR 6/1) mottled, medium dense, dry, few sand.	
SS	21/24	2 3 5 5	8	(14') As above: brown (7.5YR 5/4).	
SH	24/24			(16') As above: light brown (7.5YR 6/3).	16-18 Geotech
SS	23/24	2 5 6 7	11	(18') CLAY (CL); gray to light brown (7.5YR 6/1) mottled, very stiff, moist, few sand.	

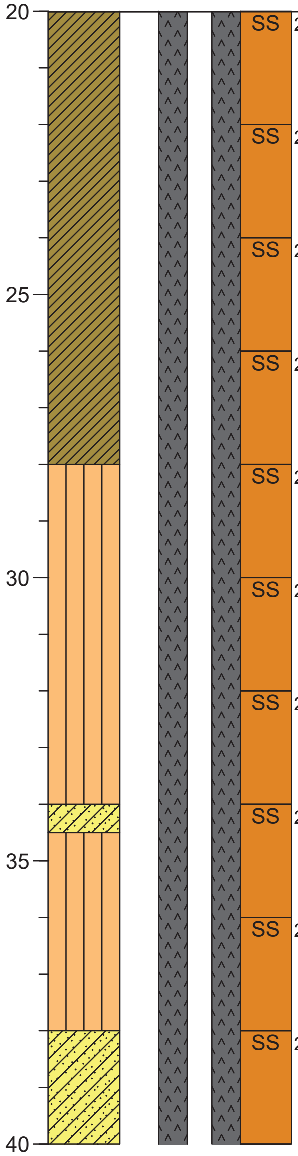
NOTES: SBG09M- (16-18)-20210127: 20.6% moisture content, 950 mg/kg total organic carbon, 105.4 pcf dry unit weight, 2.666 specific gravity, 8.3x 10^{-8} cm/s vertical hydraulic conductivity, 39 LL, 16PL, 23PI, 0.0% gravel, 5.0% sand, 95.0% fines.

Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G09M
Page: 2 of 8

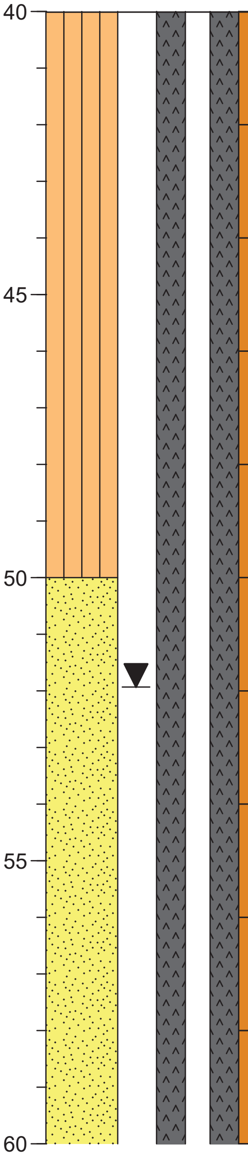
Drilling Start Date:	**01/26/2021**	Boring Depth (ft):	**158**	Well Depth (ft):	**155**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**51.93**	Riser Material:	**Sch 80 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.53**	Screen Material:	**Sch 80 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.60**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK & AT**	Location (Lat/Long):	**37.21040, -88.85422**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT: Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: Lab Sample
20	SS	24/24	2 4 7 8	11	(20') CLAY (CL); light gray with brown (10YR 7/1) mottling, very stiff, moist, trace sand and silt.	20-22 Chem
22	SS	24/24	4 6 7 8	13	(22') As above: (10YR 7/2).	
24	SS	24/24	2 5 7 8	12	(24') As above: fewer brown mottling.	
26	SS	24/24	3 3 6 7	9	(27-28') As above: increased reddish brown mottling.	
28	SS	24/24	4 8 8 7	16	(28') SILT (ML); with few sand and clay, light gray (10YR 7/2) with some brown mottling, dry, stiff.	
30	SS	24/24	4 8 6 8	14	(30') As above: moist.	
32	SS	24/24	4 5 6 7	11	(32') As above.	
34	SS	24/24	2 4 4 6	8	(34') SANDY CLAY (SC); light gray (10YR 7/2) with some brown mottling, moist. (34.5') SILT (ML); with some sand, few clay, stiff.	
36	SS	24/24	3 4 5 8	9	(36') As above: trace black organics.	
38	SS	24/24	5 20 18 17	38	(38') SANDY CLAY (SC); fine grained sand, few silt, gray (7.5YR 5/1), moist.	
40						

NOTES:

Drilling Start Date:	**01/26/2021**	Boring Depth (ft):	**158**	Well Depth (ft):	**155**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**51.93**	Riser Material:	**Sch 80 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.53**	Screen Material:	**Sch 80 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.60**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK & AT**	Location (Lat/Long):	**37.21040, -88.85422**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample
40	SS	24/24	3 6 8 7	14	(40') SILT WITH SAND (ML); few clay, gray (7.5YR 6/1), moist.	
	SS	24/24	5 3 4 5	7	(42') As above: some reddish brown mottling.	
	SS	24/24	2 3 5 6	8	(44') As above: fewer clay, more sand.	
45	SH	24/24				46-48 Geotech
	SS	24/24	5 8 18 12	26	(48') SILT WITH CLAY (ML); gradationally sandier, becomes moist, stiff to medium dense, gray (7.5YR 6/1).	48-50 Chem
50	SS	20/24	18 8 15 23	23	(50') POORLY GRADED SAND (SP); light gray (7.5YR 7/1), moist, loose.	
	SS	16/24	16 22 28 32	50	(52') POORLY GRADED SAND (SP); fine grained, with gravel up to cobble size, light gray (10YR 7/1), medium dense to loose, moist.	
	SS	20/24	25 45 49 49	94	(54') POORLY GRADED SAND (SP); fine to medium grained, light gray (7.5YR 7/1), moist, loose. (55') As above: few coarse gravel, reddish yellow (7.5YR 7/6).	
55	SS	23/24	27 33 20 20	53	(56') POORLY GRADED SAND (SP); fine to coarse grained, with coarse gravel, moist, gray (7.5YR 7/1) to reddish yellow (7.5YR 7/8).	
	SS	18/24	8 33 47 34	80	(58') As above: fine gray sand contains trace silt.	
60						

NOTES: SBG09M- (46-48)-20210127: 19.8% moisture content,105.4 pcf dry unit weight, 2.715 specific gravity, 3.5x 10^{-7} cm/s vertical hydraulic conductivity, 35 LL, 15 PL, 20 PI, 0.0% gravel, 17.2% sand, 82.8% fines.

Client: **Dynegy**
Project: **GLP0821, Joppa Ash Pond**
Address: **Unnamed Road, Metropolis, IL 62960**

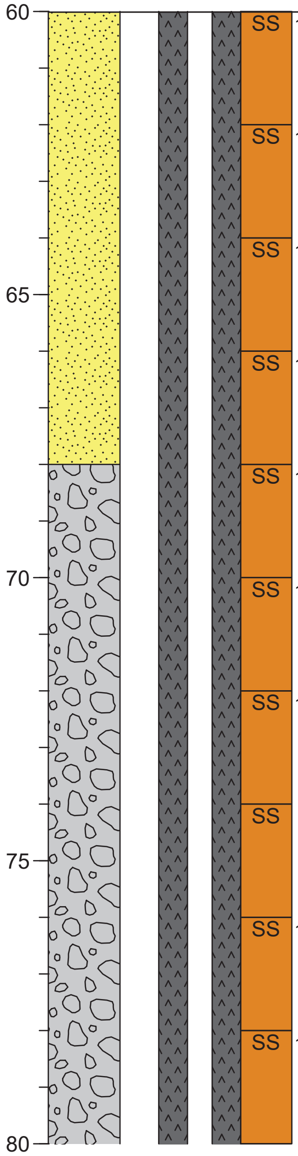
WELL LOG

Well No. **G09M**
Page: **4 of 8**

Drilling Start Date: **01/26/2021**
Drilling End Date: **01/28/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **SK & AT**

Boring Depth (ft): **158**
Boring Diameter (in): **4.25**
DTW During Drilling (ft):
DTW After Drilling (ft): **51.93**
Top of Casing Elev. (ft): **351.53**
Ground Elev. (ft): **348.60**
Location (Lat/Long): **37.21040, -88.85422**

Well Depth (ft): **155**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 80 PVC**
Screen Material: **Sch 80 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
60	SS	16/24	32 35 47 21	82	(60') POORLY GRADED SAND (SP); coarse grained, reddish yellow (7.5YR 6/8), moist, loose.	
	SS	16/24	22 50/5 14	64	(62') POORLY GRADED SAND (SP); coarse grained, reddish yellow (7.5YR 6/8), medium dense, some coarse gravel pebble size.	
	SS	13/24	17 11 12 12	23	(64') As above: increasing fine to coarse gravel.	
65	SS	12/24	15 16 15 11	31	(66') As above.	
	SS	11/24	38 50	50	(68') POORLY GRADED GRAVEL WITH SAND (GP); strong brown (7.5YR 5/6), loose, moist.	
70	SS	12/24	14 17 30 32	47	(70') As above.	
	SS	12/24	25 24 15 16	39	(72') As above: reddish yellow (7.5YR 6/8).	
	SS	8/24	6 25 20 12	45	(74') As above: sand disappears, wet.	
75	SS	14/24	7 7 8 7	15	(76') As above: strong brown (7.5YR 5/8).	
	SS	16/24	11 22 14 8	36	(78') As above: with some sand.	
80						

NOTES:

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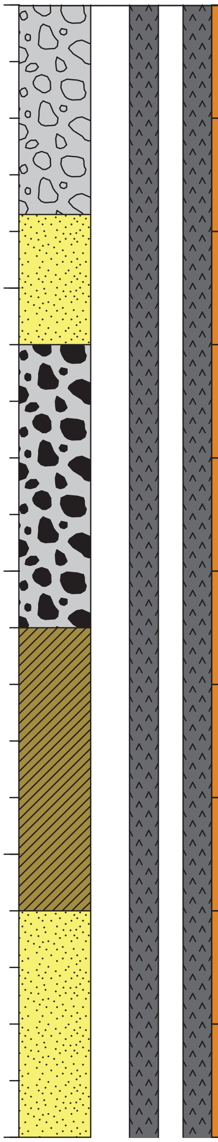
Client: **Dynegy**
Project: **GLP0821, Joppa Ash Pond**
Address: **Unnamed Road, Metropolis, IL 62960**

WELL LOG

Well No. **G09M**
Page: **5 of 8**

Drilling Start Date:	**01/26/2021**	Boring Depth (ft):	**158**	Well Depth (ft):	**155**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**51.93**	Riser Material:	**Sch 80 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.53**	Screen Material:	**Sch 80 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.60**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK & AT**	Location (Lat/Long):	**37.21040, -88.85422**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample
80	SS	12/24	2 17 19 12	36	(80') POORLY GRADED GRAVEL (GP); little sand, reddish yellow (7.5YR 6/8), very loose, wet.	80-82 Chem
82	SS	10/24	5 18 13 14	31		82-84 Geotech
84	SS	14/24		19	(83.7') POORLY GRADED SAND (SP); medium grained, trace gravel, reddish brown (7.5YR 6/8), loose, moist.	
86	SS	14/24	12 9 10 10	22	(86') WELL-GRADED GRAVEL (GW); few sand, trace clay, reddish brown (7.5YR 6/8), loose, wet.	
88	SS	14/24	25 14 8 6	14	(88') As above: clay disappears.	
90	SS		4 6 8 7		(91') GRAVELLY LEAN CLAY (CL); very pale brown (10YR 8/2), moist, soft.	
92	SS		2 3 3 4	6	(92') CLAY (CL); trace gravel, gray (7.5YR 6/1), medium dense.	
94	SS		2 1 3 3	4	(94') As above: gray (10YR 5/1).	
96	SS		1 6 23 23	29	(96') POORLY GRADED SAND (SP); fine grained, strong brown (7.5YR 5/8), loose.	
98	SS		5 14 25 23	39	(98') As above.	

NOTES: SBG09M- (82-84)-20210127: 7.6% moisture content, 740 U mg/kg total organic carbon, 100.0 pcf dry unit weight, 2.686 specific gravity, 22.7% gravel, 75.4% sand, 1.9% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

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Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

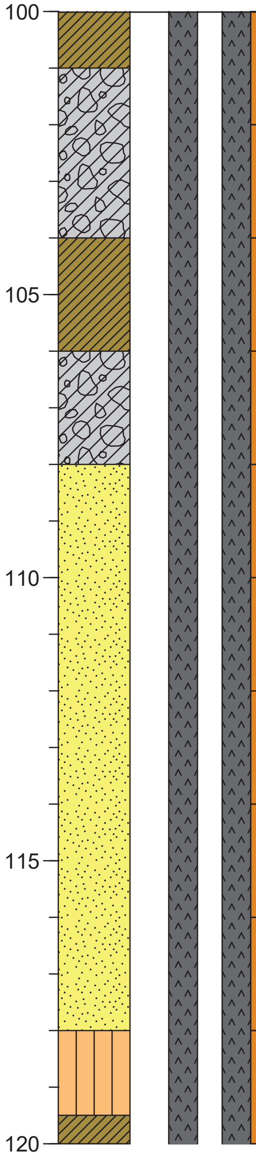
WELL LOG

Well No. G09M
Page: 6 of 8

Drilling Start Date: **01/26/2021**
Drilling End Date: **01/28/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **SK & AT**

Boring Depth (ft): **158**
Boring Diameter (in): **4.25**
DTW During Drilling (ft):
DTW After Drilling (ft): **51.93**
Top of Casing Elev. (ft): **351.53**
Ground Elev. (ft): **348.60**
Location (Lat/Long): **37.21040, -88.85422**

Well Depth (ft): **155**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 80 PVC**
Screen Material: **Sch 80 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**

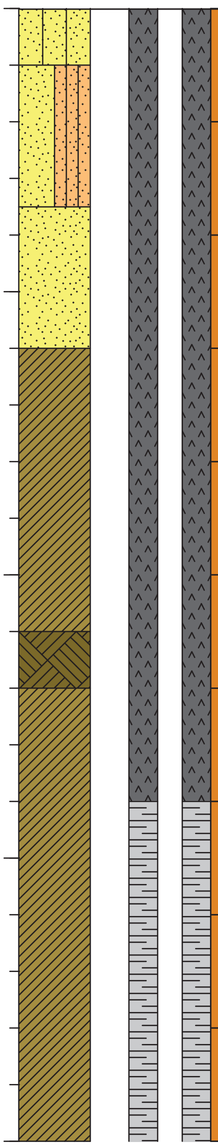


COLLECT					MEASURE
Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
SS	14/24	14 14 13 15	27	(100') CLAY (CL); (10YR 6/1), very soft, trace gravel. (101') CLAYEY GRAVEL (GC); (7.5YR 5/8), moist, loose.	
SS	15/24	14 12 8 15	20	(102') As above: some sand, brown (7.5YR 4/4).	
SS	9/24	12 12 9 14	21	(104') GRAVELLY CLAY (CL); light gray (2.5Y 7/2), stiff, moist.	
SS	15/24	12 12 12 20	24	(106') CLAYEY GRAVEL (GC); pinkish gray (7.5YR 7/2), medium dense, moist.	
SS	14/24	9 28 11 11	39	(108') POORLY GRADED SAND (SP); fine grained, yellow (10YR 7/6) to white (10YR 8/1) at 109.8' bgs, moist, loose.	
SS	15/24	8 12 8 12	20	(110') As above: light gray (10YR 7/1).	110-112 Chem
SH	8/24				112-114 Geotech
SS	13/24	10 11 9 10	20	(114') As above: yellow (10YR 7/6), trace gravel.	
SS	12/24	7 9 9 12	18	(116') As above: light gray (10YR 7/2), no gravel.	116-118 Geotech (not tested)
SS	22/24	7 1 2 3	3	(118') SILT WITH SAND (ML); gray (10YR 6/1) with some light brown mottling, soft, moist. (119.5') CLAY (CL); little silt, gray (10YR 6/1), stiff, moist.	

NOTES: SBG09M- (110-112)-20210127: 25.5% moisture content, 760 U mg/kg total organic carbon, 87.0 pcf dry unit weight, 2.675 specific gravity, 0.7% gravel, 84.1% sand, 15.2% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

Geosyntec consultants engineers | scientists | innovators	**Client:** Dynegy **Project:** GLP0821, Joppa Ash Pond **Address:** Unnamed Road, Metropolis, IL 62960	**WELL LOG** **Well No.** G09M **Page:** 7 of 8

Drilling Start Date:	**01/26/2021**	Boring Depth (ft):	**158**	Well Depth (ft):	**155**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**51.93**	Riser Material:	**Sch 80 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.53**	Screen Material:	**Sch 80 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.60**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK & AT**	Location (Lat/Long):	**37.21040, -88.85422**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
120	SS	21/24	2 3 4 14	7	(120') SAND WITH SILT (SM); light gray (10YR 7/1), medium dense, moist. (121') As above: less silty. (SP-SM)		
	SS	16/24	7 7 22 31	29			
125	SS	11/24	13 14 16 14	30	(123.5') As above: yellow (2.5Y 7/6). (SP) (124') POORLY GRADED SAND (SP); fine to medium grained, red (2.5YR 5/6), loose, dry.		
	SS	16/24	3 5 8 10	13	(126') CLAY (CL); few silt and sand, light brownish gray (10YR 6/2), very stiff, dry.		
	SS	15/24	3 8 9 13	17	(128') As above.	128-130 Chem	
130	SS	15/24	8 13 17 6	30	(130') Crushed SAPROLITE, dark yellowish brown (10YR 3/4) to black (10YR 2/1).		
	SS	16/24	6 4 6 6	10	(132') CLAY (CL); few gravel, few sand, yellowish brown (10YR 5/4), moist, stiff.	132-134 Chem	
135	SS	22/24	1 2 6 7	8	(134') As above: light brownish gray (10YR 6/2), no sand.		
	SS	20/24	2 5 5 6	10	(136') As above: very pale brown (10YR 7/3).		
	SS	13/24	4 8 7 21	15	(138') As above: light yellowish brown (5YR 6/4).		
140							

NOTES:

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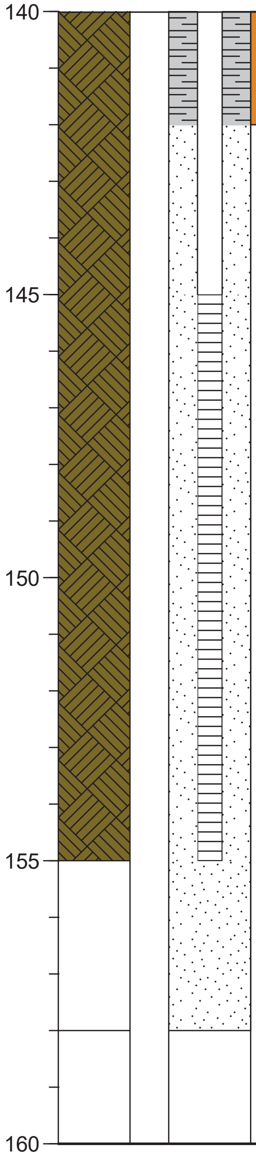
Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G09M
Page: 8 of 8

Drilling Start Date:	**01/26/2021**	Boring Depth (ft):	**158**	Well Depth (ft):	**155**
Drilling End Date:	**01/28/2021**	Boring Diameter (in):	**4.25**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**51.93**	Riser Material:	**Sch 80 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**351.53**	Screen Material:	**Sch 80 PVC Slotted**
Driller:		Ground Elev. (ft):	**348.60**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**SK & AT**	Location (Lat/Long):	**37.21040, -88.85422**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
140				SS	6/24	70/1		(140') CALCARENITE, very pale brown (10YR 7/3), dry.	140-142 Chem	
155								(155') End of Boring.		
								(158') Redrilled to 158' due to well installation difficulties.		
160										

NOTES:

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Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

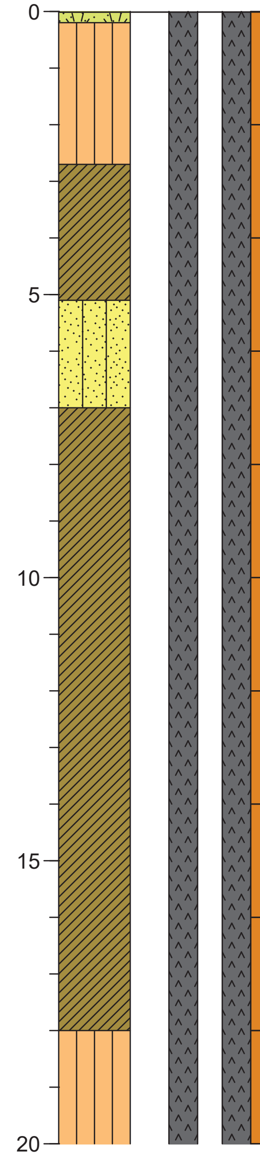
WELL LOG

Well No. G11
Page: 1 of 4

Drilling Start Date: **01/19/2021**
Drilling End Date: **01/19/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **ZJF & AT**

Boring Depth (ft): **66**
Boring Diameter (in): **7.5**
DTW During Drilling (ft):
DTW After Drilling (ft): **45.66**
Top of Casing Elev. (ft): **366.88**
Ground Elev. (ft): **363.38**
Location (Lat/Long): **37.21436, -88.85636**

Well Depth (ft): **66**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
SS	24/24	6 4 9 7	13	(0') TOPSOIL. (0.2') ASH (ML) (0.8') LEAN SILT (ML); trace fine sand, stiff, moist, tan (2.5Y 7/4).	
SS	17/24	1 1 2 4	3	(2.7') LEAN CLAY (CL); some orange fine sand, soft, wet, brown (2.5Y 3/3).	
SS	16/24	5 21 50/6	71	(5.1') SILTY SAND (SM); fine to medium grained, with coal, some organics, very dense, gray (N3), moist, well-graded.	
SS	17/24	5 7 5 5	12	(7.0') LEAN CLAY (CL); stiff, moist, tan (5Y 7/2) with gray (N8) mottles.	
SS	24/24	1 3 5 6	8	(8') As above: becomes medium stiff, orange (10YR 7/12) mottles.	
SS	24/24	2 5 8 6	13	(10') As above: becomes stiff, black inclusions, trace organics.	
SS	23/24	2 4 5 7	9	(12') As above.	
SS	24/24	2 5 6 8	11	(14') As above.	
SS	24/24	2 4 5 6	9	(16') As above.	
SS	24/24	3 7 9 10	16	(18') LEAN SILT (ML); trace sand, stiff, moist, tan (5Y 7/2) with orange (10YR 7/12) and black mottling.	

NOTES:

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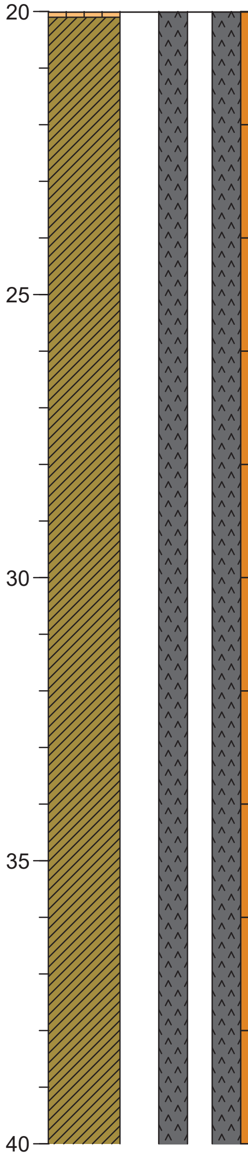
Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG
Well No. G11
Page: 2 of 4

Drilling Start Date:	**01/19/2021**	Boring Depth (ft):	**66**	Well Depth (ft):	**66**
Drilling End Date:	**01/19/2021**	Boring Diameter (in):	**7.5**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**45.66**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**366.88**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**363.38**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**ZJF & AT**	Location (Lat/Long):	**37.21436, -88.85636**	Filter Pack:	**Sand**



DEPTH (ft)	Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	Lab Sample
20	SS	24/24	3 6 8 8	14	(20.1') LEAN CLAY (CL); trace fine sand, stiff, moist, tannish orange (10YR 7/6) with gray (N8) mottles.	
22	SS	27/24	2 4 6 7	10	(22') As above.	22-24 Chem
24	SS	27/24			(24') As above.	24-26 ST
26	SS	24/24	3 4 5 7	9	(26') As above.	
28	SS	24/24	3 4 6 7	10	(28') As above.	
30	SS	26/24	2 4 4 6	8	(30') As above: with increased moisture.	
32	SS	24/24	2 4 4 6	8	(32') As above.	
34	SS	25/24	4 5 8 7	13	(34') As above: with fine sand.	
36	SS	26/24	2 5 5 5	10	(36') As above: orange (10YR 7/12) inclusions, gray (N8) with tan orange (10YR 7/6) mottling.	
38	SS	25/24	2 4 6 6	10	(38') As above: trace silt.	

NOTES: SBG11-(24-26)-20210119: 18.5% moisture content, 415 U mg/kg total organic carbon, 109.1 pcf dry unit weight, 2.688 specific gravity, 5.6x10^{-8} cm/s vertical hydraulic conductivity, 36 LL, 15 PL, 21 PI, 0.0% gravel, 11.5% sand, 88.5% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

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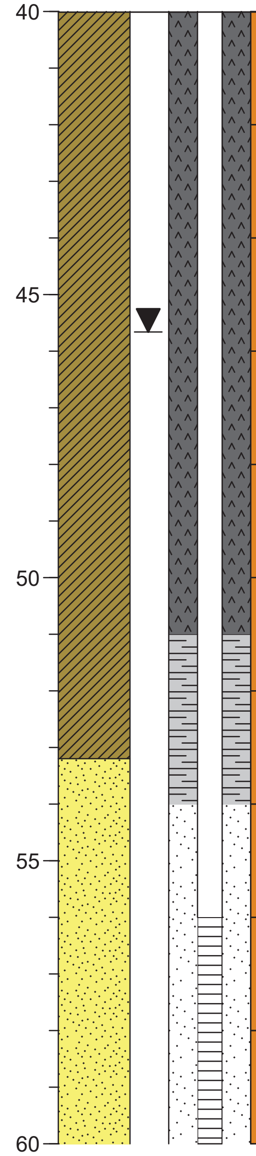
Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

WELL LOG

Well No. G11
Page: 3 of 4

Drilling Start Date:	**01/19/2021**	Boring Depth (ft):	**66**	Well Depth (ft):	**66**
Drilling End Date:	**01/19/2021**	Boring Diameter (in):	**7.5**	Well Diameter (in):	**2**
Drilling Company:	**Geotechnology**	DTW During Drilling (ft):		Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW After Drilling (ft):	**45.66**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**CME 55LC**	Top of Casing Elev. (ft):	**366.88**	Screen Material:	**Sch 40 PVC Slotted**
Driller:		Ground Elev. (ft):	**363.38**	Seal Material(s):	**Grout & Bentonite**
Logged By:	**ZJF & AT**	Location (Lat/Long):	**37.21436, -88.85636**	Filter Pack:	**Sand**



DEPTH (ft)	COLLECT Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE Lab Sample
40	SS	25/24	2 3 4 4	7	(40') As above: becomes medium stiff.	
	SS	27/24	2 4 4 6	8	(42') LEAN CLAY (CL); orange (10YR 7/6) silty fine sand seams, medium stiff, moist, gray (N8).	
	SS	25/24	2 4 5 6	9	(44') As above: stiff.	
45	SS	25/24	3 6 9 10	15	(46') As above: seams are silt only.	
	SS	24/24	3 4 5 8	9	(48') As above: no seams, trace orange (10YR 7/6) silt, increased moisture.	
50	SS	27/24	1 3 0 3	3	(50') As above: increased moisture.	
	SS	27/24	2 3 3 6	6	(52') As above: gray (N9) sand layer. (53.2') POORLY GRADED SAND (SP); fine to medium grained, trace silt, loose, gray (N9), wet.	
	SS	27/24	3 8 26 26	34	(54') As above: becomes dense, trace clay, trace orange (10YR 7/6) silt inclusions.	
55	SS	8/24			(56') As above.	56-58 Geotech
	SS	24/24	7 14 16 13	30	(58') As above: trace gravel, no silt, some orange (10YR 7/6) fine to medium sand.	58-60 Chem
60						

NOTES: SBG11-(56-58)-20210119: 14.4% moisture content, 679 U mg/kg total organic carbon, 110.0 pcf dry unit weight, 2.661 specific gravity, 0.2% gravel, 87.7% sand, 12.1% fines.
*U = Analyte was not present in concentrations above method detection limit and is reported as the reporting limit

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Client: Dynegy
Project: GLP0821, Joppa Ash Pond
Address: Unnamed Road, Metropolis, IL 62960

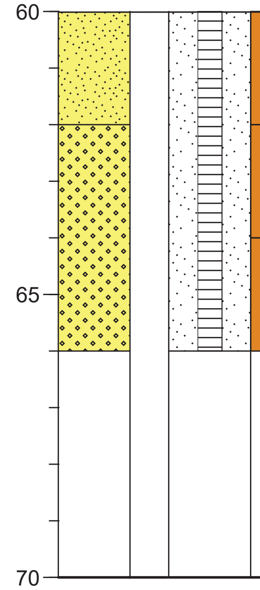
WELL LOG

Well No. G11
Page: 4 of 4

Drilling Start Date: **01/19/2021**
Drilling End Date: **01/19/2021**
Drilling Company: **Geotechnology**
Drilling Method: **Hollow Stem Auger**
Drilling Equipment: **CME 55LC**
Driller:
Logged By: **ZJF & AT**

Boring Depth (ft): **66**
Boring Diameter (in): **7.5**
DTW During Drilling (ft):
DTW After Drilling (ft): **45.66**
Top of Casing Elev. (ft): **366.88**
Ground Elev. (ft): **363.38**
Location (Lat/Long): **37.21436, -88.85636**

Well Depth (ft): **66**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Grout & Bentonite**
Filter Pack: **Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	MEASURE	DEPTH (ft)
				Sample Type	Recovery (in)	Blow Counts	N Value RQD (%)		Lab Sample	
60				SS	20/24	6 14 15 16	29	(60') As above: increased orange sand.		
				SS	14/24	0 6 11 13	17	(62') WELL-GRADED SAND (SW); fine to medium grained, medium dense, wet, orangish tan (7.5YR 8/8) with some gray (N9) sand layers.		
65				SS	18/24	2 10 15 11	25	(64') As above: with sandy gravel layer (~5" thick).		
								(66') End of Boring.		
70										

NOTES:

ATTACHMENT F

Ash and Aquifer Solids Total Metals Analytical Data

Teklab, Inc.
Environmental Laboratory

http://www.teklabinc.com/

February 05, 2021

Allison Kreinberg
Geosyntec Consultants
941 Chatham Lane, Ste 103
Columbus, OH 43221
TEL: (614) 468-0421
FAX:

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

RE: GLP8021

WorkOrder: 21011267

Dear Allison Kreinberg:

TEKLAB, INC received 12 samples on 1/25/2021 4:30:00 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,

Aaron Renner
Project Manager
(630)324-6855
arenner@teklabinc.com

Report Contents

Client: Geosyntec Consultants

Work Order: 21011267

Client Project: GLP8021

Report Date: 05-Feb-21

This reporting package includes the following:

Definitions

Client: Geosyntec Consultants **Work Order:** 21011267

Client Project: GLP8021 **Report Date:** 05-Feb-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)

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

Client: Geosyntec Consultants
Client Project: GLP8021
Work Order: 21011267
Report Date: 05-Feb-21

Cooler Receipt Temp: 1.4 °C

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

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

Accreditations

Client: Geosyntec Consultants

Client Project: GLP8021

Work Order: 21011267

Report Date: 05-Feb-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		3/14/2021	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: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-001
Client Sample ID: SB-G11-(22-24)-20210119
Matrix: SOLID
Collection Date: 01/19/2021 13:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**16.9**	%	1	01/27/2021 17:06	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**0.79**	mg/Kg-dry	10	02/01/2021 16:44	173242
Arsenic	NELAP	0.18	B	**3.50**	mg/Kg-dry	10	01/28/2021 3:21	173243
Barium	NELAP	0.18	B	**173**	mg/Kg-dry	10	01/28/2021 3:21	173243
Beryllium	NELAP	0.27		**0.74**	mg/Kg-dry	10	01/28/2021 3:21	173243
Boron	NELAP	4.55		**< 4.55**	mg/Kg-dry	10	01/28/2021 3:21	173243
Cadmium	NELAP	0.18		**0.43**	mg/Kg-dry	10	01/28/2021 3:21	173243
Calcium	*	45.5		**1370**	mg/Kg-dry	10	01/28/2021 3:21	173243
Chromium	NELAP	0.45		**15.7**	mg/Kg-dry	10	01/28/2021 3:21	173243
Cobalt	NELAP	0.18		**2.72**	mg/Kg-dry	10	01/28/2021 3:21	173243
Iron	NELAP	9.09		**12000**	mg/Kg-dry	10	01/28/2021 3:21	173243
Lead	NELAP	0.18		**8.64**	mg/Kg-dry	10	01/28/2021 3:21	173243
Lithium	*	0.27		**5.69**	mg/Kg-dry	10	01/28/2021 3:21	173243
Manganese	NELAP	0.18	B	**60.9**	mg/Kg-dry	10	01/28/2021 3:21	173243
Molybdenum	NELAP	0.18		**0.36**	mg/Kg-dry	10	01/28/2021 3:21	173243
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	01/28/2021 3:21	173243
Thallium	NELAP	0.18		**0.41**	mg/Kg-dry	10	01/28/2021 3:21	173243
Sample result(s) for AS, BA and MN exceed 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	01/26/2021 10:17	173211
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	02/01/2021 0:00	R287037

Client: Geosyntec Consultants

Work Order: 21011267

Client Project: GLP8021

Report Date: 05-Feb-21

Lab ID: 21011267-002

Client Sample ID: SB-G11-(58-60)-20210119

Matrix: SOLID

Collection Date: 01/19/2021 13:35

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**13.5**	%	1	01/27/2021 17:06	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.37		**< 0.37**	mg/Kg-dry	10	02/01/2021 16:53	173242
Arsenic	NELAP	0.18	B	**1.15**	mg/Kg-dry	10	01/28/2021 3:29	173243
Barium	NELAP	0.18	B	**21.6**	mg/Kg-dry	10	01/28/2021 3:29	173243
Beryllium	NELAP	0.27		**0.30**	mg/Kg-dry	10	01/28/2021 3:29	173243
Boron	NELAP	4.55		**< 4.55**	mg/Kg-dry	10	01/28/2021 3:29	173243
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	01/28/2021 3:29	173243
Calcium	*	45.5		**430**	mg/Kg-dry	10	01/28/2021 3:29	173243
Chromium	NELAP	0.45		**6.05**	mg/Kg-dry	10	01/28/2021 3:29	173243
Cobalt	NELAP	0.18		**1.29**	mg/Kg-dry	10	01/28/2021 3:29	173243
Iron	NELAP	9.09		**2800**	mg/Kg-dry	10	01/28/2021 3:29	173243
Lead	NELAP	0.18		**3.00**	mg/Kg-dry	10	01/28/2021 3:29	173243
Lithium	*	0.27		**2.03**	mg/Kg-dry	10	01/28/2021 3:29	173243
Manganese	NELAP	0.18	B	**11.6**	mg/Kg-dry	10	01/28/2021 3:29	173243
Molybdenum	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	01/28/2021 3:29	173243
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	01/28/2021 3:29	173243
Thallium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	01/28/2021 3:29	173243
Sample result(s) for AS, BA and MN exceed 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	01/26/2021 10:19	173211
SEE ATTACHED FOR SUBCONTRACTING ANALYSIS								
Subcontracted Analysis	*	0		**See Attached**		1	02/01/2021 0:00	R287037

Client: Geosyntec Consultants **Work Order:** 21011267

Client Project: GLP8021 **Report Date:** 05-Feb-21

Lab ID: 21011267-003 **Client Sample ID:** EQB-20210119

Matrix: AQUEOUS **Collection Date:** 01/19/2021 0:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 245.1 R3.0 (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	01/26/2021 9:58	173239
EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:35	173238
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:35	173238
Barium	NELAP	0.0010		**0.0195**	mg/L	5	01/28/2021 1:35	173238
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:35	173238
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	01/28/2021 1:35	173238
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:35	173238
Calcium	NELAP	0.125		**0.786**	mg/L	5	01/28/2021 1:35	173238
Chromium	NELAP	0.0015		**0.0129**	mg/L	5	01/28/2021 1:35	173238
Cobalt	NELAP	0.0010		**0.0011**	mg/L	5	01/28/2021 1:35	173238
Iron	NELAP	0.0250	B	**4.01**	mg/L	5	01/28/2021 1:35	173238
Lead	NELAP	0.0010		**0.0012**	mg/L	5	01/28/2021 1:35	173238
Lithium	*	0.0030		**< 0.0030**	mg/L	5	01/28/2021 1:35	173238
Manganese	NELAP	0.0020		**0.0405**	mg/L	5	01/28/2021 1:35	173238
Molybdenum	NELAP	0.0015		**0.0038**	mg/L	5	01/28/2021 1:35	173238
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:35	173238
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	01/28/2021 1:35	173238

Sample result(s) for FE exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-004
Client Sample ID: SB-XPW-01-(4-6)-20210120
Matrix:
Collection Date: 01/20/2021 11:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**24.0**	%	1	01/27/2021 17:06	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	1.96		**2.80**	mg/Kg-dry	50	02/03/2021 10:22	173242
Arsenic	NELAP	0.19	B	**16.4**	mg/Kg-dry	10	01/28/2021 3:37	173243
Barium	NELAP	0.93	B	**3080**	mg/Kg-dry	50	01/29/2021 19:48	173243
Beryllium	NELAP	1.39		**3.70**	mg/Kg-dry	50	02/03/2021 10:47	173243
Boron	NELAP	23.1		**542**	mg/Kg-dry	50	01/29/2021 19:48	173243
Cadmium	NELAP	0.19		**1.41**	mg/Kg-dry	10	01/28/2021 3:37	173243
Calcium	*	231		**141000**	mg/Kg-dry	50	01/29/2021 19:48	173243
Chromium	NELAP	2.31		**49.4**	mg/Kg-dry	50	02/03/2021 10:47	173243
Cobalt	NELAP	0.93		**22.0**	mg/Kg-dry	50	02/03/2021 10:47	173243
Iron	NELAP	46.3		**31600**	mg/Kg-dry	50	01/29/2021 19:48	173243
Lead	NELAP	0.93		**34.2**	mg/Kg-dry	50	01/29/2021 19:48	173243
Lithium	*	1.39		**30.9**	mg/Kg-dry	50	02/03/2021 10:47	173243
Manganese	NELAP	0.93	B	**95.2**	mg/Kg-dry	50	02/03/2021 10:47	173243
Molybdenum	NELAP	0.19		**7.42**	mg/Kg-dry	10	01/28/2021 3:37	173243
Selenium	NELAP	0.93		**8.29**	mg/Kg-dry	10	01/28/2021 3:37	173243
Thallium	NELAP	0.93		**< 0.93**	mg/Kg-dry	50	01/29/2021 19:48	173243

Sample result(s) for CA exceed 10 times the CCB contamination. Data is reportable per the TNI Standard.

Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7471B								
Mercury	NELAP	0.066		**0.758**	mg/Kg-dry	5	01/26/2021 10:48	173211

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-005
Client Sample ID: SB-XPW-01-(46-48)-20210120-DUP
Matrix: SOLID
Collection Date: 01/20/2021 11:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**21.7**	%	1	01/27/2021 17:07	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.40		**< 0.40**	mg/Kg-dry	10	02/01/2021 17:10	173242
Arsenic	NELAP	0.19	B	**7.31**	mg/Kg-dry	10	01/28/2021 3:45	173243
Barium	NELAP	0.19	B	**105**	mg/Kg-dry	10	01/28/2021 3:45	173243
Beryllium	NELAP	0.29		**0.72**	mg/Kg-dry	10	01/28/2021 3:45	173243
Boron	NELAP	4.81		**36.3**	mg/Kg-dry	10	01/28/2021 3:45	173243
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	01/28/2021 3:45	173243
Calcium	*	48.1		**3530**	mg/Kg-dry	10	01/28/2021 3:45	173243
Chromium	NELAP	0.48		**18.8**	mg/Kg-dry	10	01/28/2021 3:45	173243
Cobalt	NELAP	0.19		**8.99**	mg/Kg-dry	10	01/28/2021 3:45	173243
Iron	NELAP	9.62		**18400**	mg/Kg-dry	10	01/28/2021 3:45	173243
Lead	NELAP	0.19		**15.5**	mg/Kg-dry	10	01/28/2021 3:45	173243
Lithium	*	0.29		**12.3**	mg/Kg-dry	10	01/28/2021 3:45	173243
Manganese	NELAP	0.19	B	**133**	mg/Kg-dry	10	01/28/2021 3:45	173243
Molybdenum	NELAP	0.19		**47.9**	mg/Kg-dry	10	01/28/2021 3:45	173243
Selenium	NELAP	0.96		**< 0.96**	mg/Kg-dry	10	01/28/2021 3:45	173243
Thallium	NELAP	0.19		**0.26**	mg/Kg-dry	10	01/28/2021 3:45	173243
Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**0.016**	mg/Kg-dry	1	01/26/2021 10:28	173211

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-006
Client Sample ID: EQB-20210120
Matrix: AQUEOUS
Collection Date: 01/20/2021 12:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 245.1 R3.0 (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	01/26/2021 10:01	173239
EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**0.0020**	mg/L	5	01/28/2021 1:18	173238
Arsenic	NELAP	0.0010		**0.0397**	mg/L	5	01/28/2021 1:18	173238
Barium	NELAP	0.0010		**0.847**	mg/L	5	01/28/2021 1:18	173238
Beryllium	NELAP	0.0010		**0.0045**	mg/L	5	01/28/2021 1:18	173238
Boron	NELAP	0.0250		**0.204**	mg/L	5	01/28/2021 1:18	173238
Cadmium	NELAP	0.0010		**0.0012**	mg/L	5	01/28/2021 1:18	173238
Calcium	NELAP	0.125		**27.3**	mg/L	5	01/28/2021 1:18	173238
Chromium	NELAP	0.0015		**0.0676**	mg/L	5	01/28/2021 1:18	173238
Cobalt	NELAP	0.0010		**0.0185**	mg/L	5	01/28/2021 1:18	173238
Iron	NELAP	0.0250	B	**32.6**	mg/L	5	01/28/2021 1:18	173238
Lead	NELAP	0.0010		**0.0551**	mg/L	5	01/28/2021 1:18	173238
Lithium	*	0.0030		**0.0218**	mg/L	5	01/28/2021 1:18	173238
Manganese	NELAP	0.0020		**0.388**	mg/L	5	01/28/2021 1:18	173238
Molybdenum	NELAP	0.0015		**0.0220**	mg/L	5	01/28/2021 1:18	173238
Selenium	NELAP	0.0010		**0.0013**	mg/L	5	01/28/2021 1:18	173238
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	01/28/2021 1:18	173238

Sample result(s) for FE exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-007
Client Sample ID: SB-XPW-02-(4-6)-20210120
Matrix:
Collection Date: 01/20/2021 13:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**23.0**	%	1	01/27/2021 17:07	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	1.82		**3.25**	mg/Kg-dry	50	02/03/2021 10:30	173242
Arsenic	NELAP	0.20	B	**21.1**	mg/Kg-dry	10	01/28/2021 3:53	173243
Barium	NELAP	0.98	B	**2690**	mg/Kg-dry	50	01/29/2021 19:56	173243
Beryllium	NELAP	1.47		**3.18**	mg/Kg-dry	50	02/03/2021 14:10	173243
Boron	NELAP	24.5		**536**	mg/Kg-dry	50	01/29/2021 19:56	173243
Cadmium	NELAP	0.20		**1.61**	mg/Kg-dry	10	01/28/2021 3:53	173243
Calcium	*	245		**152000**	mg/Kg-dry	50	01/29/2021 19:56	173243
Chromium	NELAP	2.45		**57.7**	mg/Kg-dry	50	02/03/2021 14:10	173243
Cobalt	NELAP	0.98		**22.9**	mg/Kg-dry	50	02/03/2021 14:10	173243
Iron	NELAP	49.0		**33800**	mg/Kg-dry	50	01/29/2021 19:56	173243
Lead	NELAP	0.98		**32.0**	mg/Kg-dry	50	01/29/2021 19:56	173243
Lithium	*	1.47		**28.2**	mg/Kg-dry	50	02/03/2021 14:10	173243
Manganese	NELAP	0.98	B	**153**	mg/Kg-dry	50	02/03/2021 14:10	173243
Molybdenum	NELAP	0.20		**9.93**	mg/Kg-dry	10	01/28/2021 3:53	173243
Selenium	NELAP	0.98		**6.65**	mg/Kg-dry	10	01/28/2021 3:53	173243
Thallium	NELAP	0.98		**1.13**	mg/Kg-dry	50	01/29/2021 19:56	173243

Sample result(s) for CA exceed 10 times the CCB contamination. Data is reportable per the TNI Standard.

Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7471B								
Mercury	NELAP	0.012		**0.583**	mg/Kg-dry	1	01/26/2021 10:31	173211

Laboratory Results

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-008
Client Sample ID: SB-XPW-02-(24-26)-20210120
Matrix:
Collection Date: 01/20/2021 14:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**33.2**	%	1	01/27/2021 17:07	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.40		**2.19**	mg/Kg-dry	10	02/01/2021 17:28	173242
Arsenic	NELAP	0.20	B	**44.1**	mg/Kg-dry	10	01/28/2021 4:01	173243
Barium	NELAP	0.20	B	**193**	mg/Kg-dry	10	01/28/2021 4:01	173243
Beryllium	NELAP	0.30		**3.86**	mg/Kg-dry	10	01/28/2021 4:01	173243
Boron	NELAP	5.00		**334**	mg/Kg-dry	10	01/28/2021 4:01	173243
Cadmium	NELAP	0.20		**2.37**	mg/Kg-dry	10	01/28/2021 4:01	173243
Calcium	*	50.0		**34600**	mg/Kg-dry	10	01/28/2021 4:01	173243
Chromium	NELAP	0.50		**55.8**	mg/Kg-dry	10	01/28/2021 4:01	173243
Cobalt	NELAP	0.20		**11.8**	mg/Kg-dry	10	01/28/2021 4:01	173243
Iron	NELAP	10.0		**57000**	mg/Kg-dry	10	01/28/2021 4:01	173243
Lead	NELAP	0.20		**22.4**	mg/Kg-dry	10	01/28/2021 4:01	173243
Lithium	*	0.30		**10.4**	mg/Kg-dry	10	01/28/2021 4:01	173243
Manganese	NELAP	0.20	B	**342**	mg/Kg-dry	10	01/28/2021 4:01	173243
Molybdenum	NELAP	0.20		**7.99**	mg/Kg-dry	10	01/28/2021 4:01	173243
Selenium	NELAP	1.00		**2.23**	mg/Kg-dry	10	01/28/2021 4:01	173243
Thallium	NELAP	0.20		**2.11**	mg/Kg-dry	10	01/28/2021 4:01	173243
Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.014		**< 0.014**	mg/Kg-dry	1	01/26/2021 10:33	173211

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-009
Client Sample ID: EQB-20210121
Matrix: AQUEOUS
Collection Date: 01/21/2021 7:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 245.1 R3.0 (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	01/26/2021 10:08	173239
EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:27	173238
Arsenic	NELAP	0.0010		**0.0060**	mg/L	5	01/28/2021 1:27	173238
Barium	NELAP	0.0010		**0.113**	mg/L	5	01/28/2021 1:27	173238
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:27	173238
Boron	NELAP	0.0250		**0.0495**	mg/L	5	01/28/2021 1:27	173238
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:27	173238
Calcium	NELAP	0.125		**5.67**	mg/L	5	01/28/2021 1:27	173238
Chromium	NELAP	0.0015		**0.0208**	mg/L	5	01/28/2021 1:27	173238
Cobalt	NELAP	0.0010		**0.0027**	mg/L	5	01/28/2021 1:27	173238
Iron	NELAP	0.0250	B	**13.0**	mg/L	5	01/28/2021 1:27	173238
Lead	NELAP	0.0010		**0.0077**	mg/L	5	01/28/2021 1:27	173238
Lithium	*	0.0030		**0.0073**	mg/L	5	01/28/2021 1:27	173238
Manganese	NELAP	0.0020		**0.0720**	mg/L	5	01/28/2021 1:27	173238
Molybdenum	NELAP	0.0015		**0.0060**	mg/L	5	01/28/2021 1:27	173238
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/28/2021 1:27	173238
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	01/28/2021 1:27	173238

Sample result(s) for FE exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Laboratory Results

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-010
Client Sample ID: SB-XPW-03-(6-8)-20210121
Matrix: SOLID
Collection Date: 01/21/2021 11:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**38.1**	%	1	01/27/2021 17:07	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	1.85		**4.07**	mg/Kg-dry	50	02/03/2021 10:39	173242
Arsenic	NELAP	0.93	B	**55.8**	mg/Kg-dry	50	01/28/2021 4:09	173243
Barium	NELAP	0.93	B	**976**	mg/Kg-dry	50	01/28/2021 4:09	173243
Beryllium	NELAP	1.39		**3.30**	mg/Kg-dry	50	01/28/2021 4:09	173243
Boron	NELAP	23.1		**308**	mg/Kg-dry	50	01/28/2021 4:09	173243
Cadmium	NELAP	0.19		**0.95**	mg/Kg-dry	10	01/29/2021 20:05	173243
Calcium	*	231		**34700**	mg/Kg-dry	50	01/28/2021 4:09	173243
Chromium	NELAP	2.31		**44.8**	mg/Kg-dry	50	01/28/2021 4:09	173243
Cobalt	NELAP	0.93		**11.8**	mg/Kg-dry	50	01/28/2021 4:09	173243
Iron	NELAP	46.3		**23200**	mg/Kg-dry	50	01/28/2021 4:09	173243
Lead	NELAP	0.93		**60.3**	mg/Kg-dry	50	01/28/2021 4:09	173243
Lithium	*	1.39		**16.2**	mg/Kg-dry	50	01/28/2021 4:09	173243
Manganese	NELAP	0.93	B	**124**	mg/Kg-dry	50	01/28/2021 4:09	173243
Molybdenum	NELAP	0.93		**11.6**	mg/Kg-dry	50	01/28/2021 4:09	173243
Selenium	NELAP	0.93		**2.15**	mg/Kg-dry	10	01/29/2021 20:05	173243
Thallium	NELAP	0.93		**1.33**	mg/Kg-dry	50	01/28/2021 4:09	173243
Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.015		**0.029**	mg/Kg-dry	1	01/26/2021 10:36	173211

Client: Geosyntec Consultants
Work Order: 21011267
Client Project: GLP8021
Report Date: 05-Feb-21
Lab ID: 21011267-011
Client Sample ID: SB-XPW-03-(34-36)-20210121
Matrix: SOLID
Collection Date: 01/21/2021 12:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**31.6**	%	1	01/27/2021 17:08	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38	SR	**0.41**	mg/Kg-dry	10	02/03/2021 10:55	173503
Arsenic	NELAP	0.98	B	**52.7**	mg/Kg-dry	50	01/28/2021 4:17	173243
Barium	NELAP	0.98	B	**149**	mg/Kg-dry	50	01/28/2021 4:17	173243
Beryllium	NELAP	1.47		**1.49**	mg/Kg-dry	50	01/28/2021 4:17	173243
Boron	NELAP	24.5		**92.6**	mg/Kg-dry	50	01/28/2021 4:17	173243
Cadmium	NELAP	0.20		**0.65**	mg/Kg-dry	10	01/29/2021 20:13	173243
Calcium	*	245	S	**4010**	mg/Kg-dry	50	01/28/2021 4:17	173243
Chromium	NELAP	2.45		**31.2**	mg/Kg-dry	50	01/28/2021 4:17	173243
Cobalt	NELAP	0.98		**8.26**	mg/Kg-dry	50	01/28/2021 4:17	173243
Iron	NELAP	49.0	S	**26200**	mg/Kg-dry	50	01/28/2021 4:17	173243
Lead	NELAP	0.98		**42.8**	mg/Kg-dry	50	01/28/2021 4:17	173243
Lithium	*	1.47		**17.5**	mg/Kg-dry	50	01/28/2021 4:17	173243
Manganese	NELAP	0.98	B	**95.6**	mg/Kg-dry	50	01/28/2021 4:17	173243
Molybdenum	NELAP	0.20	SR	**213**	mg/Kg-dry	10	02/03/2021 14:51	173510
Selenium	NELAP	4.90		**6.94**	mg/Kg-dry	50	01/28/2021 4:17	173243
Thallium	NELAP	0.20	SR	**0.46**	mg/Kg-dry	10	02/03/2021 14:51	173510

Matrix spike and RPD did not recover within control limits for MO and TL due to sample composition.
Matrix spike and RPD did not recover within control limits due to sample composition.
Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.
Matrix spike control limits for CA and FE are not applicable due to high sample/spike ratio.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7471B								
Mercury	NELAP	0.073		**0.330**	mg/Kg-dry	5	01/26/2021 11:03	173211

Client: Geosyntec Consultants

Work Order: 21011267

Client Project: GLP8021

Report Date: 05-Feb-21

Lab ID: 21011267-012

Client Sample ID: SB-XPW-01-(46-48)-20210120

Matrix: SOLID

Collection Date: 01/20/2021 11:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**20.5**	%	1	01/27/2021 17:08	R286790
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	02/01/2021 19:21	173242
Arsenic	NELAP	0.19	B	**8.77**	mg/Kg-dry	10	01/28/2021 6:12	173243
Barium	NELAP	0.19	B	**105**	mg/Kg-dry	10	01/28/2021 6:12	173243
Beryllium	NELAP	0.28		**0.72**	mg/Kg-dry	10	01/28/2021 6:12	173243
Boron	NELAP	4.72		**35.1**	mg/Kg-dry	10	01/28/2021 6:12	173243
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	01/28/2021 6:12	173243
Calcium	*	47.2		**3280**	mg/Kg-dry	10	01/28/2021 6:12	173243
Chromium	NELAP	0.47		**18.3**	mg/Kg-dry	10	01/28/2021 6:12	173243
Cobalt	NELAP	0.19		**8.46**	mg/Kg-dry	10	01/28/2021 6:12	173243
Iron	NELAP	9.43		**17900**	mg/Kg-dry	10	01/28/2021 6:12	173243
Lead	NELAP	0.19		**15.1**	mg/Kg-dry	10	01/28/2021 6:12	173243
Lithium	*	0.28		**12.2**	mg/Kg-dry	10	01/28/2021 6:12	173243
Manganese	NELAP	0.19	B	**125**	mg/Kg-dry	10	01/28/2021 6:12	173243
Molybdenum	NELAP	0.19		**32.2**	mg/Kg-dry	10	01/28/2021 6:12	173243
Selenium	NELAP	0.94		**< 0.94**	mg/Kg-dry	10	01/28/2021 6:12	173243
Thallium	NELAP	0.19		**0.32**	mg/Kg-dry	10	01/28/2021 6:12	173243
Sample result(s) for AS, BA and MN exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**0.015**	mg/Kg-dry	1	01/26/2021 10:45	173211

Dates Report

Client: Geosyntec Consultants

Client Project: GLP8021

Work Order: 21011267

Report Date: 05-Feb-21

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
21011267-001A	SB-G11-(22-24)-20210119	01/19/2021 13:30	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:06
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 3:21
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/01/2021 16:44
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:17
21011267-001B	SB-G11-(22-24)-20210119	01/19/2021 13:30	01/25/2021 16:30		
	See Attached for Subcontracting Analysis				02/01/2021 0:00
21011267-002A	SB-G11-(58-60)-20210119	01/19/2021 13:35	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:06
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 3:29
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/01/2021 16:53
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:19
21011267-002B	SB-G11-(58-60)-20210119	01/19/2021 13:35	01/25/2021 16:30		
	See Attached for Subcontracting Analysis				02/01/2021 0:00
21011267-003A	EQB-20210119	01/19/2021 0:00	01/25/2021 16:30		
	EPA 600 245.1 R3.0 (Total)			01/25/2021 17:45	01/26/2021 9:58
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			01/25/2021 17:36	01/28/2021 1:35
21011267-004A	SB-XPW-01-(4-6)-20210120	01/20/2021 11:30	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:06
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 3:37
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/29/2021 19:48
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/03/2021 10:22
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	02/03/2021 10:47
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:48
21011267-005A	SB-XPW-01-(46-48)-20210120-DUP	01/20/2021 11:45	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:07
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 3:45
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/01/2021 17:10
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:28
21011267-006A	EQB-20210120	01/20/2021 12:00	01/25/2021 16:30		
	EPA 600 245.1 R3.0 (Total)			01/25/2021 17:45	01/26/2021 10:01
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			01/25/2021 17:36	01/28/2021 1:18
21011267-007A	SB-XPW-02-(4-6)-20210120	01/20/2021 13:00	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:07
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 3:53
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/29/2021 19:56

Dates Report

Client: Geosyntec Consultants
Client Project: GLP8021

Work Order: 21011267
Report Date: 05-Feb-21

Sample ID	**Client Sample ID**	**Collection Date**	**Received Date**		
	Test Name			**Prep Date/Time**	**Analysis Date/Time**
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/03/2021 10:30
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	02/03/2021 14:10
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:31
21011267-008A	SB-XPW-02-(24-26)-20210120	01/20/2021 14:00	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:07
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 4:01
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/01/2021 17:28
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:33
21011267-009A	EQB-20210121	01/21/2021 7:30	01/25/2021 16:30		
	EPA 600 245.1 R3.0 (Total)			01/25/2021 17:45	01/26/2021 10:08
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			01/25/2021 17:36	01/28/2021 1:27
21011267-010A	SB-XPW-03-(6-8)-20210121	01/21/2021 11:00	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:07
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 4:09
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/29/2021 20:05
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/03/2021 10:39
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:36
21011267-011A	SB-XPW-03-(34-36)-20210121	01/21/2021 12:00	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:08
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 4:17
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/29/2021 20:13
	SW-846 3050B, 6020A, Metals by ICPMS			02/02/2021 13:37	02/03/2021 10:55
	SW-846 3050B, 6020A, Metals by ICPMS			02/02/2021 14:28	02/03/2021 14:51
	SW-846 7471B			01/25/2021 17:42	01/26/2021 11:03
21011267-012A	SB-XPW-01-(46-48)-20210120	01/20/2021 11:45	01/25/2021 16:30		
	EPA SW846 3550C, 5035A, ASTM D2974				01/27/2021 17:08
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:50	01/28/2021 6:12
	SW-846 3050B, 6020A, Metals by ICPMS			01/25/2021 19:26	02/01/2021 19:21
	SW-846 7471B			01/25/2021 17:42	01/26/2021 10:45

Client: Geosyntec Consultants
Client Project: GLP8021

Work Order: 21011267
Report Date: 05-Feb-21

EPA SW846 3550C, 5035A, ASTM D2974

Batch **R286790** **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	01/27/2021

Batch **R286790** **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	01/27/2021

EPA 600 245.1 R3.0 (TOTAL)

Batch **173239** **SampType:** **MBLK** Units **mg/L**
SampID: MBLK-173239

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	01/26/2021

Batch **173239** **SampType:** **LCS** Units **mg/L**
SampID: LCS-173239

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00504**	0.0050	0	100.7	85	115	01/26/2021

Batch **173239** **SampType:** **MS** Units **mg/L**
SampID: 21011261-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00537**	0.0050	0.0001813	103.8	75	125	01/26/2021

Batch **173239** **SampType:** **MSD** Units **mg/L** RPD Limit **15**
SampID: 21011261-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00546**	0.0050	0.0001813	105.5	0.005373	1.53	01/26/2021

Batch **173239** **SampType:** **MS** Units **mg/L**
SampID: 21011267-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00538**	0.0050	0	107.6	75	125	01/26/2021

EPA 600 245.1 R3.0 (TOTAL)

Batch **173239** **SampType:** **MSD** Units **mg/L** RPD Limit **15**

SampID: 21011267-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00522**	0.0050	0	104.4	0.005381	2.99	01/26/2021

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173238** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-173238

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	01/28/2021
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	01/28/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	01/28/2021
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	01/28/2021
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	01/28/2021
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	01/28/2021
Calcium		0.125		**< 0.125**	0.0700	0	0	-100	100	01/28/2021
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	01/28/2021
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	01/28/2021
Iron		0.0250	S	**0.0339**	0.0115	0	294.5	-100	100	01/28/2021
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	01/28/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	01/28/2021
Manganese		0.0020		**< 0.0020**	0.0008	0	0	-100	100	01/28/2021
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	01/28/2021
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	01/28/2021
Thallium		0.0008		**< 0.0008**	0.0010	0	0	-100	100	01/29/2021
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	01/28/2021

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173238** **SampType:** **LCS** Units **mg/L**

SampID: LCS-173238

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.492**	0.5000	0	98.4	85	115	01/28/2021
Arsenic		0.0010		**0.521**	0.5000	0	104.2	85	115	01/28/2021
Barium		0.0010		**2.12**	2.000	0	105.8	85	115	01/28/2021
Beryllium		0.0010		**0.0496**	0.0500	0	99.3	85	115	01/28/2021
Boron		0.0250		**0.506**	0.5000	0	101.1	85	115	01/28/2021
Cadmium		0.0010		**0.0490**	0.0500	0	98.0	85	115	01/28/2021
Calcium		0.125		**2.25**	2.500	0	90.1	85	115	01/28/2021
Chromium		0.0015		**0.186**	0.2000	0	93.2	85	115	01/28/2021
Cobalt		0.0010		**0.471**	0.5000	0	94.1	85	115	01/28/2021
Iron		0.0250	B	**2.16**	2.000	0	107.9	85	115	01/28/2021
Lead		0.0010		**0.511**	0.5000	0	102.2	85	115	01/28/2021
Lithium	*	0.0030		**0.524**	0.5000	0	104.7	85	115	01/28/2021
Lithium	*	0.0030		**0.525**	0.5000	0	104.9	85	115	01/28/2021
Manganese		0.0020		**0.504**	0.5000	0	100.8	85	115	01/28/2021
Molybdenum		0.0015		**0.456**	0.5000	0	91.3	85	115	01/28/2021
Selenium		0.0010		**0.515**	0.5000	0	103.1	85	115	01/28/2021
Thallium		0.0008		**0.283**	0.2500	0	113.2	85	115	01/29/2021
Thallium		0.0020		**0.244**	0.2500	0	97.6	85	115	01/28/2021

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173238** **SampType:** **MS** Units **mg/L**

SampID: 21011267-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.506**	0.5000	0	101.2	70	130	01/28/2021
Arsenic		0.0010		**0.559**	0.5000	0.0007001	111.6	70	130	01/28/2021
Barium		0.0010		**2.22**	2.000	0.01950	109.9	70	130	01/28/2021
Beryllium		0.0010		**0.0554**	0.0500	0	110.9	70	130	01/28/2021
Boron		0.0250		**0.541**	0.5000	0.01196	105.7	70	130	01/28/2021
Cadmium		0.0010		**0.0510**	0.0500	0	101.9	70	130	01/28/2021
Calcium		0.125		**3.36**	2.500	0.7864	103.1	70	130	01/28/2021
Chromium		0.0015		**0.225**	0.2000	0.01286	106.2	70	130	01/28/2021
Cobalt		0.0010		**0.534**	0.5000	0.001142	106.6	70	130	01/28/2021
Iron		0.0250	B	**6.18**	2.000	4.009	108.3	70	130	01/28/2021
Lead		0.0010		**0.512**	0.5000	0.001205	102.2	70	130	01/28/2021
Lithium	*	0.0030		**0.567**	0.5000	0	113.3	70	130	01/28/2021
Manganese		0.0020		**0.578**	0.5000	0.04049	107.5	70	130	01/28/2021
Molybdenum		0.0015		**0.500**	0.5000	0.003806	99.3	70	130	01/28/2021
Selenium		0.0010		**0.517**	0.5000	0	103.4	70	130	01/28/2021
Thallium		0.0020		**0.248**	0.2500	0	99.3	70	130	01/28/2021

Batch **173238** **SampType:** **MSD** Units **mg/L** RPD Limit **20**

SampID: 21011267-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.505**	0.5000	0	100.9	0.5059	0.28	01/28/2021
Arsenic		0.0010		**0.565**	0.5000	0.0007001	112.8	0.5588	1.06	01/28/2021
Barium		0.0010		**2.24**	2.000	0.01950	111.2	2.218	1.17	01/28/2021
Beryllium		0.0010		**0.0553**	0.0500	0	110.5	0.05543	0.31	01/28/2021
Boron		0.0250		**0.562**	0.5000	0.01196	110.0	0.5407	3.84	01/28/2021
Cadmium		0.0010		**0.0516**	0.0500	0	103.2	0.05095	1.29	01/28/2021
Calcium		0.125		**3.48**	2.500	0.7864	107.9	3.363	3.56	01/28/2021
Chromium		0.0015		**0.226**	0.2000	0.01286	106.4	0.2254	0.13	01/28/2021
Cobalt		0.0010		**0.532**	0.5000	0.001142	106.2	0.5341	0.35	01/28/2021
Iron		0.0250	B	**6.17**	2.000	4.009	108.1	6.175	0.07	01/28/2021
Lead		0.0010		**0.506**	0.5000	0.001205	100.9	0.5121	1.23	01/28/2021
Lithium	*	0.0030		**0.565**	0.5000	0	113.1	0.5665	0.19	01/28/2021
Manganese		0.0020		**0.588**	0.5000	0.04049	109.5	0.5780	1.68	01/28/2021
Molybdenum		0.0015		**0.500**	0.5000	0.003806	99.3	0.5001	0.06	01/28/2021
Selenium		0.0010		**0.525**	0.5000	0	105.1	0.5169	1.62	01/28/2021
Thallium		0.0020		**0.245**	0.2500	0	98.0	0.2482	1.27	01/28/2021

Client: Geosyntec Consultants

Client Project: GLP8021

Work Order: 21011267

Report Date: 05-Feb-21

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

Batch 173242 **SampType:** **MBLK** Units **mg/Kg-dry**
SampID: MBLK-173242

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	02/01/2021

Batch 173242 **SampType:** **LCS** Units **mg/Kg-dry**
SampID: LCS-173242

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**55.2**	50.00	0	110.4	80	120	02/01/2021

Batch 173243 **SampType:** **MBLK** Units **mg/Kg-dry**
SampID: MBLK-173243

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	118.6	-100	100	01/28/2021
Barium		0.20	S	**0.36**	0.0550	0	656.6	-100	100	01/28/2021
Beryllium		0.30		**< 0.30**	0.0269	0	0	-100	100	01/28/2021
Boron		5.00		**< 5.00**	0.8000	0	0	-100	100	01/28/2021
Cadmium		0.20		**< 0.20**	0.0150	0	0	-100	100	01/28/2021
Calcium	*	50.0		**< 50.0**	18.60	0	0	-100	100	01/28/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	01/28/2021
Cobalt		0.20		**< 0.20**	0.0253	0	0	-100	100	01/28/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	01/28/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	01/28/2021
Lithium	*	0.30		**< 0.30**	0.0607	0	0	-100	100	01/28/2021
Manganese		0.20	S	**< 0.20**	0.0670	0	120.7	-100	100	01/28/2021
Molybdenum		0.20		**< 0.20**	0.0740	0	0	-100	100	01/28/2021
Selenium		1.00		**< 1.00**	0.1375	0	0	-100	100	01/28/2021
Thallium		0.20		**< 0.20**	0.1000	0	0	-100	100	01/28/2021

Client: Geosyntec Consultants

Work Order: 21011267

Client Project: GLP8021

Report Date: 05-Feb-21

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

Batch **173243** **SampType:** **LCS** Units **mg/Kg-dry**

SampID: LCS-173243

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	B	**48.3**	50.00	0	96.6	80	120	01/28/2021
Barium		0.20	B	**191**	200.0	0	95.7	80	120	01/28/2021
Beryllium		0.30		**4.41**	5.000	0	88.3	80	120	01/28/2021
Boron		5.00		**44.7**	50.00	0	89.4	80	120	01/28/2021
Cadmium		0.20		**4.44**	5.000	0	88.7	80	120	01/28/2021
Calcium	*	50.0		**222**	250.0	0	88.8	80	120	01/28/2021
Chromium		0.50		**17.1**	20.00	0	85.5	80	120	01/28/2021
Cobalt		0.20		**42.9**	50.00	0	85.9	80	120	01/28/2021
Iron		10.0		**164**	200.0	0	82.2	80	120	01/28/2021
Lead		0.20		**45.8**	50.00	0	91.5	80	120	01/28/2021
Lithium	*	0.30		**47.0**	50.00	0	94.0	80	120	01/28/2021
Manganese		0.20	B	**46.4**	50.00	0	92.8	80	120	01/28/2021
Molybdenum		0.20		**41.8**	50.00	0	83.6	80	120	01/28/2021
Selenium		1.00		**46.8**	50.00	0	93.7	80	120	01/28/2021
Thallium		0.20		**22.1**	25.00	0	88.4	80	120	01/28/2021

Batch **173243** **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21011204-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20	B	**60.1**	49.02	5.931	110.5	75	125	01/29/2021
Selenium		0.98		**48.7**	49.02	0.5322	98.3	75	125	01/29/2021

Batch **173243** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**

SampID: 21011204-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		0.19	B	**62.0**	48.08	5.931	116.6	60.08	3.12	01/29/2021
Selenium		0.96		**48.9**	48.08	0.5322	100.6	48.70	0.42	01/29/2021

Client: Geosyntec Consultants **Work Order:** 21011267

Client Project: GLP8021 **Report Date:** 05-Feb-21

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

Batch **173243** **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21011267-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.98	B	**108**	49.02	52.71	112.9	75	125	01/28/2021
Barium		0.98	B	**346**	196.1	149.4	100.5	75	125	01/28/2021
Beryllium		1.47		**6.69**	4.902	1.492	106.0	75	125	01/28/2021
Boron		24.5		**138**	49.02	92.60	92.3	75	125	01/28/2021
Cadmium		0.20		**5.58**	4.902	0.6534	100.5	75	125	01/29/2021
Calcium	*	245	S	**4560**	245.1	4012	225.3	75	125	01/28/2021
Chromium		2.45		**53.6**	19.61	31.15	114.6	75	125	01/28/2021
Cobalt		0.98		**56.8**	49.02	8.261	99.0	75	125	01/28/2021
Iron		49.0	S	**28400**	196.1	26200	1145	75	125	01/28/2021
Lead		0.98		**91.9**	49.02	42.76	100.3	75	125	01/28/2021
Lithium	*	1.47		**70.8**	49.02	17.51	108.7	75	125	01/28/2021
Manganese		0.98	B	**147**	49.02	95.60	104.3	75	125	01/28/2021
Selenium		4.90		**52.6**	49.02	6.940	93.2	75	125	01/28/2021

Batch **173243** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**

SampID: 21011267-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.00	B	**109**	50.00	52.71	112.3	108.0	0.76	01/28/2021
Barium		1.00	B	**356**	200.0	149.4	103.2	346.5	2.65	01/28/2021
Beryllium		1.50		**6.83**	5.000	1.492	106.7	6.686	2.09	01/28/2021
Boron		25.0		**141**	50.00	92.60	96.6	137.8	2.19	01/28/2021
Cadmium		0.20		**5.70**	5.000	0.6534	100.9	5.579	2.09	01/29/2021
Calcium	*	250	S	**4770**	250.0	4012	303.6	4565	4.43	01/28/2021
Chromium		2.50		**53.9**	20.00	31.15	113.8	53.62	0.53	01/28/2021
Cobalt		1.00		**57.9**	50.00	8.261	99.2	56.79	1.86	01/28/2021
Iron		50.0	S	**28500**	200.0	26200	1175	28440	0.37	01/28/2021
Lead		1.00		**94.7**	50.00	42.76	103.9	91.93	2.96	01/28/2021
Lithium	*	1.50		**72.9**	50.00	17.51	110.8	70.80	2.97	01/28/2021
Manganese		1.00	B	**149**	50.00	95.60	106.6	146.7	1.46	01/28/2021
Selenium		5.00		**54.6**	50.00	6.940	95.3	52.61	3.67	01/28/2021

Batch **173503** **SampType:** **MBLK** Units **mg/Kg-dry**

SampID: MBLK-173503

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	02/03/2021

Client: Geosyntec Consultants
Work Order: 21011267

Client Project: GLP8021
Report Date: 05-Feb-21

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

Batch **173503** **SampType:** **LCS** Units **mg/Kg-dry**
SampID: LCS-173503

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**54.0**	50.00	0	108.0	80	120	02/03/2021

Batch **173503** **SampType:** **MS** Units **mg/Kg-dry**
SampID: 21011267-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.36	S	**26.8**	45.45	0.4149	58.1	75	125	02/03/2021

Batch **173503** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**
SampID: 21011267-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.37	SR	**13.1**	46.30	0.4149	27.5	26.80	68.47	02/03/2021

Batch **173510** **SampType:** **MBLK** Units **mg/Kg-dry**
SampID: MBLK-173510

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Molybdenum		0.20		**< 0.20**	0.0740	0	0	-100	100	02/03/2021
Thallium		0.20		**< 0.20**	0.1000	0	0	-100	100	02/03/2021

Batch **173510** **SampType:** **LCS** Units **mg/Kg-dry**
SampID: LCS-173510

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Molybdenum		0.20		**44.0**	50.00	0	88.0	80	120	02/04/2021
Thallium		0.20		**21.3**	25.00	0	85.2	80	120	02/04/2021

Batch **173510** **SampType:** **MS** Units **mg/Kg-dry**
SampID: 21011267-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Molybdenum		0.19	SE	**276**	46.30	213.1	136.8	75	125	02/03/2021
Thallium		0.19	S	**12.1**	23.15	0.4640	50.3	75	125	02/03/2021

Batch **173510** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**
SampID: 21011267-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Molybdenum		0.19	SR	**77.7**	47.17	213.1	-287.0	276.4	112.21	02/03/2021
Thallium		0.19	SR	**2.91**	23.58	0.4640	10.4	12.11	122.41	02/03/2021

Client: Geosyntec Consultants **Work Order:** 21011267

Client Project: GLP8021 **Report Date:** 05-Feb-21

SW-846 7471B

Batch 173211 **SampType:** **MBLK** Units **mg/Kg**

SampID: MBLK-173211

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	01/26/2021

Batch 173211 **SampType:** **LCS** Units **mg/Kg**

SampID: LCS-173211

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.259**	0.2500	0	103.7	85	115	01/26/2021

Batch 173211 **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21011006-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.270		**3.29**	1.348	1.648	122.0	75	125	01/26/2021

Batch 173211 **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **15**

SampID: 21011006-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.287		**3.26**	1.433	1.648	112.2	3.293	1.12	01/26/2021

Batch 173211 **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21011267-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.073		**0.689**	0.3654	0.3298	98.2	75	125	01/26/2021

Batch 173211 **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **15**

SampID: 21011267-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.070		**0.649**	0.3522	0.3298	90.7	0.6885	5.87	01/26/2021

Receiving Check List

Client: Geosyntec Consultants

Client Project: GLP8021

Work Order: 21011267

Report Date: 05-Feb-21

Carrier: Jacob Wilson

Received By: EAH

Completed by:
On:
25-Jan-21
Amanda R. Ham

Reviewed by: Shelly A Hennessy
On:
25-Jan-21
Shelly A. Hennessy

Pages to follow: Chain of custody 2 Extra pages included 12

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 1.4
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 - 1/25/2021 5:31:46 PM

CHAIN OF CUSTODY

pg. 1 of 2 Work order # 21011267

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

Client: Geosyntec Consultants
Address: 1 McBride and Son Center Drive, Suite 202
City / State / Zip Chesterfield, MO 63005
Contact: Allison Kreinberg **Phone:** (636) 812-0809
E-Mail: AKreinberg@Geosyntec.com **Fax:**

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 1.4 °C LTG# 1
Preserved in: ☐ LAB ☒ FIELD **FOR LAB USE ONLY**
Lab Notes EAH 1/25/21 - pH 74534

Client Comments:
*Sb As Ba Be B Cd Ca Cr Co Pb Fe Li Mn Hg Mo Se Tl - Metals per Allison Kreinberg AH 1/25/21

Courier

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

Project Name/Number AT ~~GLP2021~~ GLP8021
Sample Collector's Name Amanda Taye

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

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	* Metals	TOC
21011267-001	SB-611-(22-24)-20210119	1-19-21 1330	2										X				1	1
002	SB-611-(58-60)-20210119	1-19-21 1335	2										X				1	1
003	EQB-20210119	1-19-21		1							X						1	
004	SB-XPW-01-(4-6)-20210120	1-20-21 1130	1										X				1	
005	SB-XPW-01-(4-6)-20210120-DUP	1-20-21 1145	1										X				1	
006	EQB-20210120	1-20-21 1200		1							X						1	
007	SB-XPW-02-(4-6)-20210120	1-20-21 1300	1										X				1	
008	SB-XPW-05(24-26)-20210120	1-20-21 1400	1										X				1	
009	EQB-20210121	1-21-21 0730		1							X						1	
010	SB-XPW-03-([illegible])-20210121	1-21-21 1100	1										X				1	

Relinquished By	Date/Time	Received By	Date/Time
	1/25/21 1320		1/25/21 1320
	1/25/21 1630	Elizabeth A Hurley	1/25/21 1630

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: 63216

EAH 1/25/21

CHAIN OF CUSTODY

pg. 2 of 2 Work order # 21011267

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

Client: Geosyntec Consultants
Address: 1 McBride and Son Center Drive, Suite 202
City / State / Zip Chesterfield, MO 63005
Contact: Allison Kreinberg **Phone:** (636) 812-0809
E-Mail: AKreinberg@Geosyntec.com **Fax:**

Samples on: ▨ ICE ▨ BLUE ICE ▨ NO ICE ____ °C LTG# ____
Preserved in: ▨ LAB ▨ FIELD **FOR LAB USE ONLY**
Lab Notes

Client Comments:

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

Project Name/Number

Sample Collector's Name Amanda Taye

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

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	Metals	TOC
	~~SB-XPU-03~~																	
21011267 011	SB-XPU-03-(34-36) -20210121	1-21-21 1200	1										X				1	
011 ~~012~~	SB-XPU-03-(34-36) -20210121-MS	1-21-21 1200	1										X				1	
TE 1/25 011 ~~013~~	SB-XPU-03-(34-36) -20210121-MSD	1-21-21 1200	1										X				1	
012 ~~014~~	SB-XPU-01-(46-48) -20210120	1-20-21 1145	1										X				1	
TE 1/25																		

Relinquished By	Date/Time	Received By	Date/Time
	1/25/21 1320		1/25/21 1320
	1/25/21 1630		1/25/21 1630

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: 63216

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

February 02, 2021

Elizabeth Hurley
Teklab, Inc
5445 Horseshoe Lake Rd
Collinsville, IL 62234

RE: Project: 21011267
Pace Project No.: 40221510

Dear Elizabeth Hurley:

Enclosed are the analytical results for sample(s) received by the laboratory on January 27, 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

CERTIFICATIONS

Project:	21011267
Pace Project No.:	40221510

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

SAMPLE SUMMARY

Project: 21011267
Pace Project No.: 40221510

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40221510001	**21011267-001**	Solid	01/19/21 13:30	01/27/21 09:35
40221510002	**21011267-002**	Solid	01/19/21 13:35	01/27/21 09:35

SAMPLE ANALYTE COUNT

Project: 21011267
Pace Project No.: 40221510

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40221510001	**21011267-001**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221510002	**21011267-002**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4

PASI-G = Pace Analytical Services - Green Bay

ANALYTICAL RESULTS

Project: 21011267
Pace Project No.: 40221510

Sample: 21011267-001 **Lab ID: 40221510001** Collected: 01/19/21 13:30 Received: 01/27/21 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	**16.3**	%	0.10	0.10	1		01/27/21 14:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**7.0**	%	0.10	0.10	1		02/01/21 11:45		
Total Organic Carbon	**401J**	mg/kg	710	212	1		02/01/21 11:45	7440-44-0	
Total Organic Carbon	**430J**	mg/kg	715	213	1		02/01/21 11:50	7440-44-0	
Mean Total Organic Carbon	**415J**	mg/kg	713	213	1		02/01/21 11:45	7440-44-0	C4

Sample: 21011267-002 **Lab ID: 40221510002** Collected: 01/19/21 13:35 Received: 01/27/21 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	**12.1**	%	0.10	0.10	1		01/27/21 14:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**5.4**	%	0.10	0.10	1		02/01/21 12:07		
Total Organic Carbon	**<202**	mg/kg	678	202	1		02/01/21 12:07	7440-44-0	
Total Organic Carbon	**<203**	mg/kg	680	203	1		02/01/21 12:13	7440-44-0	
Mean Total Organic Carbon	**<203**	mg/kg	679	203	1		02/01/21 12:07	7440-44-0	C4

QUALITY CONTROL DATA

Project: 21011267
Pace Project No.: 40221510

QC Batch: 376626
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: 40221510001, 40221510002

SAMPLE DUPLICATE: 2174826

Parameter	Units	40221488001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	6.7	6.7	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.

QUALITY CONTROL DATA

Project: 21011267
Pace Project No.: 40221510

QC Batch: 376725
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: 40221510001, 40221510002

METHOD BLANK: 2175468
Matrix: Solid
Associated Lab Samples: 40221510001, 40221510002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	<179	600	02/01/21 10:01	

LABORATORY CONTROL SAMPLE: 2175469

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	120000	117000	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2175470 2175471

Parameter	Units	40221231003 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	8080	33000	33100	40900	41000	100	99	50-150	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2175472 2175473

Parameter	Units	40221567002 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	4250	21100	21000	50800	33900	221	141	50-150	40	30	M0,R1

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.

QUALIFIERS

Project:	21011267
Pace Project No.:	40221510

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.
R1	RPD value was outside control limits.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 21011267
Pace Project No.: 40221510

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40221510001	**21011267-001**	ASTM D2974-87	376626		
40221510002	**21011267-002**	ASTM D2974-87	376626		
40221510001	**21011267-001**	EPA 9060 Modified	376725		
40221510001	**21011267-001**	EPA 9060 Modified	376726		
40221510002	**21011267-002**	EPA 9060 Modified	376725		
40221510002	**21011267-002**	EPA 9060 Modified	376726		

Pg ___ of ___

40221510

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: 2

Project# 21011267

Comments: **Please Issue reports and invoices via email only**
Please analyze for TOC on a standard turnaround time.
Batch QC is required for all analyses requested.
Any changes to analysis/methods must be approved.

Contact: Aaron Renner

Email: arenner@teklabinc.com

Requested Due Date: Standard TAT

Billing/PO: 30689

Phone: (630) 324-6855

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	21011267-001	1/19/21 13:30	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
002	21011267-002	1/19/21 13:35	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Wastewater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*Relinquished By	Date/Time	Received By	Date/Time
Fedex	1/26/21 1700 (Ext)	Nicole Haerf Pace	1/27/21 0935
FedEx	1/27/21 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)

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: TekLab

Project # 40221510

All containers needing preservation have been checked and noted below: ☐Yes ☐No [✓ N/A]

Lab Lot# of pH paper:

Lab Std #ID of preservation (if pH adjusted):

Initial when completed:

Date/ Time:

Pace Lab #	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)
	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																						1											2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
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018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

11/27/21
KW

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# : 40221510

40221510

Client Name: Eklab

Courier: ☐ CS Logistics ☑ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco
☐ Client ☐ Pace Other:

Tracking #: 9450 9224 5723

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

Thermometer Used SR - 97 **Type of Ice:** [✓ Wet] Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2 /Corr: 2

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: 1/27/21 /Initials: NM

Labeled By Initials: NP

Chain of Custody Present:	☑ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☐ Yes ☑ No ☐ N/A	2. pg# 1/27/21 NM
Chain of Custody Relinquished:	☑ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC:	☐ Yes ☑ No ☐ N/A	4.
Samples Arrived within Hold Time: - VOA Samples frozen upon receipt	☑ Yes ☐ No ☐ Yes ☐ No	5. 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: -Pace Containers Used: -Pace IR Containers Used:	☑ Yes ☐ No ☐ Yes ☑ No ☐ N/A ☐ Yes ☑ No ☐ N/A	9.
Containers Intact:	☑ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☑ N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: S	1/27/21 NM ~~☒ Yes~~ ☑ No ☐ N/A	12. Client id includes "B" at end 1/27/21 NM
Trip Blank Present: Trip Blank Custody Seals Present Pace Trip Blank Lot # (if purchased):	☐ Yes ☐ No ☑ N/A ☐ Yes ☐ No ☑ N/A	13.

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

Teklab, Inc.
Environmental Laboratory
http://www.teklabinc.com/

February 17, 2021

Allison Kreinberg
Geosyntec Consultants
941 Chatham Lane, Ste 103
Columbus, OH 43221
TEL: (614) 468-0421
FAX:

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

RE: Vistra Joppa GLP8021 **WorkOrder:** 21020428

Dear Allison Kreinberg:

TEKLAB, INC received 9 samples on 2/5/2021 3:45:00 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,

Aaron Renner
Project Manager
(630)324-6855
arenner@teklabinc.com

Report Contents

Client: Geosyntec Consultants
Client Project: Vistra Joppa GLP8021

Work Order: 21020428
Report Date: 17-Feb-21

This reporting package includes the following:

Definitions

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-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)

Definitions

Client: Geosyntec Consultants

Work Order: 21020428

Client Project: Vistra Joppa GLP8021

Report Date: 17-Feb-21

Qualifiers

\# - Unknown hydrocarbon

C - RL shown is a Client Requested Quantitation Limit

H - Holding times exceeded

J - Analyte detected below quantitation limits

ND - Not Detected at the Reporting Limit

S - Spike Recovery outside recovery limits

X - Value exceeds Maximum Contaminant Level

B - Analyte detected in associated Method Blank

E - Value above quantitation range

I - Associated internal standard was outside method criteria

M - Manual Integration used to determine area response

R - RPD outside accepted recovery limits

T - TIC(Tentatively identified compound)

Case Narrative

Client: Geosyntec Consultants
Client Project: Vistra Joppa GLP8021

Work Order: 21020428
Report Date: 17-Feb-21

Cooler Receipt Temp: 6.8 °C

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

Accreditations

Client: Geosyntec Consultants
Client Project: Vistra Joppa GLP8021

Work Order: 21020428
Report Date: 17-Feb-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		3/14/2021	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: Geosyntec Consultants

Work Order: 21020428

Client Project: Vistra Joppa GLP8021

Report Date: 17-Feb-21

Lab ID: 21020428-001

Client Sample ID: SB-G09M-(10-12)-20210126

Matrix: SOLID

Collection Date: 01/26/2021 11:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**17.7**	%	1	02/10/2021 13:44	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.39		**< 0.39**	mg/Kg-dry	10	02/16/2021 15:23	173868
Arsenic	NELAP	0.18		**3.34**	mg/Kg-dry	10	02/09/2021 0:06	173655
Barium	NELAP	0.18	B	**93.6**	mg/Kg-dry	10	02/09/2021 0:06	173655
Beryllium	NELAP	0.27		**0.46**	mg/Kg-dry	10	02/09/2021 0:06	173655
Boron	NELAP	4.55	B	**< 4.55**	mg/Kg-dry	10	02/09/2021 0:06	173655
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	02/09/2021 0:06	173655
Calcium	*	45.5		**1740**	mg/Kg-dry	10	02/09/2021 0:06	173655
Chromium	NELAP	0.45		**16.6**	mg/Kg-dry	10	02/09/2021 0:06	173655
Cobalt	NELAP	0.18		**5.68**	mg/Kg-dry	10	02/09/2021 0:06	173655
Iron	NELAP	9.09		**13100**	mg/Kg-dry	10	02/09/2021 0:06	173655
Lead	NELAP	0.18		**7.76**	mg/Kg-dry	10	02/09/2021 0:06	173655
Lithium	*	0.27		**9.67**	mg/Kg-dry	10	02/09/2021 0:06	173655
Manganese	NELAP	0.18		**338**	mg/Kg-dry	10	02/09/2021 0:06	173655
Molybdenum	NELAP	0.18		**0.37**	mg/Kg-dry	10	02/09/2021 0:06	173655
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	02/09/2021 0:06	173655
Thallium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	02/09/2021 0:06	173655

Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7471B								
Mercury	NELAP	0.012		**0.021**	mg/Kg-dry	1	02/09/2021 13:27	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	740		**950**	mg/Kg-dry	1	02/11/2021 0:00	R287399

Sample container did not meet EPA or method requirements.

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-002
Client Sample ID: SB-G09M-(82-84)-20210127
Matrix: SOLID
Collection Date: 01/27/2021 9:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**19.4**	%	1	02/10/2021 13:44	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	02/16/2021 15:31	173868
Arsenic	NELAP	0.18		**6.34**	mg/Kg-dry	10	02/09/2021 0:15	173655
Barium	NELAP	0.18	B	**19.6**	mg/Kg-dry	10	02/09/2021 0:15	173655
Beryllium	NELAP	0.27		**0.89**	mg/Kg-dry	10	02/09/2021 0:15	173655
Boron	NELAP	4.55	B	**< 4.55**	mg/Kg-dry	10	02/09/2021 0:15	173655
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	02/09/2021 0:15	173655
Calcium	*	45.5		**277**	mg/Kg-dry	10	02/09/2021 0:15	173655
Chromium	NELAP	0.45		**19.4**	mg/Kg-dry	10	02/09/2021 0:15	173655
Cobalt	NELAP	0.18		**7.69**	mg/Kg-dry	10	02/09/2021 0:15	173655
Iron	NELAP	9.09		**32000**	mg/Kg-dry	10	02/09/2021 0:15	173655
Lead	NELAP	0.18		**3.48**	mg/Kg-dry	10	02/09/2021 0:15	173655
Lithium	*	0.27		**0.78**	mg/Kg-dry	10	02/09/2021 0:15	173655
Manganese	NELAP	0.18		**270**	mg/Kg-dry	10	02/09/2021 0:15	173655
Molybdenum	NELAP	0.18		**1.04**	mg/Kg-dry	10	02/09/2021 0:15	173655
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	02/09/2021 0:15	173655
Thallium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	02/09/2021 0:15	173655
Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	02/09/2021 13:34	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	740		**< 740**	mg/Kg-dry	1	02/10/2021 0:00	R287399
Sample container did not meet EPA or method requirements.								

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-003
Client Sample ID: SB-G09M-(110-112)-20210127
Matrix: SOLID
Collection Date: 01/27/2021 11:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**22.0**	%	1	02/10/2021 13:44	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	02/16/2021 15:39	173868
Arsenic	NELAP	0.20		**4.44**	mg/Kg-dry	10	02/09/2021 0:23	173655
Barium	NELAP	0.20	B	**11.5**	mg/Kg-dry	10	02/09/2021 0:23	173655
Beryllium	NELAP	0.29		**< 0.29**	mg/Kg-dry	10	02/09/2021 0:23	173655
Boron	NELAP	4.90	B	**< 4.90**	mg/Kg-dry	10	02/09/2021 0:23	173655
Cadmium	NELAP	0.20		**< 0.20**	mg/Kg-dry	10	02/09/2021 0:23	173655
Calcium	*	49.0		**420**	mg/Kg-dry	10	02/09/2021 0:23	173655
Chromium	NELAP	0.49		**7.43**	mg/Kg-dry	10	02/09/2021 0:23	173655
Cobalt	NELAP	0.20		**0.80**	mg/Kg-dry	10	02/09/2021 0:23	173655
Iron	NELAP	9.80		**6470**	mg/Kg-dry	10	02/09/2021 0:23	173655
Lead	NELAP	0.20		**3.76**	mg/Kg-dry	10	02/09/2021 0:23	173655
Lithium	*	0.29		**1.72**	mg/Kg-dry	10	02/09/2021 0:23	173655
Manganese	NELAP	0.20		**57.2**	mg/Kg-dry	10	02/09/2021 0:23	173655
Molybdenum	NELAP	0.20		**0.51**	mg/Kg-dry	10	02/09/2021 0:23	173655
Selenium	NELAP	0.98		**< 0.98**	mg/Kg-dry	10	02/09/2021 0:23	173655
Thallium	NELAP	0.20		**< 0.20**	mg/Kg-dry	10	02/09/2021 0:23	173655
Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	02/09/2021 13:37	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	760		**< 760**	mg/Kg-dry	1	02/10/2021 0:00	R287399
Sample container did not meet EPA or method requirements.								

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-004
Client Sample ID: SB-G09M-(142-144)-20210128
Matrix: SOLID
Collection Date: 01/28/2021 15:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**65.3**	%	1	02/10/2021 13:44	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.38		**< 0.38**	mg/Kg-dry	10	02/16/2021 15:47	173868
Arsenic	NELAP	0.19		**1.88**	mg/Kg-dry	10	02/09/2021 0:31	173655
Barium	NELAP	0.19	B	**41.9**	mg/Kg-dry	10	02/09/2021 0:31	173655
Beryllium	NELAP	0.29		**< 0.29**	mg/Kg-dry	10	02/09/2021 0:31	173655
Boron	NELAP	4.81	B	**< 4.81**	mg/Kg-dry	10	02/09/2021 0:31	173655
Cadmium	NELAP	0.19		**2.75**	mg/Kg-dry	10	02/09/2021 0:31	173655
Calcium	*	48.1		**333000**	mg/Kg-dry	10	02/09/2021 0:31	173655
Chromium	NELAP	0.48		**6.32**	mg/Kg-dry	10	02/09/2021 0:31	173655
Cobalt	NELAP	0.19		**2.94**	mg/Kg-dry	10	02/09/2021 0:31	173655
Iron	NELAP	9.62		**2920**	mg/Kg-dry	10	02/09/2021 0:31	173655
Lead	NELAP	0.19		**2.02**	mg/Kg-dry	10	02/09/2021 0:31	173655
Lithium	*	0.29		**2.03**	mg/Kg-dry	10	02/09/2021 0:31	173655
Manganese	NELAP	0.19		**346**	mg/Kg-dry	10	02/09/2021 0:31	173655
Molybdenum	NELAP	0.19		**0.24**	mg/Kg-dry	10	02/09/2021 0:31	173655
Selenium	NELAP	0.96		**< 0.96**	mg/Kg-dry	10	02/09/2021 0:31	173655
Thallium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 0:31	173655
Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.027		**< 0.027**	mg/Kg-dry	1	02/09/2021 13:39	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	1700		**21000**	mg/Kg-dry	1	02/10/2021 0:00	R287399
Sample container did not meet EPA or method requirements.								

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-005
Client Sample ID: EQB-20210128
Matrix: AQUEOUS
Collection Date: 01/28/2021 16:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 245.1 R3.0 (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/09/2021 12:55	173695
EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 22:31	173688
Arsenic	NELAP	0.0010		**0.0023**	mg/L	5	02/10/2021 22:31	173688
Barium	NELAP	0.0010		**0.0226**	mg/L	5	02/10/2021 22:31	173688
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 22:31	173688
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	02/10/2021 22:31	173688
Cadmium	NELAP	0.0010		**0.0017**	mg/L	5	02/10/2021 22:31	173688
Calcium	NELAP	0.125	S	**241**	mg/L	5	02/12/2021 7:11	173688
Chromium	NELAP	0.0015		**0.0159**	mg/L	5	02/10/2021 22:31	173688
Cobalt	NELAP	0.0010		**0.0028**	mg/L	5	02/10/2021 22:31	173688
Iron	NELAP	0.0250		**5.79**	mg/L	5	02/10/2021 22:31	173688
Lead	NELAP	0.0010		**0.0023**	mg/L	5	02/10/2021 22:31	173688
Lithium	*	0.0030		**< 0.0030**	mg/L	5	02/10/2021 22:31	173688
Manganese	NELAP	0.0020		**0.215**	mg/L	5	02/10/2021 22:31	173688
Molybdenum	NELAP	0.0015		**0.0033**	mg/L	5	02/10/2021 22:31	173688
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 22:31	173688
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/10/2021 22:31	173688

Matrix spike control limits for CA are not applicable due to high sample/spike ratio.

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-006
Client Sample ID: SB-G03-(30-32)-20210202
Matrix: SOLID
Collection Date: 02/02/2021 11:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**18.2**	%	1	02/10/2021 13:45	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.37		**< 0.37**	mg/Kg-dry	10	02/16/2021 15:55	173868
Arsenic	NELAP	0.18		**2.59**	mg/Kg-dry	10	02/09/2021 0:39	173655
Barium	NELAP	0.18	B	**347**	mg/Kg-dry	10	02/10/2021 17:55	173655
Beryllium	NELAP	0.27		**0.71**	mg/Kg-dry	10	02/09/2021 0:39	173655
Boron	NELAP	4.63	BS	**< 4.63**	mg/Kg-dry	10	02/12/2021 12:53	173799
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	10	02/09/2021 0:39	173655
Calcium	*	45.5		**1590**	mg/Kg-dry	10	02/09/2021 0:39	173655
Chromium	NELAP	0.46		**18.7**	mg/Kg-dry	10	02/12/2021 12:53	173799
Cobalt	NELAP	0.19	SR	**110**	mg/Kg-dry	10	02/12/2021 12:53	173799
Iron	NELAP	9.09	S	**13900**	mg/Kg-dry	10	02/09/2021 0:39	173655
Lead	NELAP	0.18		**27.8**	mg/Kg-dry	10	02/10/2021 17:55	173655
Lithium	*	0.27		**12.6**	mg/Kg-dry	10	02/09/2021 0:39	173655
Manganese	NELAP	0.91	SR	**1320**	mg/Kg-dry	50	02/09/2021 18:16	173655
Molybdenum	NELAP	0.18		**0.38**	mg/Kg-dry	10	02/09/2021 0:39	173655
Selenium	NELAP	0.91		**< 0.91**	mg/Kg-dry	10	02/09/2021 0:39	173655
Thallium	NELAP	0.18		**0.26**	mg/Kg-dry	10	02/09/2021 0:39	173655
CO - RPD for MS/MSD was outside control limits due to sample composition. *Matrix spike did not recover within control limits for B and CO due to sample composition.* *Matrix spike control limits for Mn are not applicable due to high sample/spike ratio.* *Mn - RPD for MS/MSD was outside control limits due to sample composition.* *Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.* *Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.* *Matrix spike control limits for FE are not applicable due to high sample/spike ratio.*								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	02/09/2021 13:41	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	730		**< 730**	mg/Kg-dry	1	02/10/2021 0:00	R287399
Sample container did not meet EPA or method requirements.								

Client: Geosyntec Consultants | **Work Order:** 21020428

Client Project: Vistra Joppa GLP8021 | **Report Date:** 17-Feb-21

Lab ID: 21020428-007 | **Client Sample ID:** SB-G03-(58-60)-20210202

Matrix: SOLID | **Collection Date:** 02/02/2021 13:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**18.1**	%	1	02/10/2021 13:45	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.37		**< 0.37**	mg/Kg-dry	10	02/16/2021 18:13	173868
Arsenic	NELAP	0.19		**0.30**	mg/Kg-dry	10	02/09/2021 2:33	173655
Barium	NELAP	0.19	B	**6.01**	mg/Kg-dry	10	02/09/2021 2:33	173655
Beryllium	NELAP	0.28		**< 0.28**	mg/Kg-dry	10	02/09/2021 2:33	173655
Boron	NELAP	4.72	B	**< 4.72**	mg/Kg-dry	10	02/09/2021 2:33	173655
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:33	173655
Calcium	*	47.2		**153**	mg/Kg-dry	10	02/09/2021 2:33	173655
Chromium	NELAP	0.47		**4.69**	mg/Kg-dry	10	02/09/2021 2:33	173655
Cobalt	NELAP	0.19		**0.82**	mg/Kg-dry	10	02/09/2021 2:33	173655
Iron	NELAP	9.43		**1060**	mg/Kg-dry	10	02/09/2021 2:33	173655
Lead	NELAP	0.19		**1.30**	mg/Kg-dry	10	02/09/2021 2:33	173655
Lithium	*	0.28		**0.86**	mg/Kg-dry	10	02/09/2021 2:33	173655
Manganese	NELAP	0.19		**6.10**	mg/Kg-dry	10	02/09/2021 2:33	173655
Molybdenum	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:33	173655
Selenium	NELAP	0.94		**< 0.94**	mg/Kg-dry	10	02/09/2021 2:33	173655
Thallium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:33	173655
Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	02/09/2021 13:48	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	740		**< 740**	mg/Kg-dry	1	02/10/2021 0:00	R287399
Sample container did not meet EPA or method requirements.								

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21
Lab ID: 21020428-008
Client Sample ID: SB-G03-(58-60)-20210202-DUP
Matrix: SOLID
Collection Date: 02/02/2021 13:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550C, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**17.0**	%	1	02/10/2021 13:53	R287331
SW-846 3050B, 6020A, METALS BY ICPMS								
Antimony	NELAP	0.39		**< 0.39**	mg/Kg-dry	10	02/16/2021 18:21	173868
Arsenic	NELAP	0.19		**0.26**	mg/Kg-dry	10	02/09/2021 2:41	173655
Barium	NELAP	0.19	B	**5.06**	mg/Kg-dry	10	02/09/2021 2:41	173655
Beryllium	NELAP	0.29		**< 0.29**	mg/Kg-dry	10	02/09/2021 2:41	173655
Boron	NELAP	4.81	B	**< 4.81**	mg/Kg-dry	10	02/09/2021 2:41	173655
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:41	173655
Calcium	*	48.1		**121**	mg/Kg-dry	10	02/09/2021 2:41	173655
Chromium	NELAP	0.48		**3.91**	mg/Kg-dry	10	02/09/2021 2:41	173655
Cobalt	NELAP	0.19		**1.85**	mg/Kg-dry	10	02/09/2021 2:41	173655
Iron	NELAP	9.62		**830**	mg/Kg-dry	10	02/09/2021 2:41	173655
Lead	NELAP	0.19		**0.99**	mg/Kg-dry	10	02/09/2021 2:41	173655
Lithium	*	0.29		**0.80**	mg/Kg-dry	10	02/09/2021 2:41	173655
Manganese	NELAP	0.19		**8.51**	mg/Kg-dry	10	02/09/2021 2:41	173655
Molybdenum	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:41	173655
Selenium	NELAP	0.96		**< 0.96**	mg/Kg-dry	10	02/09/2021 2:41	173655
Thallium	NELAP	0.19		**< 0.19**	mg/Kg-dry	10	02/09/2021 2:41	173655

Sample result(s) for BA exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.
Contamination present in the MBLK for B. Sample results below the reporting limit are reportable per the TNI Standard.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	02/09/2021 13:50	173704
SW-846 METHOD 9060M, TOTAL ORGANIC CARBON								
Total Organic Carbon (TOC)	*	720		**< 720**	mg/Kg-dry	1	02/11/2021 0:00	R287399

Sample container did not meet EPA or method requirements.

Client: Geosyntec Consultants

Client Project: Vistra Joppa GLP8021

Lab ID: 21020428-009

Matrix: AQUEOUS

Work Order: 21020428

Report Date: 17-Feb-21

Client Sample ID: EQB-20210202

Collection Date: 02/02/2021 13:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 245.1 R3.0 (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/09/2021 12:57	173695
EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 23:44	173688
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 23:44	173688
Barium	NELAP	0.0010		**0.0177**	mg/L	5	02/10/2021 23:44	173688
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 23:44	173688
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	02/10/2021 23:44	173688
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 23:44	173688
Calcium	NELAP	0.125		**1.44**	mg/L	5	02/12/2021 7:02	173688
Chromium	NELAP	0.0015		**0.0059**	mg/L	5	02/10/2021 23:44	173688
Cobalt	NELAP	0.0010		**0.0013**	mg/L	5	02/10/2021 23:44	173688
Iron	NELAP	0.0250		**2.86**	mg/L	5	02/10/2021 23:44	173688
Lead	NELAP	0.0010		**0.0017**	mg/L	5	02/10/2021 23:44	173688
Lithium	*	0.0030		**< 0.0030**	mg/L	5	02/10/2021 23:44	173688
Manganese	NELAP	0.0020		**0.0331**	mg/L	5	02/10/2021 23:44	173688
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	02/10/2021 23:44	173688
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/10/2021 23:44	173688
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/10/2021 23:44	173688

Sample Summary

Client: Geosyntec Consultants
Client Project: Vistra Joppa GLP8021

Work Order: 21020428
Report Date: 17-Feb-21

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
21020428-001	SB-G09M-(10-12)-20210126	Solid	2	01/26/2021 11:00
21020428-002	SB-G09M-(82-84)-20210127	Solid	2	01/27/2021 9:30
21020428-003	SB-G09M-(110-112)-20210127	Solid	2	01/27/2021 11:00
21020428-004	SB-G09M-(142-144)-20210128	Solid	2	01/28/2021 15:00
21020428-005	EQB-20210128	Aqueous	1	01/28/2021 16:00
21020428-006	SB-G03-(30-32)-20210202	Solid	2	02/02/2021 11:10
21020428-007	SB-G03-(58-60)-20210202	Solid	2	02/02/2021 13:30
21020428-008	SB-G03-(58-60)-20210202-DUP	Solid	2	02/02/2021 13:30
21020428-009	EQB-20210202	Aqueous	1	02/02/2021 13:45

Client: Geosyntec Consultants

Client Project: Vistra Joppa GLP8021

Work Order: 21020428

Report Date: 17-Feb-21

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
21020428-001A	SB-G09M-(10-12)-20210126	01/26/2021 11:00	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:44
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 0:06
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 15:59	02/16/2021 15:23
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:27
21020428-001B	SB-G09M-(10-12)-20210126	01/26/2021 11:00	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/11/2021 0:00
21020428-002A	SB-G09M-(82-84)-20210127	01/27/2021 9:30	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:44
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 0:15
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 15:59	02/16/2021 15:31
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:34
21020428-002B	SB-G09M-(82-84)-20210127	01/27/2021 9:30	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/10/2021 0:00
21020428-003A	SB-G09M-(110-112)-20210127	01/27/2021 11:00	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:44
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 0:23
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 15:59	02/16/2021 15:39
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:37
21020428-003B	SB-G09M-(110-112)-20210127	01/27/2021 11:00	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/10/2021 0:00
21020428-004A	SB-G09M-(142-144)-20210128	01/28/2021 15:00	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:44
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 0:31
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 16:00	02/16/2021 15:47
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:39
21020428-004B	SB-G09M-(142-144)-20210128	01/28/2021 15:00	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/10/2021 0:00
21020428-005A	EQB-20210128	01/28/2021 16:00	02/05/2021 15:45		
	EPA 600 245.1 R3.0 (Total)			02/08/2021 13:29	02/09/2021 12:55
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			02/08/2021 12:15	02/10/2021 22:31
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			02/08/2021 12:15	02/12/2021 7:11
21020428-006A	SB-G03-(30-32)-20210202	02/02/2021 11:10	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:45
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 0:39
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 18:16

Dates Report

Client: Geosyntec Consultants

Client Project: Vistra Joppa GLP8021

Work Order: 21020428

Report Date: 17-Feb-21

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/10/2021 17:55
	SW-846 3050B, 6020A, Metals by ICPMS			02/11/2021 10:09	02/12/2021 12:53
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 16:00	02/16/2021 15:55
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:41
21020428-006B	SB-G03-(30-32)-20210202	02/02/2021 11:10	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/10/2021 0:00
21020428-007A	SB-G03-(58-60)-20210202	02/02/2021 13:30	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:45
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 2:33
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 16:00	02/16/2021 18:13
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:48
21020428-007B	SB-G03-(58-60)-20210202	02/02/2021 13:30	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/10/2021 0:00
21020428-008A	SB-G03-(58-60)-20210202-DUP	02/02/2021 13:30	02/05/2021 15:45		
	EPA SW846 3550C, 5035A, ASTM D2974				02/10/2021 13:53
	SW-846 3050B, 6020A, Metals by ICPMS			02/05/2021 18:07	02/09/2021 2:41
	SW-846 3050B, 6020A, Metals by ICPMS			02/12/2021 16:00	02/16/2021 18:21
	SW-846 7471B			02/08/2021 14:46	02/09/2021 13:50
21020428-008B	SB-G03-(58-60)-20210202-DUP	02/02/2021 13:30	02/05/2021 15:45		
	SW-846 Method 9060M, Total Organic Carbon				02/11/2021 0:00
21020428-009A	EQB-20210202	02/02/2021 13:45	02/05/2021 15:45		
	EPA 600 245.1 R3.0 (Total)			02/08/2021 13:29	02/09/2021 12:57
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			02/08/2021 12:15	02/10/2021 23:44
	EPA 600 4.1.4, 200.8 R5.4, Metals by ICPMS (Total)			02/08/2021 12:15	02/12/2021 7:02

EPA SW846 3550C, 5035A, ASTM D2974

Batch **R287331** **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	02/10/2021

Batch **R287331** **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	02/10/2021

EPA 600 245.1 R3.0 (TOTAL)

Batch **173695** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-173695

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	02/09/2021

Batch **173695** **SampType:** **LCS** Units **mg/L**

SampID: LCS-173695

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00498**	0.0050	0	99.6	85	115	02/09/2021

Batch **173695** **SampType:** **MS** Units **mg/L**

SampID: 21020428-009AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00478**	0.0050	0	95.6	75	125	02/09/2021

Batch **173695** **SampType:** **MSD** Units **mg/L** RPD Limit **15**

SampID: 21020428-009AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00470**	0.0050	0	94.0	0.004778	1.62	02/09/2021

Client: Geosyntec Consultants **Work Order:** 21020428

Client Project: Vistra Joppa GLP8021 **Report Date:** 17-Feb-21

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173688** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-173688

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	02/10/2021
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	02/10/2021
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	02/10/2021
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	02/10/2021
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	02/10/2021
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	02/10/2021
Calcium		0.125		**< 0.125**	0.0700	0	0	-100	100	02/12/2021
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	02/10/2021
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	02/10/2021
Iron		0.0250		**< 0.0250**	0.0115	0	0	-100	100	02/10/2021
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	02/10/2021
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	02/10/2021
Manganese		0.0020		**< 0.0020**	0.0008	0	0	-100	100	02/10/2021
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	02/10/2021
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	02/10/2021
Thallium		0.0008		**< 0.0008**	0.0010	0	0	-100	100	02/12/2021
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	02/10/2021

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173688** **SampType:** **LCS** Units **mg/L**

SampID: LCS-173688

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	80	120	02/10/2021
Arsenic		0.0010		**0.542**	0.5000	0	108.5	80	120	02/10/2021
Barium		0.0010		**2.12**	2.000	0	106.0	80	120	02/10/2021
Beryllium		0.0010		**0.0536**	0.0500	0	107.2	80	120	02/10/2021
Boron		0.0250		**0.513**	0.5000	0	102.7	80	120	02/10/2021
Cadmium		0.0010		**0.0511**	0.0500	0	102.1	80	120	02/10/2021
Calcium		0.125		**2.47**	2.500	0	98.9	80	120	02/12/2021
Chromium		0.0015		**0.212**	0.2000	0	106.0	80	120	02/10/2021
Cobalt		0.0010		**0.526**	0.5000	0	105.3	80	120	02/10/2021
Iron		0.0250		**2.05**	2.000	0	102.6	80	120	02/10/2021
Lead		0.0010		**0.514**	0.5000	0	102.7	80	120	02/10/2021
Lithium	*	0.0030		**0.533**	0.5000	0	106.7	80	120	02/10/2021
Manganese		0.0020		**0.523**	0.5000	0	104.7	80	120	02/10/2021
Molybdenum		0.0015		**0.512**	0.5000	0	102.4	80	120	02/10/2021
Selenium		0.0010		**0.497**	0.5000	0	99.5	80	120	02/10/2021
Thallium		0.0020		**0.245**	0.2500	0	98.0	80	120	02/10/2021
Thallium		0.0008		**0.239**	0.2500	0	95.6	80	120	02/12/2021

EPA 600 4.1.4, 200.8 R5.4, METALS BY ICPMS (TOTAL)

Batch **173688** **SampType:** **MS** Units **mg/L**

SampID: 21020428-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.516**	0.5000	0	103.2	70	130	02/10/2021
Arsenic		0.0010		**0.538**	0.5000	0.002305	107.2	70	130	02/10/2021
Barium		0.0010		**2.12**	2.000	0.02255	105.0	70	130	02/10/2021
Beryllium		0.0010		**0.0531**	0.0500	0.0004103	105.4	70	130	02/10/2021
Boron		0.0250		**0.503**	0.5000	0	100.7	70	130	02/10/2021
Cadmium		0.0010		**0.0540**	0.0500	0.001651	104.7	70	130	02/10/2021
Calcium		0.125	S	**243**	2.500	241.3	63.9	70	130	02/12/2021
Chromium		0.0015		**0.221**	0.2000	0.01592	102.7	70	130	02/10/2021
Cobalt		0.0010		**0.501**	0.5000	0.002804	99.7	70	130	02/10/2021
Iron		0.0250		**7.53**	2.000	5.794	87.0	70	130	02/10/2021
Lead		0.0010		**0.515**	0.5000	0.002336	102.6	70	130	02/10/2021
Lithium	*	0.0030		**0.527**	0.5000	0.002176	105.0	70	130	02/10/2021
Manganese		0.0020		**0.720**	0.5000	0.2146	101.1	70	130	02/10/2021
Molybdenum		0.0015		**0.522**	0.5000	0.003348	103.8	70	130	02/10/2021
Selenium		0.0010		**0.492**	0.5000	0	98.5	70	130	02/10/2021
Thallium		0.0020		**0.253**	0.2500	0	101.1	70	130	02/10/2021

Batch **173688** **SampType:** **MSD** Units **mg/L** RPD Limit **20**

SampID: 21020428-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.511**	0.5000	0	102.1	0.5161	1.06	02/10/2021
Arsenic		0.0010		**0.533**	0.5000	0.002305	106.1	0.5384	1.00	02/10/2021
Barium		0.0010		**2.12**	2.000	0.02255	104.9	2.123	0.11	02/10/2021
Beryllium		0.0010		**0.0541**	0.0500	0.0004103	107.4	0.05313	1.82	02/10/2021
Boron		0.0250		**0.521**	0.5000	0	104.1	0.5034	3.38	02/10/2021
Cadmium		0.0010		**0.0528**	0.0500	0.001651	102.4	0.05399	2.14	02/10/2021
Calcium		0.125	S	**248**	2.500	241.3	263.5	242.9	2.03	02/12/2021
Chromium		0.0015		**0.219**	0.2000	0.01592	101.8	0.2212	0.81	02/10/2021
Cobalt		0.0010		**0.497**	0.5000	0.002804	98.8	0.5011	0.88	02/10/2021
Iron		0.0250		**7.59**	2.000	5.794	89.9	7.535	0.76	02/10/2021
Lead		0.0010		**0.521**	0.5000	0.002336	103.8	0.5152	1.20	02/10/2021
Lithium	*	0.0030		**0.541**	0.5000	0.002176	107.8	0.5273	2.63	02/10/2021
Manganese		0.0020		**0.719**	0.5000	0.2146	101.0	0.7199	0.06	02/10/2021
Molybdenum		0.0015		**0.521**	0.5000	0.003348	103.5	0.5225	0.32	02/10/2021
Selenium		0.0010		**0.487**	0.5000	0	97.4	0.4923	1.04	02/10/2021
Thallium		0.0020		**0.256**	0.2500	0	102.4	0.2529	1.19	02/10/2021

Client: Geosyntec Consultants
Work Order: 21020428
Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21

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

Batch 173655 **SampType:** **MBLK** Units **mg/Kg-dry**
SampID: MBLK-173655

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20		**< 0.20**	0.0202	0	0	-100	100	02/08/2021
Barium		0.20	S	**< 0.20**	0.0550	0	123.7	-100	100	02/08/2021
Beryllium		0.30		**< 0.30**	0.0269	0	0	-100	100	02/08/2021
Boron		5.00	S	**< 5.00**	0.8000	0	120.1	-100	100	02/08/2021
Cadmium		0.20		**< 0.20**	0.0150	0	0	-100	100	02/08/2021
Calcium	*	50.0		**< 50.0**	18.60	0	0	-100	100	02/08/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	02/08/2021
Cobalt		0.20		**< 0.20**	0.0253	0	0	-100	100	02/08/2021
Iron		10.0		**< 10.0**	4.900	0	0	-100	100	02/08/2021
Lead		0.20		**< 0.20**	0.0310	0	0	-100	100	02/08/2021
Lithium	*	0.30		**< 0.30**	0.0607	0	0	-100	100	02/08/2021
Manganese		0.20		**< 0.20**	0.0670	0	0	-100	100	02/08/2021
Molybdenum		0.20		**< 0.20**	0.0740	0	0	-100	100	02/08/2021
Selenium		1.00		**< 1.00**	0.1375	0	0	-100	100	02/08/2021
Thallium		0.20		**< 0.20**	0.1000	0	0	-100	100	02/08/2021

Batch 173655 **SampType:** **LCS** Units **mg/Kg-dry**
SampID: LCS-173655

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20		**51.7**	50.00	0	103.3	80	120	02/09/2021
Barium		0.20	B	**208**	200.0	0	104.0	80	120	02/09/2021
Beryllium		0.30		**5.08**	5.000	0	101.6	80	120	02/09/2021
Boron		5.00	B	**50.7**	50.00	0	101.5	80	120	02/09/2021
Cadmium		0.20		**4.88**	5.000	0	97.6	80	120	02/09/2021
Calcium	*	50.0		**245**	250.0	0	98.2	80	120	02/09/2021
Chromium		0.50		**20.1**	20.00	0	100.7	80	120	02/09/2021
Cobalt		0.20		**49.2**	50.00	0	98.3	80	120	02/09/2021
Iron		10.0		**195**	200.0	0	97.5	80	120	02/09/2021
Lead		0.20		**49.8**	50.00	0	99.7	80	120	02/09/2021
Lithium	*	0.30		**55.7**	50.00	0	111.4	80	120	02/09/2021
Manganese		0.20		**52.0**	50.00	0	104.0	80	120	02/09/2021
Molybdenum		0.20		**48.3**	50.00	0	96.7	80	120	02/09/2021
Selenium		1.00		**47.4**	50.00	0	94.8	80	120	02/09/2021
Thallium		0.20		**23.9**	25.00	0	95.4	80	120	02/09/2021

Client: Geosyntec Consultants

Client Project: Vistra Joppa GLP8021

Work Order: 21020428

Report Date: 17-Feb-21

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

Batch 173655 **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21020428-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		0.20		**50.6**	50.00	2.586	96.1	75	125	02/09/2021
Barium		0.20	B	**552**	200.0	347.0	102.6	75	125	02/10/2021
Beryllium		0.30		**5.60**	5.000	0.7113	97.7	75	125	02/09/2021
Cadmium		0.20		**4.94**	5.000	0	98.8	75	125	02/09/2021
Calcium	*	50.0		**1890**	250.0	1589	121.3	75	125	02/09/2021
Iron		10.0	S	**15700**	200.0	13880	895.3	75	125	02/09/2021
Lead		0.20		**78.0**	50.00	27.78	100.5	75	125	02/10/2021
Lithium	*	0.30		**68.1**	50.00	12.58	111.0	75	125	02/09/2021
Manganese		1.00	S	**1350**	50.00	1319	66.2	75	125	02/09/2021
Molybdenum		0.20		**41.5**	50.00	0.3801	82.2	75	125	02/09/2021
Selenium		1.00		**43.9**	50.00	0	87.7	75	125	02/09/2021
Thallium		0.20		**23.0**	25.00	0.2649	90.9	75	125	02/09/2021

Batch 173655 **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**

SampID: 21020428-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		0.19		**47.5**	47.17	2.586	95.1	50.65	6.51	02/09/2021
Barium		0.19	B	**530**	188.7	347.0	96.8	552.2	4.18	02/10/2021
Beryllium		0.28		**5.42**	4.717	0.7113	99.8	5.596	3.20	02/09/2021
Cadmium		0.19		**4.59**	4.717	0	97.2	4.942	7.46	02/09/2021
Calcium	*	47.2		**1880**	235.8	1589	122.5	1892	0.75	02/09/2021
Iron		9.43	S	**16100**	188.7	13880	1179	15670	2.73	02/09/2021
Lead		0.19		**73.4**	47.17	27.78	96.7	78.03	6.16	02/10/2021
Lithium	*	0.28		**65.1**	47.17	12.58	111.4	68.10	4.44	02/09/2021
Manganese		0.94	SR	**2030**	47.17	1319	1513	1352	40.20	02/09/2021
Molybdenum		0.19		**39.1**	47.17	0.3801	82.2	41.47	5.78	02/09/2021
Selenium		0.94		**40.7**	47.17	0	86.3	43.85	7.49	02/09/2021
Thallium		0.19		**22.0**	23.58	0.2649	92.2	23.00	4.41	02/09/2021

Batch 173799 **SampType:** **MBLK** Units **mg/Kg-dry**

SampID: MBLK-173799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		5.00	S	**< 5.00**	0.8000	0	102.0	-100	100	02/12/2021
Chromium		0.50		**< 0.50**	0.2000	0	0	-100	100	02/12/2021
Cobalt		0.20		**< 0.20**	0.0253	0	0	-100	100	02/12/2021

Client: Geosyntec Consultants
Work Order: 21020428

Client Project: Vistra Joppa GLP8021
Report Date: 17-Feb-21

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

Batch 173799 **SampType:** LCS Units **mg/Kg-dry**
SampID: LCS-173799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		5.00	B	**55.2**	50.00	0	110.5	80	120	02/12/2021
Chromium		0.50		**22.4**	20.00	0	112.2	80	120	02/12/2021
Cobalt		0.20		**56.3**	50.00	0	112.6	80	120	02/12/2021

Batch 173799 **SampType:** MS Units **mg/Kg-dry**
SampID: 21020428-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		4.81	BS	**29.3**	48.08	0.8586	59.2	75	125	02/12/2021
Chromium		0.48		**37.4**	19.23	18.68	97.5	75	125	02/12/2021
Cobalt		0.19	S	**180**	48.08	109.8	145.8	75	125	02/12/2021

Batch 173799 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **20**
SampID: 21020428-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		4.63	BS	**27.0**	46.30	0.8586	56.6	29.31	8.02	02/12/2021
Chromium		0.46		**36.1**	18.52	18.68	94.1	37.43	3.59	02/12/2021
Cobalt		0.19	SR	**224**	46.30	109.8	246.0	179.9	21.71	02/12/2021

Batch 173868 **SampType:** MBLK Units **mg/Kg-dry**
SampID: MBLK-173868

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	02/16/2021

Batch 173868 **SampType:** LCS Units **mg/Kg-dry**
SampID: LCS-173868

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.40		**46.0**	50.00	0	91.9	80	120	02/16/2021

Batch 173868 **SampType:** MS Units **mg/Kg-dry**
SampID: 21020428-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.38		**43.4**	48.08	0.2009	89.9	75	125	02/16/2021

Client: Geosyntec Consultants

Client Project: Vistra Joppa GLP8021

Work Order: 21020428

Report Date: 17-Feb-21

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

Batch **173868** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **20**

SampID: 21020428-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.37		**41.8**	46.30	0.2009	89.9	43.40	3.71	02/16/2021

SW-846 7471B

Batch **173704** **SampType:** **MBLK** Units **mg/Kg**

SampID: MBLK-173704

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	02/09/2021

Batch **173704** **SampType:** **LCS** Units **mg/Kg**

SampID: LCS-173704

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.250**	0.2500	0	99.8	85	115	02/09/2021

Batch **173704** **SampType:** **MS** Units **mg/Kg-dry**

SampID: 21020428-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.012		**0.317**	0.2878	0.008627	107.1	75	125	02/09/2021

Batch **173704** **SampType:** **MSD** Units **mg/Kg-dry** RPD Limit **15**

SampID: 21020428-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.012		**0.319**	0.2983	0.008627	104.0	0.3167	0.64	02/09/2021

Teklab Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: Geosyntec Consultants
Client Project: Vistra Joppa GLP8021

Work Order: 21020428
Report Date: 17-Feb-21

Carrier: Tim Mathis

Received By: MEK

Completed by: Mary E. Kemp
On:
05-Feb-21
Mary E. Kemp

Reviewed by: Marvin L. Darling II
On:
05-Feb-21
Marvin L. Darling

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

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 6.8
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 #74446. - MKemp - 2/5/2021 4:58:00 PM

EQB-20210128 sample received in an incorrect container for TOC analysis. Allison Kreinberg was notified of this error via VM. MEK/mld 2/5/21

CHAIN OF CUSTODY

pg. 1 of 2 Work order # 21020428

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

Client: Geosyntec Consultants
Address: 1 McBride and Son Center Drive, Suite 202
City / State / Zip Chesterfield, MO 63005
Contact: Allison Kreinberg **Phone:** (636) 812-0809
E-Mail: AKreinberg@Geosyntec.com **Fax:**

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 0.8 °C LTG# 5
Preserved in: ☐ LAB ☑ FIELD **FOR LAB USE ONLY**
Lab Notes PHV 74446 PRt 2/5/21

Client Comments: Bottleware labeled "G09M" are written as G09 on sample bottles, Please use G09M [redacted] TOC/metals sample combined into one jar at G0 Two jars provided for G09M Samples

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

Project Name/Number Vistra Joppa GLP 8021
Sample Collector's Name Sean Kosty / Amanda Toye

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

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	Metals	TOC
21020428-001	SB-G09M-(10-12)-20210126	1/26/21 11:00	X 2										X				X	X
002	SB-G09M-(82-84)-20210127	1/27/21 9:30	X 2										X				X	X
003	SB-G09M-(110-112)-20210127	1/27/21 11:00	X 2										X				X	X
004	SB-G09M-(142-144)-20210128	1/28/21 15:00	X 2										X				X	X
005	[redacted] SK BQB-20210128	1/28/21 16:00		1							X						X	X
006	SB-G03-(30-32)-20210202	2/2/21 11:10	X										X				X	X
~~006~~ 007	SB-G03-(30-32)-20210202-MS	2/2/21 11:10	X										X				X	X
~~006~~ 008	SB-G03-(30-32)-20210202-MSD	2/2/21 11:10	X										X				X	X
~~007~~ 009	SB-G03-(58-60)-20210202	2/2/21 13:30	X										X				X	X
~~008~~ 010	SB-G03-(58-60)-20210202-DUP	2/2/21 13:30	X										X				X	X

MEK 2/5/21 TE

Relinquished By	Date/Time	Received By	Date/Time
			2/5/21 1425
	2/5/21 1425		2.5.21 15--
	2.5.21	Mary Kemp	2/5/21 1545

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: 63216

PRK 2/5/21

CHAIN OF CUSTODY

pg. 2 of 2 **Work order #** 21020428

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

Client: Geosyntec Consultants
Address: 1 McBride and Son Center Drive, Suite 202
City / State / Zip Chesterfield, MO 63005
Contact: Allison Kreinberg **Phone:** (636) 812-0809
E-Mail: AKreinberg@Geosyntec.com **Fax:**

Samples on: ▨ ICE ▨ BLUE ICE ▨ NO ICE ____ °C LTG# ____
Preserved in: ▨ LAB ▨ FIELD **FOR LAB USE ONLY**
Lab Notes

Client Comments:

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

Project Name/Number Vistra Joppa GLP8021
Sample Collector's Name Sean Kardy

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

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	Metals	TOC
21020428-09	EQB-20210202	2/2/21, 13:45		1							X						X	X

Relinquished By	Date/Time	Received By	Date/Time
			2/5/21 1425
	2/5/21 1455		2·5·21 1455
	2·5·21 ~~145~~	Mary Kamp	2/5/21 1545

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: 63216

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

February 12, 2021

Elizabeth Hurley
Teklab, Inc
5445 Horseshoe Lake Rd
Collinsville, IL 62234

RE: Project: 21020428
Pace Project No.: 40221986

Dear Elizabeth Hurley:

Enclosed are the analytical results for sample(s) received by the laboratory on February 09, 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

CERTIFICATIONS

Project:	21020428
Pace Project No.:	40221986

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

SAMPLE SUMMARY

Project: 21020428
Pace Project No.: 40221986

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40221986001	**21020428-001**	Solid	01/26/21 11:00	02/09/21 11:35
40221986002	**21020428-002**	Solid	01/27/21 09:30	02/09/21 11:35
40221986003	**21020428-003**	Solid	01/27/21 11:00	02/09/21 11:35
40221986004	**21020428-004**	Solid	01/28/21 15:00	02/09/21 11:35
40221986005	**21020428-006**	Solid	02/02/21 11:10	02/09/21 11:35
40221986006	**21020428-007**	Solid	02/02/21 13:30	02/09/21 11:35
40221986007	**21020428-008**	Solid	02/02/21 13:30	02/09/21 11:35

SAMPLE ANALYTE COUNT

Project: 21020428
Pace Project No.: 40221986

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40221986001	**21020428-001**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986002	**21020428-002**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986003	**21020428-003**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986004	**21020428-004**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986005	**21020428-006**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986006	**21020428-007**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4
40221986007	**21020428-008**	ASTM D2974-87	MMX	1
		EPA 9060 Modified	TJJ	4

PASI-G = Pace Analytical Services - Green Bay

ANALYTICAL RESULTS

Project: 21020428
Pace Project No.: 40221986

Sample: 21020428-001 **Lab ID: 40221986001** Collected: 01/26/21 11:00 Received: 02/09/21 11:35 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	**18.5**	%	0.10	0.10	1		02/09/21 15:26		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**4.0**	%	0.10	0.10	1		02/11/21 04:58		
Total Organic Carbon	**969**	mg/kg	737	220	1		02/11/21 04:58	7440-44-0	
Total Organic Carbon	**931**	mg/kg	740	221	1		02/11/21 05:03	7440-44-0	
Mean Total Organic Carbon	**950**	mg/kg	738	220	1		02/11/21 04:58	7440-44-0	C4

Sample: 21020428-002 **Lab ID: 40221986002** Collected: 01/27/21 09:30 Received: 02/09/21 11:35 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	**17.7**	%	0.10	0.10	1		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**6.1**	%	0.10	0.10	1		02/10/21 11:53		
Total Organic Carbon	**492J**	mg/kg	736	220	1		02/10/21 11:53	7440-44-0	
Total Organic Carbon	**464J**	mg/kg	736	220	1		02/10/21 11:59	7440-44-0	
Mean Total Organic Carbon	**478J**	mg/kg	736	220	1		02/10/21 11:53	7440-44-0	C4

Sample: 21020428-003 **Lab ID: 40221986003** Collected: 01/27/21 11:00 Received: 02/09/21 11:35 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	**21.9**	%	0.10	0.10	1		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**4.8**	%	0.10	0.10	1		02/10/21 12:05		
Total Organic Carbon	**595J**	mg/kg	767	229	1		02/10/21 12:05	7440-44-0	

ANALYTICAL RESULTS

Project: 21020428
Pace Project No.: 40221986

Sample: 21020428-003 **Lab ID: 40221986003** Collected: 01/27/21 11:00 Received: 02/09/21 11:35 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	**624J**	mg/kg	762	227	1		02/10/21 12:11	7440-44-0	
Mean Total Organic Carbon	**610J**	mg/kg	765	228	1		02/10/21 12:05	7440-44-0	C4

Sample: 21020428-004 **Lab ID: 40221986004** Collected: 01/28/21 15:00 Received: 02/09/21 11:35 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	**15.9**	%	0.10	0.10	1		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**36.9**	%	0.10	0.10	1		02/10/21 12:17		
Total Organic Carbon	**24800**	mg/kg	1660	496	1		02/10/21 12:17	7440-44-0	
Total Organic Carbon	**17100**	mg/kg	1690	506	1		02/10/21 12:24	7440-44-0	
Mean Total Organic Carbon	**20900**	mg/kg	1680	501	1		02/10/21 12:17	7440-44-0	C4

Sample: 21020428-006 **Lab ID: 40221986005** Collected: 02/02/21 11:10 Received: 02/09/21 11:35 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	**17.7**	%	0.10	0.10	1		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**1.8**	%	0.10	0.10	1		02/10/21 12:30		
Total Organic Carbon	**493J**	mg/kg	727	217	1		02/10/21 12:30	7440-44-0	
Total Organic Carbon	**502J**	mg/kg	726	217	1		02/10/21 12:36	7440-44-0	
Mean Total Organic Carbon	**497J**	mg/kg	726	217	1		02/10/21 12:30	7440-44-0	C4

ANALYTICAL RESULTS

Project: 21020428
Pace Project No.: 40221986

Sample: 21020428-007 **Lab ID: 40221986006** Collected: 02/02/21 13:30 Received: 02/09/21 11:35 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	**18.1**	%	0.10	0.10	1		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**14.7**	%	0.10	0.10	1		02/10/21 13:05		
Total Organic Carbon	**<221**	mg/kg	740	221	1		02/10/21 13:05	7440-44-0	
Total Organic Carbon	**<220**	mg/kg	737	220	1		02/10/21 13:10	7440-44-0	
Mean Total Organic Carbon	**<220**	mg/kg	738	220	1		02/10/21 13:05	7440-44-0	C4

Sample: 21020428-008 **Lab ID: 40221986007** Collected: 02/02/21 13:30 Received: 02/09/21 11:35 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		02/09/21 15:27		
Total Organic Carbon	Analytical Method: EPA 9060 Modified Pace Analytical Services - Green Bay								
Surrogates									
RPD%	**30.6**	%	0.10	0.10	1		02/11/21 05:31		
Total Organic Carbon	**<216**	mg/kg	723	216	1		02/11/21 05:31	7440-44-0	
Total Organic Carbon	**<215**	mg/kg	720	215	1		02/11/21 05:36	7440-44-0	
Mean Total Organic Carbon	**<215**	mg/kg	722	215	1		02/11/21 05:31	7440-44-0	C4

QUALITY CONTROL DATA

Project: 21020428
Pace Project No.: 40221986

QC Batch: 377476
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: 40221986001, 40221986002, 40221986003, 40221986004, 40221986005, 40221986006, 40221986007

SAMPLE DUPLICATE: 2179074

Parameter	Units	40221986005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.7	17.7	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.

QUALITY CONTROL DATA

Project: 21020428
Pace Project No.: 40221986

QC Batch: 377488
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: 40221986001, 40221986002, 40221986003, 40221986004, 40221986005, 40221986006, 40221986007

METHOD BLANK: 2179146 Matrix: Solid
Associated Lab Samples: 40221986001, 40221986002, 40221986003, 40221986004, 40221986005, 40221986006, 40221986007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	<179	600	02/10/21 08:59	

LABORATORY CONTROL SAMPLE: 2179147

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	120000	113000	94	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2179148 2179149

Parameter	Units	40221986001 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	950	7400	7390	8270	8130	99	97	50-150	2	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2179150 2179151

Parameter	Units	40221986005 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	497J	7250	7240	7150	6620	92	85	50-150	8	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.

QUALIFIERS

Project:	21020428
Pace Project No.:	40221986

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.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 21020428
Pace Project No.: 40221986

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40221986001	**21020428-001**	ASTM D2974-87	377476		
40221986002	**21020428-002**	ASTM D2974-87	377476		
40221986003	**21020428-003**	ASTM D2974-87	377476		
40221986004	**21020428-004**	ASTM D2974-87	377476		
40221986005	**21020428-006**	ASTM D2974-87	377476		
40221986006	**21020428-007**	ASTM D2974-87	377476		
40221986007	**21020428-008**	ASTM D2974-87	377476		
40221986001	**21020428-001**	EPA 9060 Modified	377488		
40221986001	**21020428-001**	EPA 9060 Modified	377489		
40221986002	**21020428-002**	EPA 9060 Modified	377488		
40221986002	**21020428-002**	EPA 9060 Modified	377489		
40221986003	**21020428-003**	EPA 9060 Modified	377488		
40221986003	**21020428-003**	EPA 9060 Modified	377489		
40221986004	**21020428-004**	EPA 9060 Modified	377488		
40221986004	**21020428-004**	EPA 9060 Modified	377489		
40221986005	**21020428-006**	EPA 9060 Modified	377488		
40221986005	**21020428-006**	EPA 9060 Modified	377489		
40221986006	**21020428-007**	EPA 9060 Modified	377488		
40221986006	**21020428-007**	EPA 9060 Modified	377489		
40221986007	**21020428-008**	EPA 9060 Modified	377488		
40221986007	**21020428-008**	EPA 9060 Modified	377489		

Pg ___ of ___

4024986

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:

QC Level: 3

Project# 21020428

Contact: Aaron Renner

Requested Due Date: STD TAT

Email: arenner@teklabinc.com

Billing/PO: 30746

Comments: **Please Issue reports and invoices via email only**

Please analyze for Total Organic Carbon SW-846 Method 9060M

on your standard turnaround time.

Batch QC is required for all analyses requested.

Any changes to analysis/methods must be approved by Teklab, Inc.

Phone: ((630) 324-6855

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	MS/MSD										
001	21020428-001	1/26/21 11:00	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
002	21020428-002	1/27/21 9:30	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
003	21020428-003	1/27/21 11:00	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
004	21020428-004	1/28/21 15:00	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
005	21020428-006	2/2/21 11:10	Unpres	Soil	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
006	21020428-007	2/2/21 13:30	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
007	21020428-008	2/2/21 13:30	Unpres	Soil	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Aqueous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Aqueous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Aqueous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
			Unpres	Aqueous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*Relinquished By	Date/Time	Received By	Date/Time
Mary Kemp	2/8/21 1700		
FedEx	2/9/21 1135	Nicole Hoeckel Pace	2/9/21 1135

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)

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: Teklab

Project # 40221986

All containers needing preservation have been checked and noted below: ☐Yes ☐No ☒N/A

Lab Lot# of pH paper:

Lab Std #ID of preservation (if pH adjusted):

Initial when completed:

Date/ Time:

	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																						1											2.5 / 5 / 10
004																						1											2.5 / 5 / 10
005																						2											2.5 / 5 / 10
006																						1											2.5 / 5 / 10
007																						1											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																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

2/9/21 RD

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#: 40221986**

40221986

Client Name: Teklab

Courier: ☐ CS Logistics ☑ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco

☐ Client ☐ Pace Other:

Tracking #: 9450 9224 10086

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

Thermometer Used SR - 97 **Type of Ice:** [✓ Wet] Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 0 /Corr: 0

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: 2/9/21 **/Initials:** NA

Labeled By Initials:

Chain of Custody Present: ☑ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out: ☐ Yes ☑ No ☐ N/A	2. pg # 2/9/21 NA
Chain of Custody Relinquished: ☑ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC: ☐ Yes ☐ No ☑ N/A	4. Subwork 2/9/21 NA
Samples Arrived within Hold Time: ☑ Yes ☐ No - VOA Samples frozen upon receipt ☐ Yes ☐ No	5. 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: 2/9/21 NA ~~☑ Yes~~ [✓ ☑ No] -Pace Containers Used: ☐ Yes ☑ No ☐ N/A -Pace IR Containers Used: ☐ Yes ☐ No ☑ N/A	9. TOC=AG 2/9/21 NA
Containers Intact: ☑ Yes ☐ No	10.
Filtered volume received for Dissolved tests ☐ Yes ☐ No ☑ N/A	11.
Sample Labels match COC: ☐ Yes ☑ No ☐ N/A -Includes date/time/ID/Analysis Matrix: S	12. All sample ids include alpha-COC does not 2/9/21 NA
Trip Blank Present: ☐ Yes ☐ No ☑ N/A Trip Blank Custody Seals Present ☐ Yes ☐ No ☑ N/A Pace Trip Blank Lot # (if purchased):	13.

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

Project : Joppa MNA

02-November-2021

SiREM Laboratory
Attn : Michael Healey

130 Stone Road W, Guelph
Canada, N1G 3Z2
Phone: 519-822-2265, Fax:519-822-3151

Date Rec. : 15 October 2021
LR Report: **CA12704-OCT21**
Reference: P.O# 800003210A

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: G-03 (57.5-62.5, 63.5-70.0)**	**6: G-07 (50.0-56.0)**	**7: G-08 (75.0-80.0)**
Sample Date & Time					14-Oct-21 13:00	14-Oct-21 14:30	14-Oct-21 16:00
TOC [%]	22-Oct-21	02:07	22-Oct-21	15:11	0.039	0.039	0.049
Ag [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	< 0.5	< 0.5	< 0.5
Al [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	13000	17000	9700
As [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	7.8	5.8	28
Ba [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	100	170	180
Be [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	1	1	1
Bi [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	< 0.09	< 0.09	< 0.09
Ca [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	3100	1500	900
Cd [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	0.08	0.06	0.31
Co [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	6	8	29
Cr [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	41	43	30
Cu [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	5.5	10	8.2
Fe [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	40000	44000	99000
K [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	2300	3500	1700
Li [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	7.0	7.6	6.7
Mg [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	1700	530	440
Mn [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	190	320	1000
Mo [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	1.0	0.6	2.8
Na [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	460	430	300
Ni [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	13	27	29
P [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	470	460	1200
Pb [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	7	7	6
S [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	610	410	910
Sb [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	< 0.8	< 0.8	< 0.8
Se [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	< 0.7	< 0.7	< 0.7
Sn [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	< 6	< 6	< 6
Sr [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	18	41	19
Ti [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	1400	1700	460
Tl [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	0.08	0.08	0.12

OnLine LIMS

0002697903

Analysis	**1: Analysis Start Date**	**2: Analysis Start Time**	**3: Analysis Completed Date**	**4: Analysis Completed Time**	**5: G-03 (57.5-62.5, 63.5-70.0)**	**6: G-07 (50.0-56.0)**	**7: G-08 (75.0-80.0)**
U [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	1.39	1.85	1.83
V [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	40	34	32
Y [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	7.25	8.94	15.6
Zn [µg/g]	25-Oct-21	14:17	28-Oct-21	10:00	44	140	91
LOI [%]	20-Oct-21	20:55	22-Oct-21	08:22	1.05	0.93	1.58

Catharine Arnold

CATHARINE ARNOLD

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

ATTACHMENT G

Sequential Extraction Procedure Analytical Data

eurofins

Environment Testing
America

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ANALYTICAL REPORT

Eurofins Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

Laboratory Job ID: 140-25875-1
Client Project/Site: Joppa MNA

For:
Sirem, div of Geosyntec Consultants
130 Stone Rd West
Guelph, Ontario N1G 3Z2

Attn: Michael Healey

Ryan Henry

Authorized for release by:
3/21/2022 11:16:44 AM

Ryan Henry, Project Manager I
(865)291-3000
williamr.henry@eurofinset.com

Table of Contents

Definitions/Glossary

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F3	Duplicate RPD exceeds the control limit
F5	Duplicate RPD exceeds limit, and one or both sample results are less than 5 times RL, and the absolute difference between results is < the upper reporting limits for both.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
L	A negative instrument reading had an absolute value greater than the reporting limit

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

Case Narrative

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Job ID: 140-25875-1

Laboratory: Eurofins Knoxville

Narrative

Job Narrative
140-25875-1

Receipt
The samples were received on 12/24/2021 at 8:00am and arrived in good condition, and where required, properly preserved and on ice.

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 ($MgSO_4$), 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 $HCl-HNO_3-H_2O$, 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, HNO_3, HCl and H_3BO_3. 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, HNO_3, HCl and H_3BO_3. 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 = $(C \times V \times V1 \times D) / (W \times S \times V2)$

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
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

Job ID: 140-25875-1 (Continued)

Laboratory: Eurofins Knoxville (Continued)

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 solutions 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.

Method 6010B: The following samples were diluted due to the presence of silicon which interferes with Arsenic: G-03 (57.5-62.5, 63.5-70.0) (140-25875-1), G-07 (50.0-56.0) (140-25875-2) and G-08 (75.0-80.0) (140-25875-3). Elevated reporting limits (RLs) are provided.

Method 6010B: The serial dilution performed for the following samples associated with batch 140-59793 was outside control limits: G-03 (57.5-62.5, 63.5-70.0) (140-25875-1)

Method 6010B SEP: The sample duplicate (DUP) precision for preparation batch 140-59371, 140-59412, 140-59413 and 140-59446 and analytical batch 140-59667 was outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits.

Method 6010B SEP: The following samples were diluted due to the presence of Iron which interferes with Arsenic. G-03 (57.5-62.5, 63.5-70.0) (140-25875-1) and G-08 (75.0-80.0) (140-25875-3). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The sample duplicate (DUP) precision for preparation batch 140-59631 and analytical batch 140-59767 was outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits.

Method 6010B SEP: The following samples were diluted due to the presence of silicon which interferes with Arsenic: G-03 (57.5-62.5, 63.5-70.0) (140-25875-1) and G-08 (75.0-80.0) (140-25875-3). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Solid	12/23/21 13:00	12/24/21 08:00
140-25875-2	G-07 (50.0-56.0)	Solid	12/23/21 13:15	12/24/21 08:00
140-25875-3	G-08 (75.0-80.0)	Solid	12/23/21 13:30	12/24/21 08:00

Client Sample Results

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Date Collected: 12/23/21 13:00
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-1

Matrix: Solid
Percent Solids: 86.8

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.61**	**J**	2.3	0.60	mg/Kg	☼	03/01/22 08:00	03/09/22 11:40	4
Boron	ND		46	46	mg/Kg	☼	03/01/22 08:00	03/09/22 11:40	4
Cobalt	ND		12	0.21	mg/Kg	☼	03/01/22 08:00	03/09/22 11:40	4
Lithium	ND		12	0.69	mg/Kg	☼	03/01/22 08:00	03/09/22 11:40	4
Molybdenum	ND		9.2	0.38	mg/Kg	☼	03/01/22 08:00	03/09/22 11:40	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.51**	**J**	1.7	0.45	mg/Kg	☼	03/02/22 08:00	03/09/22 12:10	3
Boron	ND		35	35	mg/Kg	☼	03/02/22 08:00	03/09/22 12:10	3
Cobalt	ND		8.6	0.22	mg/Kg	☼	03/02/22 08:00	03/09/22 12:10	3
Lithium	ND		8.6	0.52	mg/Kg	☼	03/02/22 08:00	03/09/22 12:10	3
Molybdenum	ND		6.9	0.28	mg/Kg	☼	03/02/22 08:00	03/09/22 12:10	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.40**	**J**	0.58	0.15	mg/Kg	☼	03/03/22 08:20	03/10/22 10:45	1
Boron	ND		12	12	mg/Kg	☼	03/03/22 08:20	03/10/22 10:45	1
Cobalt	**0.85**	**J**	2.9	0.052	mg/Kg	☼	03/03/22 08:20	03/10/22 10:45	1
Lithium	ND		2.9	0.17	mg/Kg	☼	03/03/22 08:20	03/10/22 10:45	1
Molybdenum	ND		2.3	0.095	mg/Kg	☼	03/03/22 08:20	03/10/22 10:45	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.4**	**B**	0.58	0.25	mg/Kg	☼	03/04/22 08:00	03/10/22 11:49	1
Boron	ND		12	12	mg/Kg	☼	03/04/22 08:00	03/10/22 11:49	1
Cobalt	**1.4**	**J**	2.9	0.061	mg/Kg	☼	03/04/22 08:00	03/10/22 11:49	1
Lithium	**0.27**	**J**	2.9	0.17	mg/Kg	☼	03/04/22 08:00	03/10/22 11:49	1
Molybdenum	**0.10**	**J**	2.3	0.095	mg/Kg	☼	03/04/22 08:00	03/10/22 11:49	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		8.6	2.2	mg/Kg	☼	03/09/22 08:00	03/11/22 13:19	5
Boron	ND		170	170	mg/Kg	☼	03/09/22 08:00	03/11/22 13:19	5
Cobalt	ND		43	0.69	mg/Kg	☼	03/09/22 08:00	03/11/22 13:19	5
Lithium	ND		43	2.5	mg/Kg	☼	03/09/22 08:00	03/11/22 13:19	5
Molybdenum	ND		35	1.4	mg/Kg	☼	03/09/22 08:00	03/11/22 13:19	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.5**		1.2	0.35	mg/Kg	☼	03/09/22 08:00	03/11/22 15:07	2
Boron	ND		12	12	mg/Kg	☼	03/09/22 08:00	03/11/22 14:23	1
Cobalt	**3.5**		2.9	0.053	mg/Kg	☼	03/09/22 08:00	03/11/22 14:23	1
Lithium	**1.1**	**J**	2.9	0.17	mg/Kg	☼	03/09/22 08:00	03/11/22 14:23	1
Molybdenum	**0.40**	**J**	2.3	0.11	mg/Kg	☼	03/09/22 08:00	03/11/22 14:23	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.2**	**B**	1.2	0.30	mg/Kg	☼	03/10/22 08:05	03/15/22 13:23	2
Cobalt	ND		2.9	0.030	mg/Kg	☼	03/10/22 08:05	03/15/22 12:37	1
Lithium	**3.2**		2.9	0.17	mg/Kg	☼	03/10/22 08:05	03/15/22 12:37	1

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Date Collected: 12/23/21 13:00
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-1

Matrix: Solid
Percent Solids: 86.8

Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	ND		2.3	0.095	mg/Kg	☼	03/10/22 08:05	03/15/22 12:37	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**15**		0.50	0.13	mg/Kg			03/18/22 13:19	1
Cobalt	**5.7**		2.5	0.023	mg/Kg			03/18/22 13:19	1
Lithium	**4.5**		2.5	0.15	mg/Kg			03/18/22 13:19	1
Molybdenum	**0.50**	**J**	2.0	0.082	mg/Kg			03/18/22 13:19	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.9**	**B**	1.2	0.30	mg/Kg	☼	02/28/22 08:00	03/16/22 14:31	2
Cobalt	**5.6**		2.9	0.030	mg/Kg	☼	02/28/22 08:00	03/16/22 13:45	1
Lithium	**5.4**		2.9	0.17	mg/Kg	☼	02/28/22 08:00	03/16/22 13:45	1
Molybdenum	**0.65**	**J**	2.3	0.095	mg/Kg	☼	02/28/22 08:00	03/16/22 13:45	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Client Sample ID: G-07 (50.0-56.0)

Date Collected: 12/23/21 13:15
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-2

Matrix: Solid
Percent Solids: 89.1

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.2	0.58	mg/Kg	☼	03/01/22 08:00	03/09/22 11:55	4
Boron	ND		45	45	mg/Kg	☼	03/01/22 08:00	03/09/22 11:55	4
Cobalt	ND		11	0.20	mg/Kg	☼	03/01/22 08:00	03/09/22 11:55	4
Lithium	ND		11	0.67	mg/Kg	☼	03/01/22 08:00	03/09/22 11:55	4
Molybdenum	ND		9.0	0.37	mg/Kg	☼	03/01/22 08:00	03/09/22 11:55	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.7	0.44	mg/Kg	☼	03/02/22 08:00	03/09/22 12:35	3
Boron	ND		34	34	mg/Kg	☼	03/02/22 08:00	03/09/22 12:35	3
Cobalt	ND		8.4	0.21	mg/Kg	☼	03/02/22 08:00	03/09/22 12:35	3
Lithium	ND		8.4	0.51	mg/Kg	☼	03/02/22 08:00	03/09/22 12:35	3
Molybdenum	ND		6.7	0.28	mg/Kg	☼	03/02/22 08:00	03/09/22 12:35	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.39**	**J**	0.56	0.15	mg/Kg	☼	03/03/22 08:20	03/10/22 11:00	1
Boron	ND		11	11	mg/Kg	☼	03/03/22 08:20	03/10/22 11:00	1
Cobalt	**0.76**	**J**	2.8	0.051	mg/Kg	☼	03/03/22 08:20	03/10/22 11:00	1
Lithium	ND		2.8	0.17	mg/Kg	☼	03/03/22 08:20	03/10/22 11:00	1
Molybdenum	ND		2.2	0.092	mg/Kg	☼	03/03/22 08:20	03/10/22 11:00	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.7**	**B**	0.56	0.25	mg/Kg	☼	03/04/22 08:00	03/10/22 12:13	1
Boron	ND		11	11	mg/Kg	☼	03/04/22 08:00	03/10/22 12:13	1
Cobalt	**0.97**	**J**	2.8	0.059	mg/Kg	☼	03/04/22 08:00	03/10/22 12:13	1
Lithium	**0.18**	**J**	2.8	0.17	mg/Kg	☼	03/04/22 08:00	03/10/22 12:13	1
Molybdenum	ND		2.2	0.092	mg/Kg	☼	03/04/22 08:00	03/10/22 12:13	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		8.4	2.1	mg/Kg	☼	03/09/22 08:00	03/11/22 13:34	5
Boron	ND		170	170	mg/Kg	☼	03/09/22 08:00	03/11/22 13:34	5
Cobalt	ND		42	0.67	mg/Kg	☼	03/09/22 08:00	03/11/22 13:34	5
Lithium	ND		42	2.5	mg/Kg	☼	03/09/22 08:00	03/11/22 13:34	5
Molybdenum	ND		34	1.4	mg/Kg	☼	03/09/22 08:00	03/11/22 13:34	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.4**		0.56	0.17	mg/Kg	☼	03/09/22 08:00	03/11/22 14:49	1
Boron	ND		11	11	mg/Kg	☼	03/09/22 08:00	03/11/22 14:49	1
Cobalt	**1.8**	**J**	2.8	0.052	mg/Kg	☼	03/09/22 08:00	03/11/22 14:49	1
Lithium	**0.64**	**J**	2.8	0.17	mg/Kg	☼	03/09/22 08:00	03/11/22 14:49	1
Molybdenum	ND		2.2	0.11	mg/Kg	☼	03/09/22 08:00	03/11/22 14:49	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.3**	**B**	0.56	0.15	mg/Kg	☼	03/10/22 08:05	03/15/22 12:47	1
Cobalt	ND		2.8	0.029	mg/Kg	☼	03/10/22 08:05	03/15/22 12:47	1
Lithium	**2.8**		2.8	0.17	mg/Kg	☼	03/10/22 08:05	03/15/22 12:47	1

Client Sample ID: G-07 (50.0-56.0)

Lab Sample ID: 140-25875-2

Date Collected: 12/23/21 13:15
Date Received: 12/24/21 08:00

Matrix: Solid
Percent Solids: 89.1

Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	ND		2.2	0.092	mg/Kg	☼	03/10/22 08:05	03/15/22 12:47	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**5.8**		0.50	0.13	mg/Kg			03/18/22 13:19	1
Cobalt	**3.6**		2.5	0.023	mg/Kg			03/18/22 13:19	1
Lithium	**3.7**		2.5	0.15	mg/Kg			03/18/22 13:19	1
Molybdenum	ND		2.0	0.082	mg/Kg			03/18/22 13:19	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.7**	**B**	1.1	0.29	mg/Kg	☼	02/28/22 08:00	03/16/22 14:46	2
Cobalt	**6.1**		2.8	0.029	mg/Kg	☼	02/28/22 08:00	03/16/22 14:00	1
Lithium	**4.0**		2.8	0.17	mg/Kg	☼	02/28/22 08:00	03/16/22 14:00	1
Molybdenum	**0.21**	**J**	2.2	0.092	mg/Kg	☼	02/28/22 08:00	03/16/22 14:00	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Client Sample ID: G-08 (75.0-80.0)

Date Collected: 12/23/21 13:30
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-3

Matrix: Solid
Percent Solids: 89.5

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.2	0.58	mg/Kg	☼	03/01/22 08:00	03/09/22 12:00	4
Boron	ND		45	45	mg/Kg	☼	03/01/22 08:00	03/09/22 12:00	4
Cobalt	ND		11	0.20	mg/Kg	☼	03/01/22 08:00	03/09/22 12:00	4
Lithium	ND		11	0.67	mg/Kg	☼	03/01/22 08:00	03/09/22 12:00	4
Molybdenum	ND		8.9	0.37	mg/Kg	☼	03/01/22 08:00	03/09/22 12:00	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.7	0.44	mg/Kg	☼	03/02/22 08:00	03/09/22 12:40	3
Boron	ND		34	34	mg/Kg	☼	03/02/22 08:00	03/09/22 12:40	3
Cobalt	ND		8.4	0.21	mg/Kg	☼	03/02/22 08:00	03/09/22 12:40	3
Lithium	ND		8.4	0.50	mg/Kg	☼	03/02/22 08:00	03/09/22 12:40	3
Molybdenum	ND		6.7	0.27	mg/Kg	☼	03/02/22 08:00	03/09/22 12:40	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.64**		0.56	0.15	mg/Kg	☼	03/03/22 08:20	03/10/22 11:15	1
Boron	ND		11	11	mg/Kg	☼	03/03/22 08:20	03/10/22 11:15	1
Cobalt	**1.8**	**J**	2.8	0.050	mg/Kg	☼	03/03/22 08:20	03/10/22 11:15	1
Lithium	ND		2.8	0.17	mg/Kg	☼	03/03/22 08:20	03/10/22 11:15	1
Molybdenum	**0.24**	**J**	2.2	0.092	mg/Kg	☼	03/03/22 08:20	03/10/22 11:15	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.8**	**B**	0.56	0.25	mg/Kg	☼	03/04/22 08:00	03/10/22 12:18	1
Boron	ND		11	11	mg/Kg	☼	03/04/22 08:00	03/10/22 12:18	1
Cobalt	**4.4**		2.8	0.059	mg/Kg	☼	03/04/22 08:00	03/10/22 12:18	1
Lithium	ND		2.8	0.17	mg/Kg	☼	03/04/22 08:00	03/10/22 12:18	1
Molybdenum	**0.24**	**J**	2.2	0.092	mg/Kg	☼	03/04/22 08:00	03/10/22 12:18	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**4.5**	**J**	8.4	2.1	mg/Kg	☼	03/09/22 08:00	03/11/22 13:49	5
Boron	ND		170	170	mg/Kg	☼	03/09/22 08:00	03/11/22 13:49	5
Cobalt	ND		42	0.67	mg/Kg	☼	03/09/22 08:00	03/11/22 13:49	5
Lithium	ND		42	2.5	mg/Kg	☼	03/09/22 08:00	03/11/22 13:49	5
Molybdenum	ND		34	1.4	mg/Kg	☼	03/09/22 08:00	03/11/22 13:49	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10**		1.1	0.34	mg/Kg	☼	03/09/22 08:00	03/11/22 15:22	2
Boron	ND	L	11	11	mg/Kg	☼	03/09/22 08:00	03/11/22 14:54	1
Cobalt	**7.6**		2.8	0.051	mg/Kg	☼	03/09/22 08:00	03/11/22 14:54	1
Lithium	**0.31**	**J**	2.8	0.17	mg/Kg	☼	03/09/22 08:00	03/11/22 14:54	1
Molybdenum	**0.35**	**J**	2.2	0.11	mg/Kg	☼	03/09/22 08:00	03/11/22 14:54	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**4.7**	**B**	1.1	0.29	mg/Kg	☼	03/10/22 08:05	03/15/22 13:33	2
Cobalt	**0.81**	**J**	2.8	0.029	mg/Kg	☼	03/10/22 08:05	03/15/22 13:07	1
Lithium	**3.2**		2.8	0.17	mg/Kg	☼	03/10/22 08:05	03/16/22 13:17	1

Client Sample Results

Client Sample ID: G-08 (75.0-80.0)

Date Collected: 12/23/21 13:30
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-3

Matrix: Solid
Percent Solids: 89.5

Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	ND		2.2	0.092	mg/Kg	☼	03/10/22 08:05	03/15/22 13:07	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**23**		0.50	0.13	mg/Kg			03/18/22 13:19	1
Cobalt	**15**		2.5	0.023	mg/Kg			03/18/22 13:19	1
Lithium	**3.5**		2.5	0.15	mg/Kg			03/18/22 13:19	1
Molybdenum	**0.83**	**J**	2.0	0.082	mg/Kg			03/18/22 13:19	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**22**	**B**	1.1	0.29	mg/Kg	☼	02/28/22 08:00	03/16/22 14:51	2
Cobalt	**14**		2.8	0.029	mg/Kg	☼	02/28/22 08:00	03/16/22 14:05	1
Lithium	**3.1**		2.8	0.17	mg/Kg	☼	02/28/22 08:00	03/16/22 14:05	1
Molybdenum	**1.5**	**J**	2.2	0.092	mg/Kg	☼	02/28/22 08:00	03/16/22 14:05	1

Default Detection Limits

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Prep: 3010A

SEP: Exchangeable

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Prep: 3010A

SEP: Carbonate

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.063	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Prep: 3010A

SEP: Non-Crystalline

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Prep: 3010A

SEP: Metal Hydroxide

Analyte	RL	MDL	Units
Arsenic	0.50	0.22	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.053	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units
Arsenic	1.5	0.38	mg/Kg
Boron	30	30	mg/Kg
Cobalt	7.5	0.12	mg/Kg
Lithium	7.5	0.44	mg/Kg
Molybdenum	6.0	0.25	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 6

SEP: Acid/Sulfide

Default Detection Limits

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Method: 6010B SEP - SEP Metals (ICP) - Step 6

SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Arsenic	0.50	0.15	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.046	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.099	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Prep: Residual

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.023	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B - SEP Metals (ICP) - Total

Prep: Total

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Lithium	2.5	0.15	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

QC Sample Results

1 2 3 4 5 6 7 8 9 10 11 12 13

Method: 6010B - SEP Metals (ICP) - Total

Lab Sample ID: MB 140-59245/1-A
Matrix: Solid
Analysis Batch: 59793
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 59245

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.256	J	0.50	0.13	mg/Kg		02/28/22 08:00	03/16/22 12:47	1
Cobalt	ND		2.5	0.026	mg/Kg		02/28/22 08:00	03/16/22 12:47	1
Lithium	ND		2.5	0.15	mg/Kg		02/28/22 08:00	03/16/22 12:47	1
Molybdenum	ND		2.0	0.082	mg/Kg		02/28/22 08:00	03/16/22 12:47	1

Lab Sample ID: LCS 140-59245/2-A
Matrix: Solid
Analysis Batch: 59793
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 59245

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	5.15		mg/Kg		103	80 - 120
Cobalt	5.00	5.11		mg/Kg		102	80 - 125
Lithium	5.00	4.82		mg/Kg		96	80 - 120
Molybdenum	25.0	26.5		mg/Kg		106	80 - 125

Lab Sample ID: LCSD 140-59245/3-A
Matrix: Solid
Analysis Batch: 59793
Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 59245

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	5.24		mg/Kg		105	80 - 120	2	30
Cobalt	5.00	5.14		mg/Kg		103	80 - 125	1	30
Lithium	5.00	4.81		mg/Kg		96	80 - 120	0	30
Molybdenum	25.0	26.8		mg/Kg		107	80 - 125	1	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59793
Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Total/NA
Prep Batch: 59245

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cobalt	5.6		4.09		mg/Kg	☼	30	30
Lithium	5.4		5.78		mg/Kg	☼	6	30
Molybdenum	0.65	J	0.874	J	mg/Kg	☼	30	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59793
Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Total/NA
Prep Batch: 59245

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	7.9	B	8.12		mg/Kg	☼	3	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-59247/1-B ^4
Matrix: Solid
Analysis Batch: 59628
Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 59310

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.0	0.52	mg/Kg		03/01/22 08:00	03/09/22 10:38	4
Boron	ND		40	40	mg/Kg		03/01/22 08:00	03/09/22 10:38	4

QC Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: MB 140-59247/1-B ^4
Matrix: Solid
Analysis Batch: 59628

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 59310

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	ND		10	0.18	mg/Kg		03/01/22 08:00	03/09/22 10:38	4
Lithium	ND		10	0.60	mg/Kg		03/01/22 08:00	03/09/22 10:38	4
Molybdenum	ND		8.0	0.33	mg/Kg		03/01/22 08:00	03/09/22 10:38	4

Lab Sample ID: LCS 140-59247/2-B ^5
Matrix: Solid
Analysis Batch: 59628

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 59310

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	4.76		mg/Kg		95	80 - 120
Boron	50.0	ND		mg/Kg		98	
Cobalt	5.00	4.92	J	mg/Kg		98	80 - 120
Lithium	5.00	4.99	J	mg/Kg		100	80 - 120
Molybdenum	25.0	24.7		mg/Kg		99	80 - 120

Lab Sample ID: LCSD 140-59247/3-B ^5
Matrix: Solid
Analysis Batch: 59628

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 59310

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	4.65		mg/Kg		93	80 - 120	6	30
Boron	50.0	ND		mg/Kg		96		2	
Cobalt	5.00	4.87	J	mg/Kg		97	80 - 120	2	30
Lithium	5.00	4.86	J	mg/Kg		97	80 - 120	3	30
Molybdenum	25.0	24.4		mg/Kg		98	80 - 120	2	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59628

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 1
Prep Batch: 59310

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	0.61	J	ND		mg/Kg	☼	NC	30
Boron	ND		ND		mg/Kg	☼	NC	
Cobalt	ND		ND		mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Molybdenum	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: MB 140-59318/1-B ^3
Matrix: Solid
Analysis Batch: 59628

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 59356

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.5	0.39	mg/Kg		03/02/22 08:00	03/09/22 11:02	3
Boron	ND		30	30	mg/Kg		03/02/22 08:00	03/09/22 11:02	3
Cobalt	ND		7.5	0.19	mg/Kg		03/02/22 08:00	03/09/22 11:02	3
Lithium	ND		7.5	0.45	mg/Kg		03/02/22 08:00	03/09/22 11:02	3
Molybdenum	ND		6.0	0.25	mg/Kg		03/02/22 08:00	03/09/22 11:02	3

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-59318/2-B ^5 **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Step 2**
Analysis Batch: 59628 **Prep Batch: 59356**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	4.42		mg/Kg		88	60 - 120
Boron	50.0	ND		mg/Kg		92	
Cobalt	5.00	4.69	J	mg/Kg		94	80 - 120
Lithium	5.00	4.40	J	mg/Kg		88	80 - 120
Molybdenum	25.0	20.5		mg/Kg		82	70 - 120

Lab Sample ID: LCSD 140-59318/3-B ^5 **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid **Prep Type: Step 2**
Analysis Batch: 59628 **Prep Batch: 59356**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	4.32		mg/Kg		86	60 - 120	2	30
Boron	50.0	ND		mg/Kg		90		1	
Cobalt	5.00	4.70	J	mg/Kg		94	80 - 120	0	30
Lithium	5.00	4.26	J	mg/Kg		85	80 - 120	3	30
Molybdenum	25.0	20.6		mg/Kg		82	70 - 120	0	30

Lab Sample ID: 140-25875-1 DU **Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)**
Matrix: Solid **Prep Type: Step 2**
Analysis Batch: 59628 **Prep Batch: 59356**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	0.51	J	0.472	J	mg/Kg	☼	8	30
Boron	ND		ND		mg/Kg	☼	NC	
Cobalt	ND		ND		mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Molybdenum	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: MB 140-59371/1-B **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Step 3**
Analysis Batch: 59667 **Prep Batch: 59412**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.13	mg/Kg		03/03/22 08:20	03/10/22 10:16	1
Boron	ND		10	10	mg/Kg		03/03/22 08:20	03/10/22 10:16	1
Cobalt	ND		2.5	0.045	mg/Kg		03/03/22 08:20	03/10/22 10:16	1
Lithium	ND		2.5	0.15	mg/Kg		03/03/22 08:20	03/10/22 10:16	1
Molybdenum	ND		2.0	0.082	mg/Kg		03/03/22 08:20	03/10/22 10:16	1

Lab Sample ID: LCS 140-59371/2-B **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Step 3**
Analysis Batch: 59667 **Prep Batch: 59412**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	4.73		mg/Kg		95	80 - 120
Boron	50.0	47.7		mg/Kg		95	
Cobalt	5.00	4.83		mg/Kg		97	80 - 120
Lithium	5.00	4.43		mg/Kg		89	80 - 120
Molybdenum	25.0	24.8		mg/Kg		99	80 - 120

QC Sample Results

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCSD 140-59371/3-B
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 59412

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	4.83		mg/Kg		97	80 - 120	2	30
Boron	50.0	48.9		mg/Kg		98		3	
Cobalt	5.00	4.85		mg/Kg		97	80 - 120	0	30
Lithium	5.00	4.43		mg/Kg		89	80 - 120	0	30
Molybdenum	25.0	24.9		mg/Kg		100	80 - 120	1	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 3
Prep Batch: 59412

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	0.40	J	0.393	J	mg/Kg	☼	2	30
Boron	ND		ND		mg/Kg	☼	NC	
Cobalt	0.85	J	1.31	J F5	mg/Kg	☼	43	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Molybdenum	ND		0.0985	J	mg/Kg	☼	NC	30

Lab Sample ID: MB 140-59413/1-B
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 59446

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.293	J	0.50	0.22	mg/Kg		03/04/22 08:00	03/10/22 11:20	1
Boron	ND		10	10	mg/Kg		03/04/22 08:00	03/10/22 11:20	1
Cobalt	ND		2.5	0.053	mg/Kg		03/04/22 08:00	03/10/22 11:20	1
Lithium	ND		2.5	0.15	mg/Kg		03/04/22 08:00	03/10/22 11:20	1
Molybdenum	ND		2.0	0.082	mg/Kg		03/04/22 08:00	03/10/22 11:20	1

Lab Sample ID: LCS 140-59413/2-B
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 59446

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	5.60		mg/Kg		112	80 - 130
Boron	50.0	51.8		mg/Kg		104	
Cobalt	5.00	5.25		mg/Kg		105	80 - 120
Lithium	5.00	5.00		mg/Kg		100	80 - 120
Molybdenum	25.0	27.4		mg/Kg		110	80 - 120

Lab Sample ID: LCSD 140-59413/3-B
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 4
Prep Batch: 59446

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	5.70		mg/Kg		114	80 - 130	2	30
Boron	50.0	51.8		mg/Kg		104		0	
Cobalt	5.00	5.43		mg/Kg		109	80 - 120	3	30
Lithium	5.00	4.94		mg/Kg		99	80 - 120	1	30
Molybdenum	25.0	28.1		mg/Kg		112	80 - 120	3	30

1 2 3 4 5 6 7 8 9 10 11 12 13

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59667

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 4
Prep Batch: 59446

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	2.4	B	1.74	F3	mg/Kg	☼	34	30
Boron	ND		ND		mg/Kg	☼	NC	
Cobalt	1.4	J	1.16	J	mg/Kg	☼	16	30
Lithium	0.27	J	0.195	J F5	mg/Kg	☼	33	30
Molybdenum	0.10	J	0.108	J	mg/Kg	☼	7	30

Lab Sample ID: MB 140-59468/1-B ^5
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 59579

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		7.5	1.9	mg/Kg		03/09/22 08:00	03/11/22 12:48	5
Boron	ND		150	150	mg/Kg		03/09/22 08:00	03/11/22 12:48	5
Cobalt	ND		38	0.60	mg/Kg		03/09/22 08:00	03/11/22 12:48	5
Lithium	ND		38	2.2	mg/Kg		03/09/22 08:00	03/11/22 12:48	5
Molybdenum	ND		30	1.3	mg/Kg		03/09/22 08:00	03/11/22 12:48	5

Lab Sample ID: LCS 140-59468/2-B ^5
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 59579

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	15.0	11.9		mg/Kg		79	60 - 100
Boron	150	165		mg/Kg		110	
Cobalt	15.0	0.960	J	mg/Kg		6	1 - 60
Lithium	15.0	15.7	J	mg/Kg		105	80 - 150
Molybdenum	75.0	58.0		mg/Kg		77	60 - 100

Lab Sample ID: LCSD 140-59468/3-B ^5
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 59579

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	15.0	12.1		mg/Kg		81	60 - 100	2	30
Boron	150	167		mg/Kg		111		1	
Cobalt	15.0	1.16	J	mg/Kg		8	1 - 60	18	30
Lithium	15.0	16.7	J	mg/Kg		111	80 - 150	6	30
Molybdenum	75.0	57.8		mg/Kg		77	60 - 100	0	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 5
Prep Batch: 59579

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	ND		ND		mg/Kg	☼	NC	30
Boron	ND		ND		mg/Kg	☼	NC	
Cobalt	ND		ND		mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Molybdenum	ND		ND		mg/Kg	☼	NC	30

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: MB 140-59581/1-A
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 59581

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.15	mg/Kg		03/09/22 08:00	03/11/22 13:54	1
Boron	ND		10	10	mg/Kg		03/09/22 08:00	03/11/22 13:54	1
Cobalt	ND		2.5	0.046	mg/Kg		03/09/22 08:00	03/11/22 13:54	1
Lithium	ND		2.5	0.15	mg/Kg		03/09/22 08:00	03/11/22 13:54	1
Molybdenum	ND		2.0	0.099	mg/Kg		03/09/22 08:00	03/11/22 13:54	1

Lab Sample ID: LCS 140-59581/2-A
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 59581

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	5.22		mg/Kg		104	80 - 120
Boron	50.0	53.8		mg/Kg		108	
Cobalt	5.00	5.16		mg/Kg		103	80 - 120
Lithium	5.00	4.99		mg/Kg		100	80 - 120
Molybdenum	25.0	25.2		mg/Kg		101	80 - 120

Lab Sample ID: LCSD 140-59581/3-A
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 59581

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	5.29		mg/Kg		106	80 - 120	1	30
Boron	50.0	54.7		mg/Kg		109		2	
Cobalt	5.00	5.28		mg/Kg		106	80 - 120	2	30
Lithium	5.00	5.02		mg/Kg		100	80 - 120	1	30
Molybdenum	25.0	25.7		mg/Kg		103	80 - 120	2	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 6
Prep Batch: 59581

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Boron	ND		ND	L	mg/Kg	☼	NC	
Cobalt	3.5		3.14		mg/Kg	☼	12	30
Lithium	1.1	J	0.934	J	mg/Kg	☼	14	30
Molybdenum	0.40	J	0.477	J	mg/Kg	☼	17	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59699

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 6
Prep Batch: 59581

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	7.5		5.84		mg/Kg	☼	25	30

QC Sample Results

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: MB 140-59631/1-A
Matrix: Solid
Analysis Batch: 59767

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 59631

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.319	J	0.50	0.13	mg/Kg		03/10/22 08:05	03/15/22 12:07	1
Cobalt	ND		2.5	0.026	mg/Kg		03/10/22 08:05	03/15/22 12:07	1
Lithium	ND		2.5	0.15	mg/Kg		03/10/22 08:05	03/15/22 12:07	1
Molybdenum	ND		2.0	0.082	mg/Kg		03/10/22 08:05	03/15/22 12:07	1

Lab Sample ID: LCS 140-59631/2-A
Matrix: Solid
Analysis Batch: 59767

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 59631

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			5.00	5.11		mg/Kg		102	80 - 120		
Cobalt			5.00	4.91		mg/Kg		98	80 - 125		
Lithium			5.00	4.76		mg/Kg		95	80 - 120		
Molybdenum			25.0	24.8		mg/Kg		99	80 - 125		

Lab Sample ID: LCSD 140-59631/3-A
Matrix: Solid
Analysis Batch: 59767

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 59631

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			5.00	5.13		mg/Kg		103	80 - 120	0	30
Cobalt			5.00	4.95		mg/Kg		99	80 - 125	1	30
Lithium			5.00	4.91		mg/Kg		98	80 - 120	4	30
Molybdenum			25.0	25.0		mg/Kg		100	80 - 125	1	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59767

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 7
Prep Batch: 59631

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Cobalt	ND			0.312	J	mg/Kg	☼			NC	30
Lithium	3.2			3.25		mg/Kg	☼			3	30
Molybdenum	ND			0.805	J	mg/Kg	☼			NC	30

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Analysis Batch: 59767

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Prep Type: Step 7
Prep Batch: 59631

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Arsenic	3.2	B		11.2	F3	mg/Kg	☼			111	30

QC Association Summary

Metals

Prep Batch: 59245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	Total	
140-25875-2	G-07 (50.0-56.0)	Total/NA	Solid	Total	
140-25875-3	G-08 (75.0-80.0)	Total/NA	Solid	Total	
MB 140-59245/1-A	Method Blank	Total/NA	Solid	Total	
LCS 140-59245/2-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-59245/3-A	Lab Control Sample Dup	Total/NA	Solid	Total	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	Total	

SEP Batch: 59247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	Exchangeable	
140-25875-2	G-07 (50.0-56.0)	Step 1	Solid	Exchangeable	
140-25875-3	G-08 (75.0-80.0)	Step 1	Solid	Exchangeable	
MB 140-59247/1-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-59247/2-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-59247/3-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	Exchangeable	

Prep Batch: 59310

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	3010A	59247
140-25875-2	G-07 (50.0-56.0)	Step 1	Solid	3010A	59247
140-25875-3	G-08 (75.0-80.0)	Step 1	Solid	3010A	59247
MB 140-59247/1-B ^4	Method Blank	Step 1	Solid	3010A	59247
LCS 140-59247/2-B ^5	Lab Control Sample	Step 1	Solid	3010A	59247
LCSD 140-59247/3-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	59247
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	3010A	59247

SEP Batch: 59318

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	Carbonate	
140-25875-2	G-07 (50.0-56.0)	Step 2	Solid	Carbonate	
140-25875-3	G-08 (75.0-80.0)	Step 2	Solid	Carbonate	
MB 140-59318/1-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-59318/2-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-59318/3-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	Carbonate	

Prep Batch: 59356

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	3010A	59318
140-25875-2	G-07 (50.0-56.0)	Step 2	Solid	3010A	59318
140-25875-3	G-08 (75.0-80.0)	Step 2	Solid	3010A	59318
MB 140-59318/1-B ^3	Method Blank	Step 2	Solid	3010A	59318
LCS 140-59318/2-B ^5	Lab Control Sample	Step 2	Solid	3010A	59318
LCSD 140-59318/3-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	59318
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	3010A	59318

SEP Batch: 59371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	Non-Crystalline	

Metals (Continued)

SEP Batch: 59371 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-2	G-07 (50.0-56.0)	Step 3	Solid	Non-Crystalline	
140-25875-3	G-08 (75.0-80.0)	Step 3	Solid	Non-Crystalline	
MB 140-59371/1-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-59371/2-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-59371/3-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	Non-Crystalline	

Prep Batch: 59412

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	3010A	59371
140-25875-2	G-07 (50.0-56.0)	Step 3	Solid	3010A	59371
140-25875-3	G-08 (75.0-80.0)	Step 3	Solid	3010A	59371
MB 140-59371/1-B	Method Blank	Step 3	Solid	3010A	59371
LCS 140-59371/2-B	Lab Control Sample	Step 3	Solid	3010A	59371
LCSD 140-59371/3-B	Lab Control Sample Dup	Step 3	Solid	3010A	59371
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	3010A	59371

SEP Batch: 59413

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	Metal Hydroxide	
140-25875-2	G-07 (50.0-56.0)	Step 4	Solid	Metal Hydroxide	
140-25875-3	G-08 (75.0-80.0)	Step 4	Solid	Metal Hydroxide	
MB 140-59413/1-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-59413/2-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-59413/3-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	Metal Hydroxide	

Prep Batch: 59446

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	3010A	59413
140-25875-2	G-07 (50.0-56.0)	Step 4	Solid	3010A	59413
140-25875-3	G-08 (75.0-80.0)	Step 4	Solid	3010A	59413
MB 140-59413/1-B	Method Blank	Step 4	Solid	3010A	59413
LCS 140-59413/2-B	Lab Control Sample	Step 4	Solid	3010A	59413
LCSD 140-59413/3-B	Lab Control Sample Dup	Step 4	Solid	3010A	59413
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	3010A	59413

SEP Batch: 59468

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	Organic-Bound	
140-25875-2	G-07 (50.0-56.0)	Step 5	Solid	Organic-Bound	
140-25875-3	G-08 (75.0-80.0)	Step 5	Solid	Organic-Bound	
MB 140-59468/1-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-59468/2-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-59468/3-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	Organic-Bound	

Prep Batch: 59579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	3010A	59468
140-25875-2	G-07 (50.0-56.0)	Step 5	Solid	3010A	59468

Metals (Continued)

Prep Batch: 59579 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-3	G-08 (75.0-80.0)	Step 5	Solid	3010A	59468
MB 140-59468/1-B ^5	Method Blank	Step 5	Solid	3010A	59468
LCS 140-59468/2-B ^5	Lab Control Sample	Step 5	Solid	3010A	59468
LCSD 140-59468/3-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	59468
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	3010A	59468

SEP Batch: 59581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	Acid/Sulfide	
140-25875-2	G-07 (50.0-56.0)	Step 6	Solid	Acid/Sulfide	
140-25875-3	G-08 (75.0-80.0)	Step 6	Solid	Acid/Sulfide	
MB 140-59581/1-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-59581/2-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-59581/3-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	Acid/Sulfide	

Analysis Batch: 59628

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	6010B SEP	59310
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	6010B SEP	59356
140-25875-2	G-07 (50.0-56.0)	Step 1	Solid	6010B SEP	59310
140-25875-2	G-07 (50.0-56.0)	Step 2	Solid	6010B SEP	59356
140-25875-3	G-08 (75.0-80.0)	Step 1	Solid	6010B SEP	59310
140-25875-3	G-08 (75.0-80.0)	Step 2	Solid	6010B SEP	59356
MB 140-59247/1-B ^4	Method Blank	Step 1	Solid	6010B SEP	59310
MB 140-59318/1-B ^3	Method Blank	Step 2	Solid	6010B SEP	59356
LCS 140-59247/2-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	59310
LCS 140-59318/2-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	59356
LCSD 140-59247/3-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	59310
LCSD 140-59318/3-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	59356
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 1	Solid	6010B SEP	59310
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 2	Solid	6010B SEP	59356

Prep Batch: 59631

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	Residual	
140-25875-2	G-07 (50.0-56.0)	Step 7	Solid	Residual	
140-25875-3	G-08 (75.0-80.0)	Step 7	Solid	Residual	
MB 140-59631/1-A	Method Blank	Step 7	Solid	Residual	
LCS 140-59631/2-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-59631/3-A	Lab Control Sample Dup	Step 7	Solid	Residual	
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	Residual	

Analysis Batch: 59667

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	6010B SEP	59412
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	6010B SEP	59446
140-25875-2	G-07 (50.0-56.0)	Step 3	Solid	6010B SEP	59412
140-25875-2	G-07 (50.0-56.0)	Step 4	Solid	6010B SEP	59446
140-25875-3	G-08 (75.0-80.0)	Step 3	Solid	6010B SEP	59412
140-25875-3	G-08 (75.0-80.0)	Step 4	Solid	6010B SEP	59446

Metals (Continued)

Analysis Batch: 59667 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-59371/1-B	Method Blank	Step 3	Solid	6010B SEP	59412
MB 140-59413/1-B	Method Blank	Step 4	Solid	6010B SEP	59446
LCS 140-59371/2-B	Lab Control Sample	Step 3	Solid	6010B SEP	59412
LCS 140-59413/2-B	Lab Control Sample	Step 4	Solid	6010B SEP	59446
LCSD 140-59371/3-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	59412
LCSD 140-59413/3-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	59446
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 3	Solid	6010B SEP	59412
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 4	Solid	6010B SEP	59446

Analysis Batch: 59699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	6010B SEP	59579
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	6010B SEP	59581
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	6010B SEP	59581
140-25875-2	G-07 (50.0-56.0)	Step 5	Solid	6010B SEP	59579
140-25875-2	G-07 (50.0-56.0)	Step 6	Solid	6010B SEP	59581
140-25875-3	G-08 (75.0-80.0)	Step 5	Solid	6010B SEP	59579
140-25875-3	G-08 (75.0-80.0)	Step 6	Solid	6010B SEP	59581
140-25875-3	G-08 (75.0-80.0)	Step 6	Solid	6010B SEP	59581
MB 140-59468/1-B ^5	Method Blank	Step 5	Solid	6010B SEP	59579
MB 140-59581/1-A	Method Blank	Step 6	Solid	6010B SEP	59581
LCS 140-59468/2-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	59579
LCS 140-59581/2-A	Lab Control Sample	Step 6	Solid	6010B SEP	59581
LCSD 140-59468/3-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	59579
LCSD 140-59581/3-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	59581
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 5	Solid	6010B SEP	59579
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	6010B SEP	59581
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 6	Solid	6010B SEP	59581

Analysis Batch: 59767

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	6010B SEP	59631
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	6010B SEP	59631
140-25875-2	G-07 (50.0-56.0)	Step 7	Solid	6010B SEP	59631
140-25875-3	G-08 (75.0-80.0)	Step 7	Solid	6010B SEP	59631
140-25875-3	G-08 (75.0-80.0)	Step 7	Solid	6010B SEP	59631
MB 140-59631/1-A	Method Blank	Step 7	Solid	6010B SEP	59631
LCS 140-59631/2-A	Lab Control Sample	Step 7	Solid	6010B SEP	59631
LCSD 140-59631/3-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	59631
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	6010B SEP	59631
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Step 7	Solid	6010B SEP	59631

Analysis Batch: 59793

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	6010B	59245
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	6010B	59245
140-25875-2	G-07 (50.0-56.0)	Total/NA	Solid	6010B	59245
140-25875-2	G-07 (50.0-56.0)	Total/NA	Solid	6010B	59245
140-25875-3	G-08 (75.0-80.0)	Step 7	Solid	6010B SEP	59631
140-25875-3	G-08 (75.0-80.0)	Total/NA	Solid	6010B	59245
140-25875-3	G-08 (75.0-80.0)	Total/NA	Solid	6010B	59245

Metals (Continued)

Analysis Batch: 59793 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-59245/1-A	Method Blank	Total/NA	Solid	6010B	59245
LCS 140-59245/2-A	Lab Control Sample	Total/NA	Solid	6010B	59245
LCSD 140-59245/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	59245
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	6010B	59245
140-25875-1 DU	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	6010B	59245

Analysis Batch: 59866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Sum of Steps 1-7	Solid	6010B SEP	
140-25875-2	G-07 (50.0-56.0)	Sum of Steps 1-7	Solid	6010B SEP	
140-25875-3	G-08 (75.0-80.0)	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 57767

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-25875-1	G-03 (57.5-62.5, 63.5-70.0)	Total/NA	Solid	Moisture	
140-25875-2	G-07 (50.0-56.0)	Total/NA	Solid	Moisture	
140-25875-3	G-08 (75.0-80.0)	Total/NA	Solid	Moisture	

Lab Chronicle

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Lab Sample ID: 140-25875-1

Date Collected: 12/23/21 13:00
Matrix: Solid
Date Received: 12/24/21 08:00

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			59866	03/18/22 13:19	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			57767	01/10/22 09:51	BKD	TAL KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Lab Sample ID: 140-25875-1

Date Collected: 12/23/21 13:00
Matrix: Solid
Date Received: 12/24/21 08:00
Percent Solids: 86.8

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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 13:45	JGT	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.00 g	50 mL	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		2			59793	03/16/22 14:31	JGT	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.00 g	25 mL	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		4			59628	03/09/22 11:40	JGT	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			59628	03/09/22 12:10	JGT	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 10:45	JGT	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 11:49	JGT	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.00 g	75 mL	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 13:19	JGT	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 14:23	JGT	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		2			59699	03/11/22 15:07	JGT	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:37	KNC	TAL KNX
	Instrument ID:	DUO								

Lab Chronicle

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Lab Sample ID: 140-25875-1

Date Collected: 12/23/21 13:00
Matrix: Solid
Date Received: 12/24/21 08:00
Percent Solids: 86.8

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	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		2			59767	03/15/22 13:23	KNC	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: G-07 (50.0-56.0)

Lab Sample ID: 140-25875-2

Date Collected: 12/23/21 13:15
Matrix: Solid
Date Received: 12/24/21 08:00

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			59866	03/18/22 13:19	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			57767	01/10/22 09:51	BKD	TAL KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G-07 (50.0-56.0)

Lab Sample ID: 140-25875-2

Date Collected: 12/23/21 13:15
Matrix: Solid
Date Received: 12/24/21 08:00
Percent Solids: 89.1

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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 14:00	JGT	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.00 g	50 mL	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		2			59793	03/16/22 14:46	JGT	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.00 g	25 mL	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		4			59628	03/09/22 11:55	JGT	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			59628	03/09/22 12:35	JGT	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 11:00	JGT	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 12:13	JGT	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.00 g	75 mL	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 13:34	JGT	TAL KNX
	Instrument ID:	DUO								

Lab Chronicle

Client Sample ID: G-07 (50.0-56.0)

Lab Sample ID: 140-25875-2

Date Collected: 12/23/21 13:15

Matrix: Solid

Date Received: 12/24/21 08:00

Percent Solids: 89.1

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 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 14:49	JGT	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:47	KNC	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: G-08 (75.0-80.0)

Lab Sample ID: 140-25875-3

Date Collected: 12/23/21 13:30

Matrix: Solid

Date Received: 12/24/21 08:00

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			59866	03/18/22 13:19	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			57767	01/10/22 09:51	BKD	TAL KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G-08 (75.0-80.0)

Lab Sample ID: 140-25875-3

Date Collected: 12/23/21 13:30

Matrix: Solid

Date Received: 12/24/21 08:00

Percent Solids: 89.5

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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 14:05	JGT	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.00 g	50 mL	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		2			59793	03/16/22 14:51	JGT	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.00 g	25 mL	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		4			59628	03/09/22 12:00	JGT	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			59628	03/09/22 12:40	JGT	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 11:15	JGT	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 12:18	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: G-08 (75.0-80.0)

Lab Sample ID: 140-25875-3

Date Collected: 12/23/21 13:30
Matrix: Solid
Date Received: 12/24/21 08:00
Percent Solids: 89.5

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	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 13:49	JGT	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 14:54	JGT	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		2			59699	03/11/22 15:22	JGT	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 13:07	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		2			59767	03/15/22 13:33	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59793	03/16/22 13:17	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59245/1-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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 12:47	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59247/1-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	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		4			59628	03/09/22 10:38	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59318/1-B ^3

Date Collected: N/A
Date Received: N/A

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			59628	03/09/22 11:02	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59371/1-B

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 10:16	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59413/1-B

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 11:20	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59468/1-B ^5

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 12:48	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59581/1-A

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 13:54	JGT	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client Sample ID: Method Blank

Lab Sample ID: MB 140-59631/1-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	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:07	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59245/2-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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 12:52	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59247/2-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	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		5			59628	03/09/22 10:43	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59318/2-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			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			59628	03/09/22 11:07	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59371/2-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	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 10:21	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59413/2-B

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 11:25	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59468/2-B ^5

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 12:53	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59581/2-A

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 13:59	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-59631/2-A

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:12	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59245/3-A

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 12:57	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59247/3-B ^5

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		5			59628	03/09/22 10:48	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59318/3-B ^5

Date Collected: N/A
Date Received: N/A

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			59628	03/09/22 11:12	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59371/3-B

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 10:26	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59413/3-B

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 11:30	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59468/3-B ^5

Date Collected: N/A
Date Received: N/A

Matrix: Solid

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	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 12:58	JGT	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59581/3-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 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 14:04	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-59631/3-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	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:17	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)

Lab Sample ID: 140-25875-1 DU

Date Collected: 12/23/21 13:00

Matrix: Solid

Date Received: 12/24/21 08:00

Percent Solids: 86.8

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	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		1			59793	03/16/22 13:55	JGT	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.00 g	50 mL	59245	02/28/22 08:00	WRL	TAL KNX
Total/NA	Analysis	6010B		2			59793	03/16/22 14:41	JGT	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.00 g	25 mL	59247	02/28/22 08:00	WRL	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	59310	03/01/22 08:00	WRL	TAL KNX
Step 1	Analysis	6010B SEP		4			59628	03/09/22 11:50	JGT	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	59318	03/01/22 08:00	WRL	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	59356	03/02/22 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			59628	03/09/22 12:30	JGT	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.00 g	25 mL	59371	03/02/22 08:26	WRL	TAL KNX
Step 3	Prep	3010A			5.00 mL	50 mL	59412	03/03/22 08:20	WRL	TAL KNX
Step 3	Analysis	6010B SEP		1			59667	03/10/22 10:50	JGT	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.00 g	25 mL	59413	03/03/22 08:32	WRL	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	59446	03/04/22 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			59667	03/10/22 11:53	JGT	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.00 g	75 mL	59468	03/07/22 08:00	WRL	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	59579	03/09/22 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			59699	03/11/22 13:29	JGT	TAL KNX
	Instrument ID: DUO									

Client Sample ID: G-03 (57.5-62.5, 63.5-70.0)
Date Collected: 12/23/21 13:00
Date Received: 12/24/21 08:00

Lab Sample ID: 140-25875-1 DU
Matrix: Solid
Percent Solids: 86.8

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 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		1			59699	03/11/22 14:33	JGT	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	59581	03/09/22 08:00	WRL	TAL KNX
Step 6	Analysis	6010B SEP		2			59699	03/11/22 15:12	JGT	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		1			59767	03/15/22 12:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	59631	03/10/22 08:05	WRL	TAL KNX
Step 7	Analysis	6010B SEP		2			59767	03/15/22 13:28	KNC	TAL KNX
	Instrument ID: DUO									

Laboratory References:

TAL KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

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	06-17-22
California	State	2423	06-30-22
Colorado	State	TN00009	02-28-23
Connecticut	State	PH-0223	09-30-23
Florida	NELAP	E87177	06-30-22
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-22
Kansas	NELAP	E-10349	10-31-22
Kentucky (DW)	State	90101	12-31-22
Louisiana	NELAP	83979	06-30-22
Louisiana (DW)	State	LA019	12-31-22
Maryland	State	277	03-31-22
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-22
New Hampshire	NELAP	299919	01-17-23
New Jersey	NELAP	TN001	06-30-22
New York	NELAP	10781	03-31-22
North Carolina (DW)	State	21705	07-31-22
North Carolina (WW/SW)	State	64	12-31-22
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-22
Oregon	NELAP	TNI0189	12-31-22
Pennsylvania	NELAP	68-00576	12-31-22
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-22
US Fish & Wildlife	US Federal Programs	058448	07-31-22
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-22
Virginia	NELAP	460176	09-14-22
Washington	State	C593	01-19-23
West Virginia (DW)	State	9955C	12-31-22
West Virginia DEP	State	345	04-30-22
Wisconsin	State	998044300	08-31-22

Method Summary

Client: Sirem, div of Geosyntec Consultants
Project/Site: Joppa MNA

Job ID: 140-25875-1

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	TAL KNX
6010B SEP	SEP Metals (ICP)	SW846	TAL KNX
Moisture	Percent Moisture	EPA	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	TAL KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	TAL KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	TAL KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	TAL KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	TAL KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	TAL KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	TAL KNX
Total	Preparation, Total Material	TAL-KNOX	TAL 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:

TAL KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Chain of Custody Record

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

eurofins | Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Project Manager: Michael Healey
Email: mhealey@siremlab.com
Tel/Fax: 519-515-0852

Site Contact:
Lab Contact: Rachel Hallman
Date: 23Dec21
Carrier:

COC No:
_____ of _____ COCs
TALS Project #:
Sampler:
For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:

Client Contact
SiREM Lab
130 Stone Road
Guelph/ON/Canada/N1G 3Z2
(519) 822-2265 Phone
(xxx) xxx-xxxx FAX
Project Name: Joppa MNA
Site:
P O #

Analysis Turnaround Time
☑ CALENDAR DAYS ☐ WORKING DAYS
TAT if different from Below ________
☑ 2 weeks
☐ 1 week
☐ 2 days
☐ 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	SEP (Sequential Extraction Procedu	Sample Specific Notes:
G-03 (57.5-62.5, 63.5-70.0)	12/23/21	1:00	G	Soil	1	N	X	Contact Rachel Hallman/Michael Healey Prior to Analysis
G-07 (50.0-56.0)	12/23/21	1:15	G	Soil	1	N	X	
G-08 (75.0-80.0)	12/23/21	1:30	G	Soil	1	N	X	

Rec @ RT 0.5°c CT 0.4°c
no custody Seal
1 cooler RD 12.24.21
UPS# 1Z 522 7VR 15 9311 1219

140-25875 Chain of Custody

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: Rachel Hallman	Company: SiREM	Date/Time: 23Dec21	Received by:	Company: ETAKNX	Date/Time: 12.24.21 8:00
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Loc: 140
25875

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 : SC-71 Correction factor: -0.1°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

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 #: 14006346 PM Instructions:

Sample Receiving Associate: Date: 12.24.21

QA026R32.doc, 062719

ATTACHMENT H

X-Ray Diffraction Analytical Data

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for: *Environmental Services*

Project Number/ LIMS No. *Custom XRD/MI4515-NOV21*

Sample Receipt: *November 9, 2021*

Sample Analysis: *November 11, 2021*

Reporting Date: *November 16, 2021*

Instrument: BRUKER AXS D8 Advance Diffractometer

Test Conditions: Co radiation, 35 kV, 40 mA
Regular Scanning: Step: 0.02°, Step time: 1s, 2θ range: 3-80°

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)

Kim Gibbs

Kim Gibbs, H.B.Sc., P.Geo.
Senior Mineralogist

Huyun Zhou

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

ACCREDITATION: SGS Minerals Services 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 - Minerals Services - Lakefield: http://palcan.scc.ca/SpecsSearch/GLSearchForm.do.

Method Summary

The Rietveld Method of Mineral Identification by XRD (ME-LR-MIN-MET-MN-D05) method used by SGS Minerals Services 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.

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.

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Result

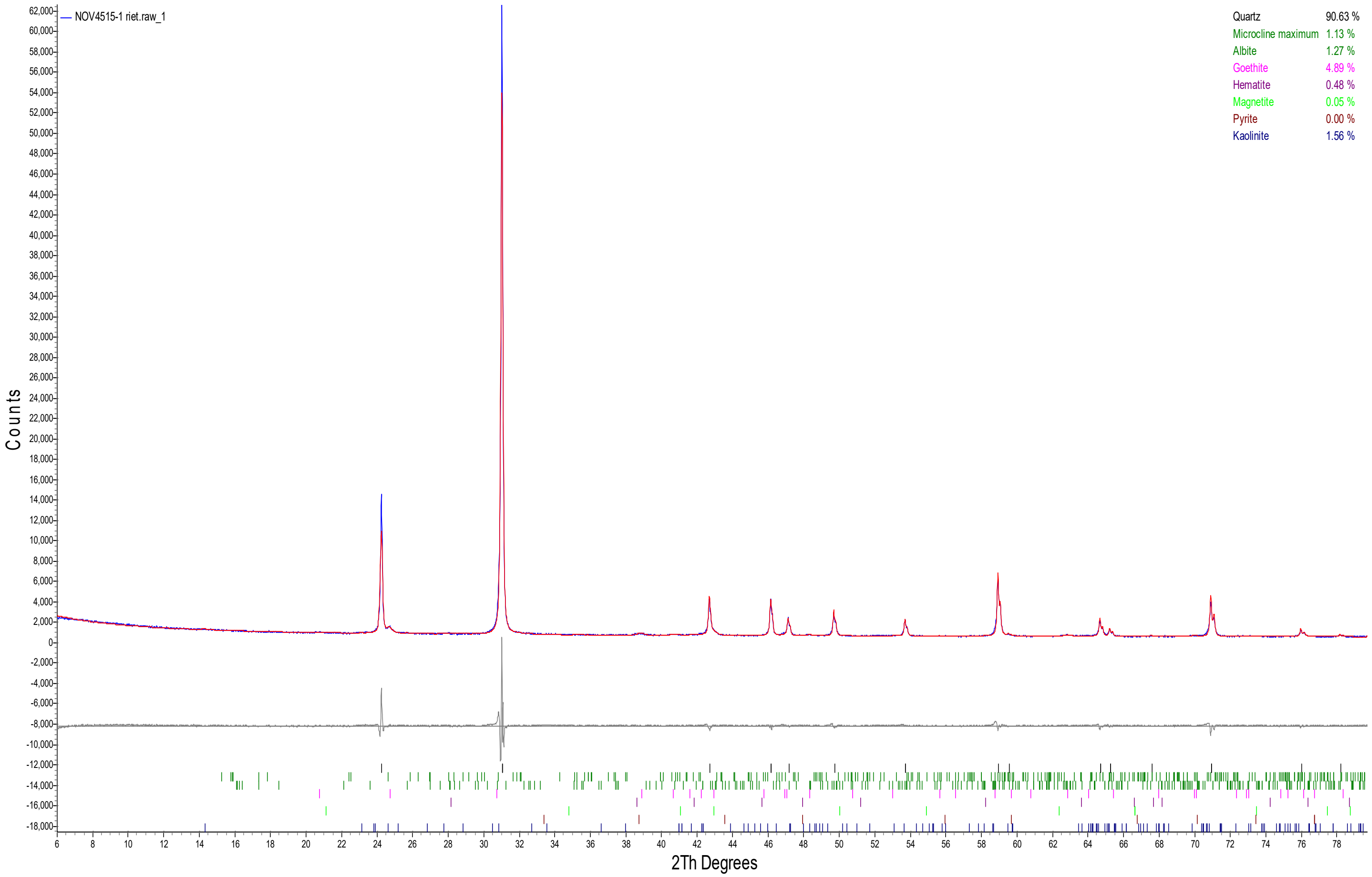
Mineral/Compound	G-03 (57.5-62.5, 63.5-70.0) NOV4515-1 (wt %)	G-07 (50.0-56.0) NOV4515-2 (wt %)	G-08 (75.0-80.0) NOV4515-3 (wt %)
Quartz	90.6	92.0	88.4
Microcline	1.1	1.7	1.3
Albite	1.3	1.5	1.2
Goethite	4.9	3.1	8.2
Hematite	0.5	0.2	0.1
Magnetite	0.0	0.0	0.0
Pyrite	0.0	0.0	0.0
Kaolinite	1.6	1.6	0.7
TOTAL	100	100	100

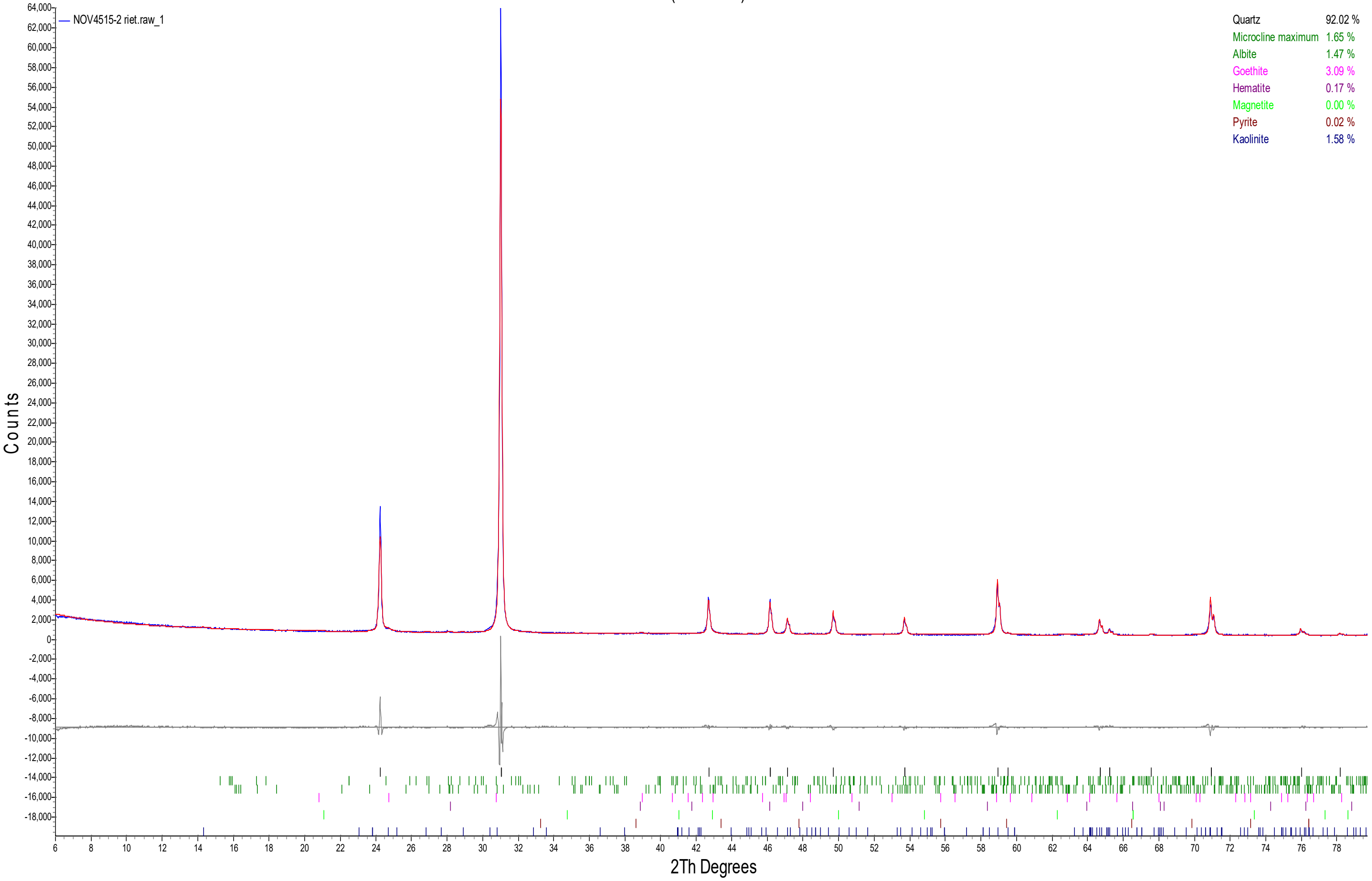
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been de

Mineral/Compound	Formula
Quartz	SiO_2
Microcline	$KAlSi_3O_8$
Albite	$NaAlSi_3O_8$
Goethite	$\alpha FeO\cdot OH$
Hematite	Fe_2O_3
Magnetite	Fe_3O_4
Pyrite	FeS_2
Kaolinite	$Al_2Si_2O_5(OH)_4$

G-03 (57.5-62.5, 63.5-70.0)

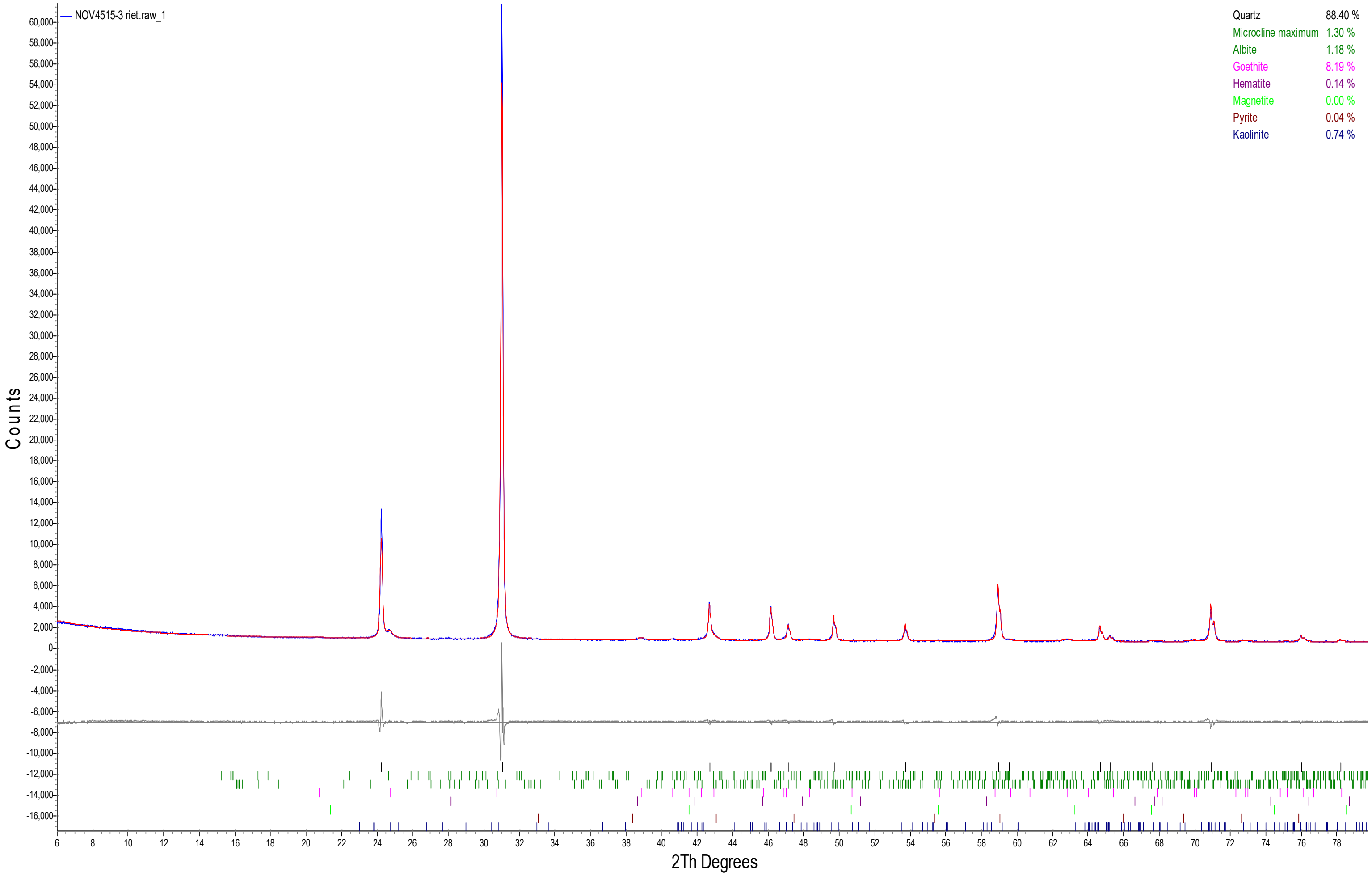




G-07 (50.0-56.0)

NOV4515-2 riet.raw_1
Counts
64,000
62,000
60,000
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
-8,000
-10,000
-12,000
-14,000
-16,000
-18,000
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
2Th Degrees
Quartz 92.02 %
Microcline maximum 1.65 %
Albite 1.47 %
Goethite 3.09 %
Hematite 0.17 %
Magnetite 0.00 %
Pyrite 0.02 %
Kaolinite 1.58 %

G-08 (75.0-80.0)


NOV4515-3 riet.raw_1
Counts
60,000
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
-8,000
-10,000
-12,000
-14,000
-16,000
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
2Th Degrees
Quartz 88.40 %
Microcline maximum 1.30 %
Albite 1.18 %
Goethite 8.19 %
Hematite 0.14 %
Magnetite 0.00 %
Pyrite 0.04 %
Kaolinite 0.74 %

ATTACHMENT I

Aqueous Phase Data Summary

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW01	Porewater	2021/03/05	pH (field)	SU	8.0
CCR	XPW01	Porewater	2021/03/24	pH (field)	SU	8.4
CCR	XPW01	Porewater	2021/04/14	pH (field)	SU	8.2
CCR	XPW01	Porewater	2021/05/12	pH (field)	SU	8.4
CCR	XPW01	Porewater	2021/07/21	pH (field)	SU	7.3
CCR	XPW01	Porewater	2022/03/15	pH (field)	SU	8.3
CCR	XPW01	Porewater	2023/03/08	pH (field)	SU	8.5
CCR	XPW01	Porewater	2023/05/03	pH (field)	SU	8.4
CCR	XPW01	Porewater	2023/09/26	pH (field)	SU	8.2
CCR	XPW01	Porewater	2023/10/25	pH (field)	SU	8.4
CCR	XPW01	Porewater	2021/03/05	Oxidation Reduction Potential	mV	-168
CCR	XPW01	Porewater	2021/03/24	Oxidation Reduction Potential	mV	-55.0
CCR	XPW01	Porewater	2021/04/14	Oxidation Reduction Potential	mV	-57.0
CCR	XPW01	Porewater	2021/05/12	Oxidation Reduction Potential	mV	-116
CCR	XPW01	Porewater	2021/07/21	Oxidation Reduction Potential	mV	-101
CCR	XPW01	Porewater	2022/03/15	Oxidation Reduction Potential	mV	-155
CCR	XPW01	Porewater	2023/03/08	Oxidation Reduction Potential	mV	-157
CCR	XPW01	Porewater	2023/05/03	Oxidation Reduction Potential	mV	-34.0
CCR	XPW01	Porewater	2023/09/26	Oxidation Reduction Potential	mV	-152
CCR	XPW01	Porewater	2023/10/25	Oxidation Reduction Potential	mV	-177
CCR	XPW01	Porewater	2021/03/05	Eh	V	0.027
CCR	XPW01	Porewater	2021/03/24	Eh	V	0.14
CCR	XPW01	Porewater	2021/04/14	Eh	V	0.14
CCR	XPW01	Porewater	2021/05/12	Eh	V	0.078
CCR	XPW01	Porewater	2021/07/21	Eh	V	0.093
CCR	XPW01	Porewater	2022/03/15	Eh	V	0.040
CCR	XPW01	Porewater	2023/03/08	Eh	V	0.038
CCR	XPW01	Porewater	2023/05/03	Eh	V	0.16
CCR	XPW01	Porewater	2023/09/26	Eh	V	0.041
CCR	XPW01	Porewater	2023/10/25	Eh	V	0.015
CCR	XPW01	Porewater	2021/03/05	Alkalinity, bicarbonate	mg/L CaCO3	155
CCR	XPW01	Porewater	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	141
CCR	XPW01	Porewater	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	136
CCR	XPW01	Porewater	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	145
CCR	XPW01	Porewater	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	142
CCR	XPW01	Porewater	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	104
CCR	XPW01	Porewater	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	64.0
CCR	XPW01	Porewater	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	130
CCR	XPW01	Porewater	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	118
CCR	XPW01	Porewater	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	84.0
CCR	XPW01	Porewater	2022/03/15	Alkalinity, carbonate	mg/L CaCO3	11.0
CCR	XPW01	Porewater	2023/03/08	Alkalinity, carbonate	mg/L CaCO3	38.0
CCR	XPW01	Porewater	2023/09/26	Alkalinity, carbonate	mg/L CaCO3	2.00
CCR	XPW01	Porewater	2023/10/25	Alkalinity, carbonate	mg/L CaCO3	27.0
CCR	XPW01	Porewater	2021/03/05	Barium, total	mg/L	0.165
CCR	XPW01	Porewater	2021/03/24	Barium, total	mg/L	0.161
CCR	XPW01	Porewater	2021/04/14	Barium, total	mg/L	0.154
CCR	XPW01	Porewater	2021/05/12	Barium, total	mg/L	0.162
CCR	XPW01	Porewater	2021/07/21	Barium, total	mg/L	0.175
CCR	XPW01	Porewater	2022/03/15	Barium, total	mg/L	0.113
CCR	XPW01	Porewater	2023/03/08	Barium, total	mg/L	0.128
CCR	XPW01	Porewater	2023/05/03	Barium, total	mg/L	0.137
CCR	XPW01	Porewater	2023/09/26	Barium, total	mg/L	0.126
CCR	XPW01	Porewater	2023/10/25	Barium, total	mg/L	0.160
CCR	XPW01	Porewater	2021/03/05	Boron, total	mg/L	10.4

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW01	Porewater	2021/03/24	Boron, total	mg/L	9.58
CCR	XPW01	Porewater	2021/04/14	Boron, total	mg/L	9.42
CCR	XPW01	Porewater	2021/05/12	Boron, total	mg/L	10.2
CCR	XPW01	Porewater	2021/07/21	Boron, total	mg/L	10.1
CCR	XPW01	Porewater	2022/03/15	Boron, total	mg/L	10.4
CCR	XPW01	Porewater	2023/03/08	Boron, total	mg/L	8.79
CCR	XPW01	Porewater	2023/05/03	Boron, total	mg/L	10.6
CCR	XPW01	Porewater	2023/09/26	Boron, total	mg/L	10.7
CCR	XPW01	Porewater	2023/10/25	Boron, total	mg/L	12.8
CCR	XPW01	Porewater	2021/03/05	Calcium, total	mg/L	162
CCR	XPW01	Porewater	2021/03/24	Calcium, total	mg/L	158
CCR	XPW01	Porewater	2021/04/14	Calcium, total	mg/L	156
CCR	XPW01	Porewater	2021/05/12	Calcium, total	mg/L	166
CCR	XPW01	Porewater	2021/07/21	Calcium, total	mg/L	160
CCR	XPW01	Porewater	2022/03/15	Calcium, total	mg/L	159
CCR	XPW01	Porewater	2023/03/08	Calcium, total	mg/L	164
CCR	XPW01	Porewater	2023/05/03	Calcium, total	mg/L	151
CCR	XPW01	Porewater	2023/09/26	Calcium, total	mg/L	168
CCR	XPW01	Porewater	2023/10/25	Calcium, total	mg/L	175
CCR	XPW01	Porewater	2021/03/05	Chloride, total	mg/L	10.0
CCR	XPW01	Porewater	2021/03/24	Chloride, total	mg/L	9.00
CCR	XPW01	Porewater	2021/04/14	Chloride, total	mg/L	7.00
CCR	XPW01	Porewater	2021/05/12	Chloride, total	mg/L	6.00
CCR	XPW01	Porewater	2021/07/21	Chloride, total	mg/L	6.00
CCR	XPW01	Porewater	2022/03/15	Chloride, total	mg/L	5.00
CCR	XPW01	Porewater	2023/03/08	Chloride, total	mg/L	11.0
CCR	XPW01	Porewater	2023/05/03	Chloride, total	mg/L	14.0
CCR	XPW01	Porewater	2023/09/26	Chloride, total	mg/L	16.0
CCR	XPW01	Porewater	2023/10/25	Chloride, total	mg/L	18.0
CCR	XPW01	Porewater	2021/03/05	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2021/03/24	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2021/04/14	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2021/05/12	Cobalt, total	mg/L	<0.001
CCR	XPW01	Porewater	2021/07/21	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2022/03/15	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2023/03/08	Cobalt, total	mg/L	0.000200
CCR	XPW01	Porewater	2023/05/03	Cobalt, total	mg/L	0.000200
CCR	XPW01	Porewater	2023/09/26	Cobalt, total	mg/L	0.000100
CCR	XPW01	Porewater	2023/10/25	Cobalt, total	mg/L	<0.0001
CCR	XPW01	Porewater	2023/05/03	Iron, dissolved	mg/L	0.152
CCR	XPW01	Porewater	2023/09/26	Iron, dissolved	mg/L	0.999
CCR	XPW01	Porewater	2021/03/05	Magnesium, total	mg/L	2.25
CCR	XPW01	Porewater	2021/03/24	Magnesium, total	mg/L	1.70
CCR	XPW01	Porewater	2021/04/14	Magnesium, total	mg/L	1.28
CCR	XPW01	Porewater	2021/05/12	Magnesium, total	mg/L	1.31
CCR	XPW01	Porewater	2021/07/21	Magnesium, total	mg/L	0.917
CCR	XPW01	Porewater	2022/03/15	Magnesium, total	mg/L	0.443
CCR	XPW01	Porewater	2023/03/08	Magnesium, total	mg/L	0.254
CCR	XPW01	Porewater	2023/05/03	Magnesium, total	mg/L	0.405
CCR	XPW01	Porewater	2023/09/26	Magnesium, total	mg/L	0.493
CCR	XPW01	Porewater	2023/10/25	Magnesium, total	mg/L	0.260
CCR	XPW01	Porewater	2023/05/03	Manganese, dissolved	mg/L	0.291
CCR	XPW01	Porewater	2023/09/26	Manganese, dissolved	mg/L	0.833
CCR	XPW01	Porewater	2023/05/03	Phosphate, dissolved	mg/L	1.49
CCR	XPW01	Porewater	2023/09/26	Phosphate, dissolved	mg/L	0.783

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW01	Porewater	2021/03/05	Potassium, total	mg/L	31.1
CCR	XPW01	Porewater	2021/03/24	Potassium, total	mg/L	38.1
CCR	XPW01	Porewater	2021/04/14	Potassium, total	mg/L	34.7
CCR	XPW01	Porewater	2021/05/12	Potassium, total	mg/L	36.9
CCR	XPW01	Porewater	2021/07/21	Potassium, total	mg/L	35.1
CCR	XPW01	Porewater	2022/03/15	Potassium, total	mg/L	36.9
CCR	XPW01	Porewater	2023/03/08	Potassium, total	mg/L	37.2
CCR	XPW01	Porewater	2023/05/03	Potassium, total	mg/L	38.5
CCR	XPW01	Porewater	2023/09/26	Potassium, total	mg/L	37.5
CCR	XPW01	Porewater	2023/10/25	Potassium, total	mg/L	39.4
CCR	XPW01	Porewater	2023/05/03	Silicon, dissolved	mg/L	4.35
CCR	XPW01	Porewater	2023/09/26	Silicon, dissolved	mg/L	4.46
CCR	XPW01	Porewater	2021/03/05	Sodium, total	mg/L	35.5
CCR	XPW01	Porewater	2021/03/24	Sodium, total	mg/L	37.2
CCR	XPW01	Porewater	2021/04/14	Sodium, total	mg/L	28.3
CCR	XPW01	Porewater	2021/05/12	Sodium, total	mg/L	29.3
CCR	XPW01	Porewater	2021/07/21	Sodium, total	mg/L	26.3
CCR	XPW01	Porewater	2022/03/15	Sodium, total	mg/L	27.4
CCR	XPW01	Porewater	2023/03/08	Sodium, total	mg/L	27.2
CCR	XPW01	Porewater	2023/05/03	Sodium, total	mg/L	27.0
CCR	XPW01	Porewater	2023/09/26	Sodium, total	mg/L	25.6
CCR	XPW01	Porewater	2023/10/25	Sodium, total	mg/L	33.8
CCR	XPW01	Porewater	2021/03/05	Sulfate, total	mg/L	345
CCR	XPW01	Porewater	2021/03/24	Sulfate, total	mg/L	355
CCR	XPW01	Porewater	2021/04/14	Sulfate, total	mg/L	355
CCR	XPW01	Porewater	2021/05/12	Sulfate, total	mg/L	309
CCR	XPW01	Porewater	2021/07/21	Sulfate, total	mg/L	328
CCR	XPW01	Porewater	2022/03/15	Sulfate, total	mg/L	360
CCR	XPW01	Porewater	2023/03/08	Sulfate, total	mg/L	414
CCR	XPW01	Porewater	2023/05/03	Sulfate, total	mg/L	345
CCR	XPW01	Porewater	2023/09/26	Sulfate, total	mg/L	365
CCR	XPW01	Porewater	2023/10/25	Sulfate, total	mg/L	343
CCR	XPW01	Porewater	2021/03/05	Temperature (Celsius)	degrees C	15.3
CCR	XPW01	Porewater	2021/03/24	Temperature (Celsius)	degrees C	17.1
CCR	XPW01	Porewater	2021/04/14	Temperature (Celsius)	degrees C	16.0
CCR	XPW01	Porewater	2021/05/12	Temperature (Celsius)	degrees C	16.7
CCR	XPW01	Porewater	2021/07/21	Temperature (Celsius)	degrees C	17.6
CCR	XPW01	Porewater	2022/03/15	Temperature (Celsius)	degrees C	15.8
CCR	XPW01	Porewater	2023/03/08	Temperature (Celsius)	degrees C	15.9
CCR	XPW01	Porewater	2023/05/03	Temperature (Celsius)	degrees C	16.7
CCR	XPW01	Porewater	2023/09/26	Temperature (Celsius)	degrees C	18.1
CCR	XPW01	Porewater	2023/10/25	Temperature (Celsius)	degrees C	19.3
CCR	XPW01	Porewater	2021/03/05	Total Dissolved Solids	mg/L	674
CCR	XPW01	Porewater	2021/03/24	Total Dissolved Solids	mg/L	702
CCR	XPW01	Porewater	2021/04/14	Total Dissolved Solids	mg/L	724
CCR	XPW01	Porewater	2021/05/12	Total Dissolved Solids	mg/L	658
CCR	XPW01	Porewater	2021/07/21	Total Dissolved Solids	mg/L	658
CCR	XPW01	Porewater	2022/03/15	Total Dissolved Solids	mg/L	698
CCR	XPW01	Porewater	2023/03/08	Total Dissolved Solids	mg/L	708
CCR	XPW01	Porewater	2023/05/03	Total Dissolved Solids	mg/L	708
CCR	XPW01	Porewater	2023/09/26	Total Dissolved Solids	mg/L	670
CCR	XPW01	Porewater	2023/10/25	Total Dissolved Solids	mg/L	722
CCR	XPW02	Porewater	2021/03/04	pH (field)	SU	8.0
CCR	XPW02	Porewater	2021/03/24	pH (field)	SU	8.0
CCR	XPW02	Porewater	2021/04/14	pH (field)	SU	7.9

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW02	Porewater	2021/05/12	pH (field)	SU	7.8
CCR	XPW02	Porewater	2021/07/21	pH (field)	SU	7.8
CCR	XPW02	Porewater	2022/03/15	pH (field)	SU	7.7
CCR	XPW02	Porewater	2023/03/21	pH (field)	SU	7.6
CCR	XPW02	Porewater	2023/05/03	pH (field)	SU	7.7
CCR	XPW02	Porewater	2023/09/26	pH (field)	SU	7.6
CCR	XPW02	Porewater	2023/10/25	pH (field)	SU	7.8
CCR	XPW02	Porewater	2021/03/04	Oxidation Reduction Potential	mV	-199
CCR	XPW02	Porewater	2021/03/24	Oxidation Reduction Potential	mV	-168
CCR	XPW02	Porewater	2021/04/14	Oxidation Reduction Potential	mV	-183
CCR	XPW02	Porewater	2021/05/12	Oxidation Reduction Potential	mV	-197
CCR	XPW02	Porewater	2021/07/21	Oxidation Reduction Potential	mV	-184
CCR	XPW02	Porewater	2022/03/15	Oxidation Reduction Potential	mV	-213
CCR	XPW02	Porewater	2023/03/21	Oxidation Reduction Potential	mV	-150
CCR	XPW02	Porewater	2023/05/03	Oxidation Reduction Potential	mV	-67.0
CCR	XPW02	Porewater	2023/09/26	Oxidation Reduction Potential	mV	-166
CCR	XPW02	Porewater	2023/10/25	Oxidation Reduction Potential	mV	-180
CCR	XPW02	Porewater	2021/03/04	Eh	V	-0.0041
CCR	XPW02	Porewater	2021/03/24	Eh	V	0.026
CCR	XPW02	Porewater	2021/04/14	Eh	V	0.011
CCR	XPW02	Porewater	2021/05/12	Eh	V	-0.0028
CCR	XPW02	Porewater	2021/07/21	Eh	V	0.0098
CCR	XPW02	Porewater	2022/03/15	Eh	V	-0.018
CCR	XPW02	Porewater	2023/03/21	Eh	V	0.046
CCR	XPW02	Porewater	2023/05/03	Eh	V	0.13
CCR	XPW02	Porewater	2023/09/26	Eh	V	0.028
CCR	XPW02	Porewater	2023/10/25	Eh	V	0.013
CCR	XPW02	Porewater	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	121
CCR	XPW02	Porewater	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	128
CCR	XPW02	Porewater	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	128
CCR	XPW02	Porewater	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	123
CCR	XPW02	Porewater	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	139
CCR	XPW02	Porewater	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	144
CCR	XPW02	Porewater	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	145
CCR	XPW02	Porewater	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	139
CCR	XPW02	Porewater	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	130
CCR	XPW02	Porewater	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	119
CCR	XPW02	Porewater	2021/03/04	Barium, total	mg/L	0.0342
CCR	XPW02	Porewater	2021/03/24	Barium, total	mg/L	0.0271
CCR	XPW02	Porewater	2021/04/14	Barium, total	mg/L	0.0283
CCR	XPW02	Porewater	2021/05/12	Barium, total	mg/L	0.0287
CCR	XPW02	Porewater	2021/07/21	Barium, total	mg/L	0.0226
CCR	XPW02	Porewater	2022/03/15	Barium, total	mg/L	0.0230
CCR	XPW02	Porewater	2023/03/08	Barium, total	mg/L	0.0208
CCR	XPW02	Porewater	2023/05/03	Barium, total	mg/L	0.0212
CCR	XPW02	Porewater	2023/09/26	Barium, total	mg/L	0.0198
CCR	XPW02	Porewater	2023/10/25	Barium, total	mg/L	0.0249
CCR	XPW02	Porewater	2021/03/04	Boron, total	mg/L	12.1
CCR	XPW02	Porewater	2021/03/24	Boron, total	mg/L	12.2
CCR	XPW02	Porewater	2021/04/14	Boron, total	mg/L	11.5
CCR	XPW02	Porewater	2021/05/12	Boron, total	mg/L	10.8
CCR	XPW02	Porewater	2021/07/21	Boron, total	mg/L	12.0
CCR	XPW02	Porewater	2022/03/15	Boron, total	mg/L	16.0
CCR	XPW02	Porewater	2023/03/08	Boron, total	mg/L	10.8
CCR	XPW02	Porewater	2023/05/03	Boron, total	mg/L	13.4

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW02	Porewater	2023/09/26	Boron, total	mg/L	12.6
CCR	XPW02	Porewater	2023/10/25	Boron, total	mg/L	14.8
CCR	XPW02	Porewater	2021/03/04	Calcium, total	mg/L	591
CCR	XPW02	Porewater	2021/03/24	Calcium, total	mg/L	484
CCR	XPW02	Porewater	2021/04/14	Calcium, total	mg/L	551
CCR	XPW02	Porewater	2021/05/12	Calcium, total	mg/L	495
CCR	XPW02	Porewater	2021/07/21	Calcium, total	mg/L	494
CCR	XPW02	Porewater	2022/03/15	Calcium, total	mg/L	483
CCR	XPW02	Porewater	2023/03/08	Calcium, total	mg/L	479
CCR	XPW02	Porewater	2023/05/03	Calcium, total	mg/L	451
CCR	XPW02	Porewater	2023/09/26	Calcium, total	mg/L	497
CCR	XPW02	Porewater	2023/10/25	Calcium, total	mg/L	488
CCR	XPW02	Porewater	2021/03/04	Chloride, total	mg/L	130
CCR	XPW02	Porewater	2021/03/24	Chloride, total	mg/L	176
CCR	XPW02	Porewater	2021/04/14	Chloride, total	mg/L	110
CCR	XPW02	Porewater	2021/05/12	Chloride, total	mg/L	134
CCR	XPW02	Porewater	2021/07/21	Chloride, total	mg/L	179
CCR	XPW02	Porewater	2022/03/15	Chloride, total	mg/L	115
CCR	XPW02	Porewater	2023/03/08	Chloride, total	mg/L	146
CCR	XPW02	Porewater	2023/05/03	Chloride, total	mg/L	104
CCR	XPW02	Porewater	2023/09/26	Chloride, total	mg/L	86.0
CCR	XPW02	Porewater	2023/10/25	Chloride, total	mg/L	119
CCR	XPW02	Porewater	2021/03/04	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2021/03/24	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2021/04/14	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2021/05/12	Cobalt, total	mg/L	<0.001
CCR	XPW02	Porewater	2021/07/21	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2022/03/15	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2023/03/08	Cobalt, total	mg/L	0.000300
CCR	XPW02	Porewater	2023/05/03	Cobalt, total	mg/L	0.000200
CCR	XPW02	Porewater	2023/09/26	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2023/10/25	Cobalt, total	mg/L	<0.0001
CCR	XPW02	Porewater	2023/05/03	Iron, dissolved	mg/L	2.60
CCR	XPW02	Porewater	2023/09/26	Iron, dissolved	mg/L	2.75
CCR	XPW02	Porewater	2021/03/04	Magnesium, total	mg/L	10.9
CCR	XPW02	Porewater	2021/03/24	Magnesium, total	mg/L	11.3
CCR	XPW02	Porewater	2021/04/14	Magnesium, total	mg/L	11.3
CCR	XPW02	Porewater	2021/05/12	Magnesium, total	mg/L	11.8
CCR	XPW02	Porewater	2021/07/21	Magnesium, total	mg/L	11.1
CCR	XPW02	Porewater	2022/03/15	Magnesium, total	mg/L	10.7
CCR	XPW02	Porewater	2023/03/08	Magnesium, total	mg/L	8.75
CCR	XPW02	Porewater	2023/05/03	Magnesium, total	mg/L	12.3
CCR	XPW02	Porewater	2023/09/26	Magnesium, total	mg/L	11.2
CCR	XPW02	Porewater	2023/10/25	Magnesium, total	mg/L	9.32
CCR	XPW02	Porewater	2023/05/03	Manganese, dissolved	mg/L	0.675
CCR	XPW02	Porewater	2023/09/26	Manganese, dissolved	mg/L	0.725
CCR	XPW02	Porewater	2023/05/03	Phosphate, dissolved	mg/L	0.307
CCR	XPW02	Porewater	2023/09/26	Phosphate, dissolved	mg/L	0.166
CCR	XPW02	Porewater	2021/03/04	Potassium, total	mg/L	23.4
CCR	XPW02	Porewater	2021/03/24	Potassium, total	mg/L	26.3
CCR	XPW02	Porewater	2021/04/14	Potassium, total	mg/L	25.3
CCR	XPW02	Porewater	2021/05/12	Potassium, total	mg/L	24.5
CCR	XPW02	Porewater	2021/07/21	Potassium, total	mg/L	24.7
CCR	XPW02	Porewater	2022/03/15	Potassium, total	mg/L	27.1
CCR	XPW02	Porewater	2023/03/08	Potassium, total	mg/L	23.9

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW02	Porewater	2023/05/03	Potassium, total	mg/L	27.4
CCR	XPW02	Porewater	2023/09/26	Potassium, total	mg/L	27.3
CCR	XPW02	Porewater	2023/10/25	Potassium, total	mg/L	26.4
CCR	XPW02	Porewater	2023/05/03	Silicon, dissolved	mg/L	7.07
CCR	XPW02	Porewater	2023/09/26	Silicon, dissolved	mg/L	7.30
CCR	XPW02	Porewater	2021/03/04	Sodium, total	mg/L	888
CCR	XPW02	Porewater	2021/03/24	Sodium, total	mg/L	798
CCR	XPW02	Porewater	2021/04/14	Sodium, total	mg/L	705
CCR	XPW02	Porewater	2021/05/12	Sodium, total	mg/L	641
CCR	XPW02	Porewater	2021/07/21	Sodium, total	mg/L	762
CCR	XPW02	Porewater	2022/03/15	Sodium, total	mg/L	828
CCR	XPW02	Porewater	2023/03/08	Sodium, total	mg/L	882
CCR	XPW02	Porewater	2023/05/03	Sodium, total	mg/L	953
CCR	XPW02	Porewater	2023/09/26	Sodium, total	mg/L	805
CCR	XPW02	Porewater	2023/10/25	Sodium, total	mg/L	1,090
CCR	XPW02	Porewater	2021/03/04	Sulfate, total	mg/L	2,380
CCR	XPW02	Porewater	2021/03/24	Sulfate, total	mg/L	2,830
CCR	XPW02	Porewater	2021/04/14	Sulfate, total	mg/L	2,410
CCR	XPW02	Porewater	2021/05/12	Sulfate, total	mg/L	2,410
CCR	XPW02	Porewater	2021/07/21	Sulfate, total	mg/L	2,330
CCR	XPW02	Porewater	2022/03/15	Sulfate, total	mg/L	2,590
CCR	XPW02	Porewater	2023/03/08	Sulfate, total	mg/L	2,450
CCR	XPW02	Porewater	2023/05/03	Sulfate, total	mg/L	2,650
CCR	XPW02	Porewater	2023/09/26	Sulfate, total	mg/L	2,580
CCR	XPW02	Porewater	2023/10/25	Sulfate, total	mg/L	2,660
CCR	XPW02	Porewater	2021/03/04	Temperature (Celsius)	degrees C	15.9
CCR	XPW02	Porewater	2021/03/24	Temperature (Celsius)	degrees C	16.7
CCR	XPW02	Porewater	2021/04/14	Temperature (Celsius)	degrees C	16.7
CCR	XPW02	Porewater	2021/05/12	Temperature (Celsius)	degrees C	16.8
CCR	XPW02	Porewater	2021/07/21	Temperature (Celsius)	degrees C	17.4
CCR	XPW02	Porewater	2022/03/15	Temperature (Celsius)	degrees C	16.2
CCR	XPW02	Porewater	2023/03/21	Temperature (Celsius)	degrees C	14.5
CCR	XPW02	Porewater	2023/05/03	Temperature (Celsius)	degrees C	17.0
CCR	XPW02	Porewater	2023/09/26	Temperature (Celsius)	degrees C	17.7
CCR	XPW02	Porewater	2023/10/25	Temperature (Celsius)	degrees C	18.7
CCR	XPW02	Porewater	2021/03/04	Total Dissolved Solids	mg/L	4,040
CCR	XPW02	Porewater	2021/03/24	Total Dissolved Solids	mg/L	4,020
CCR	XPW02	Porewater	2021/04/14	Total Dissolved Solids	mg/L	3,970
CCR	XPW02	Porewater	2021/05/12	Total Dissolved Solids	mg/L	3,860
CCR	XPW02	Porewater	2021/07/21	Total Dissolved Solids	mg/L	3,880
CCR	XPW02	Porewater	2022/03/15	Total Dissolved Solids	mg/L	4,050
CCR	XPW02	Porewater	2023/03/08	Total Dissolved Solids	mg/L	4,460
CCR	XPW02	Porewater	2023/05/03	Total Dissolved Solids	mg/L	3,970
CCR	XPW02	Porewater	2023/09/26	Total Dissolved Solids	mg/L	4,400
CCR	XPW02	Porewater	2023/10/25	Total Dissolved Solids	mg/L	4,360
CCR	XPW03	Porewater	2021/03/04	pH (field)	SU	10.5
CCR	XPW03	Porewater	2021/03/24	pH (field)	SU	10.6
CCR	XPW03	Porewater	2021/04/14	pH (field)	SU	10.5
CCR	XPW03	Porewater	2021/05/12	pH (field)	SU	10.7
CCR	XPW03	Porewater	2021/07/21	pH (field)	SU	10.0
CCR	XPW03	Porewater	2022/03/15	pH (field)	SU	10.5
CCR	XPW03	Porewater	2023/03/09	pH (field)	SU	10.7
CCR	XPW03	Porewater	2023/05/03	pH (field)	SU	10.7
CCR	XPW03	Porewater	2023/09/26	pH (field)	SU	10.8
CCR	XPW03	Porewater	2023/10/25	pH (field)	SU	10.8

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW03	Porewater	2021/03/04	Oxidation Reduction Potential	mV	-189
CCR	XPW03	Porewater	2021/03/24	Oxidation Reduction Potential	mV	-88.0
CCR	XPW03	Porewater	2021/04/14	Oxidation Reduction Potential	mV	-35.0
CCR	XPW03	Porewater	2021/05/12	Oxidation Reduction Potential	mV	-139
CCR	XPW03	Porewater	2021/07/21	Oxidation Reduction Potential	mV	-212
CCR	XPW03	Porewater	2022/03/15	Oxidation Reduction Potential	mV	-127
CCR	XPW03	Porewater	2023/03/09	Oxidation Reduction Potential	mV	-102
CCR	XPW03	Porewater	2023/05/03	Oxidation Reduction Potential	mV	-42.0
CCR	XPW03	Porewater	2023/09/26	Oxidation Reduction Potential	mV	-126
CCR	XPW03	Porewater	2023/10/25	Oxidation Reduction Potential	mV	-88.0
CCR	XPW03	Porewater	2021/03/04	Eh	V	0.0060
CCR	XPW03	Porewater	2021/03/24	Eh	V	0.11
CCR	XPW03	Porewater	2021/04/14	Eh	V	0.16
CCR	XPW03	Porewater	2021/05/12	Eh	V	0.055
CCR	XPW03	Porewater	2021/07/21	Eh	V	-0.019
CCR	XPW03	Porewater	2022/03/15	Eh	V	0.069
CCR	XPW03	Porewater	2023/03/09	Eh	V	0.092
CCR	XPW03	Porewater	2023/05/03	Eh	V	0.15
CCR	XPW03	Porewater	2023/09/26	Eh	V	0.067
CCR	XPW03	Porewater	2023/10/25	Eh	V	0.10
CCR	XPW03	Porewater	2021/03/04	Alkalinity, carbonate	mg/L CaCO3	74.0
CCR	XPW03	Porewater	2021/03/24	Alkalinity, carbonate	mg/L CaCO3	76.0
CCR	XPW03	Porewater	2021/04/14	Alkalinity, carbonate	mg/L CaCO3	80.0
CCR	XPW03	Porewater	2021/05/12	Alkalinity, carbonate	mg/L CaCO3	69.0
CCR	XPW03	Porewater	2021/07/21	Alkalinity, carbonate	mg/L CaCO3	120
CCR	XPW03	Porewater	2022/03/15	Alkalinity, carbonate	mg/L CaCO3	79.0
CCR	XPW03	Porewater	2023/03/09	Alkalinity, carbonate	mg/L CaCO3	85.0
CCR	XPW03	Porewater	2023/05/03	Alkalinity, carbonate	mg/L CaCO3	90.0
CCR	XPW03	Porewater	2023/09/26	Alkalinity, carbonate	mg/L CaCO3	96.0
CCR	XPW03	Porewater	2023/10/25	Alkalinity, carbonate	mg/L CaCO3	74.0
CCR	XPW03	Porewater	2021/03/04	Barium, total	mg/L	0.0116
CCR	XPW03	Porewater	2021/03/24	Barium, total	mg/L	0.0124
CCR	XPW03	Porewater	2021/04/14	Barium, total	mg/L	0.0118
CCR	XPW03	Porewater	2021/05/12	Barium, total	mg/L	0.0120
CCR	XPW03	Porewater	2021/07/21	Barium, total	mg/L	0.0114
CCR	XPW03	Porewater	2022/03/15	Barium, total	mg/L	0.00950
CCR	XPW03	Porewater	2023/03/09	Barium, total	mg/L	0.0120
CCR	XPW03	Porewater	2023/05/03	Barium, total	mg/L	0.0149
CCR	XPW03	Porewater	2023/09/26	Barium, total	mg/L	0.0115
CCR	XPW03	Porewater	2023/10/25	Barium, total	mg/L	0.0164
CCR	XPW03	Porewater	2021/03/04	Boron, total	mg/L	12.2
CCR	XPW03	Porewater	2021/03/24	Boron, total	mg/L	11.6
CCR	XPW03	Porewater	2021/04/14	Boron, total	mg/L	9.30
CCR	XPW03	Porewater	2021/05/12	Boron, total	mg/L	11.7
CCR	XPW03	Porewater	2021/07/21	Boron, total	mg/L	11.6
CCR	XPW03	Porewater	2022/03/15	Boron, total	mg/L	11.1
CCR	XPW03	Porewater	2023/03/09	Boron, total	mg/L	8.06
CCR	XPW03	Porewater	2023/05/03	Boron, total	mg/L	9.22
CCR	XPW03	Porewater	2023/09/26	Boron, total	mg/L	8.86
CCR	XPW03	Porewater	2023/10/25	Boron, total	mg/L	10.0
CCR	XPW03	Porewater	2021/03/04	Calcium, total	mg/L	17.3
CCR	XPW03	Porewater	2021/03/24	Calcium, total	mg/L	15.9
CCR	XPW03	Porewater	2021/04/14	Calcium, total	mg/L	15.1
CCR	XPW03	Porewater	2021/05/12	Calcium, total	mg/L	16.4
CCR	XPW03	Porewater	2021/07/21	Calcium, total	mg/L	15.3

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW03	Porewater	2022/03/15	Calcium, total	mg/L	12.9
CCR	XPW03	Porewater	2023/03/09	Calcium, total	mg/L	11.0
CCR	XPW03	Porewater	2023/05/03	Calcium, total	mg/L	13.4
CCR	XPW03	Porewater	2023/09/26	Calcium, total	mg/L	11.8
CCR	XPW03	Porewater	2023/10/25	Calcium, total	mg/L	12.1
CCR	XPW03	Porewater	2021/03/04	Chloride, total	mg/L	25.0
CCR	XPW03	Porewater	2021/03/24	Chloride, total	mg/L	25.0
CCR	XPW03	Porewater	2021/04/14	Chloride, total	mg/L	27.0
CCR	XPW03	Porewater	2021/05/12	Chloride, total	mg/L	25.0
CCR	XPW03	Porewater	2021/07/21	Chloride, total	mg/L	26.0
CCR	XPW03	Porewater	2022/03/15	Chloride, total	mg/L	25.0
CCR	XPW03	Porewater	2023/03/09	Chloride, total	mg/L	25.0
CCR	XPW03	Porewater	2023/05/03	Chloride, total	mg/L	26.0
CCR	XPW03	Porewater	2023/09/26	Chloride, total	mg/L	24.0
CCR	XPW03	Porewater	2023/10/25	Chloride, total	mg/L	26.0
CCR	XPW03	Porewater	2021/03/04	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2021/03/24	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2021/04/14	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2021/05/12	Cobalt, total	mg/L	<0.001
CCR	XPW03	Porewater	2021/07/21	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2022/03/15	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2023/03/09	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2023/05/03	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2023/09/26	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2023/10/25	Cobalt, total	mg/L	<0.0001
CCR	XPW03	Porewater	2023/05/03	Iron, dissolved	mg/L	0.0210
CCR	XPW03	Porewater	2023/09/26	Iron, dissolved	mg/L	<0.0115
CCR	XPW03	Porewater	2021/03/04	Magnesium, total	mg/L	<0.0175
CCR	XPW03	Porewater	2021/03/24	Magnesium, total	mg/L	<0.0175
CCR	XPW03	Porewater	2021/04/14	Magnesium, total	mg/L	<0.0175
CCR	XPW03	Porewater	2021/05/12	Magnesium, total	mg/L	<0.1
CCR	XPW03	Porewater	2021/07/21	Magnesium, total	mg/L	<0.0055
CCR	XPW03	Porewater	2022/03/15	Magnesium, total	mg/L	<0.006
CCR	XPW03	Porewater	2023/03/09	Magnesium, total	mg/L	0.0210
CCR	XPW03	Porewater	2023/05/03	Magnesium, total	mg/L	0.0300
CCR	XPW03	Porewater	2023/09/26	Magnesium, total	mg/L	0.0310
CCR	XPW03	Porewater	2023/10/25	Magnesium, total	mg/L	0.0380
CCR	XPW03	Porewater	2023/05/03	Manganese, dissolved	mg/L	0.00300
CCR	XPW03	Porewater	2023/09/26	Manganese, dissolved	mg/L	<0.0008
CCR	XPW03	Porewater	2023/05/03	Phosphate, dissolved	mg/L	0.430
CCR	XPW03	Porewater	2023/09/26	Phosphate, dissolved	mg/L	0.335
CCR	XPW03	Porewater	2021/03/04	Potassium, total	mg/L	25.1
CCR	XPW03	Porewater	2021/03/24	Potassium, total	mg/L	28.9
CCR	XPW03	Porewater	2021/04/14	Potassium, total	mg/L	27.5
CCR	XPW03	Porewater	2021/05/12	Potassium, total	mg/L	27.5
CCR	XPW03	Porewater	2021/07/21	Potassium, total	mg/L	26.9
CCR	XPW03	Porewater	2022/03/15	Potassium, total	mg/L	27.6
CCR	XPW03	Porewater	2023/03/09	Potassium, total	mg/L	23.8
CCR	XPW03	Porewater	2023/05/03	Potassium, total	mg/L	26.2
CCR	XPW03	Porewater	2023/09/26	Potassium, total	mg/L	26.6
CCR	XPW03	Porewater	2023/10/25	Potassium, total	mg/L	25.4
CCR	XPW03	Porewater	2023/05/03	Silicon, dissolved	mg/L	4.98
CCR	XPW03	Porewater	2023/09/26	Silicon, dissolved	mg/L	5.13
CCR	XPW03	Porewater	2021/03/04	Sodium, total	mg/L	145
CCR	XPW03	Porewater	2021/03/24	Sodium, total	mg/L	115

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
CCR	XPW03	Porewater	2021/04/14	Sodium, total	mg/L	105
CCR	XPW03	Porewater	2021/05/12	Sodium, total	mg/L	113
CCR	XPW03	Porewater	2021/07/21	Sodium, total	mg/L	104
CCR	XPW03	Porewater	2022/03/15	Sodium, total	mg/L	104
CCR	XPW03	Porewater	2023/03/09	Sodium, total	mg/L	99.6
CCR	XPW03	Porewater	2023/05/03	Sodium, total	mg/L	110
CCR	XPW03	Porewater	2023/09/26	Sodium, total	mg/L	102
CCR	XPW03	Porewater	2023/10/25	Sodium, total	mg/L	109
CCR	XPW03	Porewater	2021/03/04	Sulfate, total	mg/L	133
CCR	XPW03	Porewater	2021/03/24	Sulfate, total	mg/L	138
CCR	XPW03	Porewater	2021/04/14	Sulfate, total	mg/L	152
CCR	XPW03	Porewater	2021/05/12	Sulfate, total	mg/L	155
CCR	XPW03	Porewater	2021/07/21	Sulfate, total	mg/L	148
CCR	XPW03	Porewater	2022/03/15	Sulfate, total	mg/L	152
CCR	XPW03	Porewater	2023/03/09	Sulfate, total	mg/L	142
CCR	XPW03	Porewater	2023/05/03	Sulfate, total	mg/L	144
CCR	XPW03	Porewater	2023/09/26	Sulfate, total	mg/L	149
CCR	XPW03	Porewater	2023/10/25	Sulfate, total	mg/L	142
CCR	XPW03	Porewater	2021/03/04	Temperature (Celsius)	degrees C	15.7
CCR	XPW03	Porewater	2021/03/24	Temperature (Celsius)	degrees C	17.4
CCR	XPW03	Porewater	2021/04/14	Temperature (Celsius)	degrees C	15.9
CCR	XPW03	Porewater	2021/05/12	Temperature (Celsius)	degrees C	16.6
CCR	XPW03	Porewater	2021/07/21	Temperature (Celsius)	degrees C	19.0
CCR	XPW03	Porewater	2022/03/15	Temperature (Celsius)	degrees C	14.6
CCR	XPW03	Porewater	2023/03/09	Temperature (Celsius)	degrees C	16.4
CCR	XPW03	Porewater	2023/05/03	Temperature (Celsius)	degrees C	16.9
CCR	XPW03	Porewater	2023/09/26	Temperature (Celsius)	degrees C	18.5
CCR	XPW03	Porewater	2023/10/25	Temperature (Celsius)	degrees C	19.3
CCR	XPW03	Porewater	2021/03/04	Total Dissolved Solids	mg/L	412
CCR	XPW03	Porewater	2021/03/24	Total Dissolved Solids	mg/L	412
CCR	XPW03	Porewater	2021/04/14	Total Dissolved Solids	mg/L	454
CCR	XPW03	Porewater	2021/05/12	Total Dissolved Solids	mg/L	432
CCR	XPW03	Porewater	2021/07/21	Total Dissolved Solids	mg/L	436
CCR	XPW03	Porewater	2022/03/15	Total Dissolved Solids	mg/L	414
CCR	XPW03	Porewater	2023/03/09	Total Dissolved Solids	mg/L	416
CCR	XPW03	Porewater	2023/05/03	Total Dissolved Solids	mg/L	412
CCR	XPW03	Porewater	2023/09/26	Total Dissolved Solids	mg/L	386
CCR	XPW03	Porewater	2023/10/25	Total Dissolved Solids	mg/L	392
LAU	G13M	Delin	2022/07/29	pH (field)	SU	9.2
LAU	G13M	Delin	2022/09/15	pH (field)	SU	7.5
LAU	G13M	Delin	2022/11/01	pH (field)	SU	7.6
LAU	G13M	Delin	2023/01/26	pH (field)	SU	7.4
LAU	G13M	Delin	2022/07/29	Oxidation Reduction Potential	mV	-384
LAU	G13M	Delin	2022/09/15	Oxidation Reduction Potential	mV	-122
LAU	G13M	Delin	2022/11/01	Oxidation Reduction Potential	mV	-95.1
LAU	G13M	Delin	2023/01/26	Oxidation Reduction Potential	mV	-183
LAU	G13M	Delin	2022/07/29	Eh	V	-0.20
LAU	G13M	Delin	2022/09/15	Eh	V	0.066
LAU	G13M	Delin	2022/11/01	Eh	V	0.095
LAU	G13M	Delin	2023/01/26	Eh	V	0.013
LAU	G13M	Delin	2022/07/29	Alkalinity, bicarbonate	mg/L CaCO3	120
LAU	G13M	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	235
LAU	G13M	Delin	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	235
LAU	G13M	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	266
LAU	G13M	Delin	2022/07/29	Barium, total	mg/L	0.0339

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G13M	Delin	2022/09/15	Barium, total	mg/L	0.0792
LAU	G13M	Delin	2022/11/01	Barium, total	mg/L	0.0957
LAU	G13M	Delin	2023/01/26	Barium, total	mg/L	0.228
LAU	G13M	Delin	2022/07/29	Boron, total	mg/L	0.0453
LAU	G13M	Delin	2022/09/15	Boron, total	mg/L	0.0456
LAU	G13M	Delin	2022/11/01	Boron, total	mg/L	0.0180
LAU	G13M	Delin	2023/01/26	Boron, total	mg/L	0.0288
LAU	G13M	Delin	2022/07/29	Calcium, total	mg/L	25.0
LAU	G13M	Delin	2022/09/15	Calcium, total	mg/L	70.6
LAU	G13M	Delin	2022/11/01	Calcium, total	mg/L	70.7
LAU	G13M	Delin	2023/01/26	Calcium, total	mg/L	81.5
LAU	G13M	Delin	2022/07/29	Chloride, total	mg/L	24.0
LAU	G13M	Delin	2022/09/15	Chloride, total	mg/L	11.0
LAU	G13M	Delin	2022/11/01	Chloride, total	mg/L	9.00
LAU	G13M	Delin	2023/01/26	Chloride, total	mg/L	6.00
LAU	G13M	Delin	2022/07/29	Cobalt, total	mg/L	<0.0001
LAU	G13M	Delin	2022/09/15	Cobalt, total	mg/L	<0.0001
LAU	G13M	Delin	2022/11/01	Cobalt, total	mg/L	<0.0001
LAU	G13M	Delin	2023/01/26	Cobalt, total	mg/L	<0.0001
LAU	G13M	Delin	2022/07/29	Magnesium, total	mg/L	16.3
LAU	G13M	Delin	2022/09/15	Magnesium, total	mg/L	16.3
LAU	G13M	Delin	2022/11/01	Magnesium, total	mg/L	16.7
LAU	G13M	Delin	2023/01/26	Magnesium, total	mg/L	18.6
LAU	G13M	Delin	2022/07/29	Potassium, total	mg/L	5.45
LAU	G13M	Delin	2022/09/15	Potassium, total	mg/L	2.89
LAU	G13M	Delin	2022/11/01	Potassium, total	mg/L	2.48
LAU	G13M	Delin	2023/01/26	Potassium, total	mg/L	1.44
LAU	G13M	Delin	2022/07/29	Sodium, total	mg/L	19.7
LAU	G13M	Delin	2022/09/15	Sodium, total	mg/L	14.2
LAU	G13M	Delin	2022/11/01	Sodium, total	mg/L	12.6
LAU	G13M	Delin	2023/01/26	Sodium, total	mg/L	10.5
LAU	G13M	Delin	2022/07/29	Sulfate, total	mg/L	8.00
LAU	G13M	Delin	2022/09/15	Sulfate, total	mg/L	<6
LAU	G13M	Delin	2022/11/01	Sulfate, total	mg/L	<6
LAU	G13M	Delin	2023/01/26	Sulfate, total	mg/L	7.00
LAU	G13M	Delin	2022/07/29	Temperature (Celsius)	degrees C	25.8
LAU	G13M	Delin	2022/09/15	Temperature (Celsius)	degrees C	25.6
LAU	G13M	Delin	2022/11/01	Temperature (Celsius)	degrees C	23.4
LAU	G13M	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.3
LAU	G13M	Delin	2022/07/29	Total Dissolved Solids	mg/L	198
LAU	G13M	Delin	2022/09/15	Total Dissolved Solids	mg/L	258
LAU	G13M	Delin	2022/11/01	Total Dissolved Solids	mg/L	288
LAU	G13M	Delin	2023/01/26	Total Dissolved Solids	mg/L	304
LAU	G20M	Delin	2022/07/29	pH (field)	SU	8.3
LAU	G20M	Delin	2022/09/15	pH (field)	SU	8.3
LAU	G20M	Delin	2022/11/03	pH (field)	SU	7.5
LAU	G20M	Delin	2023/01/26	pH (field)	SU	7.6
LAU	G20M	Delin	2022/07/29	Oxidation Reduction Potential	mV	-266
LAU	G20M	Delin	2022/09/15	Oxidation Reduction Potential	mV	-176
LAU	G20M	Delin	2022/11/03	Oxidation Reduction Potential	mV	-139
LAU	G20M	Delin	2023/01/26	Oxidation Reduction Potential	mV	-232
LAU	G20M	Delin	2022/07/29	Eh	V	-0.076
LAU	G20M	Delin	2022/09/15	Eh	V	0.016
LAU	G20M	Delin	2022/11/03	Eh	V	0.054
LAU	G20M	Delin	2023/01/26	Eh	V	-0.036

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G20M	Delin	2022/07/29	Alkalinity, bicarbonate	mg/L CaCO3	206
LAU	G20M	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	133
LAU	G20M	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	249
LAU	G20M	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	259
LAU	G20M	Delin	2022/07/29	Barium, total	mg/L	0.0892
LAU	G20M	Delin	2022/09/15	Barium, total	mg/L	0.0832
LAU	G20M	Delin	2022/11/03	Barium, total	mg/L	0.0983
LAU	G20M	Delin	2023/01/26	Barium, total	mg/L	0.0970
LAU	G20M	Delin	2022/07/29	Boron, total	mg/L	0.0479
LAU	G20M	Delin	2022/09/15	Boron, total	mg/L	0.0487
LAU	G20M	Delin	2022/11/03	Boron, total	mg/L	0.0220
LAU	G20M	Delin	2023/01/26	Boron, total	mg/L	0.0302
LAU	G20M	Delin	2022/07/29	Calcium, total	mg/L	47.1
LAU	G20M	Delin	2022/09/15	Calcium, total	mg/L	24.4
LAU	G20M	Delin	2022/11/03	Calcium, total	mg/L	64.9
LAU	G20M	Delin	2023/01/26	Calcium, total	mg/L	73.3
LAU	G20M	Delin	2022/07/29	Chloride, total	mg/L	16.0
LAU	G20M	Delin	2022/09/15	Chloride, total	mg/L	18.0
LAU	G20M	Delin	2022/11/03	Chloride, total	mg/L	6.00
LAU	G20M	Delin	2023/01/26	Chloride, total	mg/L	5.00
LAU	G20M	Delin	2022/07/29	Cobalt, total	mg/L	<0.0001
LAU	G20M	Delin	2022/09/15	Cobalt, total	mg/L	0.000200
LAU	G20M	Delin	2022/11/03	Cobalt, total	mg/L	<0.0001
LAU	G20M	Delin	2023/01/26	Cobalt, total	mg/L	<0.0001
LAU	G20M	Delin	2022/07/29	Magnesium, total	mg/L	14.0
LAU	G20M	Delin	2022/09/15	Magnesium, total	mg/L	12.9
LAU	G20M	Delin	2022/11/03	Magnesium, total	mg/L	14.1
LAU	G20M	Delin	2023/01/26	Magnesium, total	mg/L	16.2
LAU	G20M	Delin	2022/07/29	Potassium, total	mg/L	2.83
LAU	G20M	Delin	2022/09/15	Potassium, total	mg/L	3.09
LAU	G20M	Delin	2022/11/03	Potassium, total	mg/L	1.99
LAU	G20M	Delin	2023/01/26	Potassium, total	mg/L	1.72
LAU	G20M	Delin	2022/07/29	Sodium, total	mg/L	25.0
LAU	G20M	Delin	2022/09/15	Sodium, total	mg/L	29.4
LAU	G20M	Delin	2022/11/03	Sodium, total	mg/L	30.9
LAU	G20M	Delin	2023/01/26	Sodium, total	mg/L	20.8
LAU	G20M	Delin	2022/07/29	Sulfate, total	mg/L	<6
LAU	G20M	Delin	2022/09/15	Sulfate, total	mg/L	7.00
LAU	G20M	Delin	2022/11/03	Sulfate, total	mg/L	<6
LAU	G20M	Delin	2023/01/26	Sulfate, total	mg/L	<6
LAU	G20M	Delin	2022/07/29	Temperature (Celsius)	degrees C	21.9
LAU	G20M	Delin	2022/09/15	Temperature (Celsius)	degrees C	20
LAU	G20M	Delin	2022/11/03	Temperature (Celsius)	degrees C	19.1
LAU	G20M	Delin	2023/01/26	Temperature (Celsius)	degrees C	14.0
LAU	G20M	Delin	2022/07/29	Total Dissolved Solids	mg/L	252
LAU	G20M	Delin	2022/09/15	Total Dissolved Solids	mg/L	210
LAU	G20M	Delin	2022/11/03	Total Dissolved Solids	mg/L	260
LAU	G20M	Delin	2023/01/26	Total Dissolved Solids	mg/L	270
LAU	G21M	Delin	2022/07/29	pH (field)	SU	10.0
LAU	G21M	Delin	2022/09/15	pH (field)	SU	11.7
LAU	G21M	Delin	2022/11/02	pH (field)	SU	11.5
LAU	G21M	Delin	2023/01/25	pH (field)	SU	12.3
LAU	G21M	Delin	2022/07/29	Oxidation Reduction Potential	mV	-218
LAU	G21M	Delin	2022/09/15	Oxidation Reduction Potential	mV	150
LAU	G21M	Delin	2022/11/02	Oxidation Reduction Potential	mV	-26.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G21M	Delin	2023/01/25	Oxidation Reduction Potential	mV	-210
LAU	G21M	Delin	2022/07/29	Eh	V	-0.026
LAU	G21M	Delin	2022/09/15	Eh	V	0.34
LAU	G21M	Delin	2022/11/02	Eh	V	0.17
LAU	G21M	Delin	2023/01/25	Eh	V	-0.011
LAU	G21M	Delin	2022/07/29	Alkalinity, bicarbonate	mg/L CaCO3	40.0
LAU	G21M	Delin	2022/07/29	Alkalinity, carbonate	mg/L CaCO3	55.0
LAU	G21M	Delin	2022/09/15	Alkalinity, carbonate	mg/L CaCO3	91.0
LAU	G21M	Delin	2022/11/02	Alkalinity, carbonate	mg/L CaCO3	66.0
LAU	G21M	Delin	2023/01/25	Alkalinity, carbonate	mg/L CaCO3	99.0
LAU	G21M	Delin	2022/07/29	Barium, total	mg/L	0.0265
LAU	G21M	Delin	2022/09/15	Barium, total	mg/L	0.231
LAU	G21M	Delin	2022/11/02	Barium, total	mg/L	0.229
LAU	G21M	Delin	2023/01/25	Barium, total	mg/L	0.267
LAU	G21M	Delin	2022/07/29	Boron, total	mg/L	0.0240
LAU	G21M	Delin	2022/09/15	Boron, total	mg/L	0.0230
LAU	G21M	Delin	2022/11/02	Boron, total	mg/L	<0.0092
LAU	G21M	Delin	2023/01/25	Boron, total	mg/L	<0.0092
LAU	G21M	Delin	2022/07/29	Calcium, total	mg/L	7.07
LAU	G21M	Delin	2022/09/15	Calcium, total	mg/L	217
LAU	G21M	Delin	2022/11/02	Calcium, total	mg/L	261
LAU	G21M	Delin	2023/01/25	Calcium, total	mg/L	279
LAU	G21M	Delin	2022/07/29	Chloride, total	mg/L	5.00
LAU	G21M	Delin	2022/09/15	Chloride, total	mg/L	8.00
LAU	G21M	Delin	2022/11/02	Chloride, total	mg/L	8.00
LAU	G21M	Delin	2023/01/25	Chloride, total	mg/L	8.00
LAU	G21M	Delin	2022/07/29	Cobalt, total	mg/L	0.000200
LAU	G21M	Delin	2022/09/15	Cobalt, total	mg/L	<0.0001
LAU	G21M	Delin	2022/11/02	Cobalt, total	mg/L	<0.0001
LAU	G21M	Delin	2023/01/25	Cobalt, total	mg/L	<0.0001
LAU	G21M	Delin	2022/07/29	Magnesium, total	mg/L	6.60
LAU	G21M	Delin	2022/09/15	Magnesium, total	mg/L	0.362
LAU	G21M	Delin	2022/11/02	Magnesium, total	mg/L	0.502
LAU	G21M	Delin	2023/01/25	Magnesium, total	mg/L	0.334
LAU	G21M	Delin	2022/07/29	Potassium, total	mg/L	25.6
LAU	G21M	Delin	2022/09/15	Potassium, total	mg/L	54.2
LAU	G21M	Delin	2022/11/02	Potassium, total	mg/L	49.0
LAU	G21M	Delin	2023/01/25	Potassium, total	mg/L	46.1
LAU	G21M	Delin	2022/07/29	Sodium, total	mg/L	16.6
LAU	G21M	Delin	2022/09/15	Sodium, total	mg/L	30.3
LAU	G21M	Delin	2022/11/02	Sodium, total	mg/L	31.2
LAU	G21M	Delin	2023/01/25	Sodium, total	mg/L	28.2
LAU	G21M	Delin	2022/07/29	Sulfate, total	mg/L	8.00
LAU	G21M	Delin	2022/09/15	Sulfate, total	mg/L	<12
LAU	G21M	Delin	2022/11/02	Sulfate, total	mg/L	<6
LAU	G21M	Delin	2023/01/25	Sulfate, total	mg/L	<6
LAU	G21M	Delin	2022/07/29	Temperature (Celsius)	degrees C	18.9
LAU	G21M	Delin	2022/09/15	Temperature (Celsius)	degrees C	17.6
LAU	G21M	Delin	2022/11/02	Temperature (Celsius)	degrees C	16.5
LAU	G21M	Delin	2023/01/25	Temperature (Celsius)	degrees C	10.5
LAU	G21M	Delin	2022/07/29	Total Dissolved Solids	mg/L	112
LAU	G21M	Delin	2022/09/15	Total Dissolved Solids	mg/L	734
LAU	G21M	Delin	2022/11/02	Total Dissolved Solids	mg/L	828
LAU	G21M	Delin	2023/01/25	Total Dissolved Solids	mg/L	776
LAU	G09M	MWO	2021/03/04	pH (field)	SU	6.9

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G09M	MWO	2021/03/25	pH (field)	SU	6.8
LAU	G09M	MWO	2021/04/14	pH (field)	SU	6.9
LAU	G09M	MWO	2021/05/12	pH (field)	SU	7.0
LAU	G09M	MWO	2021/07/21	pH (field)	SU	6.9
LAU	G09M	MWO	2022/07/25	pH (field)	SU	8.3
LAU	G09M	MWO	2022/09/14	pH (field)	SU	7.3
LAU	G09M	MWO	2022/11/01	pH (field)	SU	7.1
LAU	G09M	MWO	2021/03/04	Oxidation Reduction Potential	mV	-130
LAU	G09M	MWO	2021/03/25	Oxidation Reduction Potential	mV	-126
LAU	G09M	MWO	2021/04/14	Oxidation Reduction Potential	mV	-151
LAU	G09M	MWO	2021/05/12	Oxidation Reduction Potential	mV	-158
LAU	G09M	MWO	2021/07/21	Oxidation Reduction Potential	mV	-153
LAU	G09M	MWO	2022/07/25	Oxidation Reduction Potential	mV	-195
LAU	G09M	MWO	2022/09/14	Oxidation Reduction Potential	mV	175
LAU	G09M	MWO	2022/11/01	Oxidation Reduction Potential	mV	-130
LAU	G09M	MWO	2021/03/04	Eh	V	0.064
LAU	G09M	MWO	2021/03/25	Eh	V	0.068
LAU	G09M	MWO	2021/04/14	Eh	V	0.044
LAU	G09M	MWO	2021/05/12	Eh	V	0.037
LAU	G09M	MWO	2021/07/21	Eh	V	0.041
LAU	G09M	MWO	2022/07/25	Eh	V	-0.0014
LAU	G09M	MWO	2022/09/14	Eh	V	0.37
LAU	G09M	MWO	2022/11/01	Eh	V	0.064
LAU	G09M	MWO	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	355
LAU	G09M	MWO	2021/03/25	Alkalinity, bicarbonate	mg/L CaCO3	354
LAU	G09M	MWO	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	345
LAU	G09M	MWO	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	258
LAU	G09M	MWO	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	171
LAU	G09M	MWO	2022/07/25	Alkalinity, bicarbonate	mg/L CaCO3	256
LAU	G09M	MWO	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	255
LAU	G09M	MWO	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	259
LAU	G09M	MWO	2021/03/04	Barium, total	mg/L	0.442
LAU	G09M	MWO	2021/03/25	Barium, total	mg/L	0.437
LAU	G09M	MWO	2021/04/14	Barium, total	mg/L	0.407
LAU	G09M	MWO	2021/05/12	Barium, total	mg/L	0.340
LAU	G09M	MWO	2021/07/21	Barium, total	mg/L	0.316
LAU	G09M	MWO	2022/07/25	Barium, total	mg/L	0.292
LAU	G09M	MWO	2022/09/14	Barium, total	mg/L	0.288
LAU	G09M	MWO	2022/11/01	Barium, total	mg/L	0.311
LAU	G09M	MWO	2021/03/04	Boron, total	mg/L	0.0507
LAU	G09M	MWO	2021/03/25	Boron, total	mg/L	0.0299
LAU	G09M	MWO	2021/04/14	Boron, total	mg/L	0.0544
LAU	G09M	MWO	2021/05/12	Boron, total	mg/L	0.0191
LAU	G09M	MWO	2021/07/21	Boron, total	mg/L	0.0376
LAU	G09M	MWO	2022/07/25	Boron, total	mg/L	0.0210
LAU	G09M	MWO	2022/09/14	Boron, total	mg/L	0.0274
LAU	G09M	MWO	2022/11/01	Boron, total	mg/L	0.0269
LAU	G09M	MWO	2021/03/04	Calcium, total	mg/L	114
LAU	G09M	MWO	2021/03/25	Calcium, total	mg/L	98.6
LAU	G09M	MWO	2021/04/14	Calcium, total	mg/L	134
LAU	G09M	MWO	2021/05/12	Calcium, total	mg/L	73.7
LAU	G09M	MWO	2021/07/21	Calcium, total	mg/L	99.9
LAU	G09M	MWO	2022/07/25	Calcium, total	mg/L	91.8
LAU	G09M	MWO	2022/09/14	Calcium, total	mg/L	70.5
LAU	G09M	MWO	2022/11/01	Calcium, total	mg/L	73.7

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G09M	MWO	2021/03/04	Chloride, total	mg/L	7.00
LAU	G09M	MWO	2021/03/25	Chloride, total	mg/L	7.00
LAU	G09M	MWO	2021/04/14	Chloride, total	mg/L	7.00
LAU	G09M	MWO	2021/05/12	Chloride, total	mg/L	5.00
LAU	G09M	MWO	2021/07/21	Chloride, total	mg/L	7.00
LAU	G09M	MWO	2022/07/25	Chloride, total	mg/L	7.00
LAU	G09M	MWO	2022/09/14	Chloride, total	mg/L	6.00
LAU	G09M	MWO	2022/11/01	Chloride, total	mg/L	5.00
LAU	G09M	MWO	2021/03/04	Cobalt, total	mg/L	0.00970
LAU	G09M	MWO	2021/03/25	Cobalt, total	mg/L	0.00660
LAU	G09M	MWO	2021/04/14	Cobalt, total	mg/L	0.00410
LAU	G09M	MWO	2021/05/12	Cobalt, total	mg/L	0.00162
LAU	G09M	MWO	2021/07/21	Cobalt, total	mg/L	0.0105
LAU	G09M	MWO	2022/07/25	Cobalt, total	mg/L	0.00770
LAU	G09M	MWO	2022/09/14	Cobalt, total	mg/L	0.00210
LAU	G09M	MWO	2022/11/01	Cobalt, total	mg/L	0.00160
LAU	G09M	MWO	2021/03/04	Magnesium, total	mg/L	19.6
LAU	G09M	MWO	2021/03/25	Magnesium, total	mg/L	21.7
LAU	G09M	MWO	2021/04/14	Magnesium, total	mg/L	23.9
LAU	G09M	MWO	2021/05/12	Magnesium, total	mg/L	18.6
LAU	G09M	MWO	2021/07/21	Magnesium, total	mg/L	20.1
LAU	G09M	MWO	2022/07/25	Magnesium, total	mg/L	18.8
LAU	G09M	MWO	2022/09/14	Magnesium, total	mg/L	16.7
LAU	G09M	MWO	2022/11/01	Magnesium, total	mg/L	18.1
LAU	G09M	MWO	2021/03/04	Potassium, total	mg/L	2.08
LAU	G09M	MWO	2021/03/25	Potassium, total	mg/L	1.79
LAU	G09M	MWO	2021/04/14	Potassium, total	mg/L	1.74
LAU	G09M	MWO	2021/05/12	Potassium, total	mg/L	1.06
LAU	G09M	MWO	2021/07/21	Potassium, total	mg/L	2.32
LAU	G09M	MWO	2022/07/25	Potassium, total	mg/L	2.56
LAU	G09M	MWO	2022/09/14	Potassium, total	mg/L	1.38
LAU	G09M	MWO	2022/11/01	Potassium, total	mg/L	1.31
LAU	G09M	MWO	2021/03/04	Sodium, total	mg/L	26.3
LAU	G09M	MWO	2021/03/25	Sodium, total	mg/L	25.9
LAU	G09M	MWO	2021/04/14	Sodium, total	mg/L	32.1
LAU	G09M	MWO	2021/05/12	Sodium, total	mg/L	10.7
LAU	G09M	MWO	2021/07/21	Sodium, total	mg/L	11.7
LAU	G09M	MWO	2022/07/25	Sodium, total	mg/L	10.9
LAU	G09M	MWO	2022/09/14	Sodium, total	mg/L	9.88
LAU	G09M	MWO	2022/11/01	Sodium, total	mg/L	9.78
LAU	G09M	MWO	2021/03/04	Sulfate, total	mg/L	20.0
LAU	G09M	MWO	2021/03/25	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2021/04/14	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2021/05/12	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2021/07/21	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2022/07/25	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2022/09/14	Sulfate, total	mg/L	6.00
LAU	G09M	MWO	2022/11/01	Sulfate, total	mg/L	<6
LAU	G09M	MWO	2021/03/04	Temperature (Celsius)	degrees C	16.8
LAU	G09M	MWO	2021/03/25	Temperature (Celsius)	degrees C	17.3
LAU	G09M	MWO	2021/04/14	Temperature (Celsius)	degrees C	15.9
LAU	G09M	MWO	2021/05/12	Temperature (Celsius)	degrees C	16.3
LAU	G09M	MWO	2021/07/21	Temperature (Celsius)	degrees C	17.4
LAU	G09M	MWO	2022/07/25	Temperature (Celsius)	degrees C	17.5
LAU	G09M	MWO	2022/09/14	Temperature (Celsius)	degrees C	17.8

Attachment I. Site Groundwater Data
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Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
LAU	G09M	MWO	2022/11/01	Temperature (Celsius)	degrees C	17.6
LAU	G09M	MWO	2021/03/04	Total Dissolved Solids	mg/L	444
LAU	G09M	MWO	2021/03/25	Total Dissolved Solids	mg/L	432
LAU	G09M	MWO	2021/04/14	Total Dissolved Solids	mg/L	506
LAU	G09M	MWO	2021/05/12	Total Dissolved Solids	mg/L	282
LAU	G09M	MWO	2021/07/21	Total Dissolved Solids	mg/L	316
LAU	G09M	MWO	2022/07/25	Total Dissolved Solids	mg/L	265
LAU	G09M	MWO	2022/09/14	Total Dissolved Solids	mg/L	305
LAU	G09M	MWO	2022/11/01	Total Dissolved Solids	mg/L	270
UA	G01D	B	2015/12/03	pH (field)	SU	6.7
UA	G01D	B	2016/03/15	pH (field)	SU	6.7
UA	G01D	B	2016/06/15	pH (field)	SU	6.9
UA	G01D	B	2016/09/14	pH (field)	SU	6.8
UA	G01D	B	2016/12/14	pH (field)	SU	6.8
UA	G01D	B	2017/03/07	pH (field)	SU	6.2
UA	G01D	B	2017/06/15	pH (field)	SU	6.7
UA	G01D	B	2017/07/20	pH (field)	SU	6.8
UA	G01D	B	2017/11/30	pH (field)	SU	6.8
UA	G01D	B	2018/06/19	pH (field)	SU	6.8
UA	G01D	B	2018/09/05	pH (field)	SU	7.0
UA	G01D	B	2019/03/27	pH (field)	SU	6.7
UA	G01D	B	2019/09/09	pH (field)	SU	6.4
UA	G01D	B	2020/03/30	pH (field)	SU	6.8
UA	G01D	B	2020/09/23	pH (field)	SU	6.7
UA	G01D	B	2021/03/03	pH (field)	SU	6.6
UA	G01D	B	2021/03/24	pH (field)	SU	6.5
UA	G01D	B	2021/04/14	pH (field)	SU	6.7
UA	G01D	B	2021/05/12	pH (field)	SU	6.5
UA	G01D	B	2021/06/01	pH (field)	SU	6.3
UA	G01D	B	2021/06/14	pH (field)	SU	6.5
UA	G01D	B	2021/07/06	pH (field)	SU	6.3
UA	G01D	B	2021/07/21	pH (field)	SU	6.4
UA	G01D	B	2021/09/20	pH (field)	SU	6.5
UA	G01D	B	2022/03/14	pH (field)	SU	6.4
UA	G01D	B	2022/07/26	pH (field)	SU	7.2
UA	G01D	B	2022/09/20	pH (field)	SU	6.5
UA	G01D	B	2023/01/24	pH (field)	SU	6.6
UA	G01D	B	2023/03/07	pH (field)	SU	6.5
UA	G01D	B	2023/05/02	pH (field)	SU	6.3
UA	G01D	B	2023/09/25	pH (field)	SU	6.5
UA	G01D	B	2023/10/23	pH (field)	SU	6.4
UA	G01D	B	2015/12/03	Oxidation Reduction Potential	mV	60.0
UA	G01D	B	2016/03/15	Oxidation Reduction Potential	mV	-103
UA	G01D	B	2016/06/15	Oxidation Reduction Potential	mV	-110
UA	G01D	B	2016/09/14	Oxidation Reduction Potential	mV	-26.0
UA	G01D	B	2016/12/14	Oxidation Reduction Potential	mV	113
UA	G01D	B	2017/03/07	Oxidation Reduction Potential	mV	80.0
UA	G01D	B	2017/06/15	Oxidation Reduction Potential	mV	123
UA	G01D	B	2017/07/20	Oxidation Reduction Potential	mV	102
UA	G01D	B	2017/11/30	Oxidation Reduction Potential	mV	21.0
UA	G01D	B	2018/06/19	Oxidation Reduction Potential	mV	29.0
UA	G01D	B	2018/09/05	Oxidation Reduction Potential	mV	131
UA	G01D	B	2019/03/27	Oxidation Reduction Potential	mV	118
UA	G01D	B	2019/09/09	Oxidation Reduction Potential	mV	193
UA	G01D	B	2020/03/30	Oxidation Reduction Potential	mV	138

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Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2020/09/23	Oxidation Reduction Potential	mV	202
UA	G01D	B	2021/03/03	Oxidation Reduction Potential	mV	145
UA	G01D	B	2021/03/24	Oxidation Reduction Potential	mV	160
UA	G01D	B	2021/04/14	Oxidation Reduction Potential	mV	134
UA	G01D	B	2021/05/12	Oxidation Reduction Potential	mV	180
UA	G01D	B	2021/06/01	Oxidation Reduction Potential	mV	164
UA	G01D	B	2021/06/14	Oxidation Reduction Potential	mV	160
UA	G01D	B	2021/07/06	Oxidation Reduction Potential	mV	139
UA	G01D	B	2021/07/21	Oxidation Reduction Potential	mV	122
UA	G01D	B	2021/09/20	Oxidation Reduction Potential	mV	170
UA	G01D	B	2022/03/14	Oxidation Reduction Potential	mV	117
UA	G01D	B	2022/07/26	Oxidation Reduction Potential	mV	15.5
UA	G01D	B	2022/09/20	Oxidation Reduction Potential	mV	173
UA	G01D	B	2023/01/24	Oxidation Reduction Potential	mV	114
UA	G01D	B	2023/03/07	Oxidation Reduction Potential	mV	195
UA	G01D	B	2023/05/02	Oxidation Reduction Potential	mV	145
UA	G01D	B	2023/09/25	Oxidation Reduction Potential	mV	30.0
UA	G01D	B	2023/10/23	Oxidation Reduction Potential	mV	103
UA	G01D	B	2015/12/03	Eh	V	0.25
UA	G01D	B	2016/03/15	Eh	V	0.090
UA	G01D	B	2016/06/15	Eh	V	0.084
UA	G01D	B	2016/09/14	Eh	V	0.17
UA	G01D	B	2016/12/14	Eh	V	0.31
UA	G01D	B	2017/03/07	Eh	V	0.28
UA	G01D	B	2017/06/15	Eh	V	0.32
UA	G01D	B	2017/07/20	Eh	V	0.30
UA	G01D	B	2017/11/30	Eh	V	0.22
UA	G01D	B	2018/06/19	Eh	V	0.22
UA	G01D	B	2018/09/05	Eh	V	0.32
UA	G01D	B	2019/03/27	Eh	V	0.31
UA	G01D	B	2019/09/09	Eh	V	0.39
UA	G01D	B	2020/03/30	Eh	V	0.33
UA	G01D	B	2020/09/23	Eh	V	0.40
UA	G01D	B	2021/03/03	Eh	V	0.34
UA	G01D	B	2021/03/24	Eh	V	0.35
UA	G01D	B	2021/04/14	Eh	V	0.33
UA	G01D	B	2021/05/12	Eh	V	0.37
UA	G01D	B	2021/06/01	Eh	V	0.36
UA	G01D	B	2021/06/14	Eh	V	0.35
UA	G01D	B	2021/07/06	Eh	V	0.33
UA	G01D	B	2021/07/21	Eh	V	0.32
UA	G01D	B	2021/09/20	Eh	V	0.36
UA	G01D	B	2022/03/14	Eh	V	0.31
UA	G01D	B	2022/07/26	Eh	V	0.20
UA	G01D	B	2022/09/20	Eh	V	0.37
UA	G01D	B	2023/01/24	Eh	V	0.31
UA	G01D	B	2023/03/07	Eh	V	0.39
UA	G01D	B	2023/05/02	Eh	V	0.34
UA	G01D	B	2023/09/25	Eh	V	0.22
UA	G01D	B	2023/10/23	Eh	V	0.30
UA	G01D	B	2017/07/20	Alkalinity, bicarbonate	mg/L CaCO3	224
UA	G01D	B	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	230
UA	G01D	B	2021/03/03	Alkalinity, bicarbonate	mg/L CaCO3	209
UA	G01D	B	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	219
UA	G01D	B	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	240

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	200
UA	G01D	B	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	198
UA	G01D	B	2021/06/14	Alkalinity, bicarbonate	mg/L CaCO3	219
UA	G01D	B	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	209
UA	G01D	B	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	204
UA	G01D	B	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	215
UA	G01D	B	2022/03/14	Alkalinity, bicarbonate	mg/L CaCO3	223
UA	G01D	B	2022/07/26	Alkalinity, bicarbonate	mg/L CaCO3	228
UA	G01D	B	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	220
UA	G01D	B	2023/03/07	Alkalinity, bicarbonate	mg/L CaCO3	223
UA	G01D	B	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G01D	B	2023/09/25	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G01D	B	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	242
UA	G01D	B	2015/12/03	Barium, total	mg/L	0.254
UA	G01D	B	2016/03/15	Barium, total	mg/L	0.283
UA	G01D	B	2016/06/15	Barium, total	mg/L	0.204
UA	G01D	B	2016/09/14	Barium, total	mg/L	0.190
UA	G01D	B	2016/12/14	Barium, total	mg/L	0.163
UA	G01D	B	2017/03/07	Barium, total	mg/L	0.155
UA	G01D	B	2017/06/15	Barium, total	mg/L	0.140
UA	G01D	B	2017/07/20	Barium, total	mg/L	0.140
UA	G01D	B	2018/06/19	Barium, total	mg/L	0.202
UA	G01D	B	2018/09/05	Barium, total	mg/L	0.147
UA	G01D	B	2019/03/27	Barium, total	mg/L	0.129
UA	G01D	B	2019/09/09	Barium, total	mg/L	0.123
UA	G01D	B	2020/03/30	Barium, total	mg/L	0.130
UA	G01D	B	2020/09/23	Barium, total	mg/L	0.123
UA	G01D	B	2021/03/03	Barium, total	mg/L	0.137
UA	G01D	B	2021/03/24	Barium, total	mg/L	0.136
UA	G01D	B	2021/04/14	Barium, total	mg/L	0.112
UA	G01D	B	2021/05/12	Barium, total	mg/L	0.133
UA	G01D	B	2021/06/01	Barium, total	mg/L	0.134
UA	G01D	B	2021/06/14	Barium, total	mg/L	0.136
UA	G01D	B	2021/07/06	Barium, total	mg/L	0.136
UA	G01D	B	2021/07/21	Barium, total	mg/L	0.125
UA	G01D	B	2021/09/20	Barium, total	mg/L	0.145
UA	G01D	B	2022/03/14	Barium, total	mg/L	0.128
UA	G01D	B	2022/07/26	Barium, total	mg/L	0.146
UA	G01D	B	2022/09/20	Barium, total	mg/L	0.142
UA	G01D	B	2023/01/24	Barium, total	mg/L	0.189
UA	G01D	B	2023/03/07	Barium, total	mg/L	0.134
UA	G01D	B	2023/05/02	Barium, total	mg/L	0.213
UA	G01D	B	2023/09/25	Barium, total	mg/L	0.193
UA	G01D	B	2023/10/23	Barium, total	mg/L	0.188
UA	G01D	B	2015/12/03	Boron, total	mg/L	<0.01
UA	G01D	B	2016/03/15	Boron, total	mg/L	0.0360
UA	G01D	B	2016/06/15	Boron, total	mg/L	0.0296
UA	G01D	B	2016/09/14	Boron, total	mg/L	0.0416
UA	G01D	B	2016/12/14	Boron, total	mg/L	<0.01
UA	G01D	B	2017/03/07	Boron, total	mg/L	<0.01
UA	G01D	B	2017/06/15	Boron, total	mg/L	<0.01
UA	G01D	B	2017/07/20	Boron, total	mg/L	<0.01
UA	G01D	B	2017/11/30	Boron, total	mg/L	<0.01
UA	G01D	B	2018/06/19	Boron, total	mg/L	<0.0092
UA	G01D	B	2018/09/05	Boron, total	mg/L	<0.0092

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2019/03/27	Boron, total	mg/L	<0.0092
UA	G01D	B	2019/09/09	Boron, total	mg/L	<0.0092
UA	G01D	B	2020/03/30	Boron, total	mg/L	<0.0092
UA	G01D	B	2020/09/23	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/03/03	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/03/24	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/04/14	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/05/12	Boron, total	mg/L	0.0167
UA	G01D	B	2021/06/01	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/06/14	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/07/06	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/07/21	Boron, total	mg/L	<0.0092
UA	G01D	B	2021/09/20	Boron, total	mg/L	<0.0092
UA	G01D	B	2022/03/14	Boron, total	mg/L	<0.0092
UA	G01D	B	2022/07/26	Boron, total	mg/L	0.0150
UA	G01D	B	2022/09/20	Boron, total	mg/L	0.0140
UA	G01D	B	2023/01/24	Boron, total	mg/L	0.0220
UA	G01D	B	2023/03/07	Boron, total	mg/L	0.0290
UA	G01D	B	2023/05/02	Boron, total	mg/L	0.0210
UA	G01D	B	2023/09/25	Boron, total	mg/L	<0.0092
UA	G01D	B	2023/10/23	Boron, total	mg/L	0.0140
UA	G01D	B	2015/12/03	Calcium, total	mg/L	37.9
UA	G01D	B	2016/03/15	Calcium, total	mg/L	45.5
UA	G01D	B	2016/06/15	Calcium, total	mg/L	43.9
UA	G01D	B	2016/09/14	Calcium, total	mg/L	40.8
UA	G01D	B	2016/12/14	Calcium, total	mg/L	35.9
UA	G01D	B	2017/03/07	Calcium, total	mg/L	34.9
UA	G01D	B	2017/06/15	Calcium, total	mg/L	32.1
UA	G01D	B	2017/07/20	Calcium, total	mg/L	29.5
UA	G01D	B	2017/11/30	Calcium, total	mg/L	37.2
UA	G01D	B	2018/06/19	Calcium, total	mg/L	29.5
UA	G01D	B	2018/09/05	Calcium, total	mg/L	30.5
UA	G01D	B	2019/03/27	Calcium, total	mg/L	25.1
UA	G01D	B	2019/09/09	Calcium, total	mg/L	25.6
UA	G01D	B	2020/03/30	Calcium, total	mg/L	22.7
UA	G01D	B	2020/09/23	Calcium, total	mg/L	24.4
UA	G01D	B	2021/03/03	Calcium, total	mg/L	25.8
UA	G01D	B	2021/03/24	Calcium, total	mg/L	24.8
UA	G01D	B	2021/04/14	Calcium, total	mg/L	23.3
UA	G01D	B	2021/05/12	Calcium, total	mg/L	24.9
UA	G01D	B	2021/06/01	Calcium, total	mg/L	24.4
UA	G01D	B	2021/06/14	Calcium, total	mg/L	24.4
UA	G01D	B	2021/07/06	Calcium, total	mg/L	23.3
UA	G01D	B	2021/07/21	Calcium, total	mg/L	26.0
UA	G01D	B	2021/09/20	Calcium, total	mg/L	26.0
UA	G01D	B	2022/03/14	Calcium, total	mg/L	26.1
UA	G01D	B	2022/07/26	Calcium, total	mg/L	25.6
UA	G01D	B	2022/09/20	Calcium, total	mg/L	25.5
UA	G01D	B	2023/01/24	Calcium, total	mg/L	27.4
UA	G01D	B	2023/03/07	Calcium, total	mg/L	23.0
UA	G01D	B	2023/05/02	Calcium, total	mg/L	28.8
UA	G01D	B	2023/09/25	Calcium, total	mg/L	31.1
UA	G01D	B	2023/10/23	Calcium, total	mg/L	33.0
UA	G01D	B	2015/12/03	Chloride, total	mg/L	13.0
UA	G01D	B	2016/03/15	Chloride, total	mg/L	20.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2016/06/15	Chloride, total	mg/L	21.0
UA	G01D	B	2016/09/14	Chloride, total	mg/L	21.0
UA	G01D	B	2016/12/14	Chloride, total	mg/L	14.0
UA	G01D	B	2017/03/07	Chloride, total	mg/L	16.0
UA	G01D	B	2017/06/15	Chloride, total	mg/L	15.0
UA	G01D	B	2017/07/20	Chloride, total	mg/L	12.0
UA	G01D	B	2017/11/30	Chloride, total	mg/L	18.0
UA	G01D	B	2018/06/19	Chloride, total	mg/L	13.0
UA	G01D	B	2018/09/05	Chloride, total	mg/L	14.0
UA	G01D	B	2019/03/27	Chloride, total	mg/L	8.00
UA	G01D	B	2019/09/09	Chloride, total	mg/L	8.00
UA	G01D	B	2020/03/30	Chloride, total	mg/L	8.00
UA	G01D	B	2020/09/23	Chloride, total	mg/L	10.0
UA	G01D	B	2021/03/03	Chloride, total	mg/L	10.0
UA	G01D	B	2021/03/24	Chloride, total	mg/L	9.00
UA	G01D	B	2021/04/14	Chloride, total	mg/L	6.00
UA	G01D	B	2021/05/12	Chloride, total	mg/L	7.00
UA	G01D	B	2021/06/01	Chloride, total	mg/L	7.00
UA	G01D	B	2021/06/14	Chloride, total	mg/L	9.00
UA	G01D	B	2021/07/06	Chloride, total	mg/L	10.0
UA	G01D	B	2021/07/21	Chloride, total	mg/L	9.00
UA	G01D	B	2021/09/20	Chloride, total	mg/L	9.00
UA	G01D	B	2022/03/14	Chloride, total	mg/L	8.00
UA	G01D	B	2022/07/26	Chloride, total	mg/L	5.00
UA	G01D	B	2022/09/20	Chloride, total	mg/L	8.00
UA	G01D	B	2023/01/24	Chloride, total	mg/L	9.00
UA	G01D	B	2023/03/07	Chloride, total	mg/L	5.00
UA	G01D	B	2023/05/02	Chloride, total	mg/L	10.0
UA	G01D	B	2023/09/25	Chloride, total	mg/L	11.0
UA	G01D	B	2023/10/23	Chloride, total	mg/L	13.0
UA	G01D	B	2015/12/03	Cobalt, total	mg/L	0.00600
UA	G01D	B	2016/03/15	Cobalt, total	mg/L	0.0136
UA	G01D	B	2016/06/15	Cobalt, total	mg/L	0.0128
UA	G01D	B	2016/09/14	Cobalt, total	mg/L	0.0113
UA	G01D	B	2016/12/14	Cobalt, total	mg/L	0.00770
UA	G01D	B	2017/03/07	Cobalt, total	mg/L	0.00610
UA	G01D	B	2017/06/15	Cobalt, total	mg/L	0.00470
UA	G01D	B	2017/07/20	Cobalt, total	mg/L	0.00350
UA	G01D	B	2018/06/19	Cobalt, total	mg/L	0.00570
UA	G01D	B	2018/09/05	Cobalt, total	mg/L	0.00220
UA	G01D	B	2019/03/27	Cobalt, total	mg/L	0.00140
UA	G01D	B	2019/09/09	Cobalt, total	mg/L	0.00140
UA	G01D	B	2020/03/30	Cobalt, total	mg/L	0.00180
UA	G01D	B	2020/09/23	Cobalt, total	mg/L	0.00160
UA	G01D	B	2021/03/03	Cobalt, total	mg/L	0.00150
UA	G01D	B	2021/03/24	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/04/14	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/05/12	Cobalt, total	mg/L	<0.001
UA	G01D	B	2021/06/01	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/06/14	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/07/06	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/07/21	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2021/09/20	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2022/03/14	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2022/07/26	Cobalt, total	mg/L	0.000800

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2022/09/20	Cobalt, total	mg/L	0.000700
UA	G01D	B	2023/01/24	Cobalt, total	mg/L	0.00420
UA	G01D	B	2023/03/07	Cobalt, total	mg/L	0.00220
UA	G01D	B	2023/05/02	Cobalt, total	mg/L	0.00580
UA	G01D	B	2023/09/25	Cobalt, total	mg/L	0.000800
UA	G01D	B	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G01D	B	2023/05/02	Iron, dissolved	mg/L	0.214
UA	G01D	B	2023/09/25	Iron, dissolved	mg/L	0.0492
UA	G01D	B	2017/07/20	Magnesium, total	mg/L	9.87
UA	G01D	B	2020/03/30	Magnesium, total	mg/L	7.60
UA	G01D	B	2021/03/03	Magnesium, total	mg/L	7.79
UA	G01D	B	2021/03/24	Magnesium, total	mg/L	7.06
UA	G01D	B	2021/04/14	Magnesium, total	mg/L	7.56
UA	G01D	B	2021/05/12	Magnesium, total	mg/L	7.55
UA	G01D	B	2021/06/01	Magnesium, total	mg/L	7.36
UA	G01D	B	2021/06/14	Magnesium, total	mg/L	7.41
UA	G01D	B	2021/07/06	Magnesium, total	mg/L	7.18
UA	G01D	B	2021/07/21	Magnesium, total	mg/L	7.54
UA	G01D	B	2022/03/14	Magnesium, total	mg/L	7.77
UA	G01D	B	2022/07/26	Magnesium, total	mg/L	7.74
UA	G01D	B	2023/01/24	Magnesium, total	mg/L	9.75
UA	G01D	B	2023/03/07	Magnesium, total	mg/L	7.66
UA	G01D	B	2023/05/02	Magnesium, total	mg/L	8.43
UA	G01D	B	2023/09/25	Magnesium, total	mg/L	9.32
UA	G01D	B	2023/10/23	Magnesium, total	mg/L	9.70
UA	G01D	B	2023/05/02	Manganese, dissolved	mg/L	0.330
UA	G01D	B	2023/09/25	Manganese, dissolved	mg/L	0.0273
UA	G01D	B	2023/05/02	Phosphate, dissolved	mg/L	0.0740
UA	G01D	B	2023/09/25	Phosphate, dissolved	mg/L	0.0460
UA	G01D	B	2017/07/20	Potassium, total	mg/L	1.33
UA	G01D	B	2020/03/30	Potassium, total	mg/L	1.35
UA	G01D	B	2021/03/03	Potassium, total	mg/L	1.24
UA	G01D	B	2021/03/24	Potassium, total	mg/L	1.05
UA	G01D	B	2021/04/14	Potassium, total	mg/L	0.979
UA	G01D	B	2021/05/12	Potassium, total	mg/L	1.13
UA	G01D	B	2021/06/01	Potassium, total	mg/L	1.26
UA	G01D	B	2021/06/14	Potassium, total	mg/L	1.26
UA	G01D	B	2021/07/06	Potassium, total	mg/L	1.43
UA	G01D	B	2021/07/21	Potassium, total	mg/L	1.24
UA	G01D	B	2022/03/14	Potassium, total	mg/L	1.22
UA	G01D	B	2022/07/26	Potassium, total	mg/L	1.24
UA	G01D	B	2023/01/24	Potassium, total	mg/L	1.79
UA	G01D	B	2023/03/07	Potassium, total	mg/L	1.06
UA	G01D	B	2023/05/02	Potassium, total	mg/L	1.28
UA	G01D	B	2023/09/25	Potassium, total	mg/L	1.24
UA	G01D	B	2023/10/23	Potassium, total	mg/L	1.34
UA	G01D	B	2023/05/02	Silicon, dissolved	mg/L	7.50
UA	G01D	B	2023/09/25	Silicon, dissolved	mg/L	6.88
UA	G01D	B	2017/07/20	Sodium, total	mg/L	79.9
UA	G01D	B	2020/03/30	Sodium, total	mg/L	91.0
UA	G01D	B	2021/03/03	Sodium, total	mg/L	79.0
UA	G01D	B	2021/03/24	Sodium, total	mg/L	73.9
UA	G01D	B	2021/04/14	Sodium, total	mg/L	94.5
UA	G01D	B	2021/05/12	Sodium, total	mg/L	82.5
UA	G01D	B	2021/06/01	Sodium, total	mg/L	75.3

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2021/06/14	Sodium, total	mg/L	78.8
UA	G01D	B	2021/07/06	Sodium, total	mg/L	77.6
UA	G01D	B	2021/07/21	Sodium, total	mg/L	75.1
UA	G01D	B	2022/03/14	Sodium, total	mg/L	77.2
UA	G01D	B	2022/07/26	Sodium, total	mg/L	76.2
UA	G01D	B	2023/01/24	Sodium, total	mg/L	74.3
UA	G01D	B	2023/03/07	Sodium, total	mg/L	85.8
UA	G01D	B	2023/05/02	Sodium, total	mg/L	90.3
UA	G01D	B	2023/09/25	Sodium, total	mg/L	77.1
UA	G01D	B	2023/10/23	Sodium, total	mg/L	77.9
UA	G01D	B	2015/12/03	Sulfate, total	mg/L	20.0
UA	G01D	B	2016/03/15	Sulfate, total	mg/L	126
UA	G01D	B	2016/06/15	Sulfate, total	mg/L	157
UA	G01D	B	2016/09/14	Sulfate, total	mg/L	129
UA	G01D	B	2016/12/14	Sulfate, total	mg/L	53.0
UA	G01D	B	2017/03/07	Sulfate, total	mg/L	72.0
UA	G01D	B	2017/06/15	Sulfate, total	mg/L	56.0
UA	G01D	B	2017/07/20	Sulfate, total	mg/L	31.0
UA	G01D	B	2017/11/30	Sulfate, total	mg/L	117
UA	G01D	B	2018/06/19	Sulfate, total	mg/L	70.0
UA	G01D	B	2018/09/05	Sulfate, total	mg/L	94.0
UA	G01D	B	2019/03/27	Sulfate, total	mg/L	30.0
UA	G01D	B	2019/09/09	Sulfate, total	mg/L	37.0
UA	G01D	B	2020/03/30	Sulfate, total	mg/L	35.0
UA	G01D	B	2020/09/23	Sulfate, total	mg/L	34.0
UA	G01D	B	2021/03/03	Sulfate, total	mg/L	18.0
UA	G01D	B	2021/03/24	Sulfate, total	mg/L	21.0
UA	G01D	B	2021/04/14	Sulfate, total	mg/L	39.0
UA	G01D	B	2021/05/12	Sulfate, total	mg/L	20.0
UA	G01D	B	2021/06/01	Sulfate, total	mg/L	18.0
UA	G01D	B	2021/06/14	Sulfate, total	mg/L	20.0
UA	G01D	B	2021/07/06	Sulfate, total	mg/L	20.0
UA	G01D	B	2021/07/21	Sulfate, total	mg/L	18.0
UA	G01D	B	2021/09/20	Sulfate, total	mg/L	18.0
UA	G01D	B	2022/03/14	Sulfate, total	mg/L	22.0
UA	G01D	B	2022/07/26	Sulfate, total	mg/L	36.0
UA	G01D	B	2022/09/20	Sulfate, total	mg/L	23.0
UA	G01D	B	2023/01/24	Sulfate, total	mg/L	24.0
UA	G01D	B	2023/03/07	Sulfate, total	mg/L	36.0
UA	G01D	B	2023/05/02	Sulfate, total	mg/L	26.0
UA	G01D	B	2023/09/25	Sulfate, total	mg/L	28.0
UA	G01D	B	2023/10/23	Sulfate, total	mg/L	30.0
UA	G01D	B	2015/12/03	Temperature (Celsius)	degrees C	16.1
UA	G01D	B	2016/03/15	Temperature (Celsius)	degrees C	18.3
UA	G01D	B	2016/06/15	Temperature (Celsius)	degrees C	16.9
UA	G01D	B	2016/09/14	Temperature (Celsius)	degrees C	18.4
UA	G01D	B	2016/12/14	Temperature (Celsius)	degrees C	15.5
UA	G01D	B	2017/03/07	Temperature (Celsius)	degrees C	14.1
UA	G01D	B	2017/06/15	Temperature (Celsius)	degrees C	17.5
UA	G01D	B	2017/07/20	Temperature (Celsius)	degrees C	17.6
UA	G01D	B	2017/11/30	Temperature (Celsius)	degrees C	15.0
UA	G01D	B	2018/06/19	Temperature (Celsius)	degrees C	17.6
UA	G01D	B	2018/09/05	Temperature (Celsius)	degrees C	17.8
UA	G01D	B	2019/03/27	Temperature (Celsius)	degrees C	15.4
UA	G01D	B	2019/09/09	Temperature (Celsius)	degrees C	17.6

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G01D	B	2020/03/30	Temperature (Celsius)	degrees C	15.8
UA	G01D	B	2020/09/23	Temperature (Celsius)	degrees C	16.3
UA	G01D	B	2021/03/03	Temperature (Celsius)	degrees C	15.7
UA	G01D	B	2021/03/24	Temperature (Celsius)	degrees C	16.2
UA	G01D	B	2021/04/14	Temperature (Celsius)	degrees C	16.3
UA	G01D	B	2021/05/12	Temperature (Celsius)	degrees C	15.9
UA	G01D	B	2021/06/01	Temperature (Celsius)	degrees C	15.8
UA	G01D	B	2021/06/14	Temperature (Celsius)	degrees C	17.3
UA	G01D	B	2021/07/06	Temperature (Celsius)	degrees C	16.9
UA	G01D	B	2021/07/21	Temperature (Celsius)	degrees C	16.6
UA	G01D	B	2021/09/20	Temperature (Celsius)	degrees C	16.7
UA	G01D	B	2022/03/14	Temperature (Celsius)	degrees C	15.9
UA	G01D	B	2022/07/26	Temperature (Celsius)	degrees C	25.8
UA	G01D	B	2022/09/20	Temperature (Celsius)	degrees C	19.6
UA	G01D	B	2023/01/24	Temperature (Celsius)	degrees C	13.8
UA	G01D	B	2023/03/07	Temperature (Celsius)	degrees C	14.5
UA	G01D	B	2023/05/02	Temperature (Celsius)	degrees C	15.5
UA	G01D	B	2023/09/25	Temperature (Celsius)	degrees C	18.1
UA	G01D	B	2023/10/23	Temperature (Celsius)	degrees C	16.9
UA	G01D	B	2015/12/03	Total Dissolved Solids	mg/L	216
UA	G01D	B	2016/03/15	Total Dissolved Solids	mg/L	496
UA	G01D	B	2016/06/15	Total Dissolved Solids	mg/L	518
UA	G01D	B	2016/09/14	Total Dissolved Solids	mg/L	498
UA	G01D	B	2016/12/14	Total Dissolved Solids	mg/L	294
UA	G01D	B	2017/03/07	Total Dissolved Solids	mg/L	384
UA	G01D	B	2017/06/15	Total Dissolved Solids	mg/L	372
UA	G01D	B	2017/07/20	Total Dissolved Solids	mg/L	368
UA	G01D	B	2017/11/30	Total Dissolved Solids	mg/L	450
UA	G01D	B	2018/06/19	Total Dissolved Solids	mg/L	394
UA	G01D	B	2018/09/05	Total Dissolved Solids	mg/L	414
UA	G01D	B	2019/03/27	Total Dissolved Solids	mg/L	310
UA	G01D	B	2019/09/09	Total Dissolved Solids	mg/L	336
UA	G01D	B	2020/03/30	Total Dissolved Solids	mg/L	296
UA	G01D	B	2020/09/23	Total Dissolved Solids	mg/L	294
UA	G01D	B	2021/03/03	Total Dissolved Solids	mg/L	308
UA	G01D	B	2021/03/24	Total Dissolved Solids	mg/L	300
UA	G01D	B	2021/04/14	Total Dissolved Solids	mg/L	308
UA	G01D	B	2021/05/12	Total Dissolved Solids	mg/L	280
UA	G01D	B	2021/06/01	Total Dissolved Solids	mg/L	260
UA	G01D	B	2021/06/14	Total Dissolved Solids	mg/L	268
UA	G01D	B	2021/07/06	Total Dissolved Solids	mg/L	262
UA	G01D	B	2021/07/21	Total Dissolved Solids	mg/L	286
UA	G01D	B	2021/09/20	Total Dissolved Solids	mg/L	294
UA	G01D	B	2022/03/14	Total Dissolved Solids	mg/L	318
UA	G01D	B	2022/07/26	Total Dissolved Solids	mg/L	324
UA	G01D	B	2022/09/20	Total Dissolved Solids	mg/L	302
UA	G01D	B	2023/01/24	Total Dissolved Solids	mg/L	332
UA	G01D	B	2023/03/07	Total Dissolved Solids	mg/L	308
UA	G01D	B	2023/05/02	Total Dissolved Solids	mg/L	336
UA	G01D	B	2023/09/25	Total Dissolved Solids	mg/L	350
UA	G01D	B	2023/10/23	Total Dissolved Solids	mg/L	308
UA	G02D	B	2015/12/03	pH (field)	SU	6.7
UA	G02D	B	2016/03/15	pH (field)	SU	6.6
UA	G02D	B	2016/06/15	pH (field)	SU	6.8
UA	G02D	B	2016/09/14	pH (field)	SU	6.6

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2016/12/14	pH (field)	SU	6.3
UA	G02D	B	2017/03/08	pH (field)	SU	6.9
UA	G02D	B	2017/06/14	pH (field)	SU	6.3
UA	G02D	B	2017/07/20	pH (field)	SU	6.7
UA	G02D	B	2017/11/30	pH (field)	SU	6.9
UA	G02D	B	2018/06/19	pH (field)	SU	6.7
UA	G02D	B	2018/09/05	pH (field)	SU	6.6
UA	G02D	B	2019/03/27	pH (field)	SU	6.6
UA	G02D	B	2019/09/09	pH (field)	SU	6.5
UA	G02D	B	2020/03/30	pH (field)	SU	6.6
UA	G02D	B	2020/09/23	pH (field)	SU	6.6
UA	G02D	B	2021/03/03	pH (field)	SU	6.5
UA	G02D	B	2021/03/24	pH (field)	SU	6.3
UA	G02D	B	2021/04/14	pH (field)	SU	6.3
UA	G02D	B	2021/05/12	pH (field)	SU	6.3
UA	G02D	B	2021/06/01	pH (field)	SU	6.2
UA	G02D	B	2021/06/14	pH (field)	SU	6.4
UA	G02D	B	2021/07/06	pH (field)	SU	6.2
UA	G02D	B	2021/07/21	pH (field)	SU	6.2
UA	G02D	B	2021/09/20	pH (field)	SU	6.3
UA	G02D	B	2022/03/14	pH (field)	SU	6.5
UA	G02D	B	2022/07/27	pH (field)	SU	7.3
UA	G02D	B	2022/09/21	pH (field)	SU	6.5
UA	G02D	B	2023/01/24	pH (field)	SU	6.6
UA	G02D	B	2023/03/08	pH (field)	SU	6.6
UA	G02D	B	2023/05/03	pH (field)	SU	6.5
UA	G02D	B	2023/09/25	pH (field)	SU	6.4
UA	G02D	B	2023/10/23	pH (field)	SU	6.4
UA	G02D	B	2015/12/03	Oxidation Reduction Potential	mV	146
UA	G02D	B	2016/03/15	Oxidation Reduction Potential	mV	28.0
UA	G02D	B	2016/06/15	Oxidation Reduction Potential	mV	82.0
UA	G02D	B	2016/09/14	Oxidation Reduction Potential	mV	69.0
UA	G02D	B	2016/12/14	Oxidation Reduction Potential	mV	218
UA	G02D	B	2017/03/08	Oxidation Reduction Potential	mV	254
UA	G02D	B	2017/06/14	Oxidation Reduction Potential	mV	95.0
UA	G02D	B	2017/07/20	Oxidation Reduction Potential	mV	132
UA	G02D	B	2017/11/30	Oxidation Reduction Potential	mV	70.0
UA	G02D	B	2018/06/19	Oxidation Reduction Potential	mV	187
UA	G02D	B	2018/09/05	Oxidation Reduction Potential	mV	169
UA	G02D	B	2019/03/27	Oxidation Reduction Potential	mV	130
UA	G02D	B	2019/09/09	Oxidation Reduction Potential	mV	186
UA	G02D	B	2020/03/30	Oxidation Reduction Potential	mV	179
UA	G02D	B	2020/09/23	Oxidation Reduction Potential	mV	246
UA	G02D	B	2021/03/03	Oxidation Reduction Potential	mV	151
UA	G02D	B	2021/03/24	Oxidation Reduction Potential	mV	175
UA	G02D	B	2021/04/14	Oxidation Reduction Potential	mV	151
UA	G02D	B	2021/05/12	Oxidation Reduction Potential	mV	183
UA	G02D	B	2021/06/01	Oxidation Reduction Potential	mV	140
UA	G02D	B	2021/06/14	Oxidation Reduction Potential	mV	169
UA	G02D	B	2021/07/06	Oxidation Reduction Potential	mV	128
UA	G02D	B	2021/07/21	Oxidation Reduction Potential	mV	100
UA	G02D	B	2021/09/20	Oxidation Reduction Potential	mV	191
UA	G02D	B	2022/03/14	Oxidation Reduction Potential	mV	138
UA	G02D	B	2022/07/27	Oxidation Reduction Potential	mV	97.3
UA	G02D	B	2022/09/21	Oxidation Reduction Potential	mV	199

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2023/01/24	Oxidation Reduction Potential	mV	110
UA	G02D	B	2023/03/08	Oxidation Reduction Potential	mV	49.1
UA	G02D	B	2023/05/03	Oxidation Reduction Potential	mV	182
UA	G02D	B	2023/09/25	Oxidation Reduction Potential	mV	68.0
UA	G02D	B	2023/10/23	Oxidation Reduction Potential	mV	108
UA	G02D	B	2015/12/03	Eh	V	0.34
UA	G02D	B	2016/03/15	Eh	V	0.22
UA	G02D	B	2016/06/15	Eh	V	0.28
UA	G02D	B	2016/09/14	Eh	V	0.26
UA	G02D	B	2016/12/14	Eh	V	0.41
UA	G02D	B	2017/03/08	Eh	V	0.45
UA	G02D	B	2017/06/14	Eh	V	0.29
UA	G02D	B	2017/07/20	Eh	V	0.33
UA	G02D	B	2017/11/30	Eh	V	0.27
UA	G02D	B	2018/06/19	Eh	V	0.38
UA	G02D	B	2018/09/05	Eh	V	0.36
UA	G02D	B	2019/03/27	Eh	V	0.33
UA	G02D	B	2019/09/09	Eh	V	0.38
UA	G02D	B	2020/03/30	Eh	V	0.37
UA	G02D	B	2020/09/23	Eh	V	0.44
UA	G02D	B	2021/03/03	Eh	V	0.35
UA	G02D	B	2021/03/24	Eh	V	0.37
UA	G02D	B	2021/04/14	Eh	V	0.35
UA	G02D	B	2021/05/12	Eh	V	0.38
UA	G02D	B	2021/06/01	Eh	V	0.34
UA	G02D	B	2021/06/14	Eh	V	0.36
UA	G02D	B	2021/07/06	Eh	V	0.32
UA	G02D	B	2021/07/21	Eh	V	0.30
UA	G02D	B	2021/09/20	Eh	V	0.39
UA	G02D	B	2022/03/14	Eh	V	0.33
UA	G02D	B	2022/07/27	Eh	V	0.29
UA	G02D	B	2022/09/21	Eh	V	0.39
UA	G02D	B	2023/01/24	Eh	V	0.31
UA	G02D	B	2023/03/08	Eh	V	0.25
UA	G02D	B	2023/05/03	Eh	V	0.38
UA	G02D	B	2023/09/25	Eh	V	0.26
UA	G02D	B	2023/10/23	Eh	V	0.30
UA	G02D	B	2017/07/20	Alkalinity, bicarbonate	mg/L CaCO3	159
UA	G02D	B	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	165
UA	G02D	B	2021/03/03	Alkalinity, bicarbonate	mg/L CaCO3	159
UA	G02D	B	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G02D	B	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G02D	B	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	153
UA	G02D	B	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	151
UA	G02D	B	2021/06/14	Alkalinity, bicarbonate	mg/L CaCO3	150
UA	G02D	B	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	151
UA	G02D	B	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G02D	B	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	156
UA	G02D	B	2022/03/14	Alkalinity, bicarbonate	mg/L CaCO3	138
UA	G02D	B	2022/07/27	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G02D	B	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	136
UA	G02D	B	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G02D	B	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G02D	B	2023/09/25	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G02D	B	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	145

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2015/12/03	Barium, total	mg/L	0.232
UA	G02D	B	2016/03/15	Barium, total	mg/L	0.218
UA	G02D	B	2016/06/15	Barium, total	mg/L	0.203
UA	G02D	B	2016/09/14	Barium, total	mg/L	0.206
UA	G02D	B	2016/12/14	Barium, total	mg/L	0.224
UA	G02D	B	2017/03/08	Barium, total	mg/L	0.211
UA	G02D	B	2017/06/14	Barium, total	mg/L	0.192
UA	G02D	B	2017/07/20	Barium, total	mg/L	0.211
UA	G02D	B	2018/06/19	Barium, total	mg/L	0.245
UA	G02D	B	2018/09/05	Barium, total	mg/L	0.209
UA	G02D	B	2019/03/27	Barium, total	mg/L	0.235
UA	G02D	B	2019/09/09	Barium, total	mg/L	0.208
UA	G02D	B	2020/03/30	Barium, total	mg/L	0.202
UA	G02D	B	2020/09/23	Barium, total	mg/L	0.253
UA	G02D	B	2021/03/03	Barium, total	mg/L	0.207
UA	G02D	B	2021/03/24	Barium, total	mg/L	0.206
UA	G02D	B	2021/04/14	Barium, total	mg/L	0.187
UA	G02D	B	2021/05/12	Barium, total	mg/L	0.208
UA	G02D	B	2021/06/01	Barium, total	mg/L	0.191
UA	G02D	B	2021/06/14	Barium, total	mg/L	0.202
UA	G02D	B	2021/07/06	Barium, total	mg/L	0.189
UA	G02D	B	2021/07/21	Barium, total	mg/L	0.181
UA	G02D	B	2021/09/20	Barium, total	mg/L	0.189
UA	G02D	B	2022/03/14	Barium, total	mg/L	0.148
UA	G02D	B	2022/07/27	Barium, total	mg/L	0.182
UA	G02D	B	2022/09/21	Barium, total	mg/L	0.171
UA	G02D	B	2023/01/24	Barium, total	mg/L	0.190
UA	G02D	B	2023/03/08	Barium, total	mg/L	0.171
UA	G02D	B	2023/05/03	Barium, total	mg/L	0.210
UA	G02D	B	2023/09/25	Barium, total	mg/L	0.229
UA	G02D	B	2023/10/23	Barium, total	mg/L	0.170
UA	G02D	B	2015/12/03	Boron, total	mg/L	0.0536
UA	G02D	B	2016/03/15	Boron, total	mg/L	0.0494
UA	G02D	B	2016/06/15	Boron, total	mg/L	0.0508
UA	G02D	B	2016/09/14	Boron, total	mg/L	0.0534
UA	G02D	B	2016/12/14	Boron, total	mg/L	0.0552
UA	G02D	B	2017/03/08	Boron, total	mg/L	0.0546
UA	G02D	B	2017/06/14	Boron, total	mg/L	0.0467
UA	G02D	B	2017/07/20	Boron, total	mg/L	0.0440
UA	G02D	B	2017/11/30	Boron, total	mg/L	0.0496
UA	G02D	B	2018/06/19	Boron, total	mg/L	0.0404
UA	G02D	B	2018/09/05	Boron, total	mg/L	0.0468
UA	G02D	B	2019/03/27	Boron, total	mg/L	0.0473
UA	G02D	B	2019/09/09	Boron, total	mg/L	0.0429
UA	G02D	B	2020/03/30	Boron, total	mg/L	0.0449
UA	G02D	B	2020/09/23	Boron, total	mg/L	0.0442
UA	G02D	B	2021/03/03	Boron, total	mg/L	0.0296
UA	G02D	B	2021/03/24	Boron, total	mg/L	0.0330
UA	G02D	B	2021/04/14	Boron, total	mg/L	0.0318
UA	G02D	B	2021/05/12	Boron, total	mg/L	0.0356
UA	G02D	B	2021/06/01	Boron, total	mg/L	0.0433
UA	G02D	B	2021/06/14	Boron, total	mg/L	0.0352
UA	G02D	B	2021/07/06	Boron, total	mg/L	0.0431
UA	G02D	B	2021/07/21	Boron, total	mg/L	0.0329
UA	G02D	B	2021/09/20	Boron, total	mg/L	0.0313

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2022/03/14	Boron, total	mg/L	0.0283
UA	G02D	B	2022/07/27	Boron, total	mg/L	0.0322
UA	G02D	B	2022/09/21	Boron, total	mg/L	0.0266
UA	G02D	B	2023/01/24	Boron, total	mg/L	0.0311
UA	G02D	B	2023/03/08	Boron, total	mg/L	0.0270
UA	G02D	B	2023/05/03	Boron, total	mg/L	0.0412
UA	G02D	B	2023/09/25	Boron, total	mg/L	0.0401
UA	G02D	B	2023/10/23	Boron, total	mg/L	0.0276
UA	G02D	B	2015/12/03	Calcium, total	mg/L	39.9
UA	G02D	B	2016/03/15	Calcium, total	mg/L	39.8
UA	G02D	B	2016/06/15	Calcium, total	mg/L	38.6
UA	G02D	B	2016/09/14	Calcium, total	mg/L	34.7
UA	G02D	B	2016/12/14	Calcium, total	mg/L	40.4
UA	G02D	B	2017/03/08	Calcium, total	mg/L	40.0
UA	G02D	B	2017/06/14	Calcium, total	mg/L	33.2
UA	G02D	B	2017/07/20	Calcium, total	mg/L	37.5
UA	G02D	B	2017/11/30	Calcium, total	mg/L	40.1
UA	G02D	B	2018/06/19	Calcium, total	mg/L	33.9
UA	G02D	B	2018/09/05	Calcium, total	mg/L	36.3
UA	G02D	B	2019/03/27	Calcium, total	mg/L	38.7
UA	G02D	B	2019/09/09	Calcium, total	mg/L	40.3
UA	G02D	B	2020/03/30	Calcium, total	mg/L	33.5
UA	G02D	B	2020/09/23	Calcium, total	mg/L	45.8
UA	G02D	B	2021/03/03	Calcium, total	mg/L	34.5
UA	G02D	B	2021/03/24	Calcium, total	mg/L	34.4
UA	G02D	B	2021/04/14	Calcium, total	mg/L	32.4
UA	G02D	B	2021/05/12	Calcium, total	mg/L	34.6
UA	G02D	B	2021/06/01	Calcium, total	mg/L	32.6
UA	G02D	B	2021/06/14	Calcium, total	mg/L	34.6
UA	G02D	B	2021/07/06	Calcium, total	mg/L	32.3
UA	G02D	B	2021/07/21	Calcium, total	mg/L	36.6
UA	G02D	B	2021/09/20	Calcium, total	mg/L	34.3
UA	G02D	B	2022/03/14	Calcium, total	mg/L	38.2
UA	G02D	B	2022/07/27	Calcium, total	mg/L	36.0
UA	G02D	B	2022/09/21	Calcium, total	mg/L	35.3
UA	G02D	B	2023/01/24	Calcium, total	mg/L	35.9
UA	G02D	B	2023/03/08	Calcium, total	mg/L	37.3
UA	G02D	B	2023/05/03	Calcium, total	mg/L	38.7
UA	G02D	B	2023/09/25	Calcium, total	mg/L	33.7
UA	G02D	B	2023/10/23	Calcium, total	mg/L	34.0
UA	G02D	B	2015/12/03	Chloride, total	mg/L	24.0
UA	G02D	B	2016/03/15	Chloride, total	mg/L	24.0
UA	G02D	B	2016/06/15	Chloride, total	mg/L	21.0
UA	G02D	B	2016/09/14	Chloride, total	mg/L	24.0
UA	G02D	B	2016/12/14	Chloride, total	mg/L	24.0
UA	G02D	B	2017/03/08	Chloride, total	mg/L	24.0
UA	G02D	B	2017/06/14	Chloride, total	mg/L	25.0
UA	G02D	B	2017/07/20	Chloride, total	mg/L	22.0
UA	G02D	B	2017/11/30	Chloride, total	mg/L	23.0
UA	G02D	B	2018/06/19	Chloride, total	mg/L	23.0
UA	G02D	B	2018/09/05	Chloride, total	mg/L	23.0
UA	G02D	B	2019/03/27	Chloride, total	mg/L	20.0
UA	G02D	B	2019/09/09	Chloride, total	mg/L	18.0
UA	G02D	B	2020/03/30	Chloride, total	mg/L	20.0
UA	G02D	B	2020/09/23	Chloride, total	mg/L	19.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2021/03/03	Chloride, total	mg/L	21.0
UA	G02D	B	2021/03/24	Chloride, total	mg/L	22.0
UA	G02D	B	2021/04/14	Chloride, total	mg/L	24.0
UA	G02D	B	2021/05/12	Chloride, total	mg/L	18.0
UA	G02D	B	2021/06/01	Chloride, total	mg/L	18.0
UA	G02D	B	2021/06/14	Chloride, total	mg/L	20.0
UA	G02D	B	2021/07/06	Chloride, total	mg/L	21.0
UA	G02D	B	2021/07/21	Chloride, total	mg/L	22.0
UA	G02D	B	2021/09/20	Chloride, total	mg/L	20.0
UA	G02D	B	2022/03/14	Chloride, total	mg/L	22.0
UA	G02D	B	2022/07/27	Chloride, total	mg/L	24.0
UA	G02D	B	2022/09/21	Chloride, total	mg/L	21.0
UA	G02D	B	2023/01/24	Chloride, total	mg/L	23.0
UA	G02D	B	2023/03/08	Chloride, total	mg/L	21.0
UA	G02D	B	2023/05/03	Chloride, total	mg/L	21.0
UA	G02D	B	2023/09/25	Chloride, total	mg/L	21.0
UA	G02D	B	2023/10/23	Chloride, total	mg/L	22.0
UA	G02D	B	2015/12/03	Cobalt, total	mg/L	0.00240
UA	G02D	B	2016/03/15	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2016/06/15	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2016/09/14	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2016/12/14	Cobalt, total	mg/L	0.00190
UA	G02D	B	2017/03/08	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2017/06/14	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2017/07/20	Cobalt, total	mg/L	<0.0002
UA	G02D	B	2018/06/19	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2018/09/05	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2019/03/27	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2019/09/09	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2020/03/30	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2020/09/23	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/03/03	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/03/24	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/04/14	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/05/12	Cobalt, total	mg/L	<0.001
UA	G02D	B	2021/06/01	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/06/14	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/07/06	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/07/21	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2021/09/20	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2022/03/14	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2022/07/27	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2022/09/21	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2023/01/24	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2023/03/08	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2023/05/03	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2023/09/25	Cobalt, total	mg/L	0.000400
UA	G02D	B	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G02D	B	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G02D	B	2023/09/25	Iron, dissolved	mg/L	0.0338
UA	G02D	B	2017/07/20	Magnesium, total	mg/L	11.4
UA	G02D	B	2020/03/30	Magnesium, total	mg/L	9.96
UA	G02D	B	2021/03/03	Magnesium, total	mg/L	9.98
UA	G02D	B	2021/03/24	Magnesium, total	mg/L	9.76
UA	G02D	B	2021/04/14	Magnesium, total	mg/L	9.39

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2021/05/12	Magnesium, total	mg/L	10.4
UA	G02D	B	2021/06/01	Magnesium, total	mg/L	9.39
UA	G02D	B	2021/06/14	Magnesium, total	mg/L	9.84
UA	G02D	B	2021/07/06	Magnesium, total	mg/L	9.77
UA	G02D	B	2021/07/21	Magnesium, total	mg/L	10.1
UA	G02D	B	2022/03/14	Magnesium, total	mg/L	10.6
UA	G02D	B	2022/07/27	Magnesium, total	mg/L	10.1
UA	G02D	B	2023/01/24	Magnesium, total	mg/L	10.2
UA	G02D	B	2023/03/08	Magnesium, total	mg/L	10.3
UA	G02D	B	2023/05/03	Magnesium, total	mg/L	10.4
UA	G02D	B	2023/09/25	Magnesium, total	mg/L	9.66
UA	G02D	B	2023/10/23	Magnesium, total	mg/L	9.66
UA	G02D	B	2023/05/03	Manganese, dissolved	mg/L	0.00330
UA	G02D	B	2023/09/25	Manganese, dissolved	mg/L	0.00900
UA	G02D	B	2023/05/03	Phosphate, dissolved	mg/L	<0.034
UA	G02D	B	2023/09/25	Phosphate, dissolved	mg/L	<0.005
UA	G02D	B	2017/07/20	Potassium, total	mg/L	1.10
UA	G02D	B	2020/03/30	Potassium, total	mg/L	1.23
UA	G02D	B	2021/03/03	Potassium, total	mg/L	1.15
UA	G02D	B	2021/03/24	Potassium, total	mg/L	1.06
UA	G02D	B	2021/04/14	Potassium, total	mg/L	1.05
UA	G02D	B	2021/05/12	Potassium, total	mg/L	1.17
UA	G02D	B	2021/06/01	Potassium, total	mg/L	1.18
UA	G02D	B	2021/06/14	Potassium, total	mg/L	1.19
UA	G02D	B	2021/07/06	Potassium, total	mg/L	1.24
UA	G02D	B	2021/07/21	Potassium, total	mg/L	1.14
UA	G02D	B	2022/03/14	Potassium, total	mg/L	1.23
UA	G02D	B	2022/07/27	Potassium, total	mg/L	1.12
UA	G02D	B	2023/01/24	Potassium, total	mg/L	1.11
UA	G02D	B	2023/03/08	Potassium, total	mg/L	1.12
UA	G02D	B	2023/05/03	Potassium, total	mg/L	1.14
UA	G02D	B	2023/09/25	Potassium, total	mg/L	1.08
UA	G02D	B	2023/10/23	Potassium, total	mg/L	1.10
UA	G02D	B	2023/05/03	Silicon, dissolved	mg/L	5.93
UA	G02D	B	2023/09/25	Silicon, dissolved	mg/L	6.20
UA	G02D	B	2017/07/20	Sodium, total	mg/L	34.8
UA	G02D	B	2020/03/30	Sodium, total	mg/L	46.3
UA	G02D	B	2021/03/03	Sodium, total	mg/L	43.8
UA	G02D	B	2021/03/24	Sodium, total	mg/L	39.7
UA	G02D	B	2021/04/14	Sodium, total	mg/L	46.7
UA	G02D	B	2021/05/12	Sodium, total	mg/L	53.6
UA	G02D	B	2021/06/01	Sodium, total	mg/L	46.0
UA	G02D	B	2021/06/14	Sodium, total	mg/L	43.9
UA	G02D	B	2021/07/06	Sodium, total	mg/L	42.0
UA	G02D	B	2021/07/21	Sodium, total	mg/L	38.7
UA	G02D	B	2022/03/14	Sodium, total	mg/L	31.7
UA	G02D	B	2022/07/27	Sodium, total	mg/L	36.4
UA	G02D	B	2023/01/24	Sodium, total	mg/L	29.0
UA	G02D	B	2023/03/08	Sodium, total	mg/L	28.3
UA	G02D	B	2023/05/03	Sodium, total	mg/L	39.1
UA	G02D	B	2023/09/25	Sodium, total	mg/L	32.9
UA	G02D	B	2023/10/23	Sodium, total	mg/L	32.9
UA	G02D	B	2015/12/03	Sulfate, total	mg/L	16.0
UA	G02D	B	2016/03/15	Sulfate, total	mg/L	17.0
UA	G02D	B	2016/06/15	Sulfate, total	mg/L	15.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2016/09/14	Sulfate, total	mg/L	22.0
UA	G02D	B	2016/12/14	Sulfate, total	mg/L	22.0
UA	G02D	B	2017/03/08	Sulfate, total	mg/L	18.0
UA	G02D	B	2017/06/14	Sulfate, total	mg/L	20.0
UA	G02D	B	2017/07/20	Sulfate, total	mg/L	12.0
UA	G02D	B	2017/11/30	Sulfate, total	mg/L	17.0
UA	G02D	B	2018/06/19	Sulfate, total	mg/L	17.0
UA	G02D	B	2018/09/05	Sulfate, total	mg/L	19.0
UA	G02D	B	2019/03/27	Sulfate, total	mg/L	20.0
UA	G02D	B	2019/09/09	Sulfate, total	mg/L	20.0
UA	G02D	B	2020/03/30	Sulfate, total	mg/L	22.0
UA	G02D	B	2020/09/23	Sulfate, total	mg/L	22.0
UA	G02D	B	2021/03/03	Sulfate, total	mg/L	21.0
UA	G02D	B	2021/03/24	Sulfate, total	mg/L	18.0
UA	G02D	B	2021/04/14	Sulfate, total	mg/L	19.0
UA	G02D	B	2021/05/12	Sulfate, total	mg/L	27.0
UA	G02D	B	2021/06/01	Sulfate, total	mg/L	23.0
UA	G02D	B	2021/06/14	Sulfate, total	mg/L	23.0
UA	G02D	B	2021/07/06	Sulfate, total	mg/L	22.0
UA	G02D	B	2021/07/21	Sulfate, total	mg/L	20.0
UA	G02D	B	2021/09/20	Sulfate, total	mg/L	19.0
UA	G02D	B	2022/03/14	Sulfate, total	mg/L	11.0
UA	G02D	B	2022/07/27	Sulfate, total	mg/L	19.0
UA	G02D	B	2022/09/21	Sulfate, total	mg/L	15.0
UA	G02D	B	2023/01/24	Sulfate, total	mg/L	12.0
UA	G02D	B	2023/03/08	Sulfate, total	mg/L	11.0
UA	G02D	B	2023/05/03	Sulfate, total	mg/L	13.0
UA	G02D	B	2023/09/25	Sulfate, total	mg/L	15.0
UA	G02D	B	2023/10/23	Sulfate, total	mg/L	15.0
UA	G02D	B	2015/12/03	Temperature (Celsius)	degrees C	14.8
UA	G02D	B	2016/03/15	Temperature (Celsius)	degrees C	17.4
UA	G02D	B	2016/06/15	Temperature (Celsius)	degrees C	16.2
UA	G02D	B	2016/09/14	Temperature (Celsius)	degrees C	23.0
UA	G02D	B	2016/12/14	Temperature (Celsius)	degrees C	15.4
UA	G02D	B	2017/03/08	Temperature (Celsius)	degrees C	13.8
UA	G02D	B	2017/06/14	Temperature (Celsius)	degrees C	17.7
UA	G02D	B	2017/07/20	Temperature (Celsius)	degrees C	16.8
UA	G02D	B	2017/11/30	Temperature (Celsius)	degrees C	14.8
UA	G02D	B	2018/06/19	Temperature (Celsius)	degrees C	16.7
UA	G02D	B	2018/09/05	Temperature (Celsius)	degrees C	15.8
UA	G02D	B	2019/03/27	Temperature (Celsius)	degrees C	14.5
UA	G02D	B	2019/09/09	Temperature (Celsius)	degrees C	16.0
UA	G02D	B	2020/03/30	Temperature (Celsius)	degrees C	14.8
UA	G02D	B	2020/09/23	Temperature (Celsius)	degrees C	15.2
UA	G02D	B	2021/03/03	Temperature (Celsius)	degrees C	14.6
UA	G02D	B	2021/03/24	Temperature (Celsius)	degrees C	14.9
UA	G02D	B	2021/04/14	Temperature (Celsius)	degrees C	14.7
UA	G02D	B	2021/05/12	Temperature (Celsius)	degrees C	14.9
UA	G02D	B	2021/06/01	Temperature (Celsius)	degrees C	14.9
UA	G02D	B	2021/06/14	Temperature (Celsius)	degrees C	15.6
UA	G02D	B	2021/07/06	Temperature (Celsius)	degrees C	15.8
UA	G02D	B	2021/07/21	Temperature (Celsius)	degrees C	15.4
UA	G02D	B	2021/09/20	Temperature (Celsius)	degrees C	15.7
UA	G02D	B	2022/03/14	Temperature (Celsius)	degrees C	14.7
UA	G02D	B	2022/07/27	Temperature (Celsius)	degrees C	16.5

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G02D	B	2022/09/21	Temperature (Celsius)	degrees C	15.5
UA	G02D	B	2023/01/24	Temperature (Celsius)	degrees C	13.7
UA	G02D	B	2023/03/08	Temperature (Celsius)	degrees C	14.2
UA	G02D	B	2023/05/03	Temperature (Celsius)	degrees C	14.3
UA	G02D	B	2023/09/25	Temperature (Celsius)	degrees C	16.1
UA	G02D	B	2023/10/23	Temperature (Celsius)	degrees C	15.4
UA	G02D	B	2015/12/03	Total Dissolved Solids	mg/L	244
UA	G02D	B	2016/03/15	Total Dissolved Solids	mg/L	256
UA	G02D	B	2016/06/15	Total Dissolved Solids	mg/L	248
UA	G02D	B	2016/09/14	Total Dissolved Solids	mg/L	276
UA	G02D	B	2016/12/14	Total Dissolved Solids	mg/L	266
UA	G02D	B	2017/03/08	Total Dissolved Solids	mg/L	270
UA	G02D	B	2017/06/14	Total Dissolved Solids	mg/L	198
UA	G02D	B	2017/07/20	Total Dissolved Solids	mg/L	264
UA	G02D	B	2017/11/30	Total Dissolved Solids	mg/L	246
UA	G02D	B	2018/06/19	Total Dissolved Solids	mg/L	232
UA	G02D	B	2018/09/05	Total Dissolved Solids	mg/L	252
UA	G02D	B	2019/03/27	Total Dissolved Solids	mg/L	262
UA	G02D	B	2019/09/09	Total Dissolved Solids	mg/L	264
UA	G02D	B	2020/03/30	Total Dissolved Solids	mg/L	222
UA	G02D	B	2020/09/23	Total Dissolved Solids	mg/L	234
UA	G02D	B	2021/03/03	Total Dissolved Solids	mg/L	266
UA	G02D	B	2021/03/24	Total Dissolved Solids	mg/L	244
UA	G02D	B	2021/04/14	Total Dissolved Solids	mg/L	242
UA	G02D	B	2021/05/12	Total Dissolved Solids	mg/L	232
UA	G02D	B	2021/06/01	Total Dissolved Solids	mg/L	246
UA	G02D	B	2021/06/14	Total Dissolved Solids	mg/L	216
UA	G02D	B	2021/07/06	Total Dissolved Solids	mg/L	230
UA	G02D	B	2021/07/21	Total Dissolved Solids	mg/L	246
UA	G02D	B	2021/09/20	Total Dissolved Solids	mg/L	240
UA	G02D	B	2022/03/14	Total Dissolved Solids	mg/L	260
UA	G02D	B	2022/07/27	Total Dissolved Solids	mg/L	234
UA	G02D	B	2022/09/21	Total Dissolved Solids	mg/L	220
UA	G02D	B	2023/01/24	Total Dissolved Solids	mg/L	140
UA	G02D	B	2023/03/08	Total Dissolved Solids	mg/L	218
UA	G02D	B	2023/05/03	Total Dissolved Solids	mg/L	230
UA	G02D	B	2023/09/25	Total Dissolved Solids	mg/L	226
UA	G02D	B	2023/10/23	Total Dissolved Solids	mg/L	204
UA	G03	C	2021/03/05	pH (field)	SU	6.4
UA	G03	C	2021/03/24	pH (field)	SU	6.3
UA	G03	C	2021/04/14	pH (field)	SU	6.2
UA	G03	C	2021/05/12	pH (field)	SU	6.4
UA	G03	C	2021/06/01	pH (field)	SU	6.3
UA	G03	C	2021/06/15	pH (field)	SU	6.2
UA	G03	C	2021/07/06	pH (field)	SU	6.3
UA	G03	C	2021/07/21	pH (field)	SU	6.4
UA	G03	C	2022/07/26	pH (field)	SU	6.5
UA	G03	C	2023/03/09	pH (field)	SU	6.2
UA	G03	C	2023/05/03	pH (field)	SU	6.2
UA	G03	C	2023/09/26	pH (field)	SU	6.4
UA	G03	C	2023/10/23	pH (field)	SU	6.4
UA	G03	C	2021/03/05	Oxidation Reduction Potential	mV	117
UA	G03	C	2021/03/24	Oxidation Reduction Potential	mV	150
UA	G03	C	2021/04/14	Oxidation Reduction Potential	mV	137
UA	G03	C	2021/05/12	Oxidation Reduction Potential	mV	180

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G03	C	2021/06/01	Oxidation Reduction Potential	mV	149
UA	G03	C	2021/06/15	Oxidation Reduction Potential	mV	128
UA	G03	C	2021/07/06	Oxidation Reduction Potential	mV	116
UA	G03	C	2021/07/21	Oxidation Reduction Potential	mV	52.0
UA	G03	C	2022/07/26	Oxidation Reduction Potential	mV	63.5
UA	G03	C	2023/03/09	Oxidation Reduction Potential	mV	165
UA	G03	C	2023/05/03	Oxidation Reduction Potential	mV	226
UA	G03	C	2023/09/26	Oxidation Reduction Potential	mV	40.0
UA	G03	C	2023/10/23	Oxidation Reduction Potential	mV	130
UA	G03	C	2021/03/05	Eh	V	0.31
UA	G03	C	2021/03/24	Eh	V	0.35
UA	G03	C	2021/04/14	Eh	V	0.33
UA	G03	C	2021/05/12	Eh	V	0.38
UA	G03	C	2021/06/01	Eh	V	0.34
UA	G03	C	2021/06/15	Eh	V	0.32
UA	G03	C	2021/07/06	Eh	V	0.31
UA	G03	C	2021/07/21	Eh	V	0.25
UA	G03	C	2022/07/26	Eh	V	0.26
UA	G03	C	2023/03/09	Eh	V	0.36
UA	G03	C	2023/05/03	Eh	V	0.42
UA	G03	C	2023/09/26	Eh	V	0.23
UA	G03	C	2023/10/23	Eh	V	0.32
UA	G03	C	2021/03/05	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G03	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	146
UA	G03	C	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G03	C	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G03	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	125
UA	G03	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G03	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G03	C	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G03	C	2022/07/26	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G03	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G03	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	135
UA	G03	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	144
UA	G03	C	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	138
UA	G03	C	2021/03/05	Barium, total	mg/L	0.112
UA	G03	C	2021/03/24	Barium, total	mg/L	0.0821
UA	G03	C	2021/04/14	Barium, total	mg/L	0.0787
UA	G03	C	2021/05/12	Barium, total	mg/L	0.0728
UA	G03	C	2021/06/01	Barium, total	mg/L	0.0787
UA	G03	C	2021/06/15	Barium, total	mg/L	0.0705
UA	G03	C	2021/07/06	Barium, total	mg/L	0.0564
UA	G03	C	2021/07/21	Barium, total	mg/L	0.0555
UA	G03	C	2022/07/26	Barium, total	mg/L	0.0423
UA	G03	C	2023/03/09	Barium, total	mg/L	0.0637
UA	G03	C	2023/05/03	Barium, total	mg/L	0.100
UA	G03	C	2023/09/26	Barium, total	mg/L	0.0748
UA	G03	C	2023/10/23	Barium, total	mg/L	0.0652
UA	G03	C	2021/03/05	Boron, total	mg/L	0.213
UA	G03	C	2021/03/24	Boron, total	mg/L	0.343
UA	G03	C	2021/04/14	Boron, total	mg/L	0.603
UA	G03	C	2021/05/12	Boron, total	mg/L	0.260
UA	G03	C	2021/06/01	Boron, total	mg/L	0.232
UA	G03	C	2021/06/15	Boron, total	mg/L	0.225
UA	G03	C	2021/07/06	Boron, total	mg/L	0.235

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G03	C	2021/07/21	Boron, total	mg/L	0.294
UA	G03	C	2022/07/26	Boron, total	mg/L	0.532
UA	G03	C	2023/03/09	Boron, total	mg/L	0.330
UA	G03	C	2023/05/03	Boron, total	mg/L	0.380
UA	G03	C	2023/09/26	Boron, total	mg/L	0.267
UA	G03	C	2023/10/23	Boron, total	mg/L	0.269
UA	G03	C	2021/03/05	Calcium, total	mg/L	46.1
UA	G03	C	2021/03/24	Calcium, total	mg/L	53.5
UA	G03	C	2021/04/14	Calcium, total	mg/L	77.8
UA	G03	C	2021/05/12	Calcium, total	mg/L	47.7
UA	G03	C	2021/06/01	Calcium, total	mg/L	46.0
UA	G03	C	2021/06/15	Calcium, total	mg/L	46.7
UA	G03	C	2021/07/06	Calcium, total	mg/L	42.1
UA	G03	C	2021/07/21	Calcium, total	mg/L	50.0
UA	G03	C	2022/07/26	Calcium, total	mg/L	70.2
UA	G03	C	2023/03/09	Calcium, total	mg/L	46.5
UA	G03	C	2023/05/03	Calcium, total	mg/L	52.6
UA	G03	C	2023/09/26	Calcium, total	mg/L	41.8
UA	G03	C	2023/10/23	Calcium, total	mg/L	42.8
UA	G03	C	2021/03/05	Chloride, total	mg/L	20.0
UA	G03	C	2021/03/24	Chloride, total	mg/L	24.0
UA	G03	C	2021/04/14	Chloride, total	mg/L	33.0
UA	G03	C	2021/05/12	Chloride, total	mg/L	29.0
UA	G03	C	2021/06/01	Chloride, total	mg/L	19.0
UA	G03	C	2021/06/15	Chloride, total	mg/L	22.0
UA	G03	C	2021/07/06	Chloride, total	mg/L	22.0
UA	G03	C	2021/07/21	Chloride, total	mg/L	24.0
UA	G03	C	2022/07/26	Chloride, total	mg/L	34.0
UA	G03	C	2023/03/09	Chloride, total	mg/L	22.0
UA	G03	C	2023/05/03	Chloride, total	mg/L	28.0
UA	G03	C	2023/09/26	Chloride, total	mg/L	19.0
UA	G03	C	2023/10/23	Chloride, total	mg/L	20.0
UA	G03	C	2021/03/05	Cobalt, total	mg/L	0.00630
UA	G03	C	2021/03/24	Cobalt, total	mg/L	0.00370
UA	G03	C	2021/04/14	Cobalt, total	mg/L	0.00440
UA	G03	C	2021/05/12	Cobalt, total	mg/L	0.00257
UA	G03	C	2021/06/01	Cobalt, total	mg/L	0.00200
UA	G03	C	2021/06/15	Cobalt, total	mg/L	<0.0001
UA	G03	C	2021/07/06	Cobalt, total	mg/L	<0.0001
UA	G03	C	2021/07/21	Cobalt, total	mg/L	<0.0001
UA	G03	C	2022/07/26	Cobalt, total	mg/L	0.00250
UA	G03	C	2023/03/09	Cobalt, total	mg/L	0.00330
UA	G03	C	2023/05/03	Cobalt, total	mg/L	0.0146
UA	G03	C	2023/09/26	Cobalt, total	mg/L	0.00140
UA	G03	C	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G03	C	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G03	C	2023/09/26	Iron, dissolved	mg/L	0.0257
UA	G03	C	2021/03/05	Magnesium, total	mg/L	15.1
UA	G03	C	2021/03/24	Magnesium, total	mg/L	17.6
UA	G03	C	2021/04/14	Magnesium, total	mg/L	28.3
UA	G03	C	2021/05/12	Magnesium, total	mg/L	15.8
UA	G03	C	2021/06/01	Magnesium, total	mg/L	14.9
UA	G03	C	2021/06/15	Magnesium, total	mg/L	15.1
UA	G03	C	2021/07/06	Magnesium, total	mg/L	14.0
UA	G03	C	2021/07/21	Magnesium, total	mg/L	15.7

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G03	C	2022/07/26	Magnesium, total	mg/L	22.9
UA	G03	C	2023/03/09	Magnesium, total	mg/L	15.2
UA	G03	C	2023/05/03	Magnesium, total	mg/L	16.6
UA	G03	C	2023/09/26	Magnesium, total	mg/L	13.8
UA	G03	C	2023/10/23	Magnesium, total	mg/L	14.0
UA	G03	C	2023/05/03	Manganese, dissolved	mg/L	0.0193
UA	G03	C	2023/09/26	Manganese, dissolved	mg/L	0.00300
UA	G03	C	2023/05/03	Phosphate, dissolved	mg/L	0.0550
UA	G03	C	2023/09/26	Phosphate, dissolved	mg/L	0.0150
UA	G03	C	2021/03/05	Potassium, total	mg/L	1.57
UA	G03	C	2021/03/24	Potassium, total	mg/L	1.42
UA	G03	C	2021/04/14	Potassium, total	mg/L	1.79
UA	G03	C	2021/05/12	Potassium, total	mg/L	1.15
UA	G03	C	2021/06/01	Potassium, total	mg/L	1.46
UA	G03	C	2021/06/15	Potassium, total	mg/L	1.26
UA	G03	C	2021/07/06	Potassium, total	mg/L	1.13
UA	G03	C	2021/07/21	Potassium, total	mg/L	1.39
UA	G03	C	2022/07/26	Potassium, total	mg/L	1.54
UA	G03	C	2023/03/09	Potassium, total	mg/L	1.19
UA	G03	C	2023/05/03	Potassium, total	mg/L	1.70
UA	G03	C	2023/09/26	Potassium, total	mg/L	0.988
UA	G03	C	2023/10/23	Potassium, total	mg/L	1.09
UA	G03	C	2023/05/03	Silicon, dissolved	mg/L	6.36
UA	G03	C	2023/09/26	Silicon, dissolved	mg/L	6.10
UA	G03	C	2021/03/05	Sodium, total	mg/L	38.4
UA	G03	C	2021/03/24	Sodium, total	mg/L	48.2
UA	G03	C	2021/04/14	Sodium, total	mg/L	65.0
UA	G03	C	2021/05/12	Sodium, total	mg/L	42.0
UA	G03	C	2021/06/01	Sodium, total	mg/L	36.8
UA	G03	C	2021/06/15	Sodium, total	mg/L	40.4
UA	G03	C	2021/07/06	Sodium, total	mg/L	38.0
UA	G03	C	2021/07/21	Sodium, total	mg/L	40.2
UA	G03	C	2022/07/26	Sodium, total	mg/L	53.5
UA	G03	C	2023/03/09	Sodium, total	mg/L	35.0
UA	G03	C	2023/05/03	Sodium, total	mg/L	41.9
UA	G03	C	2023/09/26	Sodium, total	mg/L	32.2
UA	G03	C	2023/10/23	Sodium, total	mg/L	34.1
UA	G03	C	2021/03/05	Sulfate, total	mg/L	66.0
UA	G03	C	2021/03/24	Sulfate, total	mg/L	104
UA	G03	C	2021/04/14	Sulfate, total	mg/L	168
UA	G03	C	2021/05/12	Sulfate, total	mg/L	112
UA	G03	C	2021/06/01	Sulfate, total	mg/L	73.0
UA	G03	C	2021/06/15	Sulfate, total	mg/L	79.0
UA	G03	C	2021/07/06	Sulfate, total	mg/L	77.0
UA	G03	C	2021/07/21	Sulfate, total	mg/L	92.0
UA	G03	C	2022/07/26	Sulfate, total	mg/L	164
UA	G03	C	2023/03/09	Sulfate, total	mg/L	82.0
UA	G03	C	2023/05/03	Sulfate, total	mg/L	97.0
UA	G03	C	2023/09/26	Sulfate, total	mg/L	67.0
UA	G03	C	2023/10/23	Sulfate, total	mg/L	61.0
UA	G03	C	2021/03/05	Temperature (Celsius)	degrees C	15.2
UA	G03	C	2021/03/24	Temperature (Celsius)	degrees C	15.7
UA	G03	C	2021/04/14	Temperature (Celsius)	degrees C	15.6
UA	G03	C	2021/05/12	Temperature (Celsius)	degrees C	15.7
UA	G03	C	2021/06/01	Temperature (Celsius)	degrees C	15.6

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G03	C	2021/06/15	Temperature (Celsius)	degrees C	15.9
UA	G03	C	2021/07/06	Temperature (Celsius)	degrees C	15.9
UA	G03	C	2021/07/21	Temperature (Celsius)	degrees C	16.2
UA	G03	C	2022/07/26	Temperature (Celsius)	degrees C	19.4
UA	G03	C	2023/03/09	Temperature (Celsius)	degrees C	15.4
UA	G03	C	2023/05/03	Temperature (Celsius)	degrees C	15.3
UA	G03	C	2023/09/26	Temperature (Celsius)	degrees C	17.8
UA	G03	C	2023/10/23	Temperature (Celsius)	degrees C	16.4
UA	G03	C	2021/03/05	Total Dissolved Solids	mg/L	284
UA	G03	C	2021/03/24	Total Dissolved Solids	mg/L	342
UA	G03	C	2021/04/14	Total Dissolved Solids	mg/L	422
UA	G03	C	2021/05/12	Total Dissolved Solids	mg/L	304
UA	G03	C	2021/06/01	Total Dissolved Solids	mg/L	294
UA	G03	C	2021/06/15	Total Dissolved Solids	mg/L	298
UA	G03	C	2021/07/06	Total Dissolved Solids	mg/L	282
UA	G03	C	2021/07/21	Total Dissolved Solids	mg/L	310
UA	G03	C	2022/07/26	Total Dissolved Solids	mg/L	458
UA	G03	C	2023/03/09	Total Dissolved Solids	mg/L	300
UA	G03	C	2023/05/03	Total Dissolved Solids	mg/L	350
UA	G03	C	2023/09/26	Total Dissolved Solids	mg/L	295
UA	G03	C	2023/10/23	Total Dissolved Solids	mg/L	254
UA	G05	C	2021/03/04	pH (field)	SU	6.5
UA	G05	C	2021/03/24	pH (field)	SU	6.4
UA	G05	C	2021/04/13	pH (field)	SU	6.5
UA	G05	C	2021/05/11	pH (field)	SU	6.4
UA	G05	C	2021/06/01	pH (field)	SU	6.5
UA	G05	C	2021/06/15	pH (field)	SU	6.3
UA	G05	C	2021/07/06	pH (field)	SU	6.4
UA	G05	C	2021/07/20	pH (field)	SU	6.3
UA	G05	C	2022/07/26	pH (field)	SU	6.6
UA	G05	C	2023/03/09	pH (field)	SU	6.5
UA	G05	C	2023/05/03	pH (field)	SU	6.5
UA	G05	C	2023/09/27	pH (field)	SU	6.4
UA	G05	C	2023/10/24	pH (field)	SU	6.4
UA	G05	C	2021/03/04	Oxidation Reduction Potential	mV	56.0
UA	G05	C	2021/03/24	Oxidation Reduction Potential	mV	35.0
UA	G05	C	2021/04/13	Oxidation Reduction Potential	mV	18.0
UA	G05	C	2021/05/11	Oxidation Reduction Potential	mV	42.0
UA	G05	C	2021/06/01	Oxidation Reduction Potential	mV	452
UA	G05	C	2021/06/15	Oxidation Reduction Potential	mV	59.0
UA	G05	C	2021/07/06	Oxidation Reduction Potential	mV	102
UA	G05	C	2021/07/20	Oxidation Reduction Potential	mV	134
UA	G05	C	2022/07/26	Oxidation Reduction Potential	mV	-79.5
UA	G05	C	2023/03/09	Oxidation Reduction Potential	mV	47.4
UA	G05	C	2023/05/03	Oxidation Reduction Potential	mV	128
UA	G05	C	2023/09/27	Oxidation Reduction Potential	mV	-17.0
UA	G05	C	2023/10/24	Oxidation Reduction Potential	mV	45.0
UA	G05	C	2021/03/04	Eh	V	0.25
UA	G05	C	2021/03/24	Eh	V	0.23
UA	G05	C	2021/04/13	Eh	V	0.21
UA	G05	C	2021/05/11	Eh	V	0.24
UA	G05	C	2021/06/01	Eh	V	0.65
UA	G05	C	2021/06/15	Eh	V	0.25
UA	G05	C	2021/07/06	Eh	V	0.30
UA	G05	C	2021/07/20	Eh	V	0.33

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G05	C	2022/07/26	Eh	V	0.11
UA	G05	C	2023/03/09	Eh	V	0.24
UA	G05	C	2023/05/03	Eh	V	0.32
UA	G05	C	2023/09/27	Eh	V	0.18
UA	G05	C	2023/10/24	Eh	V	0.24
UA	G05	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	180
UA	G05	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	198
UA	G05	C	2021/04/13	Alkalinity, bicarbonate	mg/L CaCO3	206
UA	G05	C	2021/05/11	Alkalinity, bicarbonate	mg/L CaCO3	193
UA	G05	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	190
UA	G05	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	203
UA	G05	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	178
UA	G05	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	186
UA	G05	C	2022/07/26	Alkalinity, bicarbonate	mg/L CaCO3	181
UA	G05	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	179
UA	G05	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G05	C	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	195
UA	G05	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	188
UA	G05	C	2021/03/04	Barium, total	mg/L	0.130
UA	G05	C	2021/03/24	Barium, total	mg/L	0.129
UA	G05	C	2021/04/13	Barium, total	mg/L	0.126
UA	G05	C	2021/05/11	Barium, total	mg/L	0.132
UA	G05	C	2021/06/01	Barium, total	mg/L	0.144
UA	G05	C	2021/06/15	Barium, total	mg/L	0.132
UA	G05	C	2021/07/06	Barium, total	mg/L	0.139
UA	G05	C	2021/07/20	Barium, total	mg/L	0.133
UA	G05	C	2022/07/26	Barium, total	mg/L	0.141
UA	G05	C	2023/03/09	Barium, total	mg/L	0.175
UA	G05	C	2023/05/03	Barium, total	mg/L	0.212
UA	G05	C	2023/09/27	Barium, total	mg/L	0.169
UA	G05	C	2023/10/24	Barium, total	mg/L	0.177
UA	G05	C	2021/03/04	Boron, total	mg/L	0.181
UA	G05	C	2021/03/24	Boron, total	mg/L	0.195
UA	G05	C	2021/04/13	Boron, total	mg/L	0.190
UA	G05	C	2021/05/11	Boron, total	mg/L	0.158
UA	G05	C	2021/06/01	Boron, total	mg/L	0.157
UA	G05	C	2021/06/15	Boron, total	mg/L	0.140
UA	G05	C	2021/07/06	Boron, total	mg/L	0.148
UA	G05	C	2021/07/20	Boron, total	mg/L	0.131
UA	G05	C	2022/07/26	Boron, total	mg/L	0.0645
UA	G05	C	2023/03/09	Boron, total	mg/L	0.0541
UA	G05	C	2023/05/03	Boron, total	mg/L	0.0478
UA	G05	C	2023/09/27	Boron, total	mg/L	0.0436
UA	G05	C	2023/10/24	Boron, total	mg/L	0.0485
UA	G05	C	2021/03/04	Calcium, total	mg/L	55.3
UA	G05	C	2021/03/24	Calcium, total	mg/L	59.4
UA	G05	C	2021/04/13	Calcium, total	mg/L	68.5
UA	G05	C	2021/05/11	Calcium, total	mg/L	60.3
UA	G05	C	2021/06/01	Calcium, total	mg/L	57.1
UA	G05	C	2021/06/15	Calcium, total	mg/L	58.6
UA	G05	C	2021/07/06	Calcium, total	mg/L	51.8
UA	G05	C	2021/07/20	Calcium, total	mg/L	55.9
UA	G05	C	2022/07/26	Calcium, total	mg/L	50.6
UA	G05	C	2023/03/09	Calcium, total	mg/L	52.6
UA	G05	C	2023/05/03	Calcium, total	mg/L	54.4

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G05	C	2023/09/27	Calcium, total	mg/L	52.2
UA	G05	C	2023/10/24	Calcium, total	mg/L	50.4
UA	G05	C	2021/03/04	Chloride, total	mg/L	13.0
UA	G05	C	2021/03/24	Chloride, total	mg/L	15.0
UA	G05	C	2021/04/13	Chloride, total	mg/L	21.0
UA	G05	C	2021/05/11	Chloride, total	mg/L	19.0
UA	G05	C	2021/06/01	Chloride, total	mg/L	21.0
UA	G05	C	2021/06/15	Chloride, total	mg/L	18.0
UA	G05	C	2021/07/06	Chloride, total	mg/L	22.0
UA	G05	C	2021/07/20	Chloride, total	mg/L	20.0
UA	G05	C	2022/07/26	Chloride, total	mg/L	15.0
UA	G05	C	2023/03/09	Chloride, total	mg/L	22.0
UA	G05	C	2023/05/03	Chloride, total	mg/L	24.0
UA	G05	C	2023/09/27	Chloride, total	mg/L	20.0
UA	G05	C	2023/10/24	Chloride, total	mg/L	22.0
UA	G05	C	2021/03/04	Cobalt, total	mg/L	0.0101
UA	G05	C	2021/03/24	Cobalt, total	mg/L	0.00960
UA	G05	C	2021/04/13	Cobalt, total	mg/L	0.00950
UA	G05	C	2021/05/11	Cobalt, total	mg/L	0.00870
UA	G05	C	2021/06/01	Cobalt, total	mg/L	0.00780
UA	G05	C	2021/06/15	Cobalt, total	mg/L	0.00570
UA	G05	C	2021/07/06	Cobalt, total	mg/L	0.00910
UA	G05	C	2021/07/20	Cobalt, total	mg/L	0.00590
UA	G05	C	2022/07/26	Cobalt, total	mg/L	0.00750
UA	G05	C	2023/03/09	Cobalt, total	mg/L	0.00740
UA	G05	C	2023/05/03	Cobalt, total	mg/L	0.0103
UA	G05	C	2023/09/27	Cobalt, total	mg/L	0.00230
UA	G05	C	2023/10/24	Cobalt, total	mg/L	0.00200
UA	G05	C	2023/05/03	Iron, dissolved	mg/L	0.342
UA	G05	C	2023/09/27	Iron, dissolved	mg/L	0.429
UA	G05	C	2021/03/04	Magnesium, total	mg/L	17.2
UA	G05	C	2021/03/24	Magnesium, total	mg/L	18.8
UA	G05	C	2021/04/13	Magnesium, total	mg/L	19.5
UA	G05	C	2021/05/11	Magnesium, total	mg/L	19.4
UA	G05	C	2021/06/01	Magnesium, total	mg/L	18.6
UA	G05	C	2021/06/15	Magnesium, total	mg/L	18.4
UA	G05	C	2021/07/06	Magnesium, total	mg/L	17.6
UA	G05	C	2021/07/20	Magnesium, total	mg/L	18.5
UA	G05	C	2022/07/26	Magnesium, total	mg/L	17.6
UA	G05	C	2023/03/09	Magnesium, total	mg/L	19.4
UA	G05	C	2023/05/03	Magnesium, total	mg/L	19.3
UA	G05	C	2023/09/27	Magnesium, total	mg/L	18.8
UA	G05	C	2023/10/24	Magnesium, total	mg/L	18.0
UA	G05	C	2023/05/03	Manganese, dissolved	mg/L	0.166
UA	G05	C	2023/09/27	Manganese, dissolved	mg/L	0.104
UA	G05	C	2023/05/03	Phosphate, dissolved	mg/L	0.0400
UA	G05	C	2023/09/27	Phosphate, dissolved	mg/L	<0.005
UA	G05	C	2021/03/04	Potassium, total	mg/L	1.37
UA	G05	C	2021/03/24	Potassium, total	mg/L	1.78
UA	G05	C	2021/04/13	Potassium, total	mg/L	2.14
UA	G05	C	2021/05/11	Potassium, total	mg/L	1.97
UA	G05	C	2021/06/01	Potassium, total	mg/L	2.18
UA	G05	C	2021/06/15	Potassium, total	mg/L	1.58
UA	G05	C	2021/07/06	Potassium, total	mg/L	2.04
UA	G05	C	2021/07/20	Potassium, total	mg/L	1.75

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G05	C	2022/07/26	Potassium, total	mg/L	1.07
UA	G05	C	2023/03/09	Potassium, total	mg/L	1.59
UA	G05	C	2023/05/03	Potassium, total	mg/L	1.68
UA	G05	C	2023/09/27	Potassium, total	mg/L	1.59
UA	G05	C	2023/10/24	Potassium, total	mg/L	1.56
UA	G05	C	2023/05/03	Silicon, dissolved	mg/L	15.1
UA	G05	C	2023/09/27	Silicon, dissolved	mg/L	14.5
UA	G05	C	2021/03/04	Sodium, total	mg/L	44.1
UA	G05	C	2021/03/24	Sodium, total	mg/L	47.3
UA	G05	C	2021/04/13	Sodium, total	mg/L	53.7
UA	G05	C	2021/05/11	Sodium, total	mg/L	49.6
UA	G05	C	2021/06/01	Sodium, total	mg/L	45.5
UA	G05	C	2021/06/15	Sodium, total	mg/L	45.5
UA	G05	C	2021/07/06	Sodium, total	mg/L	45.9
UA	G05	C	2021/07/20	Sodium, total	mg/L	43.4
UA	G05	C	2022/07/26	Sodium, total	mg/L	35.4
UA	G05	C	2023/03/09	Sodium, total	mg/L	41.8
UA	G05	C	2023/05/03	Sodium, total	mg/L	46.7
UA	G05	C	2023/09/27	Sodium, total	mg/L	42.6
UA	G05	C	2023/10/24	Sodium, total	mg/L	41.8
UA	G05	C	2021/03/04	Sulfate, total	mg/L	94.0
UA	G05	C	2021/03/24	Sulfate, total	mg/L	92.0
UA	G05	C	2021/04/13	Sulfate, total	mg/L	95.0
UA	G05	C	2021/05/11	Sulfate, total	mg/L	109
UA	G05	C	2021/06/01	Sulfate, total	mg/L	83.0
UA	G05	C	2021/06/15	Sulfate, total	mg/L	91.0
UA	G05	C	2021/07/06	Sulfate, total	mg/L	90.0
UA	G05	C	2021/07/20	Sulfate, total	mg/L	87.0
UA	G05	C	2022/07/26	Sulfate, total	mg/L	68.0
UA	G05	C	2023/03/09	Sulfate, total	mg/L	90.0
UA	G05	C	2023/05/03	Sulfate, total	mg/L	112
UA	G05	C	2023/09/27	Sulfate, total	mg/L	82.0
UA	G05	C	2023/10/24	Sulfate, total	mg/L	92.0
UA	G05	C	2021/03/04	Temperature (Celsius)	degrees C	15.7
UA	G05	C	2021/03/24	Temperature (Celsius)	degrees C	16.6
UA	G05	C	2021/04/13	Temperature (Celsius)	degrees C	16.3
UA	G05	C	2021/05/11	Temperature (Celsius)	degrees C	16.1
UA	G05	C	2021/06/01	Temperature (Celsius)	degrees C	16.4
UA	G05	C	2021/06/15	Temperature (Celsius)	degrees C	16.1
UA	G05	C	2021/07/06	Temperature (Celsius)	degrees C	17.3
UA	G05	C	2021/07/20	Temperature (Celsius)	degrees C	17.5
UA	G05	C	2022/07/26	Temperature (Celsius)	degrees C	18.4
UA	G05	C	2023/03/09	Temperature (Celsius)	degrees C	13.9
UA	G05	C	2023/05/03	Temperature (Celsius)	degrees C	17.1
UA	G05	C	2023/09/27	Temperature (Celsius)	degrees C	17.4
UA	G05	C	2023/10/24	Temperature (Celsius)	degrees C	17.7
UA	G05	C	2021/03/04	Total Dissolved Solids	mg/L	370
UA	G05	C	2021/03/24	Total Dissolved Solids	mg/L	370
UA	G05	C	2021/04/13	Total Dissolved Solids	mg/L	368
UA	G05	C	2021/05/11	Total Dissolved Solids	mg/L	348
UA	G05	C	2021/06/01	Total Dissolved Solids	mg/L	366
UA	G05	C	2021/06/15	Total Dissolved Solids	mg/L	366
UA	G05	C	2021/07/06	Total Dissolved Solids	mg/L	334
UA	G05	C	2021/07/20	Total Dissolved Solids	mg/L	378
UA	G05	C	2022/07/26	Total Dissolved Solids	mg/L	348

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G05	C	2023/03/09	Total Dissolved Solids	mg/L	360
UA	G05	C	2023/05/03	Total Dissolved Solids	mg/L	388
UA	G05	C	2023/09/27	Total Dissolved Solids	mg/L	360
UA	G05	C	2023/10/24	Total Dissolved Solids	mg/L	358
UA	G06	C	2021/03/04	pH (field)	SU	6.7
UA	G06	C	2021/03/24	pH (field)	SU	6.6
UA	G06	C	2021/04/13	pH (field)	SU	6.6
UA	G06	C	2021/05/11	pH (field)	SU	6.4
UA	G06	C	2021/06/01	pH (field)	SU	6.6
UA	G06	C	2021/06/15	pH (field)	SU	6.5
UA	G06	C	2021/07/06	pH (field)	SU	6.3
UA	G06	C	2021/07/20	pH (field)	SU	6.4
UA	G06	C	2023/03/09	pH (field)	SU	6.6
UA	G06	C	2023/05/03	pH (field)	SU	6.6
UA	G06	C	2023/09/27	pH (field)	SU	6.6
UA	G06	C	2023/10/24	pH (field)	SU	6.6
UA	G06	C	2021/03/04	Oxidation Reduction Potential	mV	92.0
UA	G06	C	2021/03/24	Oxidation Reduction Potential	mV	313
UA	G06	C	2021/04/13	Oxidation Reduction Potential	mV	130
UA	G06	C	2021/05/11	Oxidation Reduction Potential	mV	140
UA	G06	C	2021/06/01	Oxidation Reduction Potential	mV	122
UA	G06	C	2021/06/15	Oxidation Reduction Potential	mV	94.0
UA	G06	C	2021/07/06	Oxidation Reduction Potential	mV	101
UA	G06	C	2021/07/20	Oxidation Reduction Potential	mV	122
UA	G06	C	2023/03/09	Oxidation Reduction Potential	mV	88.8
UA	G06	C	2023/05/03	Oxidation Reduction Potential	mV	141
UA	G06	C	2023/09/27	Oxidation Reduction Potential	mV	14.0
UA	G06	C	2023/10/24	Oxidation Reduction Potential	mV	116
UA	G06	C	2021/03/04	Eh	V	0.29
UA	G06	C	2021/03/24	Eh	V	0.51
UA	G06	C	2021/04/13	Eh	V	0.33
UA	G06	C	2021/05/11	Eh	V	0.34
UA	G06	C	2021/06/01	Eh	V	0.32
UA	G06	C	2021/06/15	Eh	V	0.29
UA	G06	C	2021/07/06	Eh	V	0.30
UA	G06	C	2021/07/20	Eh	V	0.32
UA	G06	C	2023/03/09	Eh	V	0.28
UA	G06	C	2023/05/03	Eh	V	0.34
UA	G06	C	2023/09/27	Eh	V	0.21
UA	G06	C	2023/10/24	Eh	V	0.31
UA	G06	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G06	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G06	C	2021/04/13	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G06	C	2021/05/11	Alkalinity, bicarbonate	mg/L CaCO3	156
UA	G06	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	167
UA	G06	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	170
UA	G06	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G06	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G06	C	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G06	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	161
UA	G06	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G06	C	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G06	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G06	C	2021/03/04	Barium, total	mg/L	0.0484
UA	G06	C	2021/03/24	Barium, total	mg/L	0.0490

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G06	C	2021/04/13	Barium, total	mg/L	0.0382
UA	G06	C	2021/05/11	Barium, total	mg/L	0.0311
UA	G06	C	2021/06/01	Barium, total	mg/L	0.0323
UA	G06	C	2021/06/15	Barium, total	mg/L	0.0280
UA	G06	C	2021/07/06	Barium, total	mg/L	0.0272
UA	G06	C	2021/07/20	Barium, total	mg/L	0.0244
UA	G06	C	2022/07/23	Barium, total	mg/L	0.0342
UA	G06	C	2023/03/09	Barium, total	mg/L	0.0257
UA	G06	C	2023/05/03	Barium, total	mg/L	0.0454
UA	G06	C	2023/09/27	Barium, total	mg/L	0.0251
UA	G06	C	2023/10/24	Barium, total	mg/L	0.0363
UA	G06	C	2021/03/04	Boron, total	mg/L	2.90
UA	G06	C	2021/03/24	Boron, total	mg/L	3.40
UA	G06	C	2021/04/13	Boron, total	mg/L	3.27
UA	G06	C	2021/05/11	Boron, total	mg/L	3.37
UA	G06	C	2021/06/01	Boron, total	mg/L	3.56
UA	G06	C	2021/06/15	Boron, total	mg/L	2.97
UA	G06	C	2021/07/06	Boron, total	mg/L	3.93
UA	G06	C	2021/07/20	Boron, total	mg/L	3.41
UA	G06	C	2022/07/23	Boron, total	mg/L	3.29
UA	G06	C	2023/03/09	Boron, total	mg/L	2.95
UA	G06	C	2023/05/03	Boron, total	mg/L	3.28
UA	G06	C	2023/09/27	Boron, total	mg/L	3.29
UA	G06	C	2023/10/24	Boron, total	mg/L	3.73
UA	G06	C	2021/03/04	Calcium, total	mg/L	90.2
UA	G06	C	2021/03/24	Calcium, total	mg/L	90.1
UA	G06	C	2021/04/13	Calcium, total	mg/L	124
UA	G06	C	2021/05/11	Calcium, total	mg/L	93.4
UA	G06	C	2021/06/01	Calcium, total	mg/L	92.6
UA	G06	C	2021/06/15	Calcium, total	mg/L	91.5
UA	G06	C	2021/07/06	Calcium, total	mg/L	86.7
UA	G06	C	2021/07/20	Calcium, total	mg/L	90.6
UA	G06	C	2022/07/23	Calcium, total	mg/L	89.9
UA	G06	C	2023/03/09	Calcium, total	mg/L	87.6
UA	G06	C	2023/05/03	Calcium, total	mg/L	92.5
UA	G06	C	2023/09/27	Calcium, total	mg/L	84.9
UA	G06	C	2023/10/24	Calcium, total	mg/L	82.5
UA	G06	C	2021/03/04	Chloride, total	mg/L	22.0
UA	G06	C	2021/03/24	Chloride, total	mg/L	23.0
UA	G06	C	2021/04/13	Chloride, total	mg/L	22.0
UA	G06	C	2021/05/11	Chloride, total	mg/L	22.0
UA	G06	C	2021/06/01	Chloride, total	mg/L	22.0
UA	G06	C	2021/06/15	Chloride, total	mg/L	21.0
UA	G06	C	2021/07/06	Chloride, total	mg/L	22.0
UA	G06	C	2021/07/20	Chloride, total	mg/L	21.0
UA	G06	C	2022/07/23	Chloride, total	mg/L	25.0
UA	G06	C	2023/03/09	Chloride, total	mg/L	21.0
UA	G06	C	2023/05/03	Chloride, total	mg/L	22.0
UA	G06	C	2023/09/27	Chloride, total	mg/L	21.0
UA	G06	C	2023/10/24	Chloride, total	mg/L	22.0
UA	G06	C	2021/03/04	Cobalt, total	mg/L	0.00260
UA	G06	C	2021/03/24	Cobalt, total	mg/L	0.00340
UA	G06	C	2021/04/13	Cobalt, total	mg/L	0.00210
UA	G06	C	2021/05/11	Cobalt, total	mg/L	<0.001
UA	G06	C	2021/06/01	Cobalt, total	mg/L	<0.0001

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G06	C	2021/06/15	Cobalt, total	mg/L	<0.0001
UA	G06	C	2021/07/06	Cobalt, total	mg/L	<0.0001
UA	G06	C	2021/07/20	Cobalt, total	mg/L	<0.0001
UA	G06	C	2022/07/23	Cobalt, total	mg/L	0.00160
UA	G06	C	2023/03/09	Cobalt, total	mg/L	0.000600
UA	G06	C	2023/05/03	Cobalt, total	mg/L	0.00400
UA	G06	C	2023/09/27	Cobalt, total	mg/L	0.000800
UA	G06	C	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G06	C	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G06	C	2023/09/27	Iron, dissolved	mg/L	0.0452
UA	G06	C	2021/03/04	Magnesium, total	mg/L	25.1
UA	G06	C	2021/03/24	Magnesium, total	mg/L	26.6
UA	G06	C	2021/04/13	Magnesium, total	mg/L	26.0
UA	G06	C	2021/05/11	Magnesium, total	mg/L	26.8
UA	G06	C	2021/06/01	Magnesium, total	mg/L	25.3
UA	G06	C	2021/06/15	Magnesium, total	mg/L	25.2
UA	G06	C	2021/07/06	Magnesium, total	mg/L	23.7
UA	G06	C	2021/07/20	Magnesium, total	mg/L	24.4
UA	G06	C	2022/07/23	Magnesium, total	mg/L	24.5
UA	G06	C	2023/03/09	Magnesium, total	mg/L	24.1
UA	G06	C	2023/05/03	Magnesium, total	mg/L	24.4
UA	G06	C	2023/09/27	Magnesium, total	mg/L	24.2
UA	G06	C	2023/10/24	Magnesium, total	mg/L	22.9
UA	G06	C	2023/05/03	Manganese, dissolved	mg/L	0.0155
UA	G06	C	2023/09/27	Manganese, dissolved	mg/L	0.0127
UA	G06	C	2023/05/03	Phosphate, dissolved	mg/L	0.0640
UA	G06	C	2023/09/27	Phosphate, dissolved	mg/L	0.0550
UA	G06	C	2021/03/04	Potassium, total	mg/L	2.48
UA	G06	C	2021/03/24	Potassium, total	mg/L	2.60
UA	G06	C	2021/04/13	Potassium, total	mg/L	2.48
UA	G06	C	2021/05/11	Potassium, total	mg/L	2.50
UA	G06	C	2021/06/01	Potassium, total	mg/L	2.50
UA	G06	C	2021/06/15	Potassium, total	mg/L	2.57
UA	G06	C	2021/07/06	Potassium, total	mg/L	2.57
UA	G06	C	2021/07/20	Potassium, total	mg/L	2.37
UA	G06	C	2022/07/23	Potassium, total	mg/L	2.43
UA	G06	C	2023/03/09	Potassium, total	mg/L	2.20
UA	G06	C	2023/05/03	Potassium, total	mg/L	2.49
UA	G06	C	2023/09/27	Potassium, total	mg/L	2.43
UA	G06	C	2023/10/24	Potassium, total	mg/L	2.42
UA	G06	C	2023/05/03	Silicon, dissolved	mg/L	6.48
UA	G06	C	2023/09/27	Silicon, dissolved	mg/L	6.24
UA	G06	C	2021/03/04	Sodium, total	mg/L	49.8
UA	G06	C	2021/03/24	Sodium, total	mg/L	50.9
UA	G06	C	2021/04/13	Sodium, total	mg/L	65.6
UA	G06	C	2021/05/11	Sodium, total	mg/L	52.8
UA	G06	C	2021/06/01	Sodium, total	mg/L	46.4
UA	G06	C	2021/06/15	Sodium, total	mg/L	50.7
UA	G06	C	2021/07/06	Sodium, total	mg/L	50.0
UA	G06	C	2021/07/20	Sodium, total	mg/L	47.0
UA	G06	C	2022/07/23	Sodium, total	mg/L	45.3
UA	G06	C	2023/03/09	Sodium, total	mg/L	42.1
UA	G06	C	2023/05/03	Sodium, total	mg/L	49.7
UA	G06	C	2023/09/27	Sodium, total	mg/L	45.6
UA	G06	C	2023/10/24	Sodium, total	mg/L	44.6

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G06	C	2021/03/04	Sulfate, total	mg/L	250
UA	G06	C	2021/03/24	Sulfate, total	mg/L	215
UA	G06	C	2021/04/13	Sulfate, total	mg/L	229
UA	G06	C	2021/05/11	Sulfate, total	mg/L	219
UA	G06	C	2021/06/01	Sulfate, total	mg/L	216
UA	G06	C	2021/06/15	Sulfate, total	mg/L	230
UA	G06	C	2021/07/06	Sulfate, total	mg/L	223
UA	G06	C	2021/07/20	Sulfate, total	mg/L	213
UA	G06	C	2022/07/23	Sulfate, total	mg/L	216
UA	G06	C	2023/03/09	Sulfate, total	mg/L	221
UA	G06	C	2023/05/03	Sulfate, total	mg/L	208
UA	G06	C	2023/09/27	Sulfate, total	mg/L	187
UA	G06	C	2023/10/24	Sulfate, total	mg/L	196
UA	G06	C	2021/03/04	Temperature (Celsius)	degrees C	14.9
UA	G06	C	2021/03/24	Temperature (Celsius)	degrees C	16.0
UA	G06	C	2021/04/13	Temperature (Celsius)	degrees C	15.1
UA	G06	C	2021/05/11	Temperature (Celsius)	degrees C	15.0
UA	G06	C	2021/06/01	Temperature (Celsius)	degrees C	15.0
UA	G06	C	2021/06/15	Temperature (Celsius)	degrees C	15.1
UA	G06	C	2021/07/06	Temperature (Celsius)	degrees C	15.4
UA	G06	C	2021/07/20	Temperature (Celsius)	degrees C	15.4
UA	G06	C	2023/03/09	Temperature (Celsius)	degrees C	14.8
UA	G06	C	2023/05/03	Temperature (Celsius)	degrees C	15.7
UA	G06	C	2023/09/27	Temperature (Celsius)	degrees C	16.2
UA	G06	C	2023/10/24	Temperature (Celsius)	degrees C	15.7
UA	G06	C	2021/03/04	Total Dissolved Solids	mg/L	546
UA	G06	C	2021/03/24	Total Dissolved Solids	mg/L	536
UA	G06	C	2021/04/13	Total Dissolved Solids	mg/L	534
UA	G06	C	2021/05/11	Total Dissolved Solids	mg/L	500
UA	G06	C	2021/06/01	Total Dissolved Solids	mg/L	546
UA	G06	C	2021/06/15	Total Dissolved Solids	mg/L	542
UA	G06	C	2021/07/06	Total Dissolved Solids	mg/L	500
UA	G06	C	2021/07/20	Total Dissolved Solids	mg/L	548
UA	G06	C	2022/07/23	Total Dissolved Solids	mg/L	518
UA	G06	C	2023/03/09	Total Dissolved Solids	mg/L	502
UA	G06	C	2023/05/03	Total Dissolved Solids	mg/L	525
UA	G06	C	2023/09/27	Total Dissolved Solids	mg/L	486
UA	G06	C	2023/10/24	Total Dissolved Solids	mg/L	474
UA	G07	C	2021/03/04	pH (field)	SU	6.5
UA	G07	C	2021/03/24	pH (field)	SU	6.4
UA	G07	C	2021/04/13	pH (field)	SU	6.3
UA	G07	C	2021/05/11	pH (field)	SU	6.3
UA	G07	C	2021/06/01	pH (field)	SU	6.2
UA	G07	C	2021/06/15	pH (field)	SU	6.2
UA	G07	C	2021/07/06	pH (field)	SU	6.0
UA	G07	C	2021/07/20	pH (field)	SU	6.1
UA	G07	C	2022/07/23	pH (field)	SU	7.1
UA	G07	C	2023/03/09	pH (field)	SU	6.4
UA	G07	C	2023/05/03	pH (field)	SU	6.4
UA	G07	C	2023/09/27	pH (field)	SU	6.4
UA	G07	C	2023/10/24	pH (field)	SU	6.4
UA	G07	C	2021/03/04	Oxidation Reduction Potential	mV	80.0
UA	G07	C	2021/03/24	Oxidation Reduction Potential	mV	192
UA	G07	C	2021/04/13	Oxidation Reduction Potential	mV	163
UA	G07	C	2021/05/11	Oxidation Reduction Potential	mV	120

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G07	C	2021/06/01	Oxidation Reduction Potential	mV	37.0
UA	G07	C	2021/06/15	Oxidation Reduction Potential	mV	76.0
UA	G07	C	2021/07/06	Oxidation Reduction Potential	mV	141
UA	G07	C	2021/07/20	Oxidation Reduction Potential	mV	145
UA	G07	C	2022/07/23	Oxidation Reduction Potential	mV	52.3
UA	G07	C	2023/03/09	Oxidation Reduction Potential	mV	112
UA	G07	C	2023/05/03	Oxidation Reduction Potential	mV	161
UA	G07	C	2023/09/27	Oxidation Reduction Potential	mV	31.0
UA	G07	C	2023/10/24	Oxidation Reduction Potential	mV	131
UA	G07	C	2021/03/04	Eh	V	0.28
UA	G07	C	2021/03/24	Eh	V	0.39
UA	G07	C	2021/04/13	Eh	V	0.36
UA	G07	C	2021/05/11	Eh	V	0.32
UA	G07	C	2021/06/01	Eh	V	0.23
UA	G07	C	2021/06/15	Eh	V	0.27
UA	G07	C	2021/07/06	Eh	V	0.34
UA	G07	C	2021/07/20	Eh	V	0.34
UA	G07	C	2022/07/23	Eh	V	0.25
UA	G07	C	2023/03/09	Eh	V	0.31
UA	G07	C	2023/05/03	Eh	V	0.36
UA	G07	C	2023/09/27	Eh	V	0.23
UA	G07	C	2023/10/24	Eh	V	0.33
UA	G07	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G07	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	171
UA	G07	C	2021/04/13	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G07	C	2021/05/11	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G07	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G07	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G07	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G07	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G07	C	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G07	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G07	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	171
UA	G07	C	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G07	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G07	C	2021/03/04	Barium, total	mg/L	0.0958
UA	G07	C	2021/03/24	Barium, total	mg/L	0.0643
UA	G07	C	2021/04/13	Barium, total	mg/L	0.0497
UA	G07	C	2021/05/11	Barium, total	mg/L	0.0448
UA	G07	C	2021/06/01	Barium, total	mg/L	0.0540
UA	G07	C	2021/06/15	Barium, total	mg/L	0.0429
UA	G07	C	2021/07/06	Barium, total	mg/L	0.0373
UA	G07	C	2021/07/20	Barium, total	mg/L	0.0470
UA	G07	C	2022/07/23	Barium, total	mg/L	0.178
UA	G07	C	2023/03/09	Barium, total	mg/L	0.0879
UA	G07	C	2023/05/03	Barium, total	mg/L	0.215
UA	G07	C	2023/09/27	Barium, total	mg/L	0.0366
UA	G07	C	2023/10/24	Barium, total	mg/L	0.0429
UA	G07	C	2021/03/04	Boron, total	mg/L	4.37
UA	G07	C	2021/03/24	Boron, total	mg/L	4.67
UA	G07	C	2021/04/13	Boron, total	mg/L	5.04
UA	G07	C	2021/05/11	Boron, total	mg/L	4.55
UA	G07	C	2021/06/01	Boron, total	mg/L	5.23
UA	G07	C	2021/06/15	Boron, total	mg/L	3.91
UA	G07	C	2021/07/06	Boron, total	mg/L	4.95

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G07	C	2021/07/20	Boron, total	mg/L	4.48
UA	G07	C	2022/07/23	Boron, total	mg/L	4.35
UA	G07	C	2023/03/09	Boron, total	mg/L	4.55
UA	G07	C	2023/05/03	Boron, total	mg/L	4.27
UA	G07	C	2023/09/27	Boron, total	mg/L	5.80
UA	G07	C	2023/10/24	Boron, total	mg/L	5.05
UA	G07	C	2021/03/04	Calcium, total	mg/L	93.9
UA	G07	C	2021/03/24	Calcium, total	mg/L	92.8
UA	G07	C	2021/04/13	Calcium, total	mg/L	126
UA	G07	C	2021/05/11	Calcium, total	mg/L	90.4
UA	G07	C	2021/06/01	Calcium, total	mg/L	96.6
UA	G07	C	2021/06/15	Calcium, total	mg/L	89.3
UA	G07	C	2021/07/06	Calcium, total	mg/L	84.8
UA	G07	C	2021/07/20	Calcium, total	mg/L	96.5
UA	G07	C	2022/07/23	Calcium, total	mg/L	91.9
UA	G07	C	2023/03/09	Calcium, total	mg/L	97.4
UA	G07	C	2023/05/03	Calcium, total	mg/L	97.3
UA	G07	C	2023/09/27	Calcium, total	mg/L	97.1
UA	G07	C	2023/10/24	Calcium, total	mg/L	95.7
UA	G07	C	2021/03/04	Chloride, total	mg/L	21.0
UA	G07	C	2021/03/24	Chloride, total	mg/L	21.0
UA	G07	C	2021/04/13	Chloride, total	mg/L	20.0
UA	G07	C	2021/05/11	Chloride, total	mg/L	19.0
UA	G07	C	2021/06/01	Chloride, total	mg/L	22.0
UA	G07	C	2021/06/15	Chloride, total	mg/L	20.0
UA	G07	C	2021/07/06	Chloride, total	mg/L	21.0
UA	G07	C	2021/07/20	Chloride, total	mg/L	21.0
UA	G07	C	2022/07/23	Chloride, total	mg/L	24.0
UA	G07	C	2023/03/09	Chloride, total	mg/L	23.0
UA	G07	C	2023/05/03	Chloride, total	mg/L	22.0
UA	G07	C	2023/09/27	Chloride, total	mg/L	21.0
UA	G07	C	2023/10/24	Chloride, total	mg/L	21.0
UA	G07	C	2021/03/04	Cobalt, total	mg/L	0.00620
UA	G07	C	2021/03/24	Cobalt, total	mg/L	0.00350
UA	G07	C	2021/04/13	Cobalt, total	mg/L	0.00240
UA	G07	C	2021/05/11	Cobalt, total	mg/L	0.00185
UA	G07	C	2021/06/01	Cobalt, total	mg/L	0.00230
UA	G07	C	2021/06/15	Cobalt, total	mg/L	0.00130
UA	G07	C	2021/07/06	Cobalt, total	mg/L	0.00120
UA	G07	C	2021/07/20	Cobalt, total	mg/L	0.00140
UA	G07	C	2022/07/23	Cobalt, total	mg/L	0.00450
UA	G07	C	2023/03/09	Cobalt, total	mg/L	0.00290
UA	G07	C	2023/05/03	Cobalt, total	mg/L	0.00780
UA	G07	C	2023/09/27	Cobalt, total	mg/L	0.00110
UA	G07	C	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G07	C	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G07	C	2023/09/27	Iron, dissolved	mg/L	0.177
UA	G07	C	2021/03/04	Magnesium, total	mg/L	22.9
UA	G07	C	2021/03/24	Magnesium, total	mg/L	24.2
UA	G07	C	2021/04/13	Magnesium, total	mg/L	24.4
UA	G07	C	2021/05/11	Magnesium, total	mg/L	22.9
UA	G07	C	2021/06/01	Magnesium, total	mg/L	22.9
UA	G07	C	2021/06/15	Magnesium, total	mg/L	21.8
UA	G07	C	2021/07/06	Magnesium, total	mg/L	20.5
UA	G07	C	2021/07/20	Magnesium, total	mg/L	23.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G07	C	2022/07/23	Magnesium, total	mg/L	23.2
UA	G07	C	2023/03/09	Magnesium, total	mg/L	24.3
UA	G07	C	2023/05/03	Magnesium, total	mg/L	23.4
UA	G07	C	2023/09/27	Magnesium, total	mg/L	24.8
UA	G07	C	2023/10/24	Magnesium, total	mg/L	23.7
UA	G07	C	2023/05/03	Manganese, dissolved	mg/L	1.85
UA	G07	C	2023/09/27	Manganese, dissolved	mg/L	3.10
UA	G07	C	2023/05/03	Phosphate, dissolved	mg/L	0.0430
UA	G07	C	2023/09/27	Phosphate, dissolved	mg/L	0.0460
UA	G07	C	2021/03/04	Potassium, total	mg/L	4.08
UA	G07	C	2021/03/24	Potassium, total	mg/L	3.87
UA	G07	C	2021/04/13	Potassium, total	mg/L	3.98
UA	G07	C	2021/05/11	Potassium, total	mg/L	3.90
UA	G07	C	2021/06/01	Potassium, total	mg/L	4.32
UA	G07	C	2021/06/15	Potassium, total	mg/L	3.97
UA	G07	C	2021/07/06	Potassium, total	mg/L	3.87
UA	G07	C	2021/07/20	Potassium, total	mg/L	4.03
UA	G07	C	2022/07/23	Potassium, total	mg/L	4.45
UA	G07	C	2023/03/09	Potassium, total	mg/L	3.96
UA	G07	C	2023/05/03	Potassium, total	mg/L	4.36
UA	G07	C	2023/09/27	Potassium, total	mg/L	4.10
UA	G07	C	2023/10/24	Potassium, total	mg/L	4.00
UA	G07	C	2023/05/03	Silicon, dissolved	mg/L	9.28
UA	G07	C	2023/09/27	Silicon, dissolved	mg/L	8.30
UA	G07	C	2021/03/04	Sodium, total	mg/L	71.1
UA	G07	C	2021/03/24	Sodium, total	mg/L	71.4
UA	G07	C	2021/04/13	Sodium, total	mg/L	90.4
UA	G07	C	2021/05/11	Sodium, total	mg/L	68.6
UA	G07	C	2021/06/01	Sodium, total	mg/L	67.5
UA	G07	C	2021/06/15	Sodium, total	mg/L	66.7
UA	G07	C	2021/07/06	Sodium, total	mg/L	66.5
UA	G07	C	2021/07/20	Sodium, total	mg/L	67.4
UA	G07	C	2022/07/23	Sodium, total	mg/L	64.8
UA	G07	C	2023/03/09	Sodium, total	mg/L	64.2
UA	G07	C	2023/05/03	Sodium, total	mg/L	69.9
UA	G07	C	2023/09/27	Sodium, total	mg/L	69.0
UA	G07	C	2023/10/24	Sodium, total	mg/L	67.2
UA	G07	C	2021/03/04	Sulfate, total	mg/L	285
UA	G07	C	2021/03/24	Sulfate, total	mg/L	258
UA	G07	C	2021/04/13	Sulfate, total	mg/L	274
UA	G07	C	2021/05/11	Sulfate, total	mg/L	248
UA	G07	C	2021/06/01	Sulfate, total	mg/L	257
UA	G07	C	2021/06/15	Sulfate, total	mg/L	246
UA	G07	C	2021/07/06	Sulfate, total	mg/L	258
UA	G07	C	2021/07/20	Sulfate, total	mg/L	252
UA	G07	C	2022/07/23	Sulfate, total	mg/L	246
UA	G07	C	2023/03/09	Sulfate, total	mg/L	308
UA	G07	C	2023/05/03	Sulfate, total	mg/L	260
UA	G07	C	2023/09/27	Sulfate, total	mg/L	268
UA	G07	C	2023/10/24	Sulfate, total	mg/L	285
UA	G07	C	2021/03/04	Temperature (Celsius)	degrees C	15.3
UA	G07	C	2021/03/24	Temperature (Celsius)	degrees C	15.5
UA	G07	C	2021/04/13	Temperature (Celsius)	degrees C	15.2
UA	G07	C	2021/05/11	Temperature (Celsius)	degrees C	15.1
UA	G07	C	2021/06/01	Temperature (Celsius)	degrees C	15.1

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G07	C	2021/06/15	Temperature (Celsius)	degrees C	15.2
UA	G07	C	2021/07/06	Temperature (Celsius)	degrees C	15.5
UA	G07	C	2021/07/20	Temperature (Celsius)	degrees C	15.3
UA	G07	C	2022/07/23	Temperature (Celsius)	degrees C	16
UA	G07	C	2023/03/09	Temperature (Celsius)	degrees C	15.0
UA	G07	C	2023/05/03	Temperature (Celsius)	degrees C	15.6
UA	G07	C	2023/09/27	Temperature (Celsius)	degrees C	16.0
UA	G07	C	2023/10/24	Temperature (Celsius)	degrees C	15.8
UA	G07	C	2021/03/04	Total Dissolved Solids	mg/L	636
UA	G07	C	2021/03/24	Total Dissolved Solids	mg/L	600
UA	G07	C	2021/04/13	Total Dissolved Solids	mg/L	624
UA	G07	C	2021/05/11	Total Dissolved Solids	mg/L	570
UA	G07	C	2021/06/01	Total Dissolved Solids	mg/L	594
UA	G07	C	2021/06/15	Total Dissolved Solids	mg/L	562
UA	G07	C	2021/07/06	Total Dissolved Solids	mg/L	562
UA	G07	C	2021/07/20	Total Dissolved Solids	mg/L	598
UA	G07	C	2022/07/23	Total Dissolved Solids	mg/L	550
UA	G07	C	2023/03/09	Total Dissolved Solids	mg/L	630
UA	G07	C	2023/05/03	Total Dissolved Solids	mg/L	590
UA	G07	C	2023/09/27	Total Dissolved Solids	mg/L	612
UA	G07	C	2023/10/24	Total Dissolved Solids	mg/L	618
UA	G08	C	2021/03/04	pH (field)	SU	7.0
UA	G08	C	2021/03/24	pH (field)	SU	6.9
UA	G08	C	2021/04/13	pH (field)	SU	7.0
UA	G08	C	2021/05/11	pH (field)	SU	6.9
UA	G08	C	2021/06/01	pH (field)	SU	7.0
UA	G08	C	2021/06/15	pH (field)	SU	6.9
UA	G08	C	2021/07/06	pH (field)	SU	6.8
UA	G08	C	2021/07/20	pH (field)	SU	6.8
UA	G08	C	2022/07/23	pH (field)	SU	7.6
UA	G08	C	2023/03/09	pH (field)	SU	6.8
UA	G08	C	2023/05/03	pH (field)	SU	6.9
UA	G08	C	2023/09/26	pH (field)	SU	7.0
UA	G08	C	2023/10/24	pH (field)	SU	7.0
UA	G08	C	2021/03/04	Oxidation Reduction Potential	mV	-63.0
UA	G08	C	2021/03/24	Oxidation Reduction Potential	mV	-36.0
UA	G08	C	2021/04/13	Oxidation Reduction Potential	mV	-40.0
UA	G08	C	2021/05/11	Oxidation Reduction Potential	mV	-188
UA	G08	C	2021/06/01	Oxidation Reduction Potential	mV	95.0
UA	G08	C	2021/06/15	Oxidation Reduction Potential	mV	-164
UA	G08	C	2021/07/06	Oxidation Reduction Potential	mV	-72.0
UA	G08	C	2021/07/20	Oxidation Reduction Potential	mV	-29.0
UA	G08	C	2022/07/23	Oxidation Reduction Potential	mV	-207
UA	G08	C	2023/03/09	Oxidation Reduction Potential	mV	-51.6
UA	G08	C	2023/05/03	Oxidation Reduction Potential	mV	130
UA	G08	C	2023/09/26	Oxidation Reduction Potential	mV	-92.0
UA	G08	C	2023/10/24	Oxidation Reduction Potential	mV	29.0
UA	G08	C	2021/03/04	Eh	V	0.13
UA	G08	C	2021/03/24	Eh	V	0.16
UA	G08	C	2021/04/13	Eh	V	0.15
UA	G08	C	2021/05/11	Eh	V	0.0065
UA	G08	C	2021/06/01	Eh	V	0.29
UA	G08	C	2021/06/15	Eh	V	0.031
UA	G08	C	2021/07/06	Eh	V	0.12
UA	G08	C	2021/07/20	Eh	V	0.17

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G08	C	2022/07/23	Eh	V	-0.012
UA	G08	C	2023/03/09	Eh	V	0.14
UA	G08	C	2023/05/03	Eh	V	0.32
UA	G08	C	2023/09/26	Eh	V	0.10
UA	G08	C	2023/10/24	Eh	V	0.22
UA	G08	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	213
UA	G08	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	190
UA	G08	C	2021/04/13	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G08	C	2021/05/11	Alkalinity, bicarbonate	mg/L CaCO3	185
UA	G08	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	201
UA	G08	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	198
UA	G08	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	190
UA	G08	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	187
UA	G08	C	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	191
UA	G08	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	174
UA	G08	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G08	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	178
UA	G08	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G08	C	2021/03/04	Barium, total	mg/L	0.166
UA	G08	C	2021/03/24	Barium, total	mg/L	0.0946
UA	G08	C	2021/04/13	Barium, total	mg/L	0.0772
UA	G08	C	2021/05/11	Barium, total	mg/L	0.0685
UA	G08	C	2021/06/01	Barium, total	mg/L	0.0588
UA	G08	C	2021/06/15	Barium, total	mg/L	0.0608
UA	G08	C	2021/07/06	Barium, total	mg/L	0.0575
UA	G08	C	2021/07/20	Barium, total	mg/L	0.0635
UA	G08	C	2022/07/23	Barium, total	mg/L	0.0387
UA	G08	C	2023/03/09	Barium, total	mg/L	0.0495
UA	G08	C	2023/05/03	Barium, total	mg/L	0.0974
UA	G08	C	2023/09/26	Barium, total	mg/L	0.0333
UA	G08	C	2023/10/24	Barium, total	mg/L	0.105
UA	G08	C	2021/03/04	Boron, total	mg/L	4.53
UA	G08	C	2021/03/24	Boron, total	mg/L	4.39
UA	G08	C	2021/04/13	Boron, total	mg/L	5.25
UA	G08	C	2021/05/11	Boron, total	mg/L	3.77
UA	G08	C	2021/06/01	Boron, total	mg/L	4.63
UA	G08	C	2021/06/15	Boron, total	mg/L	3.97
UA	G08	C	2021/07/06	Boron, total	mg/L	4.56
UA	G08	C	2021/07/20	Boron, total	mg/L	3.98
UA	G08	C	2022/07/23	Boron, total	mg/L	4.74
UA	G08	C	2023/03/09	Boron, total	mg/L	4.33
UA	G08	C	2023/05/03	Boron, total	mg/L	5.43
UA	G08	C	2023/09/26	Boron, total	mg/L	6.30
UA	G08	C	2023/10/24	Boron, total	mg/L	5.28
UA	G08	C	2021/03/04	Calcium, total	mg/L	111
UA	G08	C	2021/03/24	Calcium, total	mg/L	115
UA	G08	C	2021/04/13	Calcium, total	mg/L	142
UA	G08	C	2021/05/11	Calcium, total	mg/L	101
UA	G08	C	2021/06/01	Calcium, total	mg/L	114
UA	G08	C	2021/06/15	Calcium, total	mg/L	111
UA	G08	C	2021/07/06	Calcium, total	mg/L	109
UA	G08	C	2021/07/20	Calcium, total	mg/L	116
UA	G08	C	2022/07/23	Calcium, total	mg/L	118
UA	G08	C	2023/03/09	Calcium, total	mg/L	119
UA	G08	C	2023/05/03	Calcium, total	mg/L	140

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G08	C	2023/09/26	Calcium, total	mg/L	132
UA	G08	C	2023/10/24	Calcium, total	mg/L	140
UA	G08	C	2021/03/04	Chloride, total	mg/L	14.0
UA	G08	C	2021/03/24	Chloride, total	mg/L	16.0
UA	G08	C	2021/04/13	Chloride, total	mg/L	15.0
UA	G08	C	2021/05/11	Chloride, total	mg/L	12.0
UA	G08	C	2021/06/01	Chloride, total	mg/L	15.0
UA	G08	C	2021/06/15	Chloride, total	mg/L	15.0
UA	G08	C	2021/07/06	Chloride, total	mg/L	16.0
UA	G08	C	2021/07/20	Chloride, total	mg/L	16.0
UA	G08	C	2022/07/23	Chloride, total	mg/L	16.0
UA	G08	C	2023/03/09	Chloride, total	mg/L	15.0
UA	G08	C	2023/05/03	Chloride, total	mg/L	16.0
UA	G08	C	2023/09/26	Chloride, total	mg/L	14.0
UA	G08	C	2023/10/24	Chloride, total	mg/L	17.0
UA	G08	C	2021/03/04	Cobalt, total	mg/L	0.0103
UA	G08	C	2021/03/24	Cobalt, total	mg/L	0.00640
UA	G08	C	2021/04/13	Cobalt, total	mg/L	0.00410
UA	G08	C	2021/05/11	Cobalt, total	mg/L	0.00220
UA	G08	C	2021/06/01	Cobalt, total	mg/L	0.00410
UA	G08	C	2021/06/15	Cobalt, total	mg/L	0.00290
UA	G08	C	2021/07/06	Cobalt, total	mg/L	0.00400
UA	G08	C	2021/07/20	Cobalt, total	mg/L	0.00450
UA	G08	C	2022/07/23	Cobalt, total	mg/L	0.00280
UA	G08	C	2023/03/09	Cobalt, total	mg/L	0.00360
UA	G08	C	2023/05/03	Cobalt, total	mg/L	0.0113
UA	G08	C	2023/09/26	Cobalt, total	mg/L	0.00370
UA	G08	C	2023/10/24	Cobalt, total	mg/L	0.00660
UA	G08	C	2023/05/03	Iron, dissolved	mg/L	1.07
UA	G08	C	2023/09/26	Iron, dissolved	mg/L	0.751
UA	G08	C	2021/03/04	Magnesium, total	mg/L	27.2
UA	G08	C	2021/03/24	Magnesium, total	mg/L	29.0
UA	G08	C	2021/04/13	Magnesium, total	mg/L	31.9
UA	G08	C	2021/05/11	Magnesium, total	mg/L	25.4
UA	G08	C	2021/06/01	Magnesium, total	mg/L	27.2
UA	G08	C	2021/06/15	Magnesium, total	mg/L	27.2
UA	G08	C	2021/07/06	Magnesium, total	mg/L	26.2
UA	G08	C	2021/07/20	Magnesium, total	mg/L	27.1
UA	G08	C	2022/07/23	Magnesium, total	mg/L	29.0
UA	G08	C	2023/03/09	Magnesium, total	mg/L	28.9
UA	G08	C	2023/05/03	Magnesium, total	mg/L	32.2
UA	G08	C	2023/09/26	Magnesium, total	mg/L	32.9
UA	G08	C	2023/10/24	Magnesium, total	mg/L	34.2
UA	G08	C	2023/05/03	Manganese, dissolved	mg/L	1.84
UA	G08	C	2023/09/26	Manganese, dissolved	mg/L	2.25
UA	G08	C	2023/05/03	Phosphate, dissolved	mg/L	0.0860
UA	G08	C	2023/09/26	Phosphate, dissolved	mg/L	0.0340
UA	G08	C	2021/03/04	Potassium, total	mg/L	1.70
UA	G08	C	2021/03/24	Potassium, total	mg/L	1.67
UA	G08	C	2021/04/13	Potassium, total	mg/L	1.60
UA	G08	C	2021/05/11	Potassium, total	mg/L	1.45
UA	G08	C	2021/06/01	Potassium, total	mg/L	1.48
UA	G08	C	2021/06/15	Potassium, total	mg/L	1.53
UA	G08	C	2021/07/06	Potassium, total	mg/L	1.62
UA	G08	C	2021/07/20	Potassium, total	mg/L	1.44

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G08	C	2022/07/23	Potassium, total	mg/L	1.46
UA	G08	C	2023/03/09	Potassium, total	mg/L	1.47
UA	G08	C	2023/05/03	Potassium, total	mg/L	1.67
UA	G08	C	2023/09/26	Potassium, total	mg/L	1.62
UA	G08	C	2023/10/24	Potassium, total	mg/L	1.98
UA	G08	C	2023/05/03	Silicon, dissolved	mg/L	6.19
UA	G08	C	2023/09/26	Silicon, dissolved	mg/L	6.01
UA	G08	C	2021/03/04	Sodium, total	mg/L	29.3
UA	G08	C	2021/03/24	Sodium, total	mg/L	30.2
UA	G08	C	2021/04/13	Sodium, total	mg/L	33.6
UA	G08	C	2021/05/11	Sodium, total	mg/L	24.3
UA	G08	C	2021/06/01	Sodium, total	mg/L	25.4
UA	G08	C	2021/06/15	Sodium, total	mg/L	27.3
UA	G08	C	2021/07/06	Sodium, total	mg/L	26.9
UA	G08	C	2021/07/20	Sodium, total	mg/L	24.0
UA	G08	C	2022/07/23	Sodium, total	mg/L	30.5
UA	G08	C	2023/03/09	Sodium, total	mg/L	28.5
UA	G08	C	2023/05/03	Sodium, total	mg/L	41.7
UA	G08	C	2023/09/26	Sodium, total	mg/L	38.4
UA	G08	C	2023/10/24	Sodium, total	mg/L	44.3
UA	G08	C	2021/03/04	Sulfate, total	mg/L	241
UA	G08	C	2021/03/24	Sulfate, total	mg/L	225
UA	G08	C	2021/04/13	Sulfate, total	mg/L	286
UA	G08	C	2021/05/11	Sulfate, total	mg/L	203
UA	G08	C	2021/06/01	Sulfate, total	mg/L	204
UA	G08	C	2021/06/15	Sulfate, total	mg/L	226
UA	G08	C	2021/07/06	Sulfate, total	mg/L	227
UA	G08	C	2021/07/20	Sulfate, total	mg/L	227
UA	G08	C	2022/07/23	Sulfate, total	mg/L	229
UA	G08	C	2023/03/09	Sulfate, total	mg/L	297
UA	G08	C	2023/05/03	Sulfate, total	mg/L	363
UA	G08	C	2023/09/26	Sulfate, total	mg/L	320
UA	G08	C	2023/10/24	Sulfate, total	mg/L	389
UA	G08	C	2021/03/04	Temperature (Celsius)	degrees C	15.6
UA	G08	C	2021/03/24	Temperature (Celsius)	degrees C	16.6
UA	G08	C	2021/04/13	Temperature (Celsius)	degrees C	16.3
UA	G08	C	2021/05/11	Temperature (Celsius)	degrees C	16.4
UA	G08	C	2021/06/01	Temperature (Celsius)	degrees C	16.0
UA	G08	C	2021/06/15	Temperature (Celsius)	degrees C	16.1
UA	G08	C	2021/07/06	Temperature (Celsius)	degrees C	16.6
UA	G08	C	2021/07/20	Temperature (Celsius)	degrees C	16.3
UA	G08	C	2022/07/23	Temperature (Celsius)	degrees C	16.7
UA	G08	C	2023/03/09	Temperature (Celsius)	degrees C	15.4
UA	G08	C	2023/05/03	Temperature (Celsius)	degrees C	17.3
UA	G08	C	2023/09/26	Temperature (Celsius)	degrees C	17.3
UA	G08	C	2023/10/24	Temperature (Celsius)	degrees C	18.2
UA	G08	C	2021/03/04	Total Dissolved Solids	mg/L	604
UA	G08	C	2021/03/24	Total Dissolved Solids	mg/L	592
UA	G08	C	2021/04/13	Total Dissolved Solids	mg/L	620
UA	G08	C	2021/05/11	Total Dissolved Solids	mg/L	508
UA	G08	C	2021/06/01	Total Dissolved Solids	mg/L	568
UA	G08	C	2021/06/15	Total Dissolved Solids	mg/L	540
UA	G08	C	2021/07/06	Total Dissolved Solids	mg/L	548
UA	G08	C	2021/07/20	Total Dissolved Solids	mg/L	556
UA	G08	C	2022/07/23	Total Dissolved Solids	mg/L	584

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G08	C	2023/03/09	Total Dissolved Solids	mg/L	612
UA	G08	C	2023/05/03	Total Dissolved Solids	mg/L	714
UA	G08	C	2023/09/26	Total Dissolved Solids	mg/L	680
UA	G08	C	2023/10/24	Total Dissolved Solids	mg/L	660
UA	G09	C	2021/03/04	pH (field)	SU	6.2
UA	G09	C	2021/03/25	pH (field)	SU	6.3
UA	G09	C	2021/04/14	pH (field)	SU	6.3
UA	G09	C	2021/05/12	pH (field)	SU	6.4
UA	G09	C	2021/06/01	pH (field)	SU	6.2
UA	G09	C	2021/06/15	pH (field)	SU	6.0
UA	G09	C	2021/07/06	pH (field)	SU	6.3
UA	G09	C	2021/07/21	pH (field)	SU	6.0
UA	G09	C	2022/07/24	pH (field)	SU	7.6
UA	G09	C	2023/03/09	pH (field)	SU	6.1
UA	G09	C	2023/05/03	pH (field)	SU	6.4
UA	G09	C	2023/09/26	pH (field)	SU	6.2
UA	G09	C	2023/10/25	pH (field)	SU	6.2
UA	G09	C	2021/03/04	Oxidation Reduction Potential	mV	9.00
UA	G09	C	2021/03/25	Oxidation Reduction Potential	mV	42.0
UA	G09	C	2021/04/14	Oxidation Reduction Potential	mV	-22.0
UA	G09	C	2021/05/12	Oxidation Reduction Potential	mV	-78.0
UA	G09	C	2021/06/01	Oxidation Reduction Potential	mV	-24.0
UA	G09	C	2021/06/15	Oxidation Reduction Potential	mV	-46.0
UA	G09	C	2021/07/06	Oxidation Reduction Potential	mV	-40.0
UA	G09	C	2021/07/21	Oxidation Reduction Potential	mV	-6.00
UA	G09	C	2022/07/24	Oxidation Reduction Potential	mV	-202
UA	G09	C	2023/03/09	Oxidation Reduction Potential	mV	-5.00
UA	G09	C	2023/05/03	Oxidation Reduction Potential	mV	13.0
UA	G09	C	2023/09/26	Oxidation Reduction Potential	mV	33.0
UA	G09	C	2023/10/25	Oxidation Reduction Potential	mV	-3.00
UA	G09	C	2021/03/04	Eh	V	0.20
UA	G09	C	2021/03/25	Eh	V	0.24
UA	G09	C	2021/04/14	Eh	V	0.17
UA	G09	C	2021/05/12	Eh	V	0.12
UA	G09	C	2021/06/01	Eh	V	0.17
UA	G09	C	2021/06/15	Eh	V	0.15
UA	G09	C	2021/07/06	Eh	V	0.15
UA	G09	C	2021/07/21	Eh	V	0.19
UA	G09	C	2022/07/24	Eh	V	-0.0081
UA	G09	C	2023/03/09	Eh	V	0.19
UA	G09	C	2023/05/03	Eh	V	0.21
UA	G09	C	2023/09/26	Eh	V	0.23
UA	G09	C	2023/10/25	Eh	V	0.19
UA	G09	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	188
UA	G09	C	2021/03/25	Alkalinity, bicarbonate	mg/L CaCO3	190
UA	G09	C	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	180
UA	G09	C	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	165
UA	G09	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G09	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	179
UA	G09	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G09	C	2021/07/21	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G09	C	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	129
UA	G09	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	116
UA	G09	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	110
UA	G09	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	119

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G09	C	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	110
UA	G09	C	2021/03/04	Barium, total	mg/L	0.0675
UA	G09	C	2021/03/25	Barium, total	mg/L	0.0984
UA	G09	C	2021/04/14	Barium, total	mg/L	0.0673
UA	G09	C	2021/05/12	Barium, total	mg/L	0.0586
UA	G09	C	2021/06/01	Barium, total	mg/L	0.0548
UA	G09	C	2021/06/15	Barium, total	mg/L	0.0136
UA	G09	C	2021/07/06	Barium, total	mg/L	0.0444
UA	G09	C	2021/07/21	Barium, total	mg/L	0.0454
UA	G09	C	2022/07/24	Barium, total	mg/L	0.0565
UA	G09	C	2023/03/09	Barium, total	mg/L	0.0378
UA	G09	C	2023/05/03	Barium, total	mg/L	0.0560
UA	G09	C	2023/09/26	Barium, total	mg/L	0.0271
UA	G09	C	2023/10/25	Barium, total	mg/L	0.0312
UA	G09	C	2021/03/04	Boron, total	mg/L	3.19
UA	G09	C	2021/03/25	Boron, total	mg/L	3.15
UA	G09	C	2021/04/14	Boron, total	mg/L	3.48
UA	G09	C	2021/05/12	Boron, total	mg/L	3.26
UA	G09	C	2021/06/01	Boron, total	mg/L	3.65
UA	G09	C	2021/06/15	Boron, total	mg/L	0.282
UA	G09	C	2021/07/06	Boron, total	mg/L	4.05
UA	G09	C	2021/07/21	Boron, total	mg/L	3.75
UA	G09	C	2022/07/24	Boron, total	mg/L	3.89
UA	G09	C	2023/03/09	Boron, total	mg/L	3.49
UA	G09	C	2023/05/03	Boron, total	mg/L	3.87
UA	G09	C	2023/09/26	Boron, total	mg/L	4.57
UA	G09	C	2023/10/25	Boron, total	mg/L	3.50
UA	G09	C	2021/03/04	Calcium, total	mg/L	103
UA	G09	C	2021/03/25	Calcium, total	mg/L	95.2
UA	G09	C	2021/04/14	Calcium, total	mg/L	110
UA	G09	C	2021/05/12	Calcium, total	mg/L	87.7
UA	G09	C	2021/06/01	Calcium, total	mg/L	91.3
UA	G09	C	2021/06/15	Calcium, total	mg/L	137
UA	G09	C	2021/07/06	Calcium, total	mg/L	79.0
UA	G09	C	2021/07/21	Calcium, total	mg/L	92.1
UA	G09	C	2022/07/24	Calcium, total	mg/L	80.8
UA	G09	C	2023/03/09	Calcium, total	mg/L	75.5
UA	G09	C	2023/05/03	Calcium, total	mg/L	67.2
UA	G09	C	2023/09/26	Calcium, total	mg/L	64.8
UA	G09	C	2023/10/25	Calcium, total	mg/L	62.3
UA	G09	C	2021/03/04	Chloride, total	mg/L	24.0
UA	G09	C	2021/03/25	Chloride, total	mg/L	29.0
UA	G09	C	2021/04/14	Chloride, total	mg/L	25.0
UA	G09	C	2021/05/12	Chloride, total	mg/L	22.0
UA	G09	C	2021/06/01	Chloride, total	mg/L	23.0
UA	G09	C	2021/06/15	Chloride, total	mg/L	21.0
UA	G09	C	2021/07/06	Chloride, total	mg/L	22.0
UA	G09	C	2021/07/21	Chloride, total	mg/L	21.0
UA	G09	C	2022/07/24	Chloride, total	mg/L	23.0
UA	G09	C	2023/03/09	Chloride, total	mg/L	19.0
UA	G09	C	2023/05/03	Chloride, total	mg/L	20.0
UA	G09	C	2023/09/26	Chloride, total	mg/L	17.0
UA	G09	C	2023/10/25	Chloride, total	mg/L	17.0
UA	G09	C	2021/03/04	Cobalt, total	mg/L	0.0108
UA	G09	C	2021/03/25	Cobalt, total	mg/L	0.0159

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G09	C	2021/04/14	Cobalt, total	mg/L	0.0131
UA	G09	C	2021/05/12	Cobalt, total	mg/L	0.0103
UA	G09	C	2021/06/01	Cobalt, total	mg/L	0.00960
UA	G09	C	2021/06/15	Cobalt, total	mg/L	0.00110
UA	G09	C	2021/07/06	Cobalt, total	mg/L	0.00890
UA	G09	C	2021/07/21	Cobalt, total	mg/L	0.00850
UA	G09	C	2022/07/24	Cobalt, total	mg/L	0.00860
UA	G09	C	2023/03/09	Cobalt, total	mg/L	0.00550
UA	G09	C	2023/05/03	Cobalt, total	mg/L	0.00710
UA	G09	C	2023/09/26	Cobalt, total	mg/L	0.00500
UA	G09	C	2023/10/25	Cobalt, total	mg/L	0.00270
UA	G09	C	2023/05/03	Iron, dissolved	mg/L	2.50
UA	G09	C	2023/09/26	Iron, dissolved	mg/L	1.53
UA	G09	C	2021/03/04	Magnesium, total	mg/L	33.8
UA	G09	C	2021/03/25	Magnesium, total	mg/L	32.0
UA	G09	C	2021/04/14	Magnesium, total	mg/L	33.7
UA	G09	C	2021/05/12	Magnesium, total	mg/L	32.1
UA	G09	C	2021/06/01	Magnesium, total	mg/L	31.4
UA	G09	C	2021/06/15	Magnesium, total	mg/L	49.3
UA	G09	C	2021/07/06	Magnesium, total	mg/L	28.7
UA	G09	C	2021/07/21	Magnesium, total	mg/L	32.0
UA	G09	C	2022/07/24	Magnesium, total	mg/L	30.6
UA	G09	C	2023/03/09	Magnesium, total	mg/L	28.9
UA	G09	C	2023/05/03	Magnesium, total	mg/L	24.7
UA	G09	C	2023/09/26	Magnesium, total	mg/L	26.1
UA	G09	C	2023/10/25	Magnesium, total	mg/L	24.6
UA	G09	C	2023/05/03	Manganese, dissolved	mg/L	1.01
UA	G09	C	2023/09/26	Manganese, dissolved	mg/L	1.01
UA	G09	C	2023/05/03	Phosphate, dissolved	mg/L	0.0490
UA	G09	C	2023/09/26	Phosphate, dissolved	mg/L	0.114
UA	G09	C	2021/03/04	Potassium, total	mg/L	2.78
UA	G09	C	2021/03/25	Potassium, total	mg/L	2.67
UA	G09	C	2021/04/14	Potassium, total	mg/L	2.25
UA	G09	C	2021/05/12	Potassium, total	mg/L	1.99
UA	G09	C	2021/06/01	Potassium, total	mg/L	1.87
UA	G09	C	2021/06/15	Potassium, total	mg/L	1.56
UA	G09	C	2021/07/06	Potassium, total	mg/L	1.65
UA	G09	C	2021/07/21	Potassium, total	mg/L	1.55
UA	G09	C	2022/07/24	Potassium, total	mg/L	1.36
UA	G09	C	2023/03/09	Potassium, total	mg/L	1.03
UA	G09	C	2023/05/03	Potassium, total	mg/L	0.987
UA	G09	C	2023/09/26	Potassium, total	mg/L	0.926
UA	G09	C	2023/10/25	Potassium, total	mg/L	0.860
UA	G09	C	2023/05/03	Silicon, dissolved	mg/L	15.6
UA	G09	C	2023/09/26	Silicon, dissolved	mg/L	15.2
UA	G09	C	2021/03/04	Sodium, total	mg/L	72.0
UA	G09	C	2021/03/25	Sodium, total	mg/L	74.2
UA	G09	C	2021/04/14	Sodium, total	mg/L	87.2
UA	G09	C	2021/05/12	Sodium, total	mg/L	71.2
UA	G09	C	2021/06/01	Sodium, total	mg/L	65.3
UA	G09	C	2021/06/15	Sodium, total	mg/L	58.5
UA	G09	C	2021/07/06	Sodium, total	mg/L	68.3
UA	G09	C	2021/07/21	Sodium, total	mg/L	64.3
UA	G09	C	2022/07/24	Sodium, total	mg/L	62.4
UA	G09	C	2023/03/09	Sodium, total	mg/L	53.6

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G09	C	2023/05/03	Sodium, total	mg/L	66.3
UA	G09	C	2023/09/26	Sodium, total	mg/L	59.1
UA	G09	C	2023/10/25	Sodium, total	mg/L	57.7
UA	G09	C	2021/03/04	Sulfate, total	mg/L	351
UA	G09	C	2021/03/25	Sulfate, total	mg/L	286
UA	G09	C	2021/04/14	Sulfate, total	mg/L	297
UA	G09	C	2021/05/12	Sulfate, total	mg/L	272
UA	G09	C	2021/06/01	Sulfate, total	mg/L	284
UA	G09	C	2021/06/15	Sulfate, total	mg/L	294
UA	G09	C	2021/07/06	Sulfate, total	mg/L	289
UA	G09	C	2021/07/21	Sulfate, total	mg/L	286
UA	G09	C	2022/07/24	Sulfate, total	mg/L	278
UA	G09	C	2023/03/09	Sulfate, total	mg/L	295
UA	G09	C	2023/05/03	Sulfate, total	mg/L	241
UA	G09	C	2023/09/26	Sulfate, total	mg/L	229
UA	G09	C	2023/10/25	Sulfate, total	mg/L	245
UA	G09	C	2021/03/04	Temperature (Celsius)	degrees C	16.6
UA	G09	C	2021/03/25	Temperature (Celsius)	degrees C	16.1
UA	G09	C	2021/04/14	Temperature (Celsius)	degrees C	16.2
UA	G09	C	2021/05/12	Temperature (Celsius)	degrees C	16.3
UA	G09	C	2021/06/01	Temperature (Celsius)	degrees C	16.5
UA	G09	C	2021/06/15	Temperature (Celsius)	degrees C	16.6
UA	G09	C	2021/07/06	Temperature (Celsius)	degrees C	17.3
UA	G09	C	2021/07/21	Temperature (Celsius)	degrees C	16.8
UA	G09	C	2022/07/24	Temperature (Celsius)	degrees C	17.2
UA	G09	C	2023/03/09	Temperature (Celsius)	degrees C	16.2
UA	G09	C	2023/05/03	Temperature (Celsius)	degrees C	16.9
UA	G09	C	2023/09/26	Temperature (Celsius)	degrees C	17.7
UA	G09	C	2023/10/25	Temperature (Celsius)	degrees C	18.1
UA	G09	C	2021/03/04	Total Dissolved Solids	mg/L	728
UA	G09	C	2021/03/25	Total Dissolved Solids	mg/L	688
UA	G09	C	2021/04/14	Total Dissolved Solids	mg/L	712
UA	G09	C	2021/05/12	Total Dissolved Solids	mg/L	656
UA	G09	C	2021/06/01	Total Dissolved Solids	mg/L	672
UA	G09	C	2021/06/15	Total Dissolved Solids	mg/L	632
UA	G09	C	2021/07/06	Total Dissolved Solids	mg/L	614
UA	G09	C	2021/07/21	Total Dissolved Solids	mg/L	652
UA	G09	C	2022/07/24	Total Dissolved Solids	mg/L	595
UA	G09	C	2023/03/09	Total Dissolved Solids	mg/L	562
UA	G09	C	2023/05/03	Total Dissolved Solids	mg/L	534
UA	G09	C	2023/09/26	Total Dissolved Solids	mg/L	500
UA	G09	C	2023/10/25	Total Dissolved Solids	mg/L	472
UA	G10	C	2021/03/04	pH (field)	SU	6.7
UA	G10	C	2021/03/24	pH (field)	SU	6.7
UA	G10	C	2021/04/13	pH (field)	SU	6.6
UA	G10	C	2021/05/11	pH (field)	SU	6.3
UA	G10	C	2021/06/01	pH (field)	SU	6.5
UA	G10	C	2021/06/15	pH (field)	SU	6.5
UA	G10	C	2021/07/06	pH (field)	SU	6.5
UA	G10	C	2021/07/20	pH (field)	SU	6.5
UA	G10	C	2022/07/26	pH (field)	SU	6.8
UA	G10	C	2023/03/08	pH (field)	SU	6.6
UA	G10	C	2023/05/03	pH (field)	SU	6.6
UA	G10	C	2023/09/26	pH (field)	SU	6.7
UA	G10	C	2023/10/24	pH (field)	SU	6.6

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G10	C	2021/03/04	Oxidation Reduction Potential	mV	16.0
UA	G10	C	2021/03/24	Oxidation Reduction Potential	mV	33.0
UA	G10	C	2021/04/13	Oxidation Reduction Potential	mV	42.0
UA	G10	C	2021/05/11	Oxidation Reduction Potential	mV	30.0
UA	G10	C	2021/06/01	Oxidation Reduction Potential	mV	5.00
UA	G10	C	2021/06/15	Oxidation Reduction Potential	mV	-22.0
UA	G10	C	2021/07/06	Oxidation Reduction Potential	mV	35.0
UA	G10	C	2021/07/20	Oxidation Reduction Potential	mV	52.0
UA	G10	C	2022/07/26	Oxidation Reduction Potential	mV	-31.8
UA	G10	C	2023/03/08	Oxidation Reduction Potential	mV	11.6
UA	G10	C	2023/05/03	Oxidation Reduction Potential	mV	135
UA	G10	C	2023/09/26	Oxidation Reduction Potential	mV	65.0
UA	G10	C	2023/10/24	Oxidation Reduction Potential	mV	23.0
UA	G10	C	2021/03/04	Eh	V	0.21
UA	G10	C	2021/03/24	Eh	V	0.23
UA	G10	C	2021/04/13	Eh	V	0.24
UA	G10	C	2021/05/11	Eh	V	0.22
UA	G10	C	2021/06/01	Eh	V	0.20
UA	G10	C	2021/06/15	Eh	V	0.17
UA	G10	C	2021/07/06	Eh	V	0.23
UA	G10	C	2021/07/20	Eh	V	0.25
UA	G10	C	2022/07/26	Eh	V	0.16
UA	G10	C	2023/03/08	Eh	V	0.21
UA	G10	C	2023/05/03	Eh	V	0.33
UA	G10	C	2023/09/26	Eh	V	0.26
UA	G10	C	2023/10/24	Eh	V	0.22
UA	G10	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	108
UA	G10	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	132
UA	G10	C	2021/04/13	Alkalinity, bicarbonate	mg/L CaCO3	133
UA	G10	C	2021/05/11	Alkalinity, bicarbonate	mg/L CaCO3	134
UA	G10	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	127
UA	G10	C	2021/06/15	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G10	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	144
UA	G10	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G10	C	2022/07/26	Alkalinity, bicarbonate	mg/L CaCO3	131
UA	G10	C	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	203
UA	G10	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	160
UA	G10	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	232
UA	G10	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	222
UA	G10	C	2021/03/04	Barium, total	mg/L	0.0608
UA	G10	C	2021/03/24	Barium, total	mg/L	0.0553
UA	G10	C	2021/04/13	Barium, total	mg/L	0.0496
UA	G10	C	2021/05/11	Barium, total	mg/L	0.0453
UA	G10	C	2021/06/01	Barium, total	mg/L	0.0444
UA	G10	C	2021/06/15	Barium, total	mg/L	0.0439
UA	G10	C	2021/07/06	Barium, total	mg/L	0.0356
UA	G10	C	2021/07/20	Barium, total	mg/L	0.0368
UA	G10	C	2022/07/26	Barium, total	mg/L	0.0499
UA	G10	C	2023/03/08	Barium, total	mg/L	0.0395
UA	G10	C	2023/05/03	Barium, total	mg/L	0.0624
UA	G10	C	2023/09/26	Barium, total	mg/L	0.0336
UA	G10	C	2023/10/24	Barium, total	mg/L	0.0385
UA	G10	C	2021/03/04	Boron, total	mg/L	4.98
UA	G10	C	2021/03/24	Boron, total	mg/L	4.31
UA	G10	C	2021/04/13	Boron, total	mg/L	4.26

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G10	C	2021/05/11	Boron, total	mg/L	3.95
UA	G10	C	2021/06/01	Boron, total	mg/L	4.73
UA	G10	C	2021/06/15	Boron, total	mg/L	3.74
UA	G10	C	2021/07/06	Boron, total	mg/L	4.81
UA	G10	C	2021/07/20	Boron, total	mg/L	4.20
UA	G10	C	2022/07/26	Boron, total	mg/L	4.40
UA	G10	C	2023/03/08	Boron, total	mg/L	3.28
UA	G10	C	2023/05/03	Boron, total	mg/L	3.08
UA	G10	C	2023/09/26	Boron, total	mg/L	3.41
UA	G10	C	2023/10/24	Boron, total	mg/L	2.35
UA	G10	C	2021/03/04	Calcium, total	mg/L	107
UA	G10	C	2021/03/24	Calcium, total	mg/L	115
UA	G10	C	2021/04/13	Calcium, total	mg/L	142
UA	G10	C	2021/05/11	Calcium, total	mg/L	120
UA	G10	C	2021/06/01	Calcium, total	mg/L	124
UA	G10	C	2021/06/15	Calcium, total	mg/L	128
UA	G10	C	2021/07/06	Calcium, total	mg/L	119
UA	G10	C	2021/07/20	Calcium, total	mg/L	132
UA	G10	C	2022/07/26	Calcium, total	mg/L	115
UA	G10	C	2023/03/08	Calcium, total	mg/L	116
UA	G10	C	2023/05/03	Calcium, total	mg/L	124
UA	G10	C	2023/09/26	Calcium, total	mg/L	120
UA	G10	C	2023/10/24	Calcium, total	mg/L	117
UA	G10	C	2021/03/04	Chloride, total	mg/L	35.0
UA	G10	C	2021/03/24	Chloride, total	mg/L	31.0
UA	G10	C	2021/04/13	Chloride, total	mg/L	29.0
UA	G10	C	2021/05/11	Chloride, total	mg/L	25.0
UA	G10	C	2021/06/01	Chloride, total	mg/L	29.0
UA	G10	C	2021/06/15	Chloride, total	mg/L	26.0
UA	G10	C	2021/07/06	Chloride, total	mg/L	26.0
UA	G10	C	2021/07/20	Chloride, total	mg/L	26.0
UA	G10	C	2022/07/26	Chloride, total	mg/L	29.0
UA	G10	C	2023/03/08	Chloride, total	mg/L	30.0
UA	G10	C	2023/05/03	Chloride, total	mg/L	27.0
UA	G10	C	2023/09/26	Chloride, total	mg/L	24.0
UA	G10	C	2023/10/24	Chloride, total	mg/L	26.0
UA	G10	C	2021/03/04	Cobalt, total	mg/L	0.0109
UA	G10	C	2021/03/24	Cobalt, total	mg/L	0.0122
UA	G10	C	2021/04/13	Cobalt, total	mg/L	0.0100
UA	G10	C	2021/05/11	Cobalt, total	mg/L	0.00754
UA	G10	C	2021/06/01	Cobalt, total	mg/L	0.00710
UA	G10	C	2021/06/15	Cobalt, total	mg/L	0.00500
UA	G10	C	2021/07/06	Cobalt, total	mg/L	0.00490
UA	G10	C	2021/07/20	Cobalt, total	mg/L	0.00450
UA	G10	C	2022/07/26	Cobalt, total	mg/L	0.00430
UA	G10	C	2023/03/08	Cobalt, total	mg/L	0.00440
UA	G10	C	2023/05/03	Cobalt, total	mg/L	0.00580
UA	G10	C	2023/09/26	Cobalt, total	mg/L	0.00210
UA	G10	C	2023/10/24	Cobalt, total	mg/L	0.00220
UA	G10	C	2023/05/03	Iron, dissolved	mg/L	0.325
UA	G10	C	2023/09/26	Iron, dissolved	mg/L	0.534
UA	G10	C	2021/03/04	Magnesium, total	mg/L	35.7
UA	G10	C	2021/03/24	Magnesium, total	mg/L	39.3
UA	G10	C	2021/04/13	Magnesium, total	mg/L	37.2
UA	G10	C	2021/05/11	Magnesium, total	mg/L	41.1

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G10	C	2021/06/01	Magnesium, total	mg/L	38.5
UA	G10	C	2021/06/15	Magnesium, total	mg/L	40.8
UA	G10	C	2021/07/06	Magnesium, total	mg/L	37.3
UA	G10	C	2021/07/20	Magnesium, total	mg/L	40.0
UA	G10	C	2022/07/26	Magnesium, total	mg/L	36.6
UA	G10	C	2023/03/08	Magnesium, total	mg/L	36.6
UA	G10	C	2023/05/03	Magnesium, total	mg/L	36.9
UA	G10	C	2023/09/26	Magnesium, total	mg/L	39.1
UA	G10	C	2023/10/24	Magnesium, total	mg/L	38.3
UA	G10	C	2023/05/03	Manganese, dissolved	mg/L	0.121
UA	G10	C	2023/09/26	Manganese, dissolved	mg/L	0.184
UA	G10	C	2023/05/03	Phosphate, dissolved	mg/L	0.0710
UA	G10	C	2023/09/26	Phosphate, dissolved	mg/L	0.0610
UA	G10	C	2021/03/04	Potassium, total	mg/L	2.54
UA	G10	C	2021/03/24	Potassium, total	mg/L	2.91
UA	G10	C	2021/04/13	Potassium, total	mg/L	2.48
UA	G10	C	2021/05/11	Potassium, total	mg/L	2.13
UA	G10	C	2021/06/01	Potassium, total	mg/L	2.27
UA	G10	C	2021/06/15	Potassium, total	mg/L	2.25
UA	G10	C	2021/07/06	Potassium, total	mg/L	2.09
UA	G10	C	2021/07/20	Potassium, total	mg/L	2.06
UA	G10	C	2022/07/26	Potassium, total	mg/L	2.13
UA	G10	C	2023/03/08	Potassium, total	mg/L	6.00
UA	G10	C	2023/05/03	Potassium, total	mg/L	5.42
UA	G10	C	2023/09/26	Potassium, total	mg/L	9.99
UA	G10	C	2023/10/24	Potassium, total	mg/L	11.3
UA	G10	C	2023/05/03	Silicon, dissolved	mg/L	11.9
UA	G10	C	2023/09/26	Silicon, dissolved	mg/L	11.6
UA	G10	C	2021/03/04	Sodium, total	mg/L	60.3
UA	G10	C	2021/03/24	Sodium, total	mg/L	62.1
UA	G10	C	2021/04/13	Sodium, total	mg/L	68.5
UA	G10	C	2021/05/11	Sodium, total	mg/L	56.8
UA	G10	C	2021/06/01	Sodium, total	mg/L	55.0
UA	G10	C	2021/06/15	Sodium, total	mg/L	59.3
UA	G10	C	2021/07/06	Sodium, total	mg/L	57.6
UA	G10	C	2021/07/20	Sodium, total	mg/L	56.5
UA	G10	C	2022/07/26	Sodium, total	mg/L	54.8
UA	G10	C	2023/03/08	Sodium, total	mg/L	80.4
UA	G10	C	2023/05/03	Sodium, total	mg/L	77.5
UA	G10	C	2023/09/26	Sodium, total	mg/L	86.9
UA	G10	C	2023/10/24	Sodium, total	mg/L	85.6
UA	G10	C	2021/03/04	Sulfate, total	mg/L	391
UA	G10	C	2021/03/24	Sulfate, total	mg/L	369
UA	G10	C	2021/04/13	Sulfate, total	mg/L	382
UA	G10	C	2021/05/11	Sulfate, total	mg/L	364
UA	G10	C	2021/06/01	Sulfate, total	mg/L	401
UA	G10	C	2021/06/15	Sulfate, total	mg/L	407
UA	G10	C	2021/07/06	Sulfate, total	mg/L	415
UA	G10	C	2021/07/20	Sulfate, total	mg/L	410
UA	G10	C	2022/07/26	Sulfate, total	mg/L	388
UA	G10	C	2023/03/08	Sulfate, total	mg/L	425
UA	G10	C	2023/05/03	Sulfate, total	mg/L	365
UA	G10	C	2023/09/26	Sulfate, total	mg/L	356
UA	G10	C	2023/10/24	Sulfate, total	mg/L	375
UA	G10	C	2021/03/04	Temperature (Celsius)	degrees C	16.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G10	C	2021/03/24	Temperature (Celsius)	degrees C	17.1
UA	G10	C	2021/04/13	Temperature (Celsius)	degrees C	16.6
UA	G10	C	2021/05/11	Temperature (Celsius)	degrees C	16.6
UA	G10	C	2021/06/01	Temperature (Celsius)	degrees C	16.5
UA	G10	C	2021/06/15	Temperature (Celsius)	degrees C	16.8
UA	G10	C	2021/07/06	Temperature (Celsius)	degrees C	18.0
UA	G10	C	2021/07/20	Temperature (Celsius)	degrees C	17.6
UA	G10	C	2022/07/26	Temperature (Celsius)	degrees C	17.7
UA	G10	C	2023/03/08	Temperature (Celsius)	degrees C	15.9
UA	G10	C	2023/05/03	Temperature (Celsius)	degrees C	17.1
UA	G10	C	2023/09/26	Temperature (Celsius)	degrees C	17.5
UA	G10	C	2023/10/24	Temperature (Celsius)	degrees C	17.4
UA	G10	C	2021/03/04	Total Dissolved Solids	mg/L	798
UA	G10	C	2021/03/24	Total Dissolved Solids	mg/L	752
UA	G10	C	2021/04/13	Total Dissolved Solids	mg/L	754
UA	G10	C	2021/05/11	Total Dissolved Solids	mg/L	746
UA	G10	C	2021/06/01	Total Dissolved Solids	mg/L	810
UA	G10	C	2021/06/15	Total Dissolved Solids	mg/L	760
UA	G10	C	2021/07/06	Total Dissolved Solids	mg/L	750
UA	G10	C	2021/07/20	Total Dissolved Solids	mg/L	806
UA	G10	C	2022/07/26	Total Dissolved Solids	mg/L	772
UA	G10	C	2023/03/08	Total Dissolved Solids	mg/L	795
UA	G10	C	2023/05/03	Total Dissolved Solids	mg/L	760
UA	G10	C	2023/09/26	Total Dissolved Solids	mg/L	705
UA	G10	C	2023/10/24	Total Dissolved Solids	mg/L	800
UA	G11	C	2021/03/04	pH (field)	SU	5.9
UA	G11	C	2021/03/24	pH (field)	SU	5.9
UA	G11	C	2021/04/14	pH (field)	SU	5.8
UA	G11	C	2021/05/12	pH (field)	SU	5.9
UA	G11	C	2021/06/01	pH (field)	SU	5.8
UA	G11	C	2021/06/14	pH (field)	SU	5.9
UA	G11	C	2021/07/06	pH (field)	SU	5.8
UA	G11	C	2021/07/20	pH (field)	SU	5.8
UA	G11	C	2022/07/23	pH (field)	SU	6.3
UA	G11	C	2023/03/08	pH (field)	SU	5.9
UA	G11	C	2023/05/03	pH (field)	SU	5.8
UA	G11	C	2023/09/26	pH (field)	SU	6.0
UA	G11	C	2023/10/24	pH (field)	SU	5.9
UA	G11	C	2021/03/04	Oxidation Reduction Potential	mV	69.0
UA	G11	C	2021/03/24	Oxidation Reduction Potential	mV	154
UA	G11	C	2021/04/14	Oxidation Reduction Potential	mV	100
UA	G11	C	2021/05/12	Oxidation Reduction Potential	mV	194
UA	G11	C	2021/06/01	Oxidation Reduction Potential	mV	159
UA	G11	C	2021/06/14	Oxidation Reduction Potential	mV	149
UA	G11	C	2021/07/06	Oxidation Reduction Potential	mV	78.0
UA	G11	C	2021/07/20	Oxidation Reduction Potential	mV	135
UA	G11	C	2022/07/23	Oxidation Reduction Potential	mV	122
UA	G11	C	2023/03/08	Oxidation Reduction Potential	mV	166
UA	G11	C	2023/05/03	Oxidation Reduction Potential	mV	207
UA	G11	C	2023/09/26	Oxidation Reduction Potential	mV	98.0
UA	G11	C	2023/10/24	Oxidation Reduction Potential	mV	124
UA	G11	C	2021/03/04	Eh	V	0.26
UA	G11	C	2021/03/24	Eh	V	0.35
UA	G11	C	2021/04/14	Eh	V	0.29
UA	G11	C	2021/05/12	Eh	V	0.39

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G11	C	2021/06/01	Eh	V	0.35
UA	G11	C	2021/06/14	Eh	V	0.34
UA	G11	C	2021/07/06	Eh	V	0.27
UA	G11	C	2021/07/20	Eh	V	0.33
UA	G11	C	2022/07/23	Eh	V	0.32
UA	G11	C	2023/03/08	Eh	V	0.36
UA	G11	C	2023/05/03	Eh	V	0.40
UA	G11	C	2023/09/26	Eh	V	0.29
UA	G11	C	2023/10/24	Eh	V	0.32
UA	G11	C	2021/03/04	Alkalinity, bicarbonate	mg/L CaCO3	108
UA	G11	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	101
UA	G11	C	2021/04/14	Alkalinity, bicarbonate	mg/L CaCO3	94.0
UA	G11	C	2021/05/12	Alkalinity, bicarbonate	mg/L CaCO3	86.0
UA	G11	C	2021/06/01	Alkalinity, bicarbonate	mg/L CaCO3	91.0
UA	G11	C	2021/06/14	Alkalinity, bicarbonate	mg/L CaCO3	98.0
UA	G11	C	2021/07/06	Alkalinity, bicarbonate	mg/L CaCO3	96.0
UA	G11	C	2021/07/20	Alkalinity, bicarbonate	mg/L CaCO3	94.0
UA	G11	C	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	89.0
UA	G11	C	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	90.0
UA	G11	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	81.0
UA	G11	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	94.0
UA	G11	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	87.0
UA	G11	C	2021/03/04	Barium, total	mg/L	0.0287
UA	G11	C	2021/03/24	Barium, total	mg/L	0.0244
UA	G11	C	2021/04/14	Barium, total	mg/L	0.0195
UA	G11	C	2021/05/12	Barium, total	mg/L	0.0167
UA	G11	C	2021/06/01	Barium, total	mg/L	0.0166
UA	G11	C	2021/06/14	Barium, total	mg/L	0.0139
UA	G11	C	2021/07/06	Barium, total	mg/L	0.0109
UA	G11	C	2021/07/20	Barium, total	mg/L	0.0119
UA	G11	C	2022/07/23	Barium, total	mg/L	0.0164
UA	G11	C	2023/03/08	Barium, total	mg/L	0.0146
UA	G11	C	2023/05/03	Barium, total	mg/L	0.0770
UA	G11	C	2023/09/26	Barium, total	mg/L	0.0231
UA	G11	C	2023/10/24	Barium, total	mg/L	0.0217
UA	G11	C	2021/03/04	Boron, total	mg/L	0.247
UA	G11	C	2021/03/24	Boron, total	mg/L	0.420
UA	G11	C	2021/04/14	Boron, total	mg/L	0.411
UA	G11	C	2021/05/12	Boron, total	mg/L	0.321
UA	G11	C	2021/06/01	Boron, total	mg/L	0.309
UA	G11	C	2021/06/14	Boron, total	mg/L	0.266
UA	G11	C	2021/07/06	Boron, total	mg/L	0.358
UA	G11	C	2021/07/20	Boron, total	mg/L	0.302
UA	G11	C	2022/07/23	Boron, total	mg/L	0.310
UA	G11	C	2023/03/08	Boron, total	mg/L	0.327
UA	G11	C	2023/05/03	Boron, total	mg/L	0.373
UA	G11	C	2023/09/26	Boron, total	mg/L	0.308
UA	G11	C	2023/10/24	Boron, total	mg/L	0.282
UA	G11	C	2021/03/04	Calcium, total	mg/L	125
UA	G11	C	2021/03/24	Calcium, total	mg/L	178
UA	G11	C	2021/04/14	Calcium, total	mg/L	177
UA	G11	C	2021/05/12	Calcium, total	mg/L	166
UA	G11	C	2021/06/01	Calcium, total	mg/L	165
UA	G11	C	2021/06/14	Calcium, total	mg/L	136
UA	G11	C	2021/07/06	Calcium, total	mg/L	135

Attachment I. Site Groundwater Data

Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G11	C	2021/07/20	Calcium, total	mg/L	149
UA	G11	C	2022/07/23	Calcium, total	mg/L	115
UA	G11	C	2023/03/08	Calcium, total	mg/L	75.6
UA	G11	C	2023/05/03	Calcium, total	mg/L	122
UA	G11	C	2023/09/26	Calcium, total	mg/L	59.9
UA	G11	C	2023/10/24	Calcium, total	mg/L	54.4
UA	G11	C	2021/03/04	Chloride, total	mg/L	44.0
UA	G11	C	2021/03/24	Chloride, total	mg/L	35.0
UA	G11	C	2021/04/14	Chloride, total	mg/L	33.0
UA	G11	C	2021/05/12	Chloride, total	mg/L	30.0
UA	G11	C	2021/06/01	Chloride, total	mg/L	33.0
UA	G11	C	2021/06/14	Chloride, total	mg/L	39.0
UA	G11	C	2021/07/06	Chloride, total	mg/L	42.0
UA	G11	C	2021/07/20	Chloride, total	mg/L	39.0
UA	G11	C	2022/07/23	Chloride, total	mg/L	44.0
UA	G11	C	2023/03/08	Chloride, total	mg/L	36.0
UA	G11	C	2023/05/03	Chloride, total	mg/L	37.0
UA	G11	C	2023/09/26	Chloride, total	mg/L	29.0
UA	G11	C	2023/10/24	Chloride, total	mg/L	30.0
UA	G11	C	2021/03/04	Cobalt, total	mg/L	0.00390
UA	G11	C	2021/03/24	Cobalt, total	mg/L	0.00790
UA	G11	C	2021/04/14	Cobalt, total	mg/L	0.00310
UA	G11	C	2021/05/12	Cobalt, total	mg/L	0.00393
UA	G11	C	2021/06/01	Cobalt, total	mg/L	0.00290
UA	G11	C	2021/06/14	Cobalt, total	mg/L	<0.0001
UA	G11	C	2021/07/06	Cobalt, total	mg/L	<0.0001
UA	G11	C	2021/07/20	Cobalt, total	mg/L	<0.0001
UA	G11	C	2022/07/23	Cobalt, total	mg/L	0.00200
UA	G11	C	2023/03/08	Cobalt, total	mg/L	0.00100
UA	G11	C	2023/05/03	Cobalt, total	mg/L	0.0185
UA	G11	C	2023/09/26	Cobalt, total	mg/L	0.000600
UA	G11	C	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G11	C	2023/05/03	Iron, dissolved	mg/L	<0.04
UA	G11	C	2023/09/26	Iron, dissolved	mg/L	0.171
UA	G11	C	2021/03/04	Magnesium, total	mg/L	41.6
UA	G11	C	2021/03/24	Magnesium, total	mg/L	72.4
UA	G11	C	2021/04/14	Magnesium, total	mg/L	65.6
UA	G11	C	2021/05/12	Magnesium, total	mg/L	67.7
UA	G11	C	2021/06/01	Magnesium, total	mg/L	58.6
UA	G11	C	2021/06/14	Magnesium, total	mg/L	49.2
UA	G11	C	2021/07/06	Magnesium, total	mg/L	48.3
UA	G11	C	2021/07/20	Magnesium, total	mg/L	51.8
UA	G11	C	2022/07/23	Magnesium, total	mg/L	40.9
UA	G11	C	2023/03/08	Magnesium, total	mg/L	27.8
UA	G11	C	2023/05/03	Magnesium, total	mg/L	43.2
UA	G11	C	2023/09/26	Magnesium, total	mg/L	21.3
UA	G11	C	2023/10/24	Magnesium, total	mg/L	19.8
UA	G11	C	2023/05/03	Manganese, dissolved	mg/L	0.0330
UA	G11	C	2023/09/26	Manganese, dissolved	mg/L	0.00590
UA	G11	C	2023/05/03	Phosphate, dissolved	mg/L	0.0740
UA	G11	C	2023/09/26	Phosphate, dissolved	mg/L	0.0950
UA	G11	C	2021/03/04	Potassium, total	mg/L	1.19
UA	G11	C	2021/03/24	Potassium, total	mg/L	2.10
UA	G11	C	2021/04/14	Potassium, total	mg/L	2.13
UA	G11	C	2021/05/12	Potassium, total	mg/L	2.47

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G11	C	2021/06/01	Potassium, total	mg/L	2.53
UA	G11	C	2021/06/14	Potassium, total	mg/L	1.60
UA	G11	C	2021/07/06	Potassium, total	mg/L	1.34
UA	G11	C	2021/07/20	Potassium, total	mg/L	1.14
UA	G11	C	2022/07/23	Potassium, total	mg/L	1.06
UA	G11	C	2023/03/08	Potassium, total	mg/L	0.952
UA	G11	C	2023/05/03	Potassium, total	mg/L	1.03
UA	G11	C	2023/09/26	Potassium, total	mg/L	1.01
UA	G11	C	2023/10/24	Potassium, total	mg/L	0.918
UA	G11	C	2023/05/03	Silicon, dissolved	mg/L	18.1
UA	G11	C	2023/09/26	Silicon, dissolved	mg/L	13.0
UA	G11	C	2021/03/04	Sodium, total	mg/L	61.4
UA	G11	C	2021/03/24	Sodium, total	mg/L	93.4
UA	G11	C	2021/04/14	Sodium, total	mg/L	94.1
UA	G11	C	2021/05/12	Sodium, total	mg/L	76.0
UA	G11	C	2021/06/01	Sodium, total	mg/L	66.1
UA	G11	C	2021/06/14	Sodium, total	mg/L	60.6
UA	G11	C	2021/07/06	Sodium, total	mg/L	60.2
UA	G11	C	2021/07/20	Sodium, total	mg/L	58.4
UA	G11	C	2022/07/23	Sodium, total	mg/L	54.7
UA	G11	C	2023/03/08	Sodium, total	mg/L	48.7
UA	G11	C	2023/05/03	Sodium, total	mg/L	62.5
UA	G11	C	2023/09/26	Sodium, total	mg/L	43.8
UA	G11	C	2023/10/24	Sodium, total	mg/L	43.2
UA	G11	C	2021/03/04	Sulfate, total	mg/L	400
UA	G11	C	2021/03/24	Sulfate, total	mg/L	658
UA	G11	C	2021/04/14	Sulfate, total	mg/L	761
UA	G11	C	2021/05/12	Sulfate, total	mg/L	730
UA	G11	C	2021/06/01	Sulfate, total	mg/L	671
UA	G11	C	2021/06/14	Sulfate, total	mg/L	505
UA	G11	C	2021/07/06	Sulfate, total	mg/L	474
UA	G11	C	2021/07/20	Sulfate, total	mg/L	487
UA	G11	C	2022/07/23	Sulfate, total	mg/L	352
UA	G11	C	2023/03/08	Sulfate, total	mg/L	303
UA	G11	C	2023/05/03	Sulfate, total	mg/L	416
UA	G11	C	2023/09/26	Sulfate, total	mg/L	192
UA	G11	C	2023/10/24	Sulfate, total	mg/L	180
UA	G11	C	2021/03/04	Temperature (Celsius)	degrees C	16.3
UA	G11	C	2021/03/24	Temperature (Celsius)	degrees C	16.5
UA	G11	C	2021/04/14	Temperature (Celsius)	degrees C	16.1
UA	G11	C	2021/05/12	Temperature (Celsius)	degrees C	16.5
UA	G11	C	2021/06/01	Temperature (Celsius)	degrees C	16.4
UA	G11	C	2021/06/14	Temperature (Celsius)	degrees C	16.6
UA	G11	C	2021/07/06	Temperature (Celsius)	degrees C	16.7
UA	G11	C	2021/07/20	Temperature (Celsius)	degrees C	16.9
UA	G11	C	2022/07/23	Temperature (Celsius)	degrees C	17.3
UA	G11	C	2023/03/08	Temperature (Celsius)	degrees C	16.0
UA	G11	C	2023/05/03	Temperature (Celsius)	degrees C	16.5
UA	G11	C	2023/09/26	Temperature (Celsius)	degrees C	17.8
UA	G11	C	2023/10/24	Temperature (Celsius)	degrees C	18.0
UA	G11	C	2021/03/04	Total Dissolved Solids	mg/L	804
UA	G11	C	2021/03/24	Total Dissolved Solids	mg/L	1,110
UA	G11	C	2021/04/14	Total Dissolved Solids	mg/L	1,200
UA	G11	C	2021/05/12	Total Dissolved Solids	mg/L	1,130
UA	G11	C	2021/06/01	Total Dissolved Solids	mg/L	1,120

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G11	C	2021/06/14	Total Dissolved Solids	mg/L	850
UA	G11	C	2021/07/06	Total Dissolved Solids	mg/L	862
UA	G11	C	2021/07/20	Total Dissolved Solids	mg/L	874
UA	G11	C	2022/07/23	Total Dissolved Solids	mg/L	766
UA	G11	C	2023/03/08	Total Dissolved Solids	mg/L	570
UA	G11	C	2023/05/03	Total Dissolved Solids	mg/L	808
UA	G11	C	2023/09/26	Total Dissolved Solids	mg/L	428
UA	G11	C	2023/10/24	Total Dissolved Solids	mg/L	402
UA	G51D	C	2015/12/03	pH (field)	SU	6.2
UA	G51D	C	2016/03/15	pH (field)	SU	5.9
UA	G51D	C	2016/06/15	pH (field)	SU	5.8
UA	G51D	C	2016/09/14	pH (field)	SU	5.6
UA	G51D	C	2016/12/14	pH (field)	SU	5.9
UA	G51D	C	2017/03/08	pH (field)	SU	6.2
UA	G51D	C	2017/06/15	pH (field)	SU	5.6
UA	G51D	C	2017/07/20	pH (field)	SU	5.9
UA	G51D	C	2017/11/30	pH (field)	SU	5.6
UA	G51D	C	2018/06/19	pH (field)	SU	5.7
UA	G51D	C	2018/09/05	pH (field)	SU	6.0
UA	G51D	C	2019/03/27	pH (field)	SU	5.7
UA	G51D	C	2019/09/09	pH (field)	SU	5.3
UA	G51D	C	2020/03/30	pH (field)	SU	5.6
UA	G51D	C	2020/09/23	pH (field)	SU	5.7
UA	G51D	C	2021/03/24	pH (field)	SU	5.6
UA	G51D	C	2021/09/20	pH (field)	SU	5.5
UA	G51D	C	2022/03/15	pH (field)	SU	5.6
UA	G51D	C	2022/07/25	pH (field)	SU	6.9
UA	G51D	C	2022/09/20	pH (field)	SU	5.6
UA	G51D	C	2023/03/08	pH (field)	SU	5.5
UA	G51D	C	2023/05/03	pH (field)	SU	5.6
UA	G51D	C	2023/09/25	pH (field)	SU	5.4
UA	G51D	C	2023/10/25	pH (field)	SU	5.3
UA	G51D	C	2015/12/03	Oxidation Reduction Potential	mV	133
UA	G51D	C	2016/03/15	Oxidation Reduction Potential	mV	122
UA	G51D	C	2016/06/15	Oxidation Reduction Potential	mV	213
UA	G51D	C	2016/09/14	Oxidation Reduction Potential	mV	231
UA	G51D	C	2016/12/14	Oxidation Reduction Potential	mV	134
UA	G51D	C	2017/03/08	Oxidation Reduction Potential	mV	282
UA	G51D	C	2017/06/15	Oxidation Reduction Potential	mV	168
UA	G51D	C	2017/07/20	Oxidation Reduction Potential	mV	180
UA	G51D	C	2017/11/30	Oxidation Reduction Potential	mV	168
UA	G51D	C	2018/06/19	Oxidation Reduction Potential	mV	247
UA	G51D	C	2018/09/05	Oxidation Reduction Potential	mV	217
UA	G51D	C	2019/03/27	Oxidation Reduction Potential	mV	130
UA	G51D	C	2019/09/09	Oxidation Reduction Potential	mV	157
UA	G51D	C	2020/03/30	Oxidation Reduction Potential	mV	261
UA	G51D	C	2020/09/23	Oxidation Reduction Potential	mV	292
UA	G51D	C	2021/03/24	Oxidation Reduction Potential	mV	136
UA	G51D	C	2021/09/20	Oxidation Reduction Potential	mV	238
UA	G51D	C	2022/03/15	Oxidation Reduction Potential	mV	165
UA	G51D	C	2022/07/25	Oxidation Reduction Potential	mV	178
UA	G51D	C	2022/09/20	Oxidation Reduction Potential	mV	215
UA	G51D	C	2023/03/08	Oxidation Reduction Potential	mV	166
UA	G51D	C	2023/05/03	Oxidation Reduction Potential	mV	214
UA	G51D	C	2023/09/25	Oxidation Reduction Potential	mV	139

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G51D	C	2023/10/25	Oxidation Reduction Potential	mV	170
UA	G51D	C	2015/12/03	Eh	V	0.33
UA	G51D	C	2016/03/15	Eh	V	0.32
UA	G51D	C	2016/06/15	Eh	V	0.41
UA	G51D	C	2016/09/14	Eh	V	0.42
UA	G51D	C	2016/12/14	Eh	V	0.33
UA	G51D	C	2017/03/08	Eh	V	0.48
UA	G51D	C	2017/06/15	Eh	V	0.36
UA	G51D	C	2017/07/20	Eh	V	0.37
UA	G51D	C	2017/11/30	Eh	V	0.36
UA	G51D	C	2018/06/19	Eh	V	0.44
UA	G51D	C	2018/09/05	Eh	V	0.41
UA	G51D	C	2019/03/27	Eh	V	0.32
UA	G51D	C	2019/09/09	Eh	V	0.35
UA	G51D	C	2020/03/30	Eh	V	0.46
UA	G51D	C	2020/09/23	Eh	V	0.49
UA	G51D	C	2021/03/24	Eh	V	0.33
UA	G51D	C	2021/09/20	Eh	V	0.43
UA	G51D	C	2022/03/15	Eh	V	0.36
UA	G51D	C	2022/07/25	Eh	V	0.37
UA	G51D	C	2022/09/20	Eh	V	0.41
UA	G51D	C	2023/03/08	Eh	V	0.36
UA	G51D	C	2023/05/03	Eh	V	0.41
UA	G51D	C	2023/09/25	Eh	V	0.33
UA	G51D	C	2023/10/25	Eh	V	0.36
UA	G51D	C	2017/07/20	Alkalinity, bicarbonate	mg/L CaCO3	52.0
UA	G51D	C	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	52.0
UA	G51D	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	54.0
UA	G51D	C	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	50.0
UA	G51D	C	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	53.0
UA	G51D	C	2022/07/25	Alkalinity, bicarbonate	mg/L CaCO3	46.0
UA	G51D	C	2023/03/08	Alkalinity, bicarbonate	mg/L CaCO3	46.0
UA	G51D	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G51D	C	2023/09/25	Alkalinity, bicarbonate	mg/L CaCO3	55.0
UA	G51D	C	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	52.0
UA	G51D	C	2015/12/03	Barium, total	mg/L	0.129
UA	G51D	C	2016/03/15	Barium, total	mg/L	0.0702
UA	G51D	C	2016/06/15	Barium, total	mg/L	0.0628
UA	G51D	C	2016/09/14	Barium, total	mg/L	0.0536
UA	G51D	C	2016/12/14	Barium, total	mg/L	0.0459
UA	G51D	C	2017/03/08	Barium, total	mg/L	0.0493
UA	G51D	C	2017/06/15	Barium, total	mg/L	0.0442
UA	G51D	C	2017/07/20	Barium, total	mg/L	0.0462
UA	G51D	C	2018/06/19	Barium, total	mg/L	0.0756
UA	G51D	C	2018/09/05	Barium, total	mg/L	0.0395
UA	G51D	C	2019/03/27	Barium, total	mg/L	0.0495
UA	G51D	C	2019/09/09	Barium, total	mg/L	0.0377
UA	G51D	C	2020/03/30	Barium, total	mg/L	0.0445
UA	G51D	C	2020/09/23	Barium, total	mg/L	0.0445
UA	G51D	C	2021/03/24	Barium, total	mg/L	0.0400
UA	G51D	C	2021/09/20	Barium, total	mg/L	0.0405
UA	G51D	C	2022/03/15	Barium, total	mg/L	0.0433
UA	G51D	C	2022/07/25	Barium, total	mg/L	0.0582
UA	G51D	C	2022/09/20	Barium, total	mg/L	0.0321
UA	G51D	C	2023/03/08	Barium, total	mg/L	0.0417

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G51D	C	2023/05/03	Barium, total	mg/L	0.273
UA	G51D	C	2023/09/25	Barium, total	mg/L	0.0349
UA	G51D	C	2023/10/25	Barium, total	mg/L	0.0433
UA	G51D	C	2015/12/03	Boron, total	mg/L	0.117
UA	G51D	C	2016/03/15	Boron, total	mg/L	0.184
UA	G51D	C	2016/06/15	Boron, total	mg/L	0.213
UA	G51D	C	2016/09/14	Boron, total	mg/L	0.263
UA	G51D	C	2016/12/14	Boron, total	mg/L	0.171
UA	G51D	C	2017/03/08	Boron, total	mg/L	0.309
UA	G51D	C	2017/06/15	Boron, total	mg/L	0.580
UA	G51D	C	2017/07/20	Boron, total	mg/L	0.332
UA	G51D	C	2017/11/30	Boron, total	mg/L	0.302
UA	G51D	C	2018/06/19	Boron, total	mg/L	0.337
UA	G51D	C	2018/09/05	Boron, total	mg/L	0.263
UA	G51D	C	2019/03/27	Boron, total	mg/L	0.778
UA	G51D	C	2019/09/09	Boron, total	mg/L	0.501
UA	G51D	C	2020/03/30	Boron, total	mg/L	0.697
UA	G51D	C	2020/09/23	Boron, total	mg/L	0.863
UA	G51D	C	2021/03/24	Boron, total	mg/L	0.786
UA	G51D	C	2021/09/20	Boron, total	mg/L	0.689
UA	G51D	C	2022/03/15	Boron, total	mg/L	0.689
UA	G51D	C	2022/07/25	Boron, total	mg/L	0.663
UA	G51D	C	2022/09/20	Boron, total	mg/L	0.551
UA	G51D	C	2023/03/08	Boron, total	mg/L	0.963
UA	G51D	C	2023/05/03	Boron, total	mg/L	0.0297
UA	G51D	C	2023/09/25	Boron, total	mg/L	0.899
UA	G51D	C	2023/10/25	Boron, total	mg/L	0.603
UA	G51D	C	2015/12/03	Calcium, total	mg/L	39.2
UA	G51D	C	2016/03/15	Calcium, total	mg/L	39.7
UA	G51D	C	2016/06/15	Calcium, total	mg/L	42.3
UA	G51D	C	2016/09/14	Calcium, total	mg/L	29.6
UA	G51D	C	2016/12/14	Calcium, total	mg/L	30.0
UA	G51D	C	2017/03/08	Calcium, total	mg/L	32.6
UA	G51D	C	2017/06/15	Calcium, total	mg/L	34.0
UA	G51D	C	2017/07/20	Calcium, total	mg/L	31.8
UA	G51D	C	2017/11/30	Calcium, total	mg/L	34.4
UA	G51D	C	2018/06/19	Calcium, total	mg/L	31.1
UA	G51D	C	2018/09/05	Calcium, total	mg/L	29.1
UA	G51D	C	2019/03/27	Calcium, total	mg/L	34.7
UA	G51D	C	2019/09/09	Calcium, total	mg/L	31.3
UA	G51D	C	2020/03/30	Calcium, total	mg/L	31.2
UA	G51D	C	2020/09/23	Calcium, total	mg/L	42.1
UA	G51D	C	2021/03/24	Calcium, total	mg/L	31.7
UA	G51D	C	2021/09/20	Calcium, total	mg/L	31.2
UA	G51D	C	2022/03/15	Calcium, total	mg/L	31.0
UA	G51D	C	2022/07/25	Calcium, total	mg/L	31.8
UA	G51D	C	2022/09/20	Calcium, total	mg/L	28.9
UA	G51D	C	2023/03/08	Calcium, total	mg/L	29.7
UA	G51D	C	2023/05/03	Calcium, total	mg/L	48.2
UA	G51D	C	2023/09/25	Calcium, total	mg/L	28.7
UA	G51D	C	2023/10/25	Calcium, total	mg/L	31.5
UA	G51D	C	2015/12/03	Chloride, total	mg/L	9.00
UA	G51D	C	2016/03/15	Chloride, total	mg/L	9.00
UA	G51D	C	2016/06/15	Chloride, total	mg/L	7.00
UA	G51D	C	2016/09/14	Chloride, total	mg/L	9.00

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G51D	C	2016/12/14	Chloride, total	mg/L	11.0
UA	G51D	C	2017/03/08	Chloride, total	mg/L	8.00
UA	G51D	C	2017/06/15	Chloride, total	mg/L	9.00
UA	G51D	C	2017/07/20	Chloride, total	mg/L	8.00
UA	G51D	C	2017/11/30	Chloride, total	mg/L	8.00
UA	G51D	C	2018/06/19	Chloride, total	mg/L	7.00
UA	G51D	C	2018/09/05	Chloride, total	mg/L	7.00
UA	G51D	C	2019/03/27	Chloride, total	mg/L	6.00
UA	G51D	C	2019/09/09	Chloride, total	mg/L	6.00
UA	G51D	C	2020/03/30	Chloride, total	mg/L	6.00
UA	G51D	C	2020/09/23	Chloride, total	mg/L	6.00
UA	G51D	C	2021/03/24	Chloride, total	mg/L	5.00
UA	G51D	C	2021/09/20	Chloride, total	mg/L	6.00
UA	G51D	C	2022/03/15	Chloride, total	mg/L	5.00
UA	G51D	C	2022/07/25	Chloride, total	mg/L	5.00
UA	G51D	C	2022/09/20	Chloride, total	mg/L	4.00
UA	G51D	C	2023/03/08	Chloride, total	mg/L	5.00
UA	G51D	C	2023/05/03	Chloride, total	mg/L	11.0
UA	G51D	C	2023/09/25	Chloride, total	mg/L	4.00
UA	G51D	C	2023/10/25	Chloride, total	mg/L	4.00
UA	G51D	C	2015/12/03	Cobalt, total	mg/L	0.0141
UA	G51D	C	2016/03/15	Cobalt, total	mg/L	0.0249
UA	G51D	C	2016/06/15	Cobalt, total	mg/L	0.0198
UA	G51D	C	2016/09/14	Cobalt, total	mg/L	0.0110
UA	G51D	C	2016/12/14	Cobalt, total	mg/L	0.0119
UA	G51D	C	2017/03/08	Cobalt, total	mg/L	0.00820
UA	G51D	C	2017/06/15	Cobalt, total	mg/L	0.00520
UA	G51D	C	2017/07/20	Cobalt, total	mg/L	0.00550
UA	G51D	C	2018/06/19	Cobalt, total	mg/L	0.00380
UA	G51D	C	2018/09/05	Cobalt, total	mg/L	0.00430
UA	G51D	C	2019/03/27	Cobalt, total	mg/L	0.00260
UA	G51D	C	2019/09/09	Cobalt, total	mg/L	0.00170
UA	G51D	C	2020/03/30	Cobalt, total	mg/L	0.00240
UA	G51D	C	2020/09/23	Cobalt, total	mg/L	0.00200
UA	G51D	C	2021/03/24	Cobalt, total	mg/L	0.00220
UA	G51D	C	2021/09/20	Cobalt, total	mg/L	0.00180
UA	G51D	C	2022/03/15	Cobalt, total	mg/L	0.00160
UA	G51D	C	2022/07/25	Cobalt, total	mg/L	0.00140
UA	G51D	C	2022/09/20	Cobalt, total	mg/L	0.000900
UA	G51D	C	2023/03/08	Cobalt, total	mg/L	0.000600
UA	G51D	C	2023/05/03	Cobalt, total	mg/L	0.00930
UA	G51D	C	2023/09/25	Cobalt, total	mg/L	0.000800
UA	G51D	C	2023/10/25	Cobalt, total	mg/L	<0.0001
UA	G51D	C	2023/05/03	Iron, dissolved	mg/L	0.785
UA	G51D	C	2023/09/25	Iron, dissolved	mg/L	1.31
UA	G51D	C	2017/07/20	Magnesium, total	mg/L	14.4
UA	G51D	C	2020/03/30	Magnesium, total	mg/L	13.4
UA	G51D	C	2021/03/24	Magnesium, total	mg/L	12.5
UA	G51D	C	2022/03/15	Magnesium, total	mg/L	12.9
UA	G51D	C	2022/07/25	Magnesium, total	mg/L	12.8
UA	G51D	C	2023/03/08	Magnesium, total	mg/L	12.3
UA	G51D	C	2023/05/03	Magnesium, total	mg/L	14.3
UA	G51D	C	2023/09/25	Magnesium, total	mg/L	12.2
UA	G51D	C	2023/10/25	Magnesium, total	mg/L	13.0
UA	G51D	C	2023/05/03	Manganese, dissolved	mg/L	0.290

Attachment I. Site Groundwater Data
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Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G51D	C	2023/09/25	Manganese, dissolved	mg/L	0.0239
UA	G51D	C	2023/05/03	Phosphate, dissolved	mg/L	0.249
UA	G51D	C	2023/09/25	Phosphate, dissolved	mg/L	<0.005
UA	G51D	C	2017/07/20	Potassium, total	mg/L	0.329
UA	G51D	C	2020/03/30	Potassium, total	mg/L	0.492
UA	G51D	C	2021/03/24	Potassium, total	mg/L	0.275
UA	G51D	C	2022/03/15	Potassium, total	mg/L	0.442
UA	G51D	C	2022/07/25	Potassium, total	mg/L	0.320
UA	G51D	C	2023/03/08	Potassium, total	mg/L	0.235
UA	G51D	C	2023/05/03	Potassium, total	mg/L	0.693
UA	G51D	C	2023/09/25	Potassium, total	mg/L	0.319
UA	G51D	C	2023/10/25	Potassium, total	mg/L	0.308
UA	G51D	C	2023/05/03	Silicon, dissolved	mg/L	19.9
UA	G51D	C	2023/09/25	Silicon, dissolved	mg/L	20.7
UA	G51D	C	2017/07/20	Sodium, total	mg/L	37.3
UA	G51D	C	2020/03/30	Sodium, total	mg/L	37.6
UA	G51D	C	2021/03/24	Sodium, total	mg/L	36.0
UA	G51D	C	2022/03/15	Sodium, total	mg/L	35.5
UA	G51D	C	2022/07/25	Sodium, total	mg/L	33.0
UA	G51D	C	2023/03/08	Sodium, total	mg/L	33.4
UA	G51D	C	2023/05/03	Sodium, total	mg/L	28.6
UA	G51D	C	2023/09/25	Sodium, total	mg/L	32.7
UA	G51D	C	2023/10/25	Sodium, total	mg/L	37.0
UA	G51D	C	2015/12/03	Sulfate, total	mg/L	117
UA	G51D	C	2016/03/15	Sulfate, total	mg/L	145
UA	G51D	C	2016/06/15	Sulfate, total	mg/L	139
UA	G51D	C	2016/09/14	Sulfate, total	mg/L	136
UA	G51D	C	2016/12/14	Sulfate, total	mg/L	101
UA	G51D	C	2017/03/08	Sulfate, total	mg/L	146
UA	G51D	C	2017/06/15	Sulfate, total	mg/L	149
UA	G51D	C	2017/07/20	Sulfate, total	mg/L	140
UA	G51D	C	2017/11/30	Sulfate, total	mg/L	138
UA	G51D	C	2018/06/19	Sulfate, total	mg/L	124
UA	G51D	C	2018/09/05	Sulfate, total	mg/L	134
UA	G51D	C	2019/03/27	Sulfate, total	mg/L	125
UA	G51D	C	2019/09/09	Sulfate, total	mg/L	109
UA	G51D	C	2020/03/30	Sulfate, total	mg/L	130
UA	G51D	C	2020/09/23	Sulfate, total	mg/L	121
UA	G51D	C	2021/03/24	Sulfate, total	mg/L	122
UA	G51D	C	2021/09/20	Sulfate, total	mg/L	131
UA	G51D	C	2022/03/15	Sulfate, total	mg/L	123
UA	G51D	C	2022/07/25	Sulfate, total	mg/L	116
UA	G51D	C	2022/09/20	Sulfate, total	mg/L	125
UA	G51D	C	2023/03/08	Sulfate, total	mg/L	131
UA	G51D	C	2023/05/03	Sulfate, total	mg/L	59.0
UA	G51D	C	2023/09/25	Sulfate, total	mg/L	127
UA	G51D	C	2023/10/25	Sulfate, total	mg/L	120
UA	G51D	C	2015/12/03	Temperature (Celsius)	degrees C	16.7
UA	G51D	C	2016/03/15	Temperature (Celsius)	degrees C	17.6
UA	G51D	C	2016/06/15	Temperature (Celsius)	degrees C	17.8
UA	G51D	C	2016/09/14	Temperature (Celsius)	degrees C	20.8
UA	G51D	C	2016/12/14	Temperature (Celsius)	degrees C	16.2
UA	G51D	C	2017/03/08	Temperature (Celsius)	degrees C	15.1
UA	G51D	C	2017/06/15	Temperature (Celsius)	degrees C	18.5
UA	G51D	C	2017/07/20	Temperature (Celsius)	degrees C	18.9

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G51D	C	2017/11/30	Temperature (Celsius)	degrees C	16.2
UA	G51D	C	2018/06/19	Temperature (Celsius)	degrees C	19.1
UA	G51D	C	2018/09/05	Temperature (Celsius)	degrees C	17.7
UA	G51D	C	2019/03/27	Temperature (Celsius)	degrees C	16.2
UA	G51D	C	2019/09/09	Temperature (Celsius)	degrees C	17.3
UA	G51D	C	2020/03/30	Temperature (Celsius)	degrees C	16.4
UA	G51D	C	2020/09/23	Temperature (Celsius)	degrees C	16.9
UA	G51D	C	2021/03/24	Temperature (Celsius)	degrees C	17.0
UA	G51D	C	2021/09/20	Temperature (Celsius)	degrees C	17.7
UA	G51D	C	2022/03/15	Temperature (Celsius)	degrees C	16.1
UA	G51D	C	2022/07/25	Temperature (Celsius)	degrees C	18.1
UA	G51D	C	2022/09/20	Temperature (Celsius)	degrees C	20.7
UA	G51D	C	2023/03/08	Temperature (Celsius)	degrees C	15.9
UA	G51D	C	2023/05/03	Temperature (Celsius)	degrees C	16.3
UA	G51D	C	2023/09/25	Temperature (Celsius)	degrees C	18.4
UA	G51D	C	2023/10/25	Temperature (Celsius)	degrees C	17.1
UA	G51D	C	2015/12/03	Total Dissolved Solids	mg/L	304
UA	G51D	C	2016/03/15	Total Dissolved Solids	mg/L	342
UA	G51D	C	2016/06/15	Total Dissolved Solids	mg/L	330
UA	G51D	C	2016/09/14	Total Dissolved Solids	mg/L	360
UA	G51D	C	2016/12/14	Total Dissolved Solids	mg/L	270
UA	G51D	C	2017/03/08	Total Dissolved Solids	mg/L	340
UA	G51D	C	2017/06/15	Total Dissolved Solids	mg/L	340
UA	G51D	C	2017/07/20	Total Dissolved Solids	mg/L	344
UA	G51D	C	2017/11/30	Total Dissolved Solids	mg/L	356
UA	G51D	C	2018/06/19	Total Dissolved Solids	mg/L	324
UA	G51D	C	2018/09/05	Total Dissolved Solids	mg/L	342
UA	G51D	C	2019/03/27	Total Dissolved Solids	mg/L	350
UA	G51D	C	2019/09/09	Total Dissolved Solids	mg/L	320
UA	G51D	C	2020/03/30	Total Dissolved Solids	mg/L	304
UA	G51D	C	2020/09/23	Total Dissolved Solids	mg/L	314
UA	G51D	C	2021/03/24	Total Dissolved Solids	mg/L	322
UA	G51D	C	2021/09/20	Total Dissolved Solids	mg/L	312
UA	G51D	C	2022/03/15	Total Dissolved Solids	mg/L	324
UA	G51D	C	2022/07/25	Total Dissolved Solids	mg/L	306
UA	G51D	C	2022/09/20	Total Dissolved Solids	mg/L	322
UA	G51D	C	2023/03/08	Total Dissolved Solids	mg/L	296
UA	G51D	C	2023/05/03	Total Dissolved Solids	mg/L	310
UA	G51D	C	2023/09/25	Total Dissolved Solids	mg/L	292
UA	G51D	C	2023/10/25	Total Dissolved Solids	mg/L	270
UA	G52D	C	2015/12/03	pH (field)	SU	6.5
UA	G52D	C	2016/03/15	pH (field)	SU	6.3
UA	G52D	C	2016/06/15	pH (field)	SU	6.6
UA	G52D	C	2016/09/14	pH (field)	SU	6.4
UA	G52D	C	2016/12/14	pH (field)	SU	6.7
UA	G52D	C	2017/03/07	pH (field)	SU	5.9
UA	G52D	C	2017/06/14	pH (field)	SU	6.2
UA	G52D	C	2017/07/19	pH (field)	SU	6.4
UA	G52D	C	2017/11/30	pH (field)	SU	6.0
UA	G52D	C	2018/06/19	pH (field)	SU	6.4
UA	G52D	C	2018/09/05	pH (field)	SU	6.3
UA	G52D	C	2019/03/27	pH (field)	SU	6.4
UA	G52D	C	2019/09/09	pH (field)	SU	6.0
UA	G52D	C	2020/03/30	pH (field)	SU	6.4
UA	G52D	C	2020/09/23	pH (field)	SU	6.5

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2021/03/25	pH (field)	SU	6.2
UA	G52D	C	2021/09/20	pH (field)	SU	6.3
UA	G52D	C	2022/03/15	pH (field)	SU	6.2
UA	G52D	C	2022/09/21	pH (field)	SU	6.3
UA	G52D	C	2023/03/10	pH (field)	SU	6.5
UA	G52D	C	2023/05/03	pH (field)	SU	6.3
UA	G52D	C	2023/09/26	pH (field)	SU	6.3
UA	G52D	C	2023/10/24	pH (field)	SU	6.3
UA	G52D	C	2015/12/03	Oxidation Reduction Potential	mV	-5.00
UA	G52D	C	2016/03/15	Oxidation Reduction Potential	mV	-81.0
UA	G52D	C	2016/06/15	Oxidation Reduction Potential	mV	-131
UA	G52D	C	2016/09/14	Oxidation Reduction Potential	mV	-76.0
UA	G52D	C	2016/12/14	Oxidation Reduction Potential	mV	104
UA	G52D	C	2017/03/07	Oxidation Reduction Potential	mV	26.0
UA	G52D	C	2017/06/14	Oxidation Reduction Potential	mV	61.0
UA	G52D	C	2017/07/19	Oxidation Reduction Potential	mV	-48.0
UA	G52D	C	2017/11/30	Oxidation Reduction Potential	mV	-59.0
UA	G52D	C	2018/06/19	Oxidation Reduction Potential	mV	-136
UA	G52D	C	2018/09/05	Oxidation Reduction Potential	mV	-49.0
UA	G52D	C	2019/03/27	Oxidation Reduction Potential	mV	-31.0
UA	G52D	C	2019/09/09	Oxidation Reduction Potential	mV	164
UA	G52D	C	2020/03/30	Oxidation Reduction Potential	mV	-12.0
UA	G52D	C	2020/09/23	Oxidation Reduction Potential	mV	-19.0
UA	G52D	C	2021/03/25	Oxidation Reduction Potential	mV	4.00
UA	G52D	C	2021/09/20	Oxidation Reduction Potential	mV	25.0
UA	G52D	C	2022/03/15	Oxidation Reduction Potential	mV	-48.0
UA	G52D	C	2022/09/21	Oxidation Reduction Potential	mV	122
UA	G52D	C	2023/03/10	Oxidation Reduction Potential	mV	26.7
UA	G52D	C	2023/05/03	Oxidation Reduction Potential	mV	68.0
UA	G52D	C	2023/09/26	Oxidation Reduction Potential	mV	55.0
UA	G52D	C	2023/10/24	Oxidation Reduction Potential	mV	<-300
UA	G52D	C	2015/12/03	Eh	V	0.19
UA	G52D	C	2016/03/15	Eh	V	0.11
UA	G52D	C	2016/06/15	Eh	V	0.061
UA	G52D	C	2016/09/14	Eh	V	0.12
UA	G52D	C	2016/12/14	Eh	V	0.30
UA	G52D	C	2017/03/07	Eh	V	0.22
UA	G52D	C	2017/06/14	Eh	V	0.25
UA	G52D	C	2017/07/19	Eh	V	0.14
UA	G52D	C	2017/11/30	Eh	V	0.14
UA	G52D	C	2018/06/19	Eh	V	0.058
UA	G52D	C	2018/09/05	Eh	V	0.15
UA	G52D	C	2019/03/27	Eh	V	0.16
UA	G52D	C	2019/09/09	Eh	V	0.36
UA	G52D	C	2020/03/30	Eh	V	0.18
UA	G52D	C	2020/09/23	Eh	V	0.18
UA	G52D	C	2021/03/25	Eh	V	0.20
UA	G52D	C	2021/09/20	Eh	V	0.22
UA	G52D	C	2022/03/15	Eh	V	0.15
UA	G52D	C	2022/09/21	Eh	V	0.32
UA	G52D	C	2023/03/10	Eh	V	0.22
UA	G52D	C	2023/05/03	Eh	V	0.26
UA	G52D	C	2023/09/26	Eh	V	0.25
UA	G52D	C	2023/10/24	Eh	V	-0.11
UA	G52D	C	2017/07/19	Alkalinity, bicarbonate	mg/L CaCO3	148

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HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G52D	C	2021/03/25	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G52D	C	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G52D	C	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	151
UA	G52D	C	2023/03/10	Alkalinity, bicarbonate	mg/L CaCO3	156
UA	G52D	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	53.0
UA	G52D	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G52D	C	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G52D	C	2015/12/03	Barium, total	mg/L	0.318
UA	G52D	C	2016/03/15	Barium, total	mg/L	0.345
UA	G52D	C	2016/06/15	Barium, total	mg/L	0.506
UA	G52D	C	2016/09/14	Barium, total	mg/L	0.362
UA	G52D	C	2016/12/14	Barium, total	mg/L	0.356
UA	G52D	C	2017/03/07	Barium, total	mg/L	0.358
UA	G52D	C	2017/06/14	Barium, total	mg/L	0.289
UA	G52D	C	2017/07/19	Barium, total	mg/L	0.293
UA	G52D	C	2018/06/19	Barium, total	mg/L	0.340
UA	G52D	C	2018/09/05	Barium, total	mg/L	0.275
UA	G52D	C	2019/03/27	Barium, total	mg/L	0.271
UA	G52D	C	2019/09/09	Barium, total	mg/L	0.254
UA	G52D	C	2020/03/30	Barium, total	mg/L	0.254
UA	G52D	C	2020/09/23	Barium, total	mg/L	0.278
UA	G52D	C	2021/03/25	Barium, total	mg/L	0.254
UA	G52D	C	2021/09/20	Barium, total	mg/L	0.232
UA	G52D	C	2022/03/15	Barium, total	mg/L	0.208
UA	G52D	C	2022/09/21	Barium, total	mg/L	0.225
UA	G52D	C	2023/03/10	Barium, total	mg/L	0.307
UA	G52D	C	2023/05/03	Barium, total	mg/L	0.0461
UA	G52D	C	2023/09/26	Barium, total	mg/L	0.250
UA	G52D	C	2023/10/24	Barium, total	mg/L	0.354
UA	G52D	C	2015/12/03	Boron, total	mg/L	<0.01
UA	G52D	C	2016/03/15	Boron, total	mg/L	<0.01
UA	G52D	C	2016/06/15	Boron, total	mg/L	<0.01
UA	G52D	C	2016/09/14	Boron, total	mg/L	<0.01
UA	G52D	C	2016/12/14	Boron, total	mg/L	<0.01
UA	G52D	C	2017/03/07	Boron, total	mg/L	<0.01
UA	G52D	C	2017/06/14	Boron, total	mg/L	<0.01
UA	G52D	C	2017/07/19	Boron, total	mg/L	<0.01
UA	G52D	C	2017/11/30	Boron, total	mg/L	<0.01
UA	G52D	C	2018/06/19	Boron, total	mg/L	<0.0092
UA	G52D	C	2018/09/05	Boron, total	mg/L	<0.0092
UA	G52D	C	2019/03/27	Boron, total	mg/L	<0.0092
UA	G52D	C	2019/09/09	Boron, total	mg/L	<0.0092
UA	G52D	C	2020/03/30	Boron, total	mg/L	<0.0092
UA	G52D	C	2020/09/23	Boron, total	mg/L	<0.0092
UA	G52D	C	2021/03/25	Boron, total	mg/L	<0.0092
UA	G52D	C	2021/09/20	Boron, total	mg/L	<0.0092
UA	G52D	C	2022/03/15	Boron, total	mg/L	<0.0092
UA	G52D	C	2022/09/21	Boron, total	mg/L	0.0110
UA	G52D	C	2023/03/10	Boron, total	mg/L	0.0319
UA	G52D	C	2023/05/03	Boron, total	mg/L	0.682
UA	G52D	C	2023/09/26	Boron, total	mg/L	<0.0092
UA	G52D	C	2023/10/24	Boron, total	mg/L	0.0210
UA	G52D	C	2015/12/03	Calcium, total	mg/L	46.6
UA	G52D	C	2016/03/15	Calcium, total	mg/L	49.1

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2016/06/15	Calcium, total	mg/L	69.2
UA	G52D	C	2016/09/14	Calcium, total	mg/L	47.6
UA	G52D	C	2016/12/14	Calcium, total	mg/L	53.4
UA	G52D	C	2017/03/07	Calcium, total	mg/L	55.0
UA	G52D	C	2017/06/14	Calcium, total	mg/L	51.0
UA	G52D	C	2017/07/19	Calcium, total	mg/L	50.7
UA	G52D	C	2017/11/30	Calcium, total	mg/L	54.7
UA	G52D	C	2018/06/19	Calcium, total	mg/L	50.1
UA	G52D	C	2018/09/05	Calcium, total	mg/L	49.8
UA	G52D	C	2019/03/27	Calcium, total	mg/L	59.8
UA	G52D	C	2019/09/09	Calcium, total	mg/L	52.2
UA	G52D	C	2020/03/30	Calcium, total	mg/L	48.8
UA	G52D	C	2020/09/23	Calcium, total	mg/L	59.0
UA	G52D	C	2021/03/25	Calcium, total	mg/L	48.6
UA	G52D	C	2021/09/20	Calcium, total	mg/L	47.8
UA	G52D	C	2022/03/15	Calcium, total	mg/L	48.3
UA	G52D	C	2022/09/21	Calcium, total	mg/L	45.6
UA	G52D	C	2023/03/10	Calcium, total	mg/L	49.3
UA	G52D	C	2023/05/03	Calcium, total	mg/L	28.8
UA	G52D	C	2023/09/26	Calcium, total	mg/L	44.8
UA	G52D	C	2023/10/24	Calcium, total	mg/L	47.9
UA	G52D	C	2015/12/03	Chloride, total	mg/L	22.0
UA	G52D	C	2016/03/15	Chloride, total	mg/L	22.0
UA	G52D	C	2016/06/15	Chloride, total	mg/L	21.0
UA	G52D	C	2016/09/14	Chloride, total	mg/L	20.0
UA	G52D	C	2016/12/14	Chloride, total	mg/L	20.0
UA	G52D	C	2017/03/07	Chloride, total	mg/L	18.0
UA	G52D	C	2017/06/14	Chloride, total	mg/L	17.0
UA	G52D	C	2017/07/19	Chloride, total	mg/L	15.0
UA	G52D	C	2017/11/30	Chloride, total	mg/L	15.0
UA	G52D	C	2018/06/19	Chloride, total	mg/L	15.0
UA	G52D	C	2018/09/05	Chloride, total	mg/L	14.0
UA	G52D	C	2019/03/27	Chloride, total	mg/L	13.0
UA	G52D	C	2019/09/09	Chloride, total	mg/L	14.0
UA	G52D	C	2020/03/30	Chloride, total	mg/L	14.0
UA	G52D	C	2020/09/23	Chloride, total	mg/L	15.0
UA	G52D	C	2021/03/25	Chloride, total	mg/L	14.0
UA	G52D	C	2021/09/20	Chloride, total	mg/L	13.0
UA	G52D	C	2022/03/15	Chloride, total	mg/L	12.0
UA	G52D	C	2022/09/21	Chloride, total	mg/L	12.0
UA	G52D	C	2023/03/10	Chloride, total	mg/L	12.0
UA	G52D	C	2023/05/03	Chloride, total	mg/L	5.00
UA	G52D	C	2023/09/26	Chloride, total	mg/L	11.0
UA	G52D	C	2023/10/24	Chloride, total	mg/L	12.0
UA	G52D	C	2015/12/03	Cobalt, total	mg/L	0.00560
UA	G52D	C	2016/03/15	Cobalt, total	mg/L	0.00640
UA	G52D	C	2016/06/15	Cobalt, total	mg/L	0.00930
UA	G52D	C	2016/09/14	Cobalt, total	mg/L	0.00630
UA	G52D	C	2016/12/14	Cobalt, total	mg/L	0.00300
UA	G52D	C	2017/03/07	Cobalt, total	mg/L	0.00720
UA	G52D	C	2017/06/14	Cobalt, total	mg/L	0.00620
UA	G52D	C	2017/07/19	Cobalt, total	mg/L	0.00130
UA	G52D	C	2018/06/19	Cobalt, total	mg/L	0.00450
UA	G52D	C	2018/09/05	Cobalt, total	mg/L	0.00190
UA	G52D	C	2019/03/27	Cobalt, total	mg/L	0.00690

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2019/09/09	Cobalt, total	mg/L	0.00220
UA	G52D	C	2020/03/30	Cobalt, total	mg/L	0.00330
UA	G52D	C	2020/09/23	Cobalt, total	mg/L	0.00150
UA	G52D	C	2021/03/25	Cobalt, total	mg/L	0.00160
UA	G52D	C	2021/09/20	Cobalt, total	mg/L	0.00110
UA	G52D	C	2022/03/15	Cobalt, total	mg/L	0.00630
UA	G52D	C	2022/09/21	Cobalt, total	mg/L	0.00440
UA	G52D	C	2023/03/10	Cobalt, total	mg/L	0.00220
UA	G52D	C	2023/05/03	Cobalt, total	mg/L	0.00240
UA	G52D	C	2023/09/26	Cobalt, total	mg/L	0.00420
UA	G52D	C	2023/10/24	Cobalt, total	mg/L	0.00340
UA	G52D	C	2023/05/03	Iron, dissolved	mg/L	<0.04
UA	G52D	C	2023/09/26	Iron, dissolved	mg/L	2.56
UA	G52D	C	2017/07/19	Magnesium, total	mg/L	17.0
UA	G52D	C	2020/03/30	Magnesium, total	mg/L	15.3
UA	G52D	C	2021/03/25	Magnesium, total	mg/L	14.6
UA	G52D	C	2022/03/15	Magnesium, total	mg/L	15.1
UA	G52D	C	2023/03/10	Magnesium, total	mg/L	15.3
UA	G52D	C	2023/05/03	Magnesium, total	mg/L	12.1
UA	G52D	C	2023/09/26	Magnesium, total	mg/L	14.3
UA	G52D	C	2023/10/24	Magnesium, total	mg/L	15.0
UA	G52D	C	2023/05/03	Manganese, dissolved	mg/L	0.0132
UA	G52D	C	2023/09/26	Manganese, dissolved	mg/L	0.193
UA	G52D	C	2023/05/03	Phosphate, dissolved	mg/L	0.0580
UA	G52D	C	2023/09/26	Phosphate, dissolved	mg/L	0.215
UA	G52D	C	2017/07/19	Potassium, total	mg/L	0.745
UA	G52D	C	2020/03/30	Potassium, total	mg/L	0.858
UA	G52D	C	2021/03/25	Potassium, total	mg/L	0.697
UA	G52D	C	2022/03/15	Potassium, total	mg/L	0.743
UA	G52D	C	2023/03/10	Potassium, total	mg/L	0.768
UA	G52D	C	2023/05/03	Potassium, total	mg/L	0.493
UA	G52D	C	2023/09/26	Potassium, total	mg/L	0.702
UA	G52D	C	2023/10/24	Potassium, total	mg/L	0.808
UA	G52D	C	2023/05/03	Silicon, dissolved	mg/L	21.0
UA	G52D	C	2023/09/26	Silicon, dissolved	mg/L	20.7
UA	G52D	C	2017/07/19	Sodium, total	mg/L	34.8
UA	G52D	C	2020/03/30	Sodium, total	mg/L	32.4
UA	G52D	C	2021/03/25	Sodium, total	mg/L	29.2
UA	G52D	C	2022/03/15	Sodium, total	mg/L	29.0
UA	G52D	C	2023/03/10	Sodium, total	mg/L	27.7
UA	G52D	C	2023/05/03	Sodium, total	mg/L	36.1
UA	G52D	C	2023/09/26	Sodium, total	mg/L	26.2
UA	G52D	C	2023/10/24	Sodium, total	mg/L	29.9
UA	G52D	C	2015/12/03	Sulfate, total	mg/L	65.0
UA	G52D	C	2016/03/15	Sulfate, total	mg/L	99.0
UA	G52D	C	2016/06/15	Sulfate, total	mg/L	88.0
UA	G52D	C	2016/09/14	Sulfate, total	mg/L	84.0
UA	G52D	C	2016/12/14	Sulfate, total	mg/L	82.0
UA	G52D	C	2017/03/07	Sulfate, total	mg/L	115
UA	G52D	C	2017/06/14	Sulfate, total	mg/L	112
UA	G52D	C	2017/07/19	Sulfate, total	mg/L	108
UA	G52D	C	2017/11/30	Sulfate, total	mg/L	97.0
UA	G52D	C	2018/06/19	Sulfate, total	mg/L	97.0
UA	G52D	C	2018/09/05	Sulfate, total	mg/L	101
UA	G52D	C	2019/03/27	Sulfate, total	mg/L	81.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2019/09/09	Sulfate, total	mg/L	78.0
UA	G52D	C	2020/03/30	Sulfate, total	mg/L	84.0
UA	G52D	C	2020/09/23	Sulfate, total	mg/L	84.0
UA	G52D	C	2021/03/25	Sulfate, total	mg/L	75.0
UA	G52D	C	2021/09/20	Sulfate, total	mg/L	83.0
UA	G52D	C	2022/03/15	Sulfate, total	mg/L	68.0
UA	G52D	C	2022/09/21	Sulfate, total	mg/L	72.0
UA	G52D	C	2023/03/10	Sulfate, total	mg/L	74.0
UA	G52D	C	2023/05/03	Sulfate, total	mg/L	129
UA	G52D	C	2023/09/26	Sulfate, total	mg/L	52.0
UA	G52D	C	2023/10/24	Sulfate, total	mg/L	52.0
UA	G52D	C	2015/12/03	Temperature (Celsius)	degrees C	15.4
UA	G52D	C	2016/03/15	Temperature (Celsius)	degrees C	17.9
UA	G52D	C	2016/06/15	Temperature (Celsius)	degrees C	19.6
UA	G52D	C	2016/09/14	Temperature (Celsius)	degrees C	19.0
UA	G52D	C	2016/12/14	Temperature (Celsius)	degrees C	16.1
UA	G52D	C	2017/03/07	Temperature (Celsius)	degrees C	14.1
UA	G52D	C	2017/06/14	Temperature (Celsius)	degrees C	24.1
UA	G52D	C	2017/07/19	Temperature (Celsius)	degrees C	23.8
UA	G52D	C	2017/11/30	Temperature (Celsius)	degrees C	14.8
UA	G52D	C	2018/06/19	Temperature (Celsius)	degrees C	17
UA	G52D	C	2018/09/05	Temperature (Celsius)	degrees C	17.1
UA	G52D	C	2019/03/27	Temperature (Celsius)	degrees C	14.8
UA	G52D	C	2019/09/09	Temperature (Celsius)	degrees C	17.3
UA	G52D	C	2020/03/30	Temperature (Celsius)	degrees C	15.2
UA	G52D	C	2020/09/23	Temperature (Celsius)	degrees C	15.7
UA	G52D	C	2021/03/25	Temperature (Celsius)	degrees C	15.3
UA	G52D	C	2021/09/20	Temperature (Celsius)	degrees C	18.2
UA	G52D	C	2022/03/15	Temperature (Celsius)	degrees C	14.7
UA	G52D	C	2022/09/21	Temperature (Celsius)	degrees C	17.4
UA	G52D	C	2023/03/10	Temperature (Celsius)	degrees C	14.8
UA	G52D	C	2023/05/03	Temperature (Celsius)	degrees C	16.7
UA	G52D	C	2023/09/26	Temperature (Celsius)	degrees C	15.9
UA	G52D	C	2023/10/24	Temperature (Celsius)	degrees C	16.6
UA	G52D	C	2015/12/03	Total Dissolved Solids	mg/L	332
UA	G52D	C	2016/03/15	Total Dissolved Solids	mg/L	310
UA	G52D	C	2016/06/15	Total Dissolved Solids	mg/L	360
UA	G52D	C	2016/09/14	Total Dissolved Solids	mg/L	376
UA	G52D	C	2016/12/14	Total Dissolved Solids	mg/L	356
UA	G52D	C	2017/03/07	Total Dissolved Solids	mg/L	410
UA	G52D	C	2017/06/14	Total Dissolved Solids	mg/L	372
UA	G52D	C	2017/07/19	Total Dissolved Solids	mg/L	412
UA	G52D	C	2017/11/30	Total Dissolved Solids	mg/L	392
UA	G52D	C	2018/06/19	Total Dissolved Solids	mg/L	388
UA	G52D	C	2018/09/05	Total Dissolved Solids	mg/L	384
UA	G52D	C	2019/03/27	Total Dissolved Solids	mg/L	376
UA	G52D	C	2019/09/09	Total Dissolved Solids	mg/L	370
UA	G52D	C	2020/03/30	Total Dissolved Solids	mg/L	362
UA	G52D	C	2020/09/23	Total Dissolved Solids	mg/L	336
UA	G52D	C	2021/03/25	Total Dissolved Solids	mg/L	332
UA	G52D	C	2021/09/20	Total Dissolved Solids	mg/L	318
UA	G52D	C	2022/03/15	Total Dissolved Solids	mg/L	350
UA	G52D	C	2022/09/21	Total Dissolved Solids	mg/L	334
UA	G52D	C	2023/03/10	Total Dissolved Solids	mg/L	292
UA	G52D	C	2023/05/03	Total Dissolved Solids	mg/L	296

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G52D	C	2023/09/26	Total Dissolved Solids	mg/L	282
UA	G52D	C	2023/10/24	Total Dissolved Solids	mg/L	296
UA	G53D	C	2015/12/03	pH (field)	SU	6.8
UA	G53D	C	2016/03/15	pH (field)	SU	6.7
UA	G53D	C	2016/06/15	pH (field)	SU	6.6
UA	G53D	C	2016/09/14	pH (field)	SU	6.5
UA	G53D	C	2016/12/14	pH (field)	SU	6.8
UA	G53D	C	2017/03/08	pH (field)	SU	7.2
UA	G53D	C	2017/06/15	pH (field)	SU	6.6
UA	G53D	C	2017/07/20	pH (field)	SU	6.8
UA	G53D	C	2017/11/30	pH (field)	SU	6.6
UA	G53D	C	2018/06/19	pH (field)	SU	6.6
UA	G53D	C	2018/09/05	pH (field)	SU	6.8
UA	G53D	C	2019/03/27	pH (field)	SU	6.6
UA	G53D	C	2019/09/09	pH (field)	SU	6.2
UA	G53D	C	2020/03/30	pH (field)	SU	6.7
UA	G53D	C	2020/09/23	pH (field)	SU	6.7
UA	G53D	C	2021/03/25	pH (field)	SU	6.5
UA	G53D	C	2021/09/20	pH (field)	SU	6.3
UA	G53D	C	2022/03/15	pH (field)	SU	6.5
UA	G53D	C	2022/07/25	pH (field)	SU	7.9
UA	G53D	C	2022/09/20	pH (field)	SU	6.5
UA	G53D	C	2023/03/09	pH (field)	SU	6.5
UA	G53D	C	2023/05/03	pH (field)	SU	6.5
UA	G53D	C	2023/09/27	pH (field)	SU	6.5
UA	G53D	C	2023/10/25	pH (field)	SU	6.5
UA	G53D	C	2015/12/03	Oxidation Reduction Potential	mV	45.0
UA	G53D	C	2016/03/15	Oxidation Reduction Potential	mV	64.0
UA	G53D	C	2016/06/15	Oxidation Reduction Potential	mV	112
UA	G53D	C	2016/09/14	Oxidation Reduction Potential	mV	189
UA	G53D	C	2016/12/14	Oxidation Reduction Potential	mV	70.0
UA	G53D	C	2017/03/08	Oxidation Reduction Potential	mV	251
UA	G53D	C	2017/06/15	Oxidation Reduction Potential	mV	200
UA	G53D	C	2017/07/20	Oxidation Reduction Potential	mV	100
UA	G53D	C	2017/11/30	Oxidation Reduction Potential	mV	85.0
UA	G53D	C	2018/06/19	Oxidation Reduction Potential	mV	151
UA	G53D	C	2018/09/05	Oxidation Reduction Potential	mV	37.0
UA	G53D	C	2019/03/27	Oxidation Reduction Potential	mV	172
UA	G53D	C	2019/09/09	Oxidation Reduction Potential	mV	171
UA	G53D	C	2020/03/30	Oxidation Reduction Potential	mV	141
UA	G53D	C	2020/09/23	Oxidation Reduction Potential	mV	101
UA	G53D	C	2021/03/25	Oxidation Reduction Potential	mV	138
UA	G53D	C	2021/09/20	Oxidation Reduction Potential	mV	66.0
UA	G53D	C	2022/03/15	Oxidation Reduction Potential	mV	5.00
UA	G53D	C	2022/07/25	Oxidation Reduction Potential	mV	-16.0
UA	G53D	C	2022/09/20	Oxidation Reduction Potential	mV	183
UA	G53D	C	2023/03/09	Oxidation Reduction Potential	mV	3.60
UA	G53D	C	2023/05/03	Oxidation Reduction Potential	mV	137
UA	G53D	C	2023/09/27	Oxidation Reduction Potential	mV	-23.0
UA	G53D	C	2023/10/25	Oxidation Reduction Potential	mV	49.0
UA	G53D	C	2015/12/03	Eh	V	0.24
UA	G53D	C	2016/03/15	Eh	V	0.26
UA	G53D	C	2016/06/15	Eh	V	0.31
UA	G53D	C	2016/09/14	Eh	V	0.38
UA	G53D	C	2016/12/14	Eh	V	0.26

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G53D	C	2017/03/08	Eh	V	0.45
UA	G53D	C	2017/06/15	Eh	V	0.39
UA	G53D	C	2017/07/20	Eh	V	0.29
UA	G53D	C	2017/11/30	Eh	V	0.28
UA	G53D	C	2018/06/19	Eh	V	0.34
UA	G53D	C	2018/09/05	Eh	V	0.23
UA	G53D	C	2019/03/27	Eh	V	0.37
UA	G53D	C	2019/09/09	Eh	V	0.36
UA	G53D	C	2020/03/30	Eh	V	0.34
UA	G53D	C	2020/09/23	Eh	V	0.30
UA	G53D	C	2021/03/25	Eh	V	0.33
UA	G53D	C	2021/09/20	Eh	V	0.26
UA	G53D	C	2022/03/15	Eh	V	0.20
UA	G53D	C	2022/07/25	Eh	V	0.18
UA	G53D	C	2022/09/20	Eh	V	0.38
UA	G53D	C	2023/03/09	Eh	V	0.20
UA	G53D	C	2023/05/03	Eh	V	0.33
UA	G53D	C	2023/09/27	Eh	V	0.17
UA	G53D	C	2023/10/25	Eh	V	0.24
UA	G53D	C	2017/07/20	Alkalinity, bicarbonate	mg/L CaCO3	194
UA	G53D	C	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	160
UA	G53D	C	2021/03/25	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G53D	C	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	171
UA	G53D	C	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	176
UA	G53D	C	2022/07/25	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G53D	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G53D	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	170
UA	G53D	C	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G53D	C	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	170
UA	G53D	C	2015/12/03	Barium, total	mg/L	0.353
UA	G53D	C	2016/03/15	Barium, total	mg/L	0.279
UA	G53D	C	2016/06/15	Barium, total	mg/L	0.207
UA	G53D	C	2016/09/14	Barium, total	mg/L	0.191
UA	G53D	C	2016/12/14	Barium, total	mg/L	0.169
UA	G53D	C	2017/03/08	Barium, total	mg/L	0.109
UA	G53D	C	2017/06/15	Barium, total	mg/L	0.172
UA	G53D	C	2017/07/20	Barium, total	mg/L	0.165
UA	G53D	C	2018/06/19	Barium, total	mg/L	0.176
UA	G53D	C	2018/09/05	Barium, total	mg/L	0.133
UA	G53D	C	2019/03/27	Barium, total	mg/L	0.101
UA	G53D	C	2019/09/09	Barium, total	mg/L	0.128
UA	G53D	C	2020/03/30	Barium, total	mg/L	0.109
UA	G53D	C	2020/09/23	Barium, total	mg/L	0.122
UA	G53D	C	2021/03/25	Barium, total	mg/L	0.112
UA	G53D	C	2021/09/20	Barium, total	mg/L	0.103
UA	G53D	C	2022/03/15	Barium, total	mg/L	0.0922
UA	G53D	C	2022/07/25	Barium, total	mg/L	0.0913
UA	G53D	C	2022/09/20	Barium, total	mg/L	0.109
UA	G53D	C	2023/03/09	Barium, total	mg/L	0.101
UA	G53D	C	2023/05/03	Barium, total	mg/L	0.102
UA	G53D	C	2023/09/27	Barium, total	mg/L	0.0910
UA	G53D	C	2023/10/25	Barium, total	mg/L	0.107
UA	G53D	C	2015/12/03	Boron, total	mg/L	0.332
UA	G53D	C	2016/03/15	Boron, total	mg/L	0.334
UA	G53D	C	2016/06/15	Boron, total	mg/L	0.342

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G53D	C	2016/09/14	Boron, total	mg/L	0.368
UA	G53D	C	2016/12/14	Boron, total	mg/L	0.364
UA	G53D	C	2017/03/08	Boron, total	mg/L	0.138
UA	G53D	C	2017/06/15	Boron, total	mg/L	0.309
UA	G53D	C	2017/07/20	Boron, total	mg/L	0.366
UA	G53D	C	2017/11/30	Boron, total	mg/L	0.427
UA	G53D	C	2018/06/19	Boron, total	mg/L	0.361
UA	G53D	C	2018/09/05	Boron, total	mg/L	0.392
UA	G53D	C	2019/03/27	Boron, total	mg/L	0.269
UA	G53D	C	2019/09/09	Boron, total	mg/L	0.385
UA	G53D	C	2020/03/30	Boron, total	mg/L	0.334
UA	G53D	C	2020/09/23	Boron, total	mg/L	0.411
UA	G53D	C	2021/03/25	Boron, total	mg/L	0.355
UA	G53D	C	2021/09/20	Boron, total	mg/L	0.402
UA	G53D	C	2022/03/15	Boron, total	mg/L	0.332
UA	G53D	C	2022/07/25	Boron, total	mg/L	0.341
UA	G53D	C	2022/09/20	Boron, total	mg/L	0.431
UA	G53D	C	2023/03/09	Boron, total	mg/L	0.370
UA	G53D	C	2023/05/03	Boron, total	mg/L	0.367
UA	G53D	C	2023/09/27	Boron, total	mg/L	0.371
UA	G53D	C	2023/10/25	Boron, total	mg/L	0.349
UA	G53D	C	2015/12/03	Calcium, total	mg/L	62.6
UA	G53D	C	2016/03/15	Calcium, total	mg/L	50.5
UA	G53D	C	2016/06/15	Calcium, total	mg/L	47.2
UA	G53D	C	2016/09/14	Calcium, total	mg/L	44.4
UA	G53D	C	2016/12/14	Calcium, total	mg/L	44.5
UA	G53D	C	2017/03/08	Calcium, total	mg/L	23.6
UA	G53D	C	2017/06/15	Calcium, total	mg/L	38.9
UA	G53D	C	2017/07/20	Calcium, total	mg/L	40.8
UA	G53D	C	2017/11/30	Calcium, total	mg/L	44.6
UA	G53D	C	2018/06/19	Calcium, total	mg/L	37.8
UA	G53D	C	2018/09/05	Calcium, total	mg/L	40.3
UA	G53D	C	2019/03/27	Calcium, total	mg/L	30.5
UA	G53D	C	2019/09/09	Calcium, total	mg/L	42.2
UA	G53D	C	2020/03/30	Calcium, total	mg/L	34.8
UA	G53D	C	2020/09/23	Calcium, total	mg/L	44.4
UA	G53D	C	2021/03/25	Calcium, total	mg/L	38.6
UA	G53D	C	2021/09/20	Calcium, total	mg/L	38.5
UA	G53D	C	2022/03/15	Calcium, total	mg/L	38.1
UA	G53D	C	2022/07/25	Calcium, total	mg/L	39.7
UA	G53D	C	2022/09/20	Calcium, total	mg/L	35.9
UA	G53D	C	2023/03/09	Calcium, total	mg/L	38.3
UA	G53D	C	2023/05/03	Calcium, total	mg/L	34.3
UA	G53D	C	2023/09/27	Calcium, total	mg/L	35.9
UA	G53D	C	2023/10/25	Calcium, total	mg/L	38.6
UA	G53D	C	2015/12/03	Chloride, total	mg/L	22.0
UA	G53D	C	2016/03/15	Chloride, total	mg/L	20.0
UA	G53D	C	2016/06/15	Chloride, total	mg/L	17.0
UA	G53D	C	2016/09/14	Chloride, total	mg/L	20.0
UA	G53D	C	2016/12/14	Chloride, total	mg/L	20.0
UA	G53D	C	2017/03/08	Chloride, total	mg/L	6.00
UA	G53D	C	2017/06/15	Chloride, total	mg/L	18.0
UA	G53D	C	2017/07/20	Chloride, total	mg/L	18.0
UA	G53D	C	2017/11/30	Chloride, total	mg/L	20.0
UA	G53D	C	2018/06/19	Chloride, total	mg/L	18.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G53D	C	2018/09/05	Chloride, total	mg/L	20.0
UA	G53D	C	2019/03/27	Chloride, total	mg/L	12.0
UA	G53D	C	2019/09/09	Chloride, total	mg/L	18.0
UA	G53D	C	2020/03/30	Chloride, total	mg/L	17.0
UA	G53D	C	2020/09/23	Chloride, total	mg/L	20.0
UA	G53D	C	2021/03/25	Chloride, total	mg/L	19.0
UA	G53D	C	2021/09/20	Chloride, total	mg/L	19.0
UA	G53D	C	2022/03/15	Chloride, total	mg/L	18.0
UA	G53D	C	2022/07/25	Chloride, total	mg/L	19.0
UA	G53D	C	2022/09/20	Chloride, total	mg/L	18.0
UA	G53D	C	2023/03/09	Chloride, total	mg/L	17.0
UA	G53D	C	2023/05/03	Chloride, total	mg/L	18.0
UA	G53D	C	2023/09/27	Chloride, total	mg/L	17.0
UA	G53D	C	2023/10/25	Chloride, total	mg/L	18.0
UA	G53D	C	2015/12/03	Cobalt, total	mg/L	0.00870
UA	G53D	C	2016/03/15	Cobalt, total	mg/L	0.00870
UA	G53D	C	2016/06/15	Cobalt, total	mg/L	0.00590
UA	G53D	C	2016/09/14	Cobalt, total	mg/L	0.00200
UA	G53D	C	2016/12/14	Cobalt, total	mg/L	0.00290
UA	G53D	C	2017/03/08	Cobalt, total	mg/L	0.00270
UA	G53D	C	2017/06/15	Cobalt, total	mg/L	<0.0002
UA	G53D	C	2017/07/20	Cobalt, total	mg/L	0.00110
UA	G53D	C	2018/06/19	Cobalt, total	mg/L	<0.0001
UA	G53D	C	2018/09/05	Cobalt, total	mg/L	0.00160
UA	G53D	C	2019/03/27	Cobalt, total	mg/L	<0.0001
UA	G53D	C	2019/09/09	Cobalt, total	mg/L	0.00200
UA	G53D	C	2020/03/30	Cobalt, total	mg/L	<0.0001
UA	G53D	C	2020/09/23	Cobalt, total	mg/L	0.00240
UA	G53D	C	2021/03/25	Cobalt, total	mg/L	0.00260
UA	G53D	C	2021/09/20	Cobalt, total	mg/L	0.00210
UA	G53D	C	2022/03/15	Cobalt, total	mg/L	0.00220
UA	G53D	C	2022/07/25	Cobalt, total	mg/L	0.00210
UA	G53D	C	2022/09/20	Cobalt, total	mg/L	0.00170
UA	G53D	C	2023/03/09	Cobalt, total	mg/L	0.00220
UA	G53D	C	2023/05/03	Cobalt, total	mg/L	0.00180
UA	G53D	C	2023/09/27	Cobalt, total	mg/L	0.00130
UA	G53D	C	2023/10/25	Cobalt, total	mg/L	0.00120
UA	G53D	C	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G53D	C	2023/09/27	Iron, dissolved	mg/L	0.101
UA	G53D	C	2017/07/20	Magnesium, total	mg/L	19.2
UA	G53D	C	2020/03/30	Magnesium, total	mg/L	15.7
UA	G53D	C	2021/03/25	Magnesium, total	mg/L	15.7
UA	G53D	C	2022/03/15	Magnesium, total	mg/L	16.5
UA	G53D	C	2022/07/25	Magnesium, total	mg/L	17.0
UA	G53D	C	2023/03/09	Magnesium, total	mg/L	16.4
UA	G53D	C	2023/05/03	Magnesium, total	mg/L	15.3
UA	G53D	C	2023/09/27	Magnesium, total	mg/L	15.9
UA	G53D	C	2023/10/25	Magnesium, total	mg/L	16.9
UA	G53D	C	2023/05/03	Manganese, dissolved	mg/L	0.126
UA	G53D	C	2023/09/27	Manganese, dissolved	mg/L	0.172
UA	G53D	C	2023/05/03	Phosphate, dissolved	mg/L	0.0430
UA	G53D	C	2023/09/27	Phosphate, dissolved	mg/L	0.101
UA	G53D	C	2017/07/20	Potassium, total	mg/L	0.359
UA	G53D	C	2020/03/30	Potassium, total	mg/L	0.385
UA	G53D	C	2021/03/25	Potassium, total	mg/L	0.278

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Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G53D	C	2022/03/15	Potassium, total	mg/L	0.317
UA	G53D	C	2022/07/25	Potassium, total	mg/L	0.300
UA	G53D	C	2023/03/09	Potassium, total	mg/L	0.355
UA	G53D	C	2023/05/03	Potassium, total	mg/L	0.332
UA	G53D	C	2023/09/27	Potassium, total	mg/L	0.285
UA	G53D	C	2023/10/25	Potassium, total	mg/L	0.294
UA	G53D	C	2023/05/03	Silicon, dissolved	mg/L	18.0
UA	G53D	C	2023/09/27	Silicon, dissolved	mg/L	18.3
UA	G53D	C	2017/07/20	Sodium, total	mg/L	63.0
UA	G53D	C	2020/03/30	Sodium, total	mg/L	48.9
UA	G53D	C	2021/03/25	Sodium, total	mg/L	50.8
UA	G53D	C	2022/03/15	Sodium, total	mg/L	51.3
UA	G53D	C	2022/07/25	Sodium, total	mg/L	49.4
UA	G53D	C	2023/03/09	Sodium, total	mg/L	49.2
UA	G53D	C	2023/05/03	Sodium, total	mg/L	53.1
UA	G53D	C	2023/09/27	Sodium, total	mg/L	46.6
UA	G53D	C	2023/10/25	Sodium, total	mg/L	49.9
UA	G53D	C	2015/12/03	Sulfate, total	mg/L	103
UA	G53D	C	2016/03/15	Sulfate, total	mg/L	107
UA	G53D	C	2016/06/15	Sulfate, total	mg/L	107
UA	G53D	C	2016/09/14	Sulfate, total	mg/L	104
UA	G53D	C	2016/12/14	Sulfate, total	mg/L	106
UA	G53D	C	2017/03/08	Sulfate, total	mg/L	35.0
UA	G53D	C	2017/06/15	Sulfate, total	mg/L	79.0
UA	G53D	C	2017/07/20	Sulfate, total	mg/L	94.0
UA	G53D	C	2017/11/30	Sulfate, total	mg/L	98.0
UA	G53D	C	2018/06/19	Sulfate, total	mg/L	84.0
UA	G53D	C	2018/09/05	Sulfate, total	mg/L	81.0
UA	G53D	C	2019/03/27	Sulfate, total	mg/L	54.0
UA	G53D	C	2019/09/09	Sulfate, total	mg/L	80.0
UA	G53D	C	2020/03/30	Sulfate, total	mg/L	66.0
UA	G53D	C	2020/09/23	Sulfate, total	mg/L	79.0
UA	G53D	C	2021/03/25	Sulfate, total	mg/L	71.0
UA	G53D	C	2021/09/20	Sulfate, total	mg/L	78.0
UA	G53D	C	2022/03/15	Sulfate, total	mg/L	74.0
UA	G53D	C	2022/07/25	Sulfate, total	mg/L	77.0
UA	G53D	C	2022/09/20	Sulfate, total	mg/L	79.0
UA	G53D	C	2023/03/09	Sulfate, total	mg/L	72.0
UA	G53D	C	2023/05/03	Sulfate, total	mg/L	68.0
UA	G53D	C	2023/09/27	Sulfate, total	mg/L	73.0
UA	G53D	C	2023/10/25	Sulfate, total	mg/L	69.0
UA	G53D	C	2015/12/03	Temperature (Celsius)	degrees C	16.3
UA	G53D	C	2016/03/15	Temperature (Celsius)	degrees C	18.2
UA	G53D	C	2016/06/15	Temperature (Celsius)	degrees C	16.8
UA	G53D	C	2016/09/14	Temperature (Celsius)	degrees C	18.8
UA	G53D	C	2016/12/14	Temperature (Celsius)	degrees C	17.0
UA	G53D	C	2017/03/08	Temperature (Celsius)	degrees C	14.2
UA	G53D	C	2017/06/15	Temperature (Celsius)	degrees C	16.5
UA	G53D	C	2017/07/20	Temperature (Celsius)	degrees C	18.1
UA	G53D	C	2017/11/30	Temperature (Celsius)	degrees C	15.9
UA	G53D	C	2018/06/19	Temperature (Celsius)	degrees C	17.4
UA	G53D	C	2018/09/05	Temperature (Celsius)	degrees C	17.3
UA	G53D	C	2019/03/27	Temperature (Celsius)	degrees C	15.9
UA	G53D	C	2019/09/09	Temperature (Celsius)	degrees C	17.6
UA	G53D	C	2020/03/30	Temperature (Celsius)	degrees C	15.9

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Joppa Power Plant
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HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G53D	C	2020/09/23	Temperature (Celsius)	degrees C	16.4
UA	G53D	C	2021/03/25	Temperature (Celsius)	degrees C	15.6
UA	G53D	C	2021/09/20	Temperature (Celsius)	degrees C	17.4
UA	G53D	C	2022/03/15	Temperature (Celsius)	degrees C	16.2
UA	G53D	C	2022/07/25	Temperature (Celsius)	degrees C	17.9
UA	G53D	C	2022/09/20	Temperature (Celsius)	degrees C	18.1
UA	G53D	C	2023/03/09	Temperature (Celsius)	degrees C	15.7
UA	G53D	C	2023/05/03	Temperature (Celsius)	degrees C	16.7
UA	G53D	C	2023/09/27	Temperature (Celsius)	degrees C	17.0
UA	G53D	C	2023/10/25	Temperature (Celsius)	degrees C	17.7
UA	G53D	C	2015/12/03	Total Dissolved Solids	mg/L	368
UA	G53D	C	2016/03/15	Total Dissolved Solids	mg/L	406
UA	G53D	C	2016/06/15	Total Dissolved Solids	mg/L	392
UA	G53D	C	2016/09/14	Total Dissolved Solids	mg/L	424
UA	G53D	C	2016/12/14	Total Dissolved Solids	mg/L	418
UA	G53D	C	2017/03/08	Total Dissolved Solids	mg/L	216
UA	G53D	C	2017/06/15	Total Dissolved Solids	mg/L	348
UA	G53D	C	2017/07/20	Total Dissolved Solids	mg/L	396
UA	G53D	C	2017/11/30	Total Dissolved Solids	mg/L	348
UA	G53D	C	2018/06/19	Total Dissolved Solids	mg/L	360
UA	G53D	C	2018/09/05	Total Dissolved Solids	mg/L	390
UA	G53D	C	2019/03/27	Total Dissolved Solids	mg/L	272
UA	G53D	C	2019/09/09	Total Dissolved Solids	mg/L	364
UA	G53D	C	2020/03/30	Total Dissolved Solids	mg/L	296
UA	G53D	C	2020/09/23	Total Dissolved Solids	mg/L	342
UA	G53D	C	2021/03/25	Total Dissolved Solids	mg/L	334
UA	G53D	C	2021/09/20	Total Dissolved Solids	mg/L	324
UA	G53D	C	2022/03/15	Total Dissolved Solids	mg/L	342
UA	G53D	C	2022/07/25	Total Dissolved Solids	mg/L	330
UA	G53D	C	2022/09/20	Total Dissolved Solids	mg/L	350
UA	G53D	C	2023/03/09	Total Dissolved Solids	mg/L	346
UA	G53D	C	2023/05/03	Total Dissolved Solids	mg/L	314
UA	G53D	C	2023/09/27	Total Dissolved Solids	mg/L	330
UA	G53D	C	2023/10/25	Total Dissolved Solids	mg/L	312
UA	G54D	C	2015/12/03	pH (field)	SU	7.0
UA	G54D	C	2016/03/15	pH (field)	SU	6.8
UA	G54D	C	2016/06/15	pH (field)	SU	6.6
UA	G54D	C	2016/09/14	pH (field)	SU	6.6
UA	G54D	C	2016/12/14	pH (field)	SU	6.7
UA	G54D	C	2017/03/08	pH (field)	SU	7.1
UA	G54D	C	2017/06/15	pH (field)	SU	6.8
UA	G54D	C	2017/07/20	pH (field)	SU	6.8
UA	G54D	C	2017/11/30	pH (field)	SU	6.7
UA	G54D	C	2018/06/19	pH (field)	SU	6.7
UA	G54D	C	2018/09/05	pH (field)	SU	6.5
UA	G54D	C	2019/03/27	pH (field)	SU	6.8
UA	G54D	C	2019/09/09	pH (field)	SU	6.4
UA	G54D	C	2020/03/30	pH (field)	SU	6.8
UA	G54D	C	2020/09/23	pH (field)	SU	6.7
UA	G54D	C	2021/03/24	pH (field)	SU	6.6
UA	G54D	C	2021/09/20	pH (field)	SU	6.5
UA	G54D	C	2022/03/15	pH (field)	SU	6.6
UA	G54D	C	2022/07/26	pH (field)	SU	7.1
UA	G54D	C	2022/09/20	pH (field)	SU	6.5
UA	G54D	C	2023/03/09	pH (field)	SU	6.5

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HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2023/05/03	pH (field)	SU	6.8
UA	G54D	C	2023/09/26	pH (field)	SU	6.6
UA	G54D	C	2023/10/25	pH (field)	SU	6.6
UA	G54D	C	2015/12/03	Oxidation Reduction Potential	mV	3.00
UA	G54D	C	2016/03/15	Oxidation Reduction Potential	mV	-73.0
UA	G54D	C	2016/06/15	Oxidation Reduction Potential	mV	-118
UA	G54D	C	2016/09/14	Oxidation Reduction Potential	mV	7.00
UA	G54D	C	2016/12/14	Oxidation Reduction Potential	mV	142
UA	G54D	C	2017/03/08	Oxidation Reduction Potential	mV	92.0
UA	G54D	C	2017/06/15	Oxidation Reduction Potential	mV	100
UA	G54D	C	2017/07/20	Oxidation Reduction Potential	mV	37.0
UA	G54D	C	2017/11/30	Oxidation Reduction Potential	mV	39.0
UA	G54D	C	2018/06/19	Oxidation Reduction Potential	mV	25.0
UA	G54D	C	2018/09/05	Oxidation Reduction Potential	mV	-13.0
UA	G54D	C	2019/03/27	Oxidation Reduction Potential	mV	43.0
UA	G54D	C	2019/09/09	Oxidation Reduction Potential	mV	121
UA	G54D	C	2020/03/30	Oxidation Reduction Potential	mV	-1.00
UA	G54D	C	2020/09/23	Oxidation Reduction Potential	mV	62.0
UA	G54D	C	2021/03/24	Oxidation Reduction Potential	mV	92.0
UA	G54D	C	2021/09/20	Oxidation Reduction Potential	mV	27.0
UA	G54D	C	2022/03/15	Oxidation Reduction Potential	mV	-2.00
UA	G54D	C	2022/07/26	Oxidation Reduction Potential	mV	-67.9
UA	G54D	C	2022/09/20	Oxidation Reduction Potential	mV	184
UA	G54D	C	2023/03/09	Oxidation Reduction Potential	mV	1.50
UA	G54D	C	2023/05/03	Oxidation Reduction Potential	mV	42.0
UA	G54D	C	2023/09/26	Oxidation Reduction Potential	mV	38.0
UA	G54D	C	2023/10/25	Oxidation Reduction Potential	mV	-32.0
UA	G54D	C	2015/12/03	Eh	V	0.20
UA	G54D	C	2016/03/15	Eh	V	0.12
UA	G54D	C	2016/06/15	Eh	V	0.076
UA	G54D	C	2016/09/14	Eh	V	0.20
UA	G54D	C	2016/12/14	Eh	V	0.34
UA	G54D	C	2017/03/08	Eh	V	0.29
UA	G54D	C	2017/06/15	Eh	V	0.29
UA	G54D	C	2017/07/20	Eh	V	0.23
UA	G54D	C	2017/11/30	Eh	V	0.23
UA	G54D	C	2018/06/19	Eh	V	0.22
UA	G54D	C	2018/09/05	Eh	V	0.18
UA	G54D	C	2019/03/27	Eh	V	0.24
UA	G54D	C	2019/09/09	Eh	V	0.31
UA	G54D	C	2020/03/30	Eh	V	0.19
UA	G54D	C	2020/09/23	Eh	V	0.26
UA	G54D	C	2021/03/24	Eh	V	0.29
UA	G54D	C	2021/09/20	Eh	V	0.22
UA	G54D	C	2022/03/15	Eh	V	0.19
UA	G54D	C	2022/07/26	Eh	V	0.12
UA	G54D	C	2022/09/20	Eh	V	0.38
UA	G54D	C	2023/03/09	Eh	V	0.20
UA	G54D	C	2023/05/03	Eh	V	0.24
UA	G54D	C	2023/09/26	Eh	V	0.23
UA	G54D	C	2023/10/25	Eh	V	0.16
UA	G54D	C	2017/07/20	Alkalinity, bicarbonate	mg/L CaCO3	210
UA	G54D	C	2020/03/30	Alkalinity, bicarbonate	mg/L CaCO3	220
UA	G54D	C	2021/03/24	Alkalinity, bicarbonate	mg/L CaCO3	214
UA	G54D	C	2021/09/20	Alkalinity, bicarbonate	mg/L CaCO3	207

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	208
UA	G54D	C	2022/07/26	Alkalinity, bicarbonate	mg/L CaCO3	208
UA	G54D	C	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	210
UA	G54D	C	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	206
UA	G54D	C	2023/09/26	Alkalinity, bicarbonate	mg/L CaCO3	214
UA	G54D	C	2023/10/25	Alkalinity, bicarbonate	mg/L CaCO3	201
UA	G54D	C	2015/12/03	Barium, total	mg/L	0.115
UA	G54D	C	2016/03/15	Barium, total	mg/L	0.106
UA	G54D	C	2016/06/15	Barium, total	mg/L	0.114
UA	G54D	C	2016/09/14	Barium, total	mg/L	0.134
UA	G54D	C	2016/12/14	Barium, total	mg/L	0.138
UA	G54D	C	2017/03/08	Barium, total	mg/L	0.132
UA	G54D	C	2017/06/15	Barium, total	mg/L	0.105
UA	G54D	C	2017/07/20	Barium, total	mg/L	0.127
UA	G54D	C	2018/06/19	Barium, total	mg/L	0.196
UA	G54D	C	2018/09/05	Barium, total	mg/L	0.131
UA	G54D	C	2019/03/27	Barium, total	mg/L	0.120
UA	G54D	C	2019/09/09	Barium, total	mg/L	0.128
UA	G54D	C	2020/03/30	Barium, total	mg/L	0.105
UA	G54D	C	2020/09/23	Barium, total	mg/L	0.160
UA	G54D	C	2021/03/24	Barium, total	mg/L	0.0941
UA	G54D	C	2021/09/20	Barium, total	mg/L	0.0879
UA	G54D	C	2022/03/15	Barium, total	mg/L	0.0640
UA	G54D	C	2022/07/26	Barium, total	mg/L	0.0866
UA	G54D	C	2022/09/20	Barium, total	mg/L	0.0768
UA	G54D	C	2023/03/09	Barium, total	mg/L	0.0724
UA	G54D	C	2023/05/03	Barium, total	mg/L	0.0794
UA	G54D	C	2023/09/26	Barium, total	mg/L	0.0739
UA	G54D	C	2023/10/25	Barium, total	mg/L	0.121
UA	G54D	C	2015/12/03	Boron, total	mg/L	0.663
UA	G54D	C	2016/03/15	Boron, total	mg/L	0.513
UA	G54D	C	2016/06/15	Boron, total	mg/L	0.508
UA	G54D	C	2016/09/14	Boron, total	mg/L	0.557
UA	G54D	C	2016/12/14	Boron, total	mg/L	0.564
UA	G54D	C	2017/03/08	Boron, total	mg/L	0.499
UA	G54D	C	2017/06/15	Boron, total	mg/L	0.685
UA	G54D	C	2017/07/20	Boron, total	mg/L	0.580
UA	G54D	C	2017/11/30	Boron, total	mg/L	0.646
UA	G54D	C	2018/06/19	Boron, total	mg/L	0.631
UA	G54D	C	2018/09/05	Boron, total	mg/L	0.660
UA	G54D	C	2019/03/27	Boron, total	mg/L	1.03
UA	G54D	C	2019/09/09	Boron, total	mg/L	0.614
UA	G54D	C	2020/03/30	Boron, total	mg/L	0.766
UA	G54D	C	2020/09/23	Boron, total	mg/L	0.819
UA	G54D	C	2021/03/24	Boron, total	mg/L	0.404
UA	G54D	C	2021/09/20	Boron, total	mg/L	0.350
UA	G54D	C	2022/03/15	Boron, total	mg/L	0.451
UA	G54D	C	2022/07/26	Boron, total	mg/L	0.178
UA	G54D	C	2022/09/20	Boron, total	mg/L	0.252
UA	G54D	C	2023/03/09	Boron, total	mg/L	0.555
UA	G54D	C	2023/05/03	Boron, total	mg/L	0.555
UA	G54D	C	2023/09/26	Boron, total	mg/L	0.404
UA	G54D	C	2023/10/25	Boron, total	mg/L	0.396
UA	G54D	C	2015/12/03	Calcium, total	mg/L	103
UA	G54D	C	2016/03/15	Calcium, total	mg/L	75.2

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2016/06/15	Calcium, total	mg/L	72.8
UA	G54D	C	2016/09/14	Calcium, total	mg/L	70.4
UA	G54D	C	2016/12/14	Calcium, total	mg/L	74.3
UA	G54D	C	2017/03/08	Calcium, total	mg/L	74.1
UA	G54D	C	2017/06/15	Calcium, total	mg/L	80.5
UA	G54D	C	2017/07/20	Calcium, total	mg/L	75.7
UA	G54D	C	2017/11/30	Calcium, total	mg/L	76.2
UA	G54D	C	2018/06/19	Calcium, total	mg/L	72.7
UA	G54D	C	2018/09/05	Calcium, total	mg/L	73.6
UA	G54D	C	2019/03/27	Calcium, total	mg/L	115
UA	G54D	C	2019/09/09	Calcium, total	mg/L	79.9
UA	G54D	C	2020/03/30	Calcium, total	mg/L	84.9
UA	G54D	C	2020/09/23	Calcium, total	mg/L	122
UA	G54D	C	2021/03/24	Calcium, total	mg/L	78.1
UA	G54D	C	2021/09/20	Calcium, total	mg/L	72.8
UA	G54D	C	2022/03/15	Calcium, total	mg/L	83.4
UA	G54D	C	2022/07/26	Calcium, total	mg/L	68.9
UA	G54D	C	2022/09/20	Calcium, total	mg/L	69.7
UA	G54D	C	2023/03/09	Calcium, total	mg/L	86.9
UA	G54D	C	2023/05/03	Calcium, total	mg/L	81.5
UA	G54D	C	2023/09/26	Calcium, total	mg/L	81.2
UA	G54D	C	2023/10/25	Calcium, total	mg/L	87.5
UA	G54D	C	2015/12/03	Chloride, total	mg/L	33.0
UA	G54D	C	2016/03/15	Chloride, total	mg/L	32.0
UA	G54D	C	2016/06/15	Chloride, total	mg/L	28.0
UA	G54D	C	2016/09/14	Chloride, total	mg/L	28.0
UA	G54D	C	2016/12/14	Chloride, total	mg/L	26.0
UA	G54D	C	2017/03/08	Chloride, total	mg/L	26.0
UA	G54D	C	2017/06/15	Chloride, total	mg/L	24.0
UA	G54D	C	2017/07/20	Chloride, total	mg/L	24.0
UA	G54D	C	2017/11/30	Chloride, total	mg/L	26.0
UA	G54D	C	2018/06/19	Chloride, total	mg/L	26.0
UA	G54D	C	2018/09/05	Chloride, total	mg/L	25.0
UA	G54D	C	2019/03/27	Chloride, total	mg/L	22.0
UA	G54D	C	2019/09/09	Chloride, total	mg/L	<2
UA	G54D	C	2020/03/30	Chloride, total	mg/L	22.0
UA	G54D	C	2020/09/23	Chloride, total	mg/L	25.0
UA	G54D	C	2021/03/24	Chloride, total	mg/L	23.0
UA	G54D	C	2021/09/20	Chloride, total	mg/L	24.0
UA	G54D	C	2022/03/15	Chloride, total	mg/L	21.0
UA	G54D	C	2022/07/26	Chloride, total	mg/L	23.0
UA	G54D	C	2022/09/20	Chloride, total	mg/L	22.0
UA	G54D	C	2023/03/09	Chloride, total	mg/L	22.0
UA	G54D	C	2023/05/03	Chloride, total	mg/L	22.0
UA	G54D	C	2023/09/26	Chloride, total	mg/L	20.0
UA	G54D	C	2023/10/25	Chloride, total	mg/L	23.0
UA	G54D	C	2015/12/03	Cobalt, total	mg/L	0.0268
UA	G54D	C	2016/03/15	Cobalt, total	mg/L	0.0183
UA	G54D	C	2016/06/15	Cobalt, total	mg/L	0.0158
UA	G54D	C	2016/09/14	Cobalt, total	mg/L	0.0167
UA	G54D	C	2016/12/14	Cobalt, total	mg/L	0.0178
UA	G54D	C	2017/03/08	Cobalt, total	mg/L	0.0170
UA	G54D	C	2017/06/15	Cobalt, total	mg/L	0.0160
UA	G54D	C	2017/07/20	Cobalt, total	mg/L	0.0139
UA	G54D	C	2018/06/19	Cobalt, total	mg/L	0.0134

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2018/09/05	Cobalt, total	mg/L	0.0109
UA	G54D	C	2019/03/27	Cobalt, total	mg/L	0.0138
UA	G54D	C	2019/09/09	Cobalt, total	mg/L	0.0117
UA	G54D	C	2020/03/30	Cobalt, total	mg/L	0.0130
UA	G54D	C	2020/09/23	Cobalt, total	mg/L	0.0163
UA	G54D	C	2021/03/24	Cobalt, total	mg/L	0.00450
UA	G54D	C	2021/09/20	Cobalt, total	mg/L	0.00830
UA	G54D	C	2022/03/15	Cobalt, total	mg/L	0.0110
UA	G54D	C	2022/07/26	Cobalt, total	mg/L	0.00540
UA	G54D	C	2022/09/20	Cobalt, total	mg/L	0.00480
UA	G54D	C	2023/03/09	Cobalt, total	mg/L	0.0113
UA	G54D	C	2023/05/03	Cobalt, total	mg/L	0.0106
UA	G54D	C	2023/09/26	Cobalt, total	mg/L	0.0102
UA	G54D	C	2023/10/25	Cobalt, total	mg/L	0.00880
UA	G54D	C	2023/05/03	Iron, dissolved	mg/L	0.716
UA	G54D	C	2023/09/26	Iron, dissolved	mg/L	0.669
UA	G54D	C	2017/07/20	Magnesium, total	mg/L	25.2
UA	G54D	C	2020/03/30	Magnesium, total	mg/L	27.1
UA	G54D	C	2021/03/24	Magnesium, total	mg/L	24.2
UA	G54D	C	2022/03/15	Magnesium, total	mg/L	25.8
UA	G54D	C	2022/07/26	Magnesium, total	mg/L	22.3
UA	G54D	C	2023/03/09	Magnesium, total	mg/L	26.4
UA	G54D	C	2023/05/03	Magnesium, total	mg/L	26.4
UA	G54D	C	2023/09/26	Magnesium, total	mg/L	25.7
UA	G54D	C	2023/10/25	Magnesium, total	mg/L	27.6
UA	G54D	C	2023/05/03	Manganese, dissolved	mg/L	1.04
UA	G54D	C	2023/09/26	Manganese, dissolved	mg/L	0.960
UA	G54D	C	2023/05/03	Phosphate, dissolved	mg/L	<0.034
UA	G54D	C	2023/09/26	Phosphate, dissolved	mg/L	<0.005
UA	G54D	C	2017/07/20	Potassium, total	mg/L	1.16
UA	G54D	C	2020/03/30	Potassium, total	mg/L	1.36
UA	G54D	C	2021/03/24	Potassium, total	mg/L	1.12
UA	G54D	C	2022/03/15	Potassium, total	mg/L	1.21
UA	G54D	C	2022/07/26	Potassium, total	mg/L	1.12
UA	G54D	C	2023/03/09	Potassium, total	mg/L	1.28
UA	G54D	C	2023/05/03	Potassium, total	mg/L	1.21
UA	G54D	C	2023/09/26	Potassium, total	mg/L	1.18
UA	G54D	C	2023/10/25	Potassium, total	mg/L	1.59
UA	G54D	C	2023/05/03	Silicon, dissolved	mg/L	12.8
UA	G54D	C	2023/09/26	Silicon, dissolved	mg/L	11.6
UA	G54D	C	2017/07/20	Sodium, total	mg/L	41.1
UA	G54D	C	2020/03/30	Sodium, total	mg/L	47.8
UA	G54D	C	2021/03/24	Sodium, total	mg/L	62.4
UA	G54D	C	2022/03/15	Sodium, total	mg/L	54.2
UA	G54D	C	2022/07/26	Sodium, total	mg/L	56.8
UA	G54D	C	2023/03/09	Sodium, total	mg/L	55.7
UA	G54D	C	2023/05/03	Sodium, total	mg/L	57.0
UA	G54D	C	2023/09/26	Sodium, total	mg/L	48.3
UA	G54D	C	2023/10/25	Sodium, total	mg/L	57.4
UA	G54D	C	2015/12/03	Sulfate, total	mg/L	191
UA	G54D	C	2016/03/15	Sulfate, total	mg/L	176
UA	G54D	C	2016/06/15	Sulfate, total	mg/L	160
UA	G54D	C	2016/09/14	Sulfate, total	mg/L	149
UA	G54D	C	2016/12/14	Sulfate, total	mg/L	144
UA	G54D	C	2017/03/08	Sulfate, total	mg/L	131

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2017/06/15	Sulfate, total	mg/L	170
UA	G54D	C	2017/07/20	Sulfate, total	mg/L	151
UA	G54D	C	2017/11/30	Sulfate, total	mg/L	136
UA	G54D	C	2018/06/19	Sulfate, total	mg/L	146
UA	G54D	C	2018/09/05	Sulfate, total	mg/L	152
UA	G54D	C	2019/03/27	Sulfate, total	mg/L	142
UA	G54D	C	2019/09/09	Sulfate, total	mg/L	136
UA	G54D	C	2020/03/30	Sulfate, total	mg/L	184
UA	G54D	C	2020/09/23	Sulfate, total	mg/L	173
UA	G54D	C	2021/03/24	Sulfate, total	mg/L	186
UA	G54D	C	2021/09/20	Sulfate, total	mg/L	175
UA	G54D	C	2022/03/15	Sulfate, total	mg/L	213
UA	G54D	C	2022/07/26	Sulfate, total	mg/L	188
UA	G54D	C	2022/09/20	Sulfate, total	mg/L	218
UA	G54D	C	2023/03/09	Sulfate, total	mg/L	231
UA	G54D	C	2023/05/03	Sulfate, total	mg/L	194
UA	G54D	C	2023/09/26	Sulfate, total	mg/L	180
UA	G54D	C	2023/10/25	Sulfate, total	mg/L	192
UA	G54D	C	2015/12/03	Temperature (Celsius)	degrees C	15.8
UA	G54D	C	2016/03/15	Temperature (Celsius)	degrees C	17.8
UA	G54D	C	2016/06/15	Temperature (Celsius)	degrees C	17.1
UA	G54D	C	2016/09/14	Temperature (Celsius)	degrees C	18.3
UA	G54D	C	2016/12/14	Temperature (Celsius)	degrees C	16.3
UA	G54D	C	2017/03/08	Temperature (Celsius)	degrees C	14.3
UA	G54D	C	2017/06/15	Temperature (Celsius)	degrees C	17.2
UA	G54D	C	2017/07/20	Temperature (Celsius)	degrees C	17.6
UA	G54D	C	2017/11/30	Temperature (Celsius)	degrees C	15.5
UA	G54D	C	2018/06/19	Temperature (Celsius)	degrees C	17.3
UA	G54D	C	2018/09/05	Temperature (Celsius)	degrees C	16.8
UA	G54D	C	2019/03/27	Temperature (Celsius)	degrees C	15.3
UA	G54D	C	2019/09/09	Temperature (Celsius)	degrees C	17.4
UA	G54D	C	2020/03/30	Temperature (Celsius)	degrees C	15.6
UA	G54D	C	2020/09/23	Temperature (Celsius)	degrees C	15.8
UA	G54D	C	2021/03/24	Temperature (Celsius)	degrees C	16.0
UA	G54D	C	2021/09/20	Temperature (Celsius)	degrees C	16.9
UA	G54D	C	2022/03/15	Temperature (Celsius)	degrees C	15.9
UA	G54D	C	2022/07/26	Temperature (Celsius)	degrees C	23.9
UA	G54D	C	2022/09/20	Temperature (Celsius)	degrees C	18.4
UA	G54D	C	2023/03/09	Temperature (Celsius)	degrees C	15.2
UA	G54D	C	2023/05/03	Temperature (Celsius)	degrees C	16.4
UA	G54D	C	2023/09/26	Temperature (Celsius)	degrees C	17.2
UA	G54D	C	2023/10/25	Temperature (Celsius)	degrees C	17.2
UA	G54D	C	2015/12/03	Total Dissolved Solids	mg/L	556
UA	G54D	C	2016/03/15	Total Dissolved Solids	mg/L	554
UA	G54D	C	2016/06/15	Total Dissolved Solids	mg/L	476
UA	G54D	C	2016/09/14	Total Dissolved Solids	mg/L	502
UA	G54D	C	2016/12/14	Total Dissolved Solids	mg/L	456
UA	G54D	C	2017/03/08	Total Dissolved Solids	mg/L	482
UA	G54D	C	2017/06/15	Total Dissolved Solids	mg/L	506
UA	G54D	C	2017/07/20	Total Dissolved Solids	mg/L	512
UA	G54D	C	2017/11/30	Total Dissolved Solids	mg/L	472
UA	G54D	C	2018/06/19	Total Dissolved Solids	mg/L	486
UA	G54D	C	2018/09/05	Total Dissolved Solids	mg/L	480
UA	G54D	C	2019/03/27	Total Dissolved Solids	mg/L	510
UA	G54D	C	2019/09/09	Total Dissolved Solids	mg/L	482

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G54D	C	2020/03/30	Total Dissolved Solids	mg/L	508
UA	G54D	C	2020/09/23	Total Dissolved Solids	mg/L	508
UA	G54D	C	2021/03/24	Total Dissolved Solids	mg/L	532
UA	G54D	C	2021/09/20	Total Dissolved Solids	mg/L	474
UA	G54D	C	2022/03/15	Total Dissolved Solids	mg/L	524
UA	G54D	C	2022/07/26	Total Dissolved Solids	mg/L	492
UA	G54D	C	2022/09/20	Total Dissolved Solids	mg/L	518
UA	G54D	C	2023/03/09	Total Dissolved Solids	mg/L	562
UA	G54D	C	2023/05/03	Total Dissolved Solids	mg/L	544
UA	G54D	C	2023/09/26	Total Dissolved Solids	mg/L	508
UA	G54D	C	2023/10/25	Total Dissolved Solids	mg/L	502
UA	G12S	Delin	2022/01/20	pH (field)	SU	6.3
UA	G12S	Delin	2022/02/10	pH (field)	SU	6.6
UA	G12S	Delin	2022/03/16	pH (field)	SU	6.5
UA	G12S	Delin	2022/07/23	pH (field)	SU	7.1
UA	G12S	Delin	2022/09/13	pH (field)	SU	6.3
UA	G12S	Delin	2022/11/01	pH (field)	SU	6.4
UA	G12S	Delin	2023/01/26	pH (field)	SU	6.9
UA	G12S	Delin	2023/03/09	pH (field)	SU	6.6
UA	G12S	Delin	2023/05/02	pH (field)	SU	6.1
UA	G12S	Delin	2023/09/28	pH (field)	SU	6.6
UA	G12S	Delin	2023/10/24	pH (field)	SU	6.5
UA	G12S	Delin	2022/01/20	Oxidation Reduction Potential	mV	62.0
UA	G12S	Delin	2022/02/10	Oxidation Reduction Potential	mV	-4.00
UA	G12S	Delin	2022/03/16	Oxidation Reduction Potential	mV	97.0
UA	G12S	Delin	2022/07/23	Oxidation Reduction Potential	mV	51.6
UA	G12S	Delin	2022/09/13	Oxidation Reduction Potential	mV	141
UA	G12S	Delin	2022/11/01	Oxidation Reduction Potential	mV	124
UA	G12S	Delin	2023/01/26	Oxidation Reduction Potential	mV	23.7
UA	G12S	Delin	2023/03/09	Oxidation Reduction Potential	mV	107
UA	G12S	Delin	2023/05/02	Oxidation Reduction Potential	mV	101
UA	G12S	Delin	2023/09/28	Oxidation Reduction Potential	mV	108
UA	G12S	Delin	2023/10/24	Oxidation Reduction Potential	mV	116
UA	G12S	Delin	2022/01/20	Eh	V	0.26
UA	G12S	Delin	2022/02/10	Eh	V	0.19
UA	G12S	Delin	2022/03/16	Eh	V	0.29
UA	G12S	Delin	2022/07/23	Eh	V	0.25
UA	G12S	Delin	2022/09/13	Eh	V	0.34
UA	G12S	Delin	2022/11/01	Eh	V	0.32
UA	G12S	Delin	2023/01/26	Eh	V	0.22
UA	G12S	Delin	2023/03/09	Eh	V	0.30
UA	G12S	Delin	2023/05/02	Eh	V	0.30
UA	G12S	Delin	2023/09/28	Eh	V	0.30
UA	G12S	Delin	2023/10/24	Eh	V	0.31
UA	G12S	Delin	2022/01/20	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G12S	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	134
UA	G12S	Delin	2022/03/16	Alkalinity, bicarbonate	mg/L CaCO3	138
UA	G12S	Delin	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G12S	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	132
UA	G12S	Delin	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	134
UA	G12S	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G12S	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G12S	Delin	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	135
UA	G12S	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G12S	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	136

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12S	Delin	2022/01/20	Barium, total	mg/L	0.0367
UA	G12S	Delin	2022/02/10	Barium, total	mg/L	0.0343
UA	G12S	Delin	2022/03/16	Barium, total	mg/L	0.0287
UA	G12S	Delin	2022/07/23	Barium, total	mg/L	0.0291
UA	G12S	Delin	2022/09/13	Barium, total	mg/L	0.0270
UA	G12S	Delin	2022/11/01	Barium, total	mg/L	0.0311
UA	G12S	Delin	2023/01/26	Barium, total	mg/L	0.0303
UA	G12S	Delin	2023/03/09	Barium, total	mg/L	0.0315
UA	G12S	Delin	2023/05/02	Barium, total	mg/L	0.0372
UA	G12S	Delin	2023/09/28	Barium, total	mg/L	0.0267
UA	G12S	Delin	2023/10/24	Barium, total	mg/L	0.0361
UA	G12S	Delin	2022/01/20	Boron, total	mg/L	5.91
UA	G12S	Delin	2022/02/10	Boron, total	mg/L	5.89
UA	G12S	Delin	2022/03/16	Boron, total	mg/L	5.83
UA	G12S	Delin	2022/07/23	Boron, total	mg/L	6.15
UA	G12S	Delin	2022/09/13	Boron, total	mg/L	5.24
UA	G12S	Delin	2022/11/01	Boron, total	mg/L	5.71
UA	G12S	Delin	2023/01/26	Boron, total	mg/L	6.40
UA	G12S	Delin	2023/03/09	Boron, total	mg/L	6.23
UA	G12S	Delin	2023/05/02	Boron, total	mg/L	6.49
UA	G12S	Delin	2023/09/28	Boron, total	mg/L	8.16
UA	G12S	Delin	2023/10/24	Boron, total	mg/L	6.80
UA	G12S	Delin	2022/01/20	Calcium, total	mg/L	83.7
UA	G12S	Delin	2022/02/10	Calcium, total	mg/L	78.8
UA	G12S	Delin	2022/03/16	Calcium, total	mg/L	80.8
UA	G12S	Delin	2022/07/23	Calcium, total	mg/L	79.7
UA	G12S	Delin	2022/09/13	Calcium, total	mg/L	73.3
UA	G12S	Delin	2022/11/01	Calcium, total	mg/L	78.2
UA	G12S	Delin	2023/01/26	Calcium, total	mg/L	87.6
UA	G12S	Delin	2023/03/09	Calcium, total	mg/L	79.6
UA	G12S	Delin	2023/05/02	Calcium, total	mg/L	77.5
UA	G12S	Delin	2023/09/28	Calcium, total	mg/L	82.0
UA	G12S	Delin	2023/10/24	Calcium, total	mg/L	77.9
UA	G12S	Delin	2022/01/20	Chloride, total	mg/L	19.0
UA	G12S	Delin	2022/02/10	Chloride, total	mg/L	19.0
UA	G12S	Delin	2022/03/16	Chloride, total	mg/L	19.0
UA	G12S	Delin	2022/07/23	Chloride, total	mg/L	21.0
UA	G12S	Delin	2022/09/13	Chloride, total	mg/L	21.0
UA	G12S	Delin	2022/11/01	Chloride, total	mg/L	21.0
UA	G12S	Delin	2023/01/26	Chloride, total	mg/L	22.0
UA	G12S	Delin	2023/03/09	Chloride, total	mg/L	21.0
UA	G12S	Delin	2023/05/02	Chloride, total	mg/L	24.0
UA	G12S	Delin	2023/09/28	Chloride, total	mg/L	22.0
UA	G12S	Delin	2023/10/24	Chloride, total	mg/L	24.0
UA	G12S	Delin	2022/01/20	Cobalt, total	mg/L	<0.0001
UA	G12S	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G12S	Delin	2022/03/16	Cobalt, total	mg/L	<0.0001
UA	G12S	Delin	2022/07/23	Cobalt, total	mg/L	0.000200
UA	G12S	Delin	2022/09/13	Cobalt, total	mg/L	0.000300
UA	G12S	Delin	2022/11/01	Cobalt, total	mg/L	<0.0001
UA	G12S	Delin	2023/01/26	Cobalt, total	mg/L	0.000200
UA	G12S	Delin	2023/03/09	Cobalt, total	mg/L	0.000200
UA	G12S	Delin	2023/05/02	Cobalt, total	mg/L	0.000900
UA	G12S	Delin	2023/09/28	Cobalt, total	mg/L	<0.0001
UA	G12S	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12S	Delin	2023/05/02	Iron, dissolved	mg/L	<0.02
UA	G12S	Delin	2023/09/28	Iron, dissolved	mg/L	<0.0115
UA	G12S	Delin	2022/01/20	Magnesium, total	mg/L	24.1
UA	G12S	Delin	2022/02/10	Magnesium, total	mg/L	23.9
UA	G12S	Delin	2022/03/16	Magnesium, total	mg/L	23.4
UA	G12S	Delin	2022/07/23	Magnesium, total	mg/L	23.2
UA	G12S	Delin	2022/09/13	Magnesium, total	mg/L	21.6
UA	G12S	Delin	2022/11/01	Magnesium, total	mg/L	23.5
UA	G12S	Delin	2023/01/26	Magnesium, total	mg/L	25.9
UA	G12S	Delin	2023/03/09	Magnesium, total	mg/L	23.2
UA	G12S	Delin	2023/05/02	Magnesium, total	mg/L	24.0
UA	G12S	Delin	2023/09/28	Magnesium, total	mg/L	24.4
UA	G12S	Delin	2023/10/24	Magnesium, total	mg/L	23.2
UA	G12S	Delin	2023/05/02	Manganese, dissolved	mg/L	0.00640
UA	G12S	Delin	2023/09/28	Manganese, dissolved	mg/L	0.00820
UA	G12S	Delin	2023/05/02	Phosphate, dissolved	mg/L	0.0520
UA	G12S	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.0400
UA	G12S	Delin	2022/01/20	Potassium, total	mg/L	1.56
UA	G12S	Delin	2022/02/10	Potassium, total	mg/L	1.65
UA	G12S	Delin	2022/03/16	Potassium, total	mg/L	1.54
UA	G12S	Delin	2022/07/23	Potassium, total	mg/L	1.53
UA	G12S	Delin	2022/09/13	Potassium, total	mg/L	1.46
UA	G12S	Delin	2022/11/01	Potassium, total	mg/L	1.56
UA	G12S	Delin	2023/01/26	Potassium, total	mg/L	1.52
UA	G12S	Delin	2023/03/09	Potassium, total	mg/L	1.56
UA	G12S	Delin	2023/05/02	Potassium, total	mg/L	1.59
UA	G12S	Delin	2023/09/28	Potassium, total	mg/L	1.60
UA	G12S	Delin	2023/10/24	Potassium, total	mg/L	1.55
UA	G12S	Delin	2023/05/02	Silicon, dissolved	mg/L	6.74
UA	G12S	Delin	2023/09/28	Silicon, dissolved	mg/L	6.68
UA	G12S	Delin	2022/01/20	Sodium, total	mg/L	31.6
UA	G12S	Delin	2022/02/10	Sodium, total	mg/L	30.0
UA	G12S	Delin	2022/03/16	Sodium, total	mg/L	30.7
UA	G12S	Delin	2022/07/23	Sodium, total	mg/L	29.3
UA	G12S	Delin	2022/09/13	Sodium, total	mg/L	28.4
UA	G12S	Delin	2022/11/01	Sodium, total	mg/L	29.2
UA	G12S	Delin	2023/01/26	Sodium, total	mg/L	28.4
UA	G12S	Delin	2023/03/09	Sodium, total	mg/L	28.5
UA	G12S	Delin	2023/05/02	Sodium, total	mg/L	31.9
UA	G12S	Delin	2023/09/28	Sodium, total	mg/L	29.5
UA	G12S	Delin	2023/10/24	Sodium, total	mg/L	28.9
UA	G12S	Delin	2022/01/20	Sulfate, total	mg/L	175
UA	G12S	Delin	2022/02/10	Sulfate, total	mg/L	211
UA	G12S	Delin	2022/03/16	Sulfate, total	mg/L	209
UA	G12S	Delin	2022/07/23	Sulfate, total	mg/L	197
UA	G12S	Delin	2022/09/13	Sulfate, total	mg/L	192
UA	G12S	Delin	2022/11/01	Sulfate, total	mg/L	175
UA	G12S	Delin	2023/01/26	Sulfate, total	mg/L	196
UA	G12S	Delin	2023/03/09	Sulfate, total	mg/L	192
UA	G12S	Delin	2023/05/02	Sulfate, total	mg/L	191
UA	G12S	Delin	2023/09/28	Sulfate, total	mg/L	179
UA	G12S	Delin	2023/10/24	Sulfate, total	mg/L	194
UA	G12S	Delin	2022/01/20	Temperature (Celsius)	degrees C	14.5
UA	G12S	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.6
UA	G12S	Delin	2022/03/16	Temperature (Celsius)	degrees C	14.7

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12S	Delin	2022/07/23	Temperature (Celsius)	degrees C	15.3
UA	G12S	Delin	2022/09/13	Temperature (Celsius)	degrees C	17.0
UA	G12S	Delin	2022/11/01	Temperature (Celsius)	degrees C	15.6
UA	G12S	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.1
UA	G12S	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.6
UA	G12S	Delin	2023/05/02	Temperature (Celsius)	degrees C	15.0
UA	G12S	Delin	2023/09/28	Temperature (Celsius)	degrees C	15.3
UA	G12S	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.4
UA	G12S	Delin	2022/01/20	Total Dissolved Solids	mg/L	470
UA	G12S	Delin	2022/02/10	Total Dissolved Solids	mg/L	432
UA	G12S	Delin	2022/03/16	Total Dissolved Solids	mg/L	456
UA	G12S	Delin	2022/07/23	Total Dissolved Solids	mg/L	466
UA	G12S	Delin	2022/09/13	Total Dissolved Solids	mg/L	438
UA	G12S	Delin	2022/11/01	Total Dissolved Solids	mg/L	460
UA	G12S	Delin	2023/01/26	Total Dissolved Solids	mg/L	468
UA	G12S	Delin	2023/03/09	Total Dissolved Solids	mg/L	470
UA	G12S	Delin	2023/05/02	Total Dissolved Solids	mg/L	444
UA	G12S	Delin	2023/09/28	Total Dissolved Solids	mg/L	484
UA	G12S	Delin	2023/10/24	Total Dissolved Solids	mg/L	444
UA	G12D	Delin	2022/01/20	pH (field)	SU	6.5
UA	G12D	Delin	2022/02/10	pH (field)	SU	6.7
UA	G12D	Delin	2022/03/16	pH (field)	SU	6.6
UA	G12D	Delin	2022/07/23	pH (field)	SU	7.3
UA	G12D	Delin	2022/09/13	pH (field)	SU	6.6
UA	G12D	Delin	2022/11/01	pH (field)	SU	6.7
UA	G12D	Delin	2023/01/26	pH (field)	SU	6.9
UA	G12D	Delin	2023/03/09	pH (field)	SU	6.6
UA	G12D	Delin	2023/05/02	pH (field)	SU	6.9
UA	G12D	Delin	2023/09/28	pH (field)	SU	6.6
UA	G12D	Delin	2023/10/24	pH (field)	SU	6.6
UA	G12D	Delin	2022/01/20	Oxidation Reduction Potential	mV	40.0
UA	G12D	Delin	2022/02/10	Oxidation Reduction Potential	mV	10.0
UA	G12D	Delin	2022/03/16	Oxidation Reduction Potential	mV	69.0
UA	G12D	Delin	2022/07/23	Oxidation Reduction Potential	mV	43.5
UA	G12D	Delin	2022/09/13	Oxidation Reduction Potential	mV	134
UA	G12D	Delin	2022/11/01	Oxidation Reduction Potential	mV	109
UA	G12D	Delin	2023/01/26	Oxidation Reduction Potential	mV	33.7
UA	G12D	Delin	2023/03/09	Oxidation Reduction Potential	mV	108
UA	G12D	Delin	2023/05/02	Oxidation Reduction Potential	mV	94.0
UA	G12D	Delin	2023/09/28	Oxidation Reduction Potential	mV	112
UA	G12D	Delin	2023/10/24	Oxidation Reduction Potential	mV	116
UA	G12D	Delin	2022/01/20	Eh	V	0.24
UA	G12D	Delin	2022/02/10	Eh	V	0.21
UA	G12D	Delin	2022/03/16	Eh	V	0.26
UA	G12D	Delin	2022/07/23	Eh	V	0.24
UA	G12D	Delin	2022/09/13	Eh	V	0.33
UA	G12D	Delin	2022/11/01	Eh	V	0.30
UA	G12D	Delin	2023/01/26	Eh	V	0.23
UA	G12D	Delin	2023/03/09	Eh	V	0.30
UA	G12D	Delin	2023/05/02	Eh	V	0.29
UA	G12D	Delin	2023/09/28	Eh	V	0.31
UA	G12D	Delin	2023/10/24	Eh	V	0.31
UA	G12D	Delin	2022/01/20	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G12D	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G12D	Delin	2022/03/16	Alkalinity, bicarbonate	mg/L CaCO3	146

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12D	Delin	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G12D	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G12D	Delin	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	145
UA	G12D	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G12D	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	146
UA	G12D	Delin	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G12D	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G12D	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G12D	Delin	2022/01/20	Barium, total	mg/L	0.0449
UA	G12D	Delin	2022/02/10	Barium, total	mg/L	0.0361
UA	G12D	Delin	2022/03/16	Barium, total	mg/L	0.0282
UA	G12D	Delin	2022/07/23	Barium, total	mg/L	0.0322
UA	G12D	Delin	2022/09/13	Barium, total	mg/L	0.0456
UA	G12D	Delin	2022/11/01	Barium, total	mg/L	0.0311
UA	G12D	Delin	2023/01/26	Barium, total	mg/L	0.0326
UA	G12D	Delin	2023/03/09	Barium, total	mg/L	0.0314
UA	G12D	Delin	2023/05/02	Barium, total	mg/L	0.0313
UA	G12D	Delin	2023/09/28	Barium, total	mg/L	0.0282
UA	G12D	Delin	2023/10/24	Barium, total	mg/L	0.0423
UA	G12D	Delin	2022/01/20	Boron, total	mg/L	6.94
UA	G12D	Delin	2022/02/10	Boron, total	mg/L	6.38
UA	G12D	Delin	2022/03/16	Boron, total	mg/L	6.79
UA	G12D	Delin	2022/07/23	Boron, total	mg/L	6.59
UA	G12D	Delin	2022/09/13	Boron, total	mg/L	5.31
UA	G12D	Delin	2022/11/01	Boron, total	mg/L	5.79
UA	G12D	Delin	2023/01/26	Boron, total	mg/L	7.92
UA	G12D	Delin	2023/03/09	Boron, total	mg/L	6.32
UA	G12D	Delin	2023/05/02	Boron, total	mg/L	6.48
UA	G12D	Delin	2023/09/28	Boron, total	mg/L	6.58
UA	G12D	Delin	2023/10/24	Boron, total	mg/L	8.01
UA	G12D	Delin	2022/01/20	Calcium, total	mg/L	88.4
UA	G12D	Delin	2022/02/10	Calcium, total	mg/L	85.8
UA	G12D	Delin	2022/03/16	Calcium, total	mg/L	88.1
UA	G12D	Delin	2022/07/23	Calcium, total	mg/L	87.2
UA	G12D	Delin	2022/09/13	Calcium, total	mg/L	79.9
UA	G12D	Delin	2022/11/01	Calcium, total	mg/L	85.3
UA	G12D	Delin	2023/01/26	Calcium, total	mg/L	90.3
UA	G12D	Delin	2023/03/09	Calcium, total	mg/L	85.6
UA	G12D	Delin	2023/05/02	Calcium, total	mg/L	80.9
UA	G12D	Delin	2023/09/28	Calcium, total	mg/L	84.8
UA	G12D	Delin	2023/10/24	Calcium, total	mg/L	82.7
UA	G12D	Delin	2022/01/20	Chloride, total	mg/L	18.0
UA	G12D	Delin	2022/02/10	Chloride, total	mg/L	19.0
UA	G12D	Delin	2022/03/16	Chloride, total	mg/L	19.0
UA	G12D	Delin	2022/07/23	Chloride, total	mg/L	20.0
UA	G12D	Delin	2022/09/13	Chloride, total	mg/L	19.0
UA	G12D	Delin	2022/11/01	Chloride, total	mg/L	20.0
UA	G12D	Delin	2023/01/26	Chloride, total	mg/L	20.0
UA	G12D	Delin	2023/03/09	Chloride, total	mg/L	19.0
UA	G12D	Delin	2023/05/02	Chloride, total	mg/L	20.0
UA	G12D	Delin	2023/09/28	Chloride, total	mg/L	20.0
UA	G12D	Delin	2023/10/24	Chloride, total	mg/L	21.0
UA	G12D	Delin	2022/01/20	Cobalt, total	mg/L	0.00140
UA	G12D	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G12D	Delin	2022/03/16	Cobalt, total	mg/L	<0.0001

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12D	Delin	2022/07/23	Cobalt, total	mg/L	0.000600
UA	G12D	Delin	2022/09/13	Cobalt, total	mg/L	0.000300
UA	G12D	Delin	2022/11/01	Cobalt, total	mg/L	0.000200
UA	G12D	Delin	2023/01/26	Cobalt, total	mg/L	0.000100
UA	G12D	Delin	2023/03/09	Cobalt, total	mg/L	0.000400
UA	G12D	Delin	2023/05/02	Cobalt, total	mg/L	0.000200
UA	G12D	Delin	2023/09/28	Cobalt, total	mg/L	<0.0001
UA	G12D	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G12D	Delin	2023/05/02	Iron, dissolved	mg/L	<0.02
UA	G12D	Delin	2023/09/28	Iron, dissolved	mg/L	0.0599
UA	G12D	Delin	2022/01/20	Magnesium, total	mg/L	24.6
UA	G12D	Delin	2022/02/10	Magnesium, total	mg/L	25.3
UA	G12D	Delin	2022/03/16	Magnesium, total	mg/L	24.9
UA	G12D	Delin	2022/07/23	Magnesium, total	mg/L	24.8
UA	G12D	Delin	2022/09/13	Magnesium, total	mg/L	22.8
UA	G12D	Delin	2022/11/01	Magnesium, total	mg/L	24.8
UA	G12D	Delin	2023/01/26	Magnesium, total	mg/L	26.3
UA	G12D	Delin	2023/03/09	Magnesium, total	mg/L	24.3
UA	G12D	Delin	2023/05/02	Magnesium, total	mg/L	24.6
UA	G12D	Delin	2023/09/28	Magnesium, total	mg/L	25.0
UA	G12D	Delin	2023/10/24	Magnesium, total	mg/L	24.2
UA	G12D	Delin	2023/05/02	Manganese, dissolved	mg/L	0.00500
UA	G12D	Delin	2023/09/28	Manganese, dissolved	mg/L	0.00510
UA	G12D	Delin	2023/05/02	Phosphate, dissolved	mg/L	0.0520
UA	G12D	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.0520
UA	G12D	Delin	2022/01/20	Potassium, total	mg/L	1.47
UA	G12D	Delin	2022/02/10	Potassium, total	mg/L	1.64
UA	G12D	Delin	2022/03/16	Potassium, total	mg/L	1.53
UA	G12D	Delin	2022/07/23	Potassium, total	mg/L	1.56
UA	G12D	Delin	2022/09/13	Potassium, total	mg/L	1.47
UA	G12D	Delin	2022/11/01	Potassium, total	mg/L	1.55
UA	G12D	Delin	2023/01/26	Potassium, total	mg/L	1.52
UA	G12D	Delin	2023/03/09	Potassium, total	mg/L	1.55
UA	G12D	Delin	2023/05/02	Potassium, total	mg/L	1.54
UA	G12D	Delin	2023/09/28	Potassium, total	mg/L	1.68
UA	G12D	Delin	2023/10/24	Potassium, total	mg/L	1.53
UA	G12D	Delin	2023/05/02	Silicon, dissolved	mg/L	6.42
UA	G12D	Delin	2023/09/28	Silicon, dissolved	mg/L	6.51
UA	G12D	Delin	2022/01/20	Sodium, total	mg/L	29.7
UA	G12D	Delin	2022/02/10	Sodium, total	mg/L	29.5
UA	G12D	Delin	2022/03/16	Sodium, total	mg/L	29.7
UA	G12D	Delin	2022/07/23	Sodium, total	mg/L	29.3
UA	G12D	Delin	2022/09/13	Sodium, total	mg/L	28.0
UA	G12D	Delin	2022/11/01	Sodium, total	mg/L	27.7
UA	G12D	Delin	2023/01/26	Sodium, total	mg/L	27.5
UA	G12D	Delin	2023/03/09	Sodium, total	mg/L	27.4
UA	G12D	Delin	2023/05/02	Sodium, total	mg/L	30.3
UA	G12D	Delin	2023/09/28	Sodium, total	mg/L	28.8
UA	G12D	Delin	2023/10/24	Sodium, total	mg/L	27.6
UA	G12D	Delin	2022/01/20	Sulfate, total	mg/L	195
UA	G12D	Delin	2022/02/10	Sulfate, total	mg/L	191
UA	G12D	Delin	2022/03/16	Sulfate, total	mg/L	225
UA	G12D	Delin	2022/07/23	Sulfate, total	mg/L	196
UA	G12D	Delin	2022/09/13	Sulfate, total	mg/L	231
UA	G12D	Delin	2022/11/01	Sulfate, total	mg/L	185

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G12D	Delin	2023/01/26	Sulfate, total	mg/L	201
UA	G12D	Delin	2023/03/09	Sulfate, total	mg/L	198
UA	G12D	Delin	2023/05/02	Sulfate, total	mg/L	195
UA	G12D	Delin	2023/09/28	Sulfate, total	mg/L	180
UA	G12D	Delin	2023/10/24	Sulfate, total	mg/L	195
UA	G12D	Delin	2022/01/20	Temperature (Celsius)	degrees C	14.4
UA	G12D	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.6
UA	G12D	Delin	2022/03/16	Temperature (Celsius)	degrees C	14.8
UA	G12D	Delin	2022/07/23	Temperature (Celsius)	degrees C	17.2
UA	G12D	Delin	2022/09/13	Temperature (Celsius)	degrees C	18.4
UA	G12D	Delin	2022/11/01	Temperature (Celsius)	degrees C	16.3
UA	G12D	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.3
UA	G12D	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.6
UA	G12D	Delin	2023/05/02	Temperature (Celsius)	degrees C	15.1
UA	G12D	Delin	2023/09/28	Temperature (Celsius)	degrees C	15.5
UA	G12D	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.6
UA	G12D	Delin	2022/01/20	Total Dissolved Solids	mg/L	492
UA	G12D	Delin	2022/02/10	Total Dissolved Solids	mg/L	458
UA	G12D	Delin	2022/03/16	Total Dissolved Solids	mg/L	482
UA	G12D	Delin	2022/07/23	Total Dissolved Solids	mg/L	512
UA	G12D	Delin	2022/09/13	Total Dissolved Solids	mg/L	444
UA	G12D	Delin	2022/11/01	Total Dissolved Solids	mg/L	480
UA	G12D	Delin	2023/01/26	Total Dissolved Solids	mg/L	448
UA	G12D	Delin	2023/03/09	Total Dissolved Solids	mg/L	472
UA	G12D	Delin	2023/05/02	Total Dissolved Solids	mg/L	466
UA	G12D	Delin	2023/09/28	Total Dissolved Solids	mg/L	484
UA	G12D	Delin	2023/10/24	Total Dissolved Solids	mg/L	442
UA	G13S	Delin	2022/01/20	pH (field)	SU	6.5
UA	G13S	Delin	2022/02/10	pH (field)	SU	6.5
UA	G13S	Delin	2022/03/16	pH (field)	SU	6.3
UA	G13S	Delin	2022/07/23	pH (field)	SU	7.3
UA	G13S	Delin	2022/09/13	pH (field)	SU	6.0
UA	G13S	Delin	2022/11/01	pH (field)	SU	6.4
UA	G13S	Delin	2023/01/26	pH (field)	SU	6.9
UA	G13S	Delin	2023/03/09	pH (field)	SU	6.6
UA	G13S	Delin	2023/05/02	pH (field)	SU	7.1
UA	G13S	Delin	2023/09/27	pH (field)	SU	6.7
UA	G13S	Delin	2023/10/24	pH (field)	SU	6.5
UA	G13S	Delin	2022/01/20	Oxidation Reduction Potential	mV	67.0
UA	G13S	Delin	2022/02/10	Oxidation Reduction Potential	mV	19.0
UA	G13S	Delin	2022/03/16	Oxidation Reduction Potential	mV	112
UA	G13S	Delin	2022/07/23	Oxidation Reduction Potential	mV	0.800
UA	G13S	Delin	2022/09/13	Oxidation Reduction Potential	mV	142
UA	G13S	Delin	2022/11/01	Oxidation Reduction Potential	mV	187
UA	G13S	Delin	2023/01/26	Oxidation Reduction Potential	mV	24.1
UA	G13S	Delin	2023/03/09	Oxidation Reduction Potential	mV	113
UA	G13S	Delin	2023/05/02	Oxidation Reduction Potential	mV	87.0
UA	G13S	Delin	2023/09/27	Oxidation Reduction Potential	mV	7.00
UA	G13S	Delin	2023/10/24	Oxidation Reduction Potential	mV	107
UA	G13S	Delin	2022/01/20	Eh	V	0.26
UA	G13S	Delin	2022/02/10	Eh	V	0.21
UA	G13S	Delin	2022/03/16	Eh	V	0.31
UA	G13S	Delin	2022/07/23	Eh	V	0.20
UA	G13S	Delin	2022/09/13	Eh	V	0.34
UA	G13S	Delin	2022/11/01	Eh	V	0.38

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13S	Delin	2023/01/26	Eh	V	0.22
UA	G13S	Delin	2023/03/09	Eh	V	0.31
UA	G13S	Delin	2023/05/02	Eh	V	0.28
UA	G13S	Delin	2023/09/27	Eh	V	0.20
UA	G13S	Delin	2023/10/24	Eh	V	0.30
UA	G13S	Delin	2022/01/20	Alkalinity, bicarbonate	mg/L CaCO3	146
UA	G13S	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	143
UA	G13S	Delin	2022/03/16	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G13S	Delin	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G13S	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G13S	Delin	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G13S	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	104
UA	G13S	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	150
UA	G13S	Delin	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	155
UA	G13S	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	157
UA	G13S	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G13S	Delin	2022/01/20	Barium, total	mg/L	0.0341
UA	G13S	Delin	2022/02/10	Barium, total	mg/L	0.0297
UA	G13S	Delin	2022/03/16	Barium, total	mg/L	0.0259
UA	G13S	Delin	2022/07/23	Barium, total	mg/L	0.0299
UA	G13S	Delin	2022/09/13	Barium, total	mg/L	0.0399
UA	G13S	Delin	2022/11/01	Barium, total	mg/L	0.0310
UA	G13S	Delin	2023/01/26	Barium, total	mg/L	0.0326
UA	G13S	Delin	2023/03/09	Barium, total	mg/L	0.0351
UA	G13S	Delin	2023/05/02	Barium, total	mg/L	0.0307
UA	G13S	Delin	2023/09/27	Barium, total	mg/L	0.0261
UA	G13S	Delin	2023/10/24	Barium, total	mg/L	0.0408
UA	G13S	Delin	2022/01/20	Boron, total	mg/L	5.22
UA	G13S	Delin	2022/02/10	Boron, total	mg/L	4.74
UA	G13S	Delin	2022/03/16	Boron, total	mg/L	4.99
UA	G13S	Delin	2022/07/23	Boron, total	mg/L	5.49
UA	G13S	Delin	2022/09/13	Boron, total	mg/L	4.34
UA	G13S	Delin	2022/11/01	Boron, total	mg/L	4.78
UA	G13S	Delin	2023/01/26	Boron, total	mg/L	7.31
UA	G13S	Delin	2023/03/09	Boron, total	mg/L	5.47
UA	G13S	Delin	2023/05/02	Boron, total	mg/L	4.75
UA	G13S	Delin	2023/09/27	Boron, total	mg/L	6.78
UA	G13S	Delin	2023/10/24	Boron, total	mg/L	5.82
UA	G13S	Delin	2022/01/20	Calcium, total	mg/L	82.2
UA	G13S	Delin	2022/02/10	Calcium, total	mg/L	79.5
UA	G13S	Delin	2022/03/16	Calcium, total	mg/L	80.4
UA	G13S	Delin	2022/07/23	Calcium, total	mg/L	82.3
UA	G13S	Delin	2022/09/13	Calcium, total	mg/L	74.2
UA	G13S	Delin	2022/11/01	Calcium, total	mg/L	78.4
UA	G13S	Delin	2023/01/26	Calcium, total	mg/L	84.6
UA	G13S	Delin	2023/03/09	Calcium, total	mg/L	79.2
UA	G13S	Delin	2023/05/02	Calcium, total	mg/L	76.8
UA	G13S	Delin	2023/09/27	Calcium, total	mg/L	80.8
UA	G13S	Delin	2023/10/24	Calcium, total	mg/L	77.8
UA	G13S	Delin	2022/01/20	Chloride, total	mg/L	19.0
UA	G13S	Delin	2022/02/10	Chloride, total	mg/L	19.0
UA	G13S	Delin	2022/03/16	Chloride, total	mg/L	20.0
UA	G13S	Delin	2022/07/23	Chloride, total	mg/L	21.0
UA	G13S	Delin	2022/09/13	Chloride, total	mg/L	20.0
UA	G13S	Delin	2022/11/01	Chloride, total	mg/L	21.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13S	Delin	2023/01/26	Chloride, total	mg/L	20.0
UA	G13S	Delin	2023/03/09	Chloride, total	mg/L	20.0
UA	G13S	Delin	2023/05/02	Chloride, total	mg/L	21.0
UA	G13S	Delin	2023/09/27	Chloride, total	mg/L	20.0
UA	G13S	Delin	2023/10/24	Chloride, total	mg/L	21.0
UA	G13S	Delin	2022/01/20	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2022/03/16	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2022/07/23	Cobalt, total	mg/L	<0.0006
UA	G13S	Delin	2022/09/13	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2022/11/01	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/01/26	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/03/09	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/05/02	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/09/27	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G13S	Delin	2023/05/02	Iron, dissolved	mg/L	<0.02
UA	G13S	Delin	2023/09/27	Iron, dissolved	mg/L	0.0350
UA	G13S	Delin	2022/01/20	Magnesium, total	mg/L	22.6
UA	G13S	Delin	2022/02/10	Magnesium, total	mg/L	22.9
UA	G13S	Delin	2022/03/16	Magnesium, total	mg/L	22.6
UA	G13S	Delin	2022/07/23	Magnesium, total	mg/L	23.0
UA	G13S	Delin	2022/09/13	Magnesium, total	mg/L	20.8
UA	G13S	Delin	2022/11/01	Magnesium, total	mg/L	22.5
UA	G13S	Delin	2023/01/26	Magnesium, total	mg/L	23.9
UA	G13S	Delin	2023/03/09	Magnesium, total	mg/L	22.0
UA	G13S	Delin	2023/05/02	Magnesium, total	mg/L	23.3
UA	G13S	Delin	2023/09/27	Magnesium, total	mg/L	22.9
UA	G13S	Delin	2023/10/24	Magnesium, total	mg/L	21.9
UA	G13S	Delin	2023/05/02	Manganese, dissolved	mg/L	<0.0025
UA	G13S	Delin	2023/09/27	Manganese, dissolved	mg/L	<0.0008
UA	G13S	Delin	2023/05/02	Phosphate, dissolved	mg/L	0.160
UA	G13S	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0580
UA	G13S	Delin	2022/01/20	Potassium, total	mg/L	1.46
UA	G13S	Delin	2022/02/10	Potassium, total	mg/L	1.64
UA	G13S	Delin	2022/03/16	Potassium, total	mg/L	1.55
UA	G13S	Delin	2022/07/23	Potassium, total	mg/L	1.56
UA	G13S	Delin	2022/09/13	Potassium, total	mg/L	1.44
UA	G13S	Delin	2022/11/01	Potassium, total	mg/L	1.55
UA	G13S	Delin	2023/01/26	Potassium, total	mg/L	1.62
UA	G13S	Delin	2023/03/09	Potassium, total	mg/L	1.59
UA	G13S	Delin	2023/05/02	Potassium, total	mg/L	1.63
UA	G13S	Delin	2023/09/27	Potassium, total	mg/L	1.64
UA	G13S	Delin	2023/10/24	Potassium, total	mg/L	1.57
UA	G13S	Delin	2023/05/02	Silicon, dissolved	mg/L	6.96
UA	G13S	Delin	2023/09/27	Silicon, dissolved	mg/L	7.06
UA	G13S	Delin	2022/01/20	Sodium, total	mg/L	30.2
UA	G13S	Delin	2022/02/10	Sodium, total	mg/L	30.0
UA	G13S	Delin	2022/03/16	Sodium, total	mg/L	30.8
UA	G13S	Delin	2022/07/23	Sodium, total	mg/L	30.0
UA	G13S	Delin	2022/09/13	Sodium, total	mg/L	28.2
UA	G13S	Delin	2022/11/01	Sodium, total	mg/L	29.1
UA	G13S	Delin	2023/01/26	Sodium, total	mg/L	28.8
UA	G13S	Delin	2023/03/09	Sodium, total	mg/L	29.1
UA	G13S	Delin	2023/05/02	Sodium, total	mg/L	33.5

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13S	Delin	2023/09/27	Sodium, total	mg/L	30.1
UA	G13S	Delin	2023/10/24	Sodium, total	mg/L	29.3
UA	G13S	Delin	2022/01/20	Sulfate, total	mg/L	155
UA	G13S	Delin	2022/02/10	Sulfate, total	mg/L	151
UA	G13S	Delin	2022/03/16	Sulfate, total	mg/L	159
UA	G13S	Delin	2022/07/23	Sulfate, total	mg/L	168
UA	G13S	Delin	2022/09/13	Sulfate, total	mg/L	179
UA	G13S	Delin	2022/11/01	Sulfate, total	mg/L	182
UA	G13S	Delin	2023/01/26	Sulfate, total	mg/L	180
UA	G13S	Delin	2023/03/09	Sulfate, total	mg/L	168
UA	G13S	Delin	2023/05/02	Sulfate, total	mg/L	170
UA	G13S	Delin	2023/09/27	Sulfate, total	mg/L	185
UA	G13S	Delin	2023/10/24	Sulfate, total	mg/L	176
UA	G13S	Delin	2022/01/20	Temperature (Celsius)	degrees C	14.2
UA	G13S	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.3
UA	G13S	Delin	2022/03/16	Temperature (Celsius)	degrees C	14.3
UA	G13S	Delin	2022/07/23	Temperature (Celsius)	degrees C	16.8
UA	G13S	Delin	2022/09/13	Temperature (Celsius)	degrees C	16.7
UA	G13S	Delin	2022/11/01	Temperature (Celsius)	degrees C	16.2
UA	G13S	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.6
UA	G13S	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.3
UA	G13S	Delin	2023/05/02	Temperature (Celsius)	degrees C	18.2
UA	G13S	Delin	2023/09/27	Temperature (Celsius)	degrees C	15.6
UA	G13S	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.2
UA	G13S	Delin	2022/01/20	Total Dissolved Solids	mg/L	456
UA	G13S	Delin	2022/02/10	Total Dissolved Solids	mg/L	428
UA	G13S	Delin	2022/03/16	Total Dissolved Solids	mg/L	440
UA	G13S	Delin	2022/07/23	Total Dissolved Solids	mg/L	458
UA	G13S	Delin	2022/09/13	Total Dissolved Solids	mg/L	392
UA	G13S	Delin	2022/11/01	Total Dissolved Solids	mg/L	436
UA	G13S	Delin	2023/01/26	Total Dissolved Solids	mg/L	434
UA	G13S	Delin	2023/03/09	Total Dissolved Solids	mg/L	444
UA	G13S	Delin	2023/05/02	Total Dissolved Solids	mg/L	446
UA	G13S	Delin	2023/09/27	Total Dissolved Solids	mg/L	442
UA	G13S	Delin	2023/10/24	Total Dissolved Solids	mg/L	442
UA	G13D	Delin	2022/01/20	pH (field)	SU	6.6
UA	G13D	Delin	2022/02/10	pH (field)	SU	6.5
UA	G13D	Delin	2022/03/16	pH (field)	SU	6.4
UA	G13D	Delin	2022/07/23	pH (field)	SU	7.3
UA	G13D	Delin	2022/09/13	pH (field)	SU	5.9
UA	G13D	Delin	2022/11/01	pH (field)	SU	6.4
UA	G13D	Delin	2023/01/26	pH (field)	SU	7.0
UA	G13D	Delin	2023/03/09	pH (field)	SU	6.6
UA	G13D	Delin	2023/05/02	pH (field)	SU	7.0
UA	G13D	Delin	2023/09/27	pH (field)	SU	6.7
UA	G13D	Delin	2023/10/24	pH (field)	SU	6.6
UA	G13D	Delin	2022/01/20	Oxidation Reduction Potential	mV	57.0
UA	G13D	Delin	2022/02/10	Oxidation Reduction Potential	mV	28.0
UA	G13D	Delin	2022/03/16	Oxidation Reduction Potential	mV	97.0
UA	G13D	Delin	2022/07/23	Oxidation Reduction Potential	mV	13.0
UA	G13D	Delin	2022/09/13	Oxidation Reduction Potential	mV	144
UA	G13D	Delin	2022/11/01	Oxidation Reduction Potential	mV	147
UA	G13D	Delin	2023/01/26	Oxidation Reduction Potential	mV	-7.90
UA	G13D	Delin	2023/03/09	Oxidation Reduction Potential	mV	115
UA	G13D	Delin	2023/05/02	Oxidation Reduction Potential	mV	80.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13D	Delin	2023/09/27	Oxidation Reduction Potential	mV	10.0
UA	G13D	Delin	2023/10/24	Oxidation Reduction Potential	mV	111
UA	G13D	Delin	2022/01/20	Eh	V	0.25
UA	G13D	Delin	2022/02/10	Eh	V	0.22
UA	G13D	Delin	2022/03/16	Eh	V	0.29
UA	G13D	Delin	2022/07/23	Eh	V	0.21
UA	G13D	Delin	2022/09/13	Eh	V	0.34
UA	G13D	Delin	2022/11/01	Eh	V	0.34
UA	G13D	Delin	2023/01/26	Eh	V	0.19
UA	G13D	Delin	2023/03/09	Eh	V	0.31
UA	G13D	Delin	2023/05/02	Eh	V	0.28
UA	G13D	Delin	2023/09/27	Eh	V	0.20
UA	G13D	Delin	2023/10/24	Eh	V	0.31
UA	G13D	Delin	2022/01/20	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G13D	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	153
UA	G13D	Delin	2022/03/16	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G13D	Delin	2022/07/23	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G13D	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G13D	Delin	2022/11/01	Alkalinity, bicarbonate	mg/L CaCO3	156
UA	G13D	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	160
UA	G13D	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	158
UA	G13D	Delin	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G13D	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G13D	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G13D	Delin	2022/01/20	Barium, total	mg/L	0.0376
UA	G13D	Delin	2022/02/10	Barium, total	mg/L	0.0346
UA	G13D	Delin	2022/03/16	Barium, total	mg/L	0.0302
UA	G13D	Delin	2022/07/23	Barium, total	mg/L	0.0527
UA	G13D	Delin	2022/09/13	Barium, total	mg/L	0.0433
UA	G13D	Delin	2022/11/01	Barium, total	mg/L	0.0328
UA	G13D	Delin	2023/01/26	Barium, total	mg/L	0.0336
UA	G13D	Delin	2023/03/09	Barium, total	mg/L	0.0450
UA	G13D	Delin	2023/05/02	Barium, total	mg/L	0.0545
UA	G13D	Delin	2023/09/27	Barium, total	mg/L	0.0284
UA	G13D	Delin	2023/10/24	Barium, total	mg/L	0.0284
UA	G13D	Delin	2022/01/20	Boron, total	mg/L	4.62
UA	G13D	Delin	2022/02/10	Boron, total	mg/L	4.55
UA	G13D	Delin	2022/03/16	Boron, total	mg/L	4.82
UA	G13D	Delin	2022/07/23	Boron, total	mg/L	6.81
UA	G13D	Delin	2022/09/13	Boron, total	mg/L	3.66
UA	G13D	Delin	2022/11/01	Boron, total	mg/L	4.84
UA	G13D	Delin	2023/01/26	Boron, total	mg/L	5.69
UA	G13D	Delin	2023/03/09	Boron, total	mg/L	5.63
UA	G13D	Delin	2023/05/02	Boron, total	mg/L	6.44
UA	G13D	Delin	2023/09/27	Boron, total	mg/L	5.16
UA	G13D	Delin	2023/10/24	Boron, total	mg/L	3.64
UA	G13D	Delin	2022/01/20	Calcium, total	mg/L	84.5
UA	G13D	Delin	2022/02/10	Calcium, total	mg/L	83.0
UA	G13D	Delin	2022/03/16	Calcium, total	mg/L	81.5
UA	G13D	Delin	2022/07/23	Calcium, total	mg/L	83.3
UA	G13D	Delin	2022/09/13	Calcium, total	mg/L	77.0
UA	G13D	Delin	2022/11/01	Calcium, total	mg/L	84.2
UA	G13D	Delin	2023/01/26	Calcium, total	mg/L	85.4
UA	G13D	Delin	2023/03/09	Calcium, total	mg/L	81.6
UA	G13D	Delin	2023/05/02	Calcium, total	mg/L	124

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13D	Delin	2023/09/27	Calcium, total	mg/L	80.2
UA	G13D	Delin	2023/10/24	Calcium, total	mg/L	78.1
UA	G13D	Delin	2022/01/20	Chloride, total	mg/L	19.0
UA	G13D	Delin	2022/02/10	Chloride, total	mg/L	19.0
UA	G13D	Delin	2022/03/16	Chloride, total	mg/L	19.0
UA	G13D	Delin	2022/07/23	Chloride, total	mg/L	20.0
UA	G13D	Delin	2022/09/13	Chloride, total	mg/L	19.0
UA	G13D	Delin	2022/11/01	Chloride, total	mg/L	20.0
UA	G13D	Delin	2023/01/26	Chloride, total	mg/L	20.0
UA	G13D	Delin	2023/03/09	Chloride, total	mg/L	19.0
UA	G13D	Delin	2023/05/02	Chloride, total	mg/L	20.0
UA	G13D	Delin	2023/09/27	Chloride, total	mg/L	19.0
UA	G13D	Delin	2023/10/24	Chloride, total	mg/L	20.0
UA	G13D	Delin	2022/01/20	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2022/03/16	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2022/07/23	Cobalt, total	mg/L	0.00120
UA	G13D	Delin	2022/09/13	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2022/11/01	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2023/01/26	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2023/03/09	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2023/05/02	Cobalt, total	mg/L	0.000200
UA	G13D	Delin	2023/09/27	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G13D	Delin	2023/05/02	Iron, dissolved	mg/L	<0.02
UA	G13D	Delin	2023/09/27	Iron, dissolved	mg/L	0.0374
UA	G13D	Delin	2022/01/20	Magnesium, total	mg/L	22.7
UA	G13D	Delin	2022/02/10	Magnesium, total	mg/L	23.2
UA	G13D	Delin	2022/03/16	Magnesium, total	mg/L	21.7
UA	G13D	Delin	2022/07/23	Magnesium, total	mg/L	22.6
UA	G13D	Delin	2022/09/13	Magnesium, total	mg/L	21.0
UA	G13D	Delin	2022/11/01	Magnesium, total	mg/L	22.5
UA	G13D	Delin	2023/01/26	Magnesium, total	mg/L	23.7
UA	G13D	Delin	2023/03/09	Magnesium, total	mg/L	22.1
UA	G13D	Delin	2023/05/02	Magnesium, total	mg/L	33.9
UA	G13D	Delin	2023/09/27	Magnesium, total	mg/L	22.3
UA	G13D	Delin	2023/10/24	Magnesium, total	mg/L	21.6
UA	G13D	Delin	2023/05/02	Manganese, dissolved	mg/L	<0.0025
UA	G13D	Delin	2023/09/27	Manganese, dissolved	mg/L	<0.0008
UA	G13D	Delin	2023/05/02	Phosphate, dissolved	mg/L	0.0860
UA	G13D	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0430
UA	G13D	Delin	2022/01/20	Potassium, total	mg/L	1.59
UA	G13D	Delin	2022/02/10	Potassium, total	mg/L	1.78
UA	G13D	Delin	2022/03/16	Potassium, total	mg/L	1.64
UA	G13D	Delin	2022/07/23	Potassium, total	mg/L	1.66
UA	G13D	Delin	2022/09/13	Potassium, total	mg/L	1.60
UA	G13D	Delin	2022/11/01	Potassium, total	mg/L	1.69
UA	G13D	Delin	2023/01/26	Potassium, total	mg/L	1.63
UA	G13D	Delin	2023/03/09	Potassium, total	mg/L	1.74
UA	G13D	Delin	2023/05/02	Potassium, total	mg/L	2.60
UA	G13D	Delin	2023/09/27	Potassium, total	mg/L	1.77
UA	G13D	Delin	2023/10/24	Potassium, total	mg/L	1.70
UA	G13D	Delin	2023/05/02	Silicon, dissolved	mg/L	6.23
UA	G13D	Delin	2023/09/27	Silicon, dissolved	mg/L	6.29
UA	G13D	Delin	2022/01/20	Sodium, total	mg/L	30.7

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G13D	Delin	2022/02/10	Sodium, total	mg/L	30.6
UA	G13D	Delin	2022/03/16	Sodium, total	mg/L	30.7
UA	G13D	Delin	2022/07/23	Sodium, total	mg/L	30.8
UA	G13D	Delin	2022/09/13	Sodium, total	mg/L	30.0
UA	G13D	Delin	2022/11/01	Sodium, total	mg/L	31.5
UA	G13D	Delin	2023/01/26	Sodium, total	mg/L	28.6
UA	G13D	Delin	2023/03/09	Sodium, total	mg/L	30.1
UA	G13D	Delin	2023/05/02	Sodium, total	mg/L	50.5
UA	G13D	Delin	2023/09/27	Sodium, total	mg/L	30.8
UA	G13D	Delin	2023/10/24	Sodium, total	mg/L	30.2
UA	G13D	Delin	2022/01/20	Sulfate, total	mg/L	157
UA	G13D	Delin	2022/02/10	Sulfate, total	mg/L	185
UA	G13D	Delin	2022/03/16	Sulfate, total	mg/L	162
UA	G13D	Delin	2022/07/23	Sulfate, total	mg/L	164
UA	G13D	Delin	2022/09/13	Sulfate, total	mg/L	181
UA	G13D	Delin	2022/11/01	Sulfate, total	mg/L	158
UA	G13D	Delin	2023/01/26	Sulfate, total	mg/L	171
UA	G13D	Delin	2023/03/09	Sulfate, total	mg/L	155
UA	G13D	Delin	2023/05/02	Sulfate, total	mg/L	168
UA	G13D	Delin	2023/09/27	Sulfate, total	mg/L	147
UA	G13D	Delin	2023/10/24	Sulfate, total	mg/L	162
UA	G13D	Delin	2022/01/20	Temperature (Celsius)	degrees C	14.1
UA	G13D	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.3
UA	G13D	Delin	2022/03/16	Temperature (Celsius)	degrees C	14.4
UA	G13D	Delin	2022/07/23	Temperature (Celsius)	degrees C	15.9
UA	G13D	Delin	2022/09/13	Temperature (Celsius)	degrees C	17.9
UA	G13D	Delin	2022/11/01	Temperature (Celsius)	degrees C	15.4
UA	G13D	Delin	2023/01/26	Temperature (Celsius)	degrees C	12.7
UA	G13D	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.3
UA	G13D	Delin	2023/05/02	Temperature (Celsius)	degrees C	15.1
UA	G13D	Delin	2023/09/27	Temperature (Celsius)	degrees C	17.2
UA	G13D	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.2
UA	G13D	Delin	2022/01/20	Total Dissolved Solids	mg/L	444
UA	G13D	Delin	2022/02/10	Total Dissolved Solids	mg/L	398
UA	G13D	Delin	2022/03/16	Total Dissolved Solids	mg/L	436
UA	G13D	Delin	2022/07/23	Total Dissolved Solids	mg/L	442
UA	G13D	Delin	2022/09/13	Total Dissolved Solids	mg/L	418
UA	G13D	Delin	2022/11/01	Total Dissolved Solids	mg/L	438
UA	G13D	Delin	2023/01/26	Total Dissolved Solids	mg/L	420
UA	G13D	Delin	2023/03/09	Total Dissolved Solids	mg/L	430
UA	G13D	Delin	2023/05/02	Total Dissolved Solids	mg/L	420
UA	G13D	Delin	2023/09/27	Total Dissolved Solids	mg/L	426
UA	G13D	Delin	2023/10/24	Total Dissolved Solids	mg/L	418
UA	G14S	Delin	2022/01/19	pH (field)	SU	6.6
UA	G14S	Delin	2022/02/10	pH (field)	SU	6.5
UA	G14S	Delin	2022/03/15	pH (field)	SU	6.5
UA	G14S	Delin	2022/07/24	pH (field)	SU	7.6
UA	G14S	Delin	2022/09/14	pH (field)	SU	6.4
UA	G14S	Delin	2022/11/03	pH (field)	SU	6.6
UA	G14S	Delin	2023/01/25	pH (field)	SU	7.2
UA	G14S	Delin	2023/03/10	pH (field)	SU	6.6
UA	G14S	Delin	2022/01/19	Oxidation Reduction Potential	mV	12.0
UA	G14S	Delin	2022/02/10	Oxidation Reduction Potential	mV	32.0
UA	G14S	Delin	2022/03/15	Oxidation Reduction Potential	mV	63.0
UA	G14S	Delin	2022/07/24	Oxidation Reduction Potential	mV	-21.5

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G14S	Delin	2022/09/14	Oxidation Reduction Potential	mV	215
UA	G14S	Delin	2022/11/03	Oxidation Reduction Potential	mV	68.3
UA	G14S	Delin	2023/01/25	Oxidation Reduction Potential	mV	34.7
UA	G14S	Delin	2023/03/10	Oxidation Reduction Potential	mV	59.7
UA	G14S	Delin	2022/01/19	Eh	V	0.21
UA	G14S	Delin	2022/02/10	Eh	V	0.23
UA	G14S	Delin	2022/03/15	Eh	V	0.26
UA	G14S	Delin	2022/07/24	Eh	V	0.17
UA	G14S	Delin	2022/09/14	Eh	V	0.41
UA	G14S	Delin	2022/11/03	Eh	V	0.26
UA	G14S	Delin	2023/01/25	Eh	V	0.23
UA	G14S	Delin	2023/03/10	Eh	V	0.26
UA	G14S	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	161
UA	G14S	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	160
UA	G14S	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G14S	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G14S	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	154
UA	G14S	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G14S	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G14S	Delin	2023/03/10	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G14S	Delin	2022/01/19	Barium, total	mg/L	0.0381
UA	G14S	Delin	2022/02/10	Barium, total	mg/L	0.0348
UA	G14S	Delin	2022/03/15	Barium, total	mg/L	0.0314
UA	G14S	Delin	2022/07/24	Barium, total	mg/L	0.0356
UA	G14S	Delin	2022/09/14	Barium, total	mg/L	0.0427
UA	G14S	Delin	2022/11/03	Barium, total	mg/L	0.0317
UA	G14S	Delin	2023/01/25	Barium, total	mg/L	0.0337
UA	G14S	Delin	2023/03/10	Barium, total	mg/L	0.0415
UA	G14S	Delin	2022/01/19	Boron, total	mg/L	3.40
UA	G14S	Delin	2022/02/10	Boron, total	mg/L	3.60
UA	G14S	Delin	2022/03/15	Boron, total	mg/L	4.02
UA	G14S	Delin	2022/07/24	Boron, total	mg/L	3.75
UA	G14S	Delin	2022/09/14	Boron, total	mg/L	3.09
UA	G14S	Delin	2022/11/03	Boron, total	mg/L	3.22
UA	G14S	Delin	2023/01/25	Boron, total	mg/L	3.77
UA	G14S	Delin	2023/03/10	Boron, total	mg/L	4.34
UA	G14S	Delin	2022/01/19	Calcium, total	mg/L	88.0
UA	G14S	Delin	2022/02/10	Calcium, total	mg/L	85.0
UA	G14S	Delin	2022/03/15	Calcium, total	mg/L	85.8
UA	G14S	Delin	2022/07/24	Calcium, total	mg/L	84.1
UA	G14S	Delin	2022/09/14	Calcium, total	mg/L	77.8
UA	G14S	Delin	2022/11/03	Calcium, total	mg/L	86.4
UA	G14S	Delin	2023/01/25	Calcium, total	mg/L	85.0
UA	G14S	Delin	2023/03/10	Calcium, total	mg/L	83.9
UA	G14S	Delin	2022/01/19	Chloride, total	mg/L	21.0
UA	G14S	Delin	2022/02/10	Chloride, total	mg/L	20.0
UA	G14S	Delin	2022/03/15	Chloride, total	mg/L	20.0
UA	G14S	Delin	2022/07/24	Chloride, total	mg/L	22.0
UA	G14S	Delin	2022/09/14	Chloride, total	mg/L	20.0
UA	G14S	Delin	2022/11/03	Chloride, total	mg/L	20.0
UA	G14S	Delin	2023/01/25	Chloride, total	mg/L	20.0
UA	G14S	Delin	2023/03/10	Chloride, total	mg/L	19.0
UA	G14S	Delin	2022/01/19	Cobalt, total	mg/L	<0.0001
UA	G14S	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G14S	Delin	2022/03/15	Cobalt, total	mg/L	<0.0001

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G14S	Delin	2022/07/24	Cobalt, total	mg/L	0.000300
UA	G14S	Delin	2022/09/14	Cobalt, total	mg/L	<0.0001
UA	G14S	Delin	2022/11/03	Cobalt, total	mg/L	<0.0001
UA	G14S	Delin	2023/01/25	Cobalt, total	mg/L	0.000200
UA	G14S	Delin	2023/03/10	Cobalt, total	mg/L	<0.0001
UA	G14S	Delin	2022/01/19	Magnesium, total	mg/L	22.7
UA	G14S	Delin	2022/02/10	Magnesium, total	mg/L	22.6
UA	G14S	Delin	2022/03/15	Magnesium, total	mg/L	21.8
UA	G14S	Delin	2022/07/24	Magnesium, total	mg/L	21.4
UA	G14S	Delin	2022/09/14	Magnesium, total	mg/L	20.4
UA	G14S	Delin	2022/11/03	Magnesium, total	mg/L	22.3
UA	G14S	Delin	2023/01/25	Magnesium, total	mg/L	22.3
UA	G14S	Delin	2023/03/10	Magnesium, total	mg/L	21.4
UA	G14S	Delin	2022/01/19	Potassium, total	mg/L	1.66
UA	G14S	Delin	2022/02/10	Potassium, total	mg/L	1.81
UA	G14S	Delin	2022/03/15	Potassium, total	mg/L	1.72
UA	G14S	Delin	2022/07/24	Potassium, total	mg/L	1.72
UA	G14S	Delin	2022/09/14	Potassium, total	mg/L	1.61
UA	G14S	Delin	2022/11/03	Potassium, total	mg/L	1.79
UA	G14S	Delin	2023/01/25	Potassium, total	mg/L	1.84
UA	G14S	Delin	2023/03/10	Potassium, total	mg/L	1.82
UA	G14S	Delin	2022/01/19	Sodium, total	mg/L	41.4
UA	G14S	Delin	2022/02/10	Sodium, total	mg/L	39.3
UA	G14S	Delin	2022/03/15	Sodium, total	mg/L	41.4
UA	G14S	Delin	2022/07/24	Sodium, total	mg/L	38.4
UA	G14S	Delin	2022/09/14	Sodium, total	mg/L	38.2
UA	G14S	Delin	2022/11/03	Sodium, total	mg/L	40.2
UA	G14S	Delin	2023/01/25	Sodium, total	mg/L	33.8
UA	G14S	Delin	2023/03/10	Sodium, total	mg/L	36.8
UA	G14S	Delin	2022/01/19	Sulfate, total	mg/L	180
UA	G14S	Delin	2022/02/10	Sulfate, total	mg/L	190
UA	G14S	Delin	2022/03/15	Sulfate, total	mg/L	197
UA	G14S	Delin	2022/07/24	Sulfate, total	mg/L	180
UA	G14S	Delin	2022/09/14	Sulfate, total	mg/L	162
UA	G14S	Delin	2022/11/03	Sulfate, total	mg/L	165
UA	G14S	Delin	2023/01/25	Sulfate, total	mg/L	158
UA	G14S	Delin	2023/03/10	Sulfate, total	mg/L	166
UA	G14S	Delin	2022/01/19	Temperature (Celsius)	degrees C	14.0
UA	G14S	Delin	2022/02/10	Temperature (Celsius)	degrees C	13.9
UA	G14S	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.1
UA	G14S	Delin	2022/07/24	Temperature (Celsius)	degrees C	14.7
UA	G14S	Delin	2022/09/14	Temperature (Celsius)	degrees C	15.6
UA	G14S	Delin	2022/11/03	Temperature (Celsius)	degrees C	15
UA	G14S	Delin	2023/01/25	Temperature (Celsius)	degrees C	13
UA	G14S	Delin	2023/03/10	Temperature (Celsius)	degrees C	13.8
UA	G14S	Delin	2022/01/19	Total Dissolved Solids	mg/L	498
UA	G14S	Delin	2022/02/10	Total Dissolved Solids	mg/L	456
UA	G14S	Delin	2022/03/15	Total Dissolved Solids	mg/L	472
UA	G14S	Delin	2022/07/24	Total Dissolved Solids	mg/L	474
UA	G14S	Delin	2022/09/14	Total Dissolved Solids	mg/L	464
UA	G14S	Delin	2022/11/03	Total Dissolved Solids	mg/L	454
UA	G14S	Delin	2023/01/25	Total Dissolved Solids	mg/L	438
UA	G14S	Delin	2023/03/10	Total Dissolved Solids	mg/L	440
UA	G14D	Delin	2022/01/19	pH (field)	SU	7.0
UA	G14D	Delin	2022/02/10	pH (field)	SU	7.1

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G14D	Delin	2022/03/15	pH (field)	SU	7.1
UA	G14D	Delin	2022/07/24	pH (field)	SU	7.9
UA	G14D	Delin	2022/09/15	pH (field)	SU	7.1
UA	G14D	Delin	2022/11/03	pH (field)	SU	7.1
UA	G14D	Delin	2023/01/26	pH (field)	SU	7.5
UA	G14D	Delin	2023/03/10	pH (field)	SU	6.9
UA	G14D	Delin	2022/01/19	Oxidation Reduction Potential	mV	-63.0
UA	G14D	Delin	2022/02/10	Oxidation Reduction Potential	mV	-36.0
UA	G14D	Delin	2022/03/15	Oxidation Reduction Potential	mV	-92.0
UA	G14D	Delin	2022/07/24	Oxidation Reduction Potential	mV	-197
UA	G14D	Delin	2022/09/15	Oxidation Reduction Potential	mV	219
UA	G14D	Delin	2022/11/03	Oxidation Reduction Potential	mV	67.7
UA	G14D	Delin	2023/01/26	Oxidation Reduction Potential	mV	156
UA	G14D	Delin	2023/03/10	Oxidation Reduction Potential	mV	75.3
UA	G14D	Delin	2022/01/19	Eh	V	0.13
UA	G14D	Delin	2022/02/10	Eh	V	0.16
UA	G14D	Delin	2022/03/15	Eh	V	0.10
UA	G14D	Delin	2022/07/24	Eh	V	-0.0014
UA	G14D	Delin	2022/09/15	Eh	V	0.41
UA	G14D	Delin	2022/11/03	Eh	V	0.26
UA	G14D	Delin	2023/01/26	Eh	V	0.36
UA	G14D	Delin	2023/03/10	Eh	V	0.27
UA	G14D	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	253
UA	G14D	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	252
UA	G14D	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	254
UA	G14D	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	249
UA	G14D	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	254
UA	G14D	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	256
UA	G14D	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	157
UA	G14D	Delin	2023/03/10	Alkalinity, bicarbonate	mg/L CaCO3	90.0
UA	G14D	Delin	2022/01/19	Barium, total	mg/L	0.106
UA	G14D	Delin	2022/02/10	Barium, total	mg/L	0.0992
UA	G14D	Delin	2022/03/15	Barium, total	mg/L	0.103
UA	G14D	Delin	2022/07/24	Barium, total	mg/L	0.0896
UA	G14D	Delin	2022/09/15	Barium, total	mg/L	0.0916
UA	G14D	Delin	2022/11/03	Barium, total	mg/L	0.104
UA	G14D	Delin	2023/01/26	Barium, total	mg/L	0.0553
UA	G14D	Delin	2023/03/10	Barium, total	mg/L	0.0340
UA	G14D	Delin	2022/01/19	Boron, total	mg/L	0.0540
UA	G14D	Delin	2022/02/10	Boron, total	mg/L	<0.0092
UA	G14D	Delin	2022/03/15	Boron, total	mg/L	<0.0092
UA	G14D	Delin	2022/07/24	Boron, total	mg/L	0.0252
UA	G14D	Delin	2022/09/15	Boron, total	mg/L	0.0200
UA	G14D	Delin	2022/11/03	Boron, total	mg/L	0.0180
UA	G14D	Delin	2023/01/26	Boron, total	mg/L	0.0781
UA	G14D	Delin	2023/03/10	Boron, total	mg/L	0.101
UA	G14D	Delin	2022/01/19	Calcium, total	mg/L	75.9
UA	G14D	Delin	2022/02/10	Calcium, total	mg/L	77.7
UA	G14D	Delin	2022/03/15	Calcium, total	mg/L	72.1
UA	G14D	Delin	2022/07/24	Calcium, total	mg/L	82.9
UA	G14D	Delin	2022/09/15	Calcium, total	mg/L	72.9
UA	G14D	Delin	2022/11/03	Calcium, total	mg/L	82.9
UA	G14D	Delin	2023/01/26	Calcium, total	mg/L	48.4
UA	G14D	Delin	2023/03/10	Calcium, total	mg/L	24.4
UA	G14D	Delin	2022/01/19	Chloride, total	mg/L	4.00

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G14D	Delin	2022/02/10	Chloride, total	mg/L	3.00
UA	G14D	Delin	2022/03/15	Chloride, total	mg/L	<1
UA	G14D	Delin	2022/07/24	Chloride, total	mg/L	4.00
UA	G14D	Delin	2022/09/15	Chloride, total	mg/L	4.00
UA	G14D	Delin	2022/11/03	Chloride, total	mg/L	4.00
UA	G14D	Delin	2023/01/26	Chloride, total	mg/L	2.00
UA	G14D	Delin	2023/03/10	Chloride, total	mg/L	1.00
UA	G14D	Delin	2022/01/19	Cobalt, total	mg/L	<0.0001
UA	G14D	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G14D	Delin	2022/03/15	Cobalt, total	mg/L	<0.0001
UA	G14D	Delin	2022/07/24	Cobalt, total	mg/L	0.000400
UA	G14D	Delin	2022/09/15	Cobalt, total	mg/L	0.000100
UA	G14D	Delin	2022/11/03	Cobalt, total	mg/L	<0.0001
UA	G14D	Delin	2023/01/26	Cobalt, total	mg/L	0.000400
UA	G14D	Delin	2023/03/10	Cobalt, total	mg/L	0.000500
UA	G14D	Delin	2022/01/19	Magnesium, total	mg/L	14.8
UA	G14D	Delin	2022/02/10	Magnesium, total	mg/L	15.5
UA	G14D	Delin	2022/03/15	Magnesium, total	mg/L	14.9
UA	G14D	Delin	2022/07/24	Magnesium, total	mg/L	15.5
UA	G14D	Delin	2022/09/15	Magnesium, total	mg/L	13.7
UA	G14D	Delin	2022/11/03	Magnesium, total	mg/L	16.0
UA	G14D	Delin	2023/01/26	Magnesium, total	mg/L	11.7
UA	G14D	Delin	2023/03/10	Magnesium, total	mg/L	5.13
UA	G14D	Delin	2022/01/19	Potassium, total	mg/L	1.39
UA	G14D	Delin	2022/02/10	Potassium, total	mg/L	1.51
UA	G14D	Delin	2022/03/15	Potassium, total	mg/L	1.52
UA	G14D	Delin	2022/07/24	Potassium, total	mg/L	1.57
UA	G14D	Delin	2022/09/15	Potassium, total	mg/L	1.58
UA	G14D	Delin	2022/11/03	Potassium, total	mg/L	1.64
UA	G14D	Delin	2023/01/26	Potassium, total	mg/L	12.5
UA	G14D	Delin	2023/03/10	Potassium, total	mg/L	5.61
UA	G14D	Delin	2022/01/19	Sodium, total	mg/L	8.21
UA	G14D	Delin	2022/02/10	Sodium, total	mg/L	8.40
UA	G14D	Delin	2022/03/15	Sodium, total	mg/L	8.51
UA	G14D	Delin	2022/07/24	Sodium, total	mg/L	8.55
UA	G14D	Delin	2022/09/15	Sodium, total	mg/L	8.12
UA	G14D	Delin	2022/11/03	Sodium, total	mg/L	9.20
UA	G14D	Delin	2023/01/26	Sodium, total	mg/L	3.59
UA	G14D	Delin	2023/03/10	Sodium, total	mg/L	1.14
UA	G14D	Delin	2022/01/19	Sulfate, total	mg/L	<6
UA	G14D	Delin	2022/02/10	Sulfate, total	mg/L	<6
UA	G14D	Delin	2022/03/15	Sulfate, total	mg/L	<6
UA	G14D	Delin	2022/07/24	Sulfate, total	mg/L	<6
UA	G14D	Delin	2022/09/15	Sulfate, total	mg/L	<6
UA	G14D	Delin	2022/11/03	Sulfate, total	mg/L	<6
UA	G14D	Delin	2023/01/26	Sulfate, total	mg/L	25.0
UA	G14D	Delin	2023/03/10	Sulfate, total	mg/L	11.0
UA	G14D	Delin	2022/01/19	Temperature (Celsius)	degrees C	13.9
UA	G14D	Delin	2022/02/10	Temperature (Celsius)	degrees C	13.7
UA	G14D	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.2
UA	G14D	Delin	2022/07/24	Temperature (Celsius)	degrees C	15.2
UA	G14D	Delin	2022/09/15	Temperature (Celsius)	degrees C	16.2
UA	G14D	Delin	2022/11/03	Temperature (Celsius)	degrees C	15
UA	G14D	Delin	2023/01/26	Temperature (Celsius)	degrees C	9.60
UA	G14D	Delin	2023/03/10	Temperature (Celsius)	degrees C	12.8

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G14D	Delin	2022/01/19	Total Dissolved Solids	mg/L	278
UA	G14D	Delin	2022/02/10	Total Dissolved Solids	mg/L	244
UA	G14D	Delin	2022/03/15	Total Dissolved Solids	mg/L	278
UA	G14D	Delin	2022/07/24	Total Dissolved Solids	mg/L	250
UA	G14D	Delin	2022/09/15	Total Dissolved Solids	mg/L	180
UA	G14D	Delin	2022/11/03	Total Dissolved Solids	mg/L	280
UA	G14D	Delin	2023/01/26	Total Dissolved Solids	mg/L	230
UA	G14D	Delin	2023/03/10	Total Dissolved Solids	mg/L	144
UA	G15S	Delin	2022/01/19	pH (field)	SU	6.2
UA	G15S	Delin	2022/02/10	pH (field)	SU	6.2
UA	G15S	Delin	2022/03/15	pH (field)	SU	6.2
UA	G15S	Delin	2022/07/24	pH (field)	SU	7.1
UA	G15S	Delin	2022/09/13	pH (field)	SU	5.9
UA	G15S	Delin	2022/11/03	pH (field)	SU	6.4
UA	G15S	Delin	2023/01/25	pH (field)	SU	6.8
UA	G15S	Delin	2023/03/09	pH (field)	SU	6.2
UA	G15S	Delin	2022/01/19	Oxidation Reduction Potential	mV	68.0
UA	G15S	Delin	2022/02/10	Oxidation Reduction Potential	mV	82.0
UA	G15S	Delin	2022/03/15	Oxidation Reduction Potential	mV	99.0
UA	G15S	Delin	2022/07/24	Oxidation Reduction Potential	mV	-28.5
UA	G15S	Delin	2022/09/13	Oxidation Reduction Potential	mV	137
UA	G15S	Delin	2022/11/03	Oxidation Reduction Potential	mV	82.8
UA	G15S	Delin	2023/01/25	Oxidation Reduction Potential	mV	41.6
UA	G15S	Delin	2023/03/09	Oxidation Reduction Potential	mV	127
UA	G15S	Delin	2022/01/19	Eh	V	0.26
UA	G15S	Delin	2022/02/10	Eh	V	0.28
UA	G15S	Delin	2022/03/15	Eh	V	0.29
UA	G15S	Delin	2022/07/24	Eh	V	0.17
UA	G15S	Delin	2022/09/13	Eh	V	0.33
UA	G15S	Delin	2022/11/03	Eh	V	0.28
UA	G15S	Delin	2023/01/25	Eh	V	0.24
UA	G15S	Delin	2023/03/09	Eh	V	0.32
UA	G15S	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	135
UA	G15S	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	139
UA	G15S	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	130
UA	G15S	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	101
UA	G15S	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	118
UA	G15S	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	112
UA	G15S	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	127
UA	G15S	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	135
UA	G15S	Delin	2022/01/19	Barium, total	mg/L	0.0914
UA	G15S	Delin	2022/02/10	Barium, total	mg/L	0.101
UA	G15S	Delin	2022/03/15	Barium, total	mg/L	0.0895
UA	G15S	Delin	2022/07/24	Barium, total	mg/L	0.106
UA	G15S	Delin	2022/09/13	Barium, total	mg/L	0.162
UA	G15S	Delin	2022/11/03	Barium, total	mg/L	0.130
UA	G15S	Delin	2023/01/25	Barium, total	mg/L	0.0970
UA	G15S	Delin	2023/03/09	Barium, total	mg/L	0.0999
UA	G15S	Delin	2022/01/19	Boron, total	mg/L	1.14
UA	G15S	Delin	2022/02/10	Boron, total	mg/L	1.05
UA	G15S	Delin	2022/03/15	Boron, total	mg/L	0.740
UA	G15S	Delin	2022/07/24	Boron, total	mg/L	1.26
UA	G15S	Delin	2022/09/13	Boron, total	mg/L	0.980
UA	G15S	Delin	2022/11/03	Boron, total	mg/L	1.32
UA	G15S	Delin	2023/01/25	Boron, total	mg/L	0.963

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G15S	Delin	2023/03/09	Boron, total	mg/L	1.33
UA	G15S	Delin	2022/01/19	Calcium, total	mg/L	55.7
UA	G15S	Delin	2022/02/10	Calcium, total	mg/L	56.6
UA	G15S	Delin	2022/03/15	Calcium, total	mg/L	45.5
UA	G15S	Delin	2022/07/24	Calcium, total	mg/L	49.7
UA	G15S	Delin	2022/09/13	Calcium, total	mg/L	49.7
UA	G15S	Delin	2022/11/03	Calcium, total	mg/L	55.3
UA	G15S	Delin	2023/01/25	Calcium, total	mg/L	52.9
UA	G15S	Delin	2023/03/09	Calcium, total	mg/L	52.0
UA	G15S	Delin	2022/01/19	Chloride, total	mg/L	6.00
UA	G15S	Delin	2022/02/10	Chloride, total	mg/L	7.00
UA	G15S	Delin	2022/03/15	Chloride, total	mg/L	3.00
UA	G15S	Delin	2022/07/24	Chloride, total	mg/L	6.00
UA	G15S	Delin	2022/09/13	Chloride, total	mg/L	7.00
UA	G15S	Delin	2022/11/03	Chloride, total	mg/L	7.00
UA	G15S	Delin	2023/01/25	Chloride, total	mg/L	5.00
UA	G15S	Delin	2023/03/09	Chloride, total	mg/L	5.00
UA	G15S	Delin	2022/01/19	Cobalt, total	mg/L	0.00690
UA	G15S	Delin	2022/02/10	Cobalt, total	mg/L	0.00420
UA	G15S	Delin	2022/03/15	Cobalt, total	mg/L	0.00260
UA	G15S	Delin	2022/07/24	Cobalt, total	mg/L	0.00370
UA	G15S	Delin	2022/09/13	Cobalt, total	mg/L	0.00220
UA	G15S	Delin	2022/11/03	Cobalt, total	mg/L	0.000500
UA	G15S	Delin	2023/01/25	Cobalt, total	mg/L	0.000400
UA	G15S	Delin	2023/03/09	Cobalt, total	mg/L	0.00130
UA	G15S	Delin	2022/01/19	Magnesium, total	mg/L	18.2
UA	G15S	Delin	2022/02/10	Magnesium, total	mg/L	19.2
UA	G15S	Delin	2022/03/15	Magnesium, total	mg/L	14.7
UA	G15S	Delin	2022/07/24	Magnesium, total	mg/L	18.0
UA	G15S	Delin	2022/09/13	Magnesium, total	mg/L	18.0
UA	G15S	Delin	2022/11/03	Magnesium, total	mg/L	19.9
UA	G15S	Delin	2023/01/25	Magnesium, total	mg/L	19.4
UA	G15S	Delin	2023/03/09	Magnesium, total	mg/L	18.1
UA	G15S	Delin	2022/01/19	Potassium, total	mg/L	0.733
UA	G15S	Delin	2022/02/10	Potassium, total	mg/L	0.758
UA	G15S	Delin	2022/03/15	Potassium, total	mg/L	0.608
UA	G15S	Delin	2022/07/24	Potassium, total	mg/L	0.548
UA	G15S	Delin	2022/09/13	Potassium, total	mg/L	0.591
UA	G15S	Delin	2022/11/03	Potassium, total	mg/L	0.569
UA	G15S	Delin	2023/01/25	Potassium, total	mg/L	0.524
UA	G15S	Delin	2023/03/09	Potassium, total	mg/L	0.778
UA	G15S	Delin	2022/01/19	Sodium, total	mg/L	21.1
UA	G15S	Delin	2022/02/10	Sodium, total	mg/L	21.0
UA	G15S	Delin	2022/03/15	Sodium, total	mg/L	13.9
UA	G15S	Delin	2022/07/24	Sodium, total	mg/L	17.9
UA	G15S	Delin	2022/09/13	Sodium, total	mg/L	19.4
UA	G15S	Delin	2022/11/03	Sodium, total	mg/L	22.6
UA	G15S	Delin	2023/01/25	Sodium, total	mg/L	17.5
UA	G15S	Delin	2023/03/09	Sodium, total	mg/L	20.5
UA	G15S	Delin	2022/01/19	Sulfate, total	mg/L	101
UA	G15S	Delin	2022/02/10	Sulfate, total	mg/L	104
UA	G15S	Delin	2022/03/15	Sulfate, total	mg/L	53.0
UA	G15S	Delin	2022/07/24	Sulfate, total	mg/L	108
UA	G15S	Delin	2022/09/13	Sulfate, total	mg/L	148
UA	G15S	Delin	2022/11/03	Sulfate, total	mg/L	123

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G15S	Delin	2023/01/25	Sulfate, total	mg/L	88.0
UA	G15S	Delin	2023/03/09	Sulfate, total	mg/L	89.0
UA	G15S	Delin	2022/01/19	Temperature (Celsius)	degrees C	14.1
UA	G15S	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.2
UA	G15S	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.3
UA	G15S	Delin	2022/07/24	Temperature (Celsius)	degrees C	15.1
UA	G15S	Delin	2022/09/13	Temperature (Celsius)	degrees C	15.8
UA	G15S	Delin	2022/11/03	Temperature (Celsius)	degrees C	15.3
UA	G15S	Delin	2023/01/25	Temperature (Celsius)	degrees C	13.5
UA	G15S	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.2
UA	G15S	Delin	2022/01/19	Total Dissolved Solids	mg/L	320
UA	G15S	Delin	2022/02/10	Total Dissolved Solids	mg/L	290
UA	G15S	Delin	2022/03/15	Total Dissolved Solids	mg/L	230
UA	G15S	Delin	2022/07/24	Total Dissolved Solids	mg/L	302
UA	G15S	Delin	2022/09/13	Total Dissolved Solids	mg/L	306
UA	G15S	Delin	2022/11/03	Total Dissolved Solids	mg/L	336
UA	G15S	Delin	2023/01/25	Total Dissolved Solids	mg/L	282
UA	G15S	Delin	2023/03/09	Total Dissolved Solids	mg/L	310
UA	G15D	Delin	2022/01/19	pH (field)	SU	6.8
UA	G15D	Delin	2022/02/11	pH (field)	SU	6.7
UA	G15D	Delin	2022/03/15	pH (field)	SU	6.8
UA	G15D	Delin	2022/07/24	pH (field)	SU	8.2
UA	G15D	Delin	2022/09/13	pH (field)	SU	6.8
UA	G15D	Delin	2022/11/03	pH (field)	SU	7.1
UA	G15D	Delin	2023/01/25	pH (field)	SU	7.3
UA	G15D	Delin	2023/03/09	pH (field)	SU	6.7
UA	G15D	Delin	2022/01/19	Oxidation Reduction Potential	mV	-58.0
UA	G15D	Delin	2022/02/11	Oxidation Reduction Potential	mV	-73.0
UA	G15D	Delin	2022/03/15	Oxidation Reduction Potential	mV	-78.0
UA	G15D	Delin	2022/07/24	Oxidation Reduction Potential	mV	-220
UA	G15D	Delin	2022/09/13	Oxidation Reduction Potential	mV	101
UA	G15D	Delin	2022/11/03	Oxidation Reduction Potential	mV	-6.10
UA	G15D	Delin	2023/01/25	Oxidation Reduction Potential	mV	-95.5
UA	G15D	Delin	2023/03/09	Oxidation Reduction Potential	mV	-28.4
UA	G15D	Delin	2022/01/19	Eh	V	0.14
UA	G15D	Delin	2022/02/11	Eh	V	0.12
UA	G15D	Delin	2022/03/15	Eh	V	0.12
UA	G15D	Delin	2022/07/24	Eh	V	-0.025
UA	G15D	Delin	2022/09/13	Eh	V	0.30
UA	G15D	Delin	2022/11/03	Eh	V	0.19
UA	G15D	Delin	2023/01/25	Eh	V	0.10
UA	G15D	Delin	2023/03/09	Eh	V	0.17
UA	G15D	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G15D	Delin	2022/02/11	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G15D	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	172
UA	G15D	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G15D	Delin	2022/09/13	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G15D	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G15D	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	88.0
UA	G15D	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G15D	Delin	2022/01/19	Barium, total	mg/L	0.0506
UA	G15D	Delin	2022/02/11	Barium, total	mg/L	0.0444
UA	G15D	Delin	2022/03/15	Barium, total	mg/L	0.0365
UA	G15D	Delin	2022/07/24	Barium, total	mg/L	0.0411
UA	G15D	Delin	2022/09/13	Barium, total	mg/L	0.0364

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G15D	Delin	2022/11/03	Barium, total	mg/L	0.0436
UA	G15D	Delin	2023/01/25	Barium, total	mg/L	0.0327
UA	G15D	Delin	2023/03/09	Barium, total	mg/L	0.0441
UA	G15D	Delin	2022/01/19	Boron, total	mg/L	6.69
UA	G15D	Delin	2022/02/11	Boron, total	mg/L	6.10
UA	G15D	Delin	2022/03/15	Boron, total	mg/L	7.88
UA	G15D	Delin	2022/07/24	Boron, total	mg/L	6.22
UA	G15D	Delin	2022/09/13	Boron, total	mg/L	4.17
UA	G15D	Delin	2022/11/03	Boron, total	mg/L	4.26
UA	G15D	Delin	2023/01/25	Boron, total	mg/L	6.17
UA	G15D	Delin	2023/03/09	Boron, total	mg/L	7.22
UA	G15D	Delin	2022/01/19	Calcium, total	mg/L	134
UA	G15D	Delin	2022/02/11	Calcium, total	mg/L	126
UA	G15D	Delin	2022/03/15	Calcium, total	mg/L	134
UA	G15D	Delin	2022/07/24	Calcium, total	mg/L	133
UA	G15D	Delin	2022/09/13	Calcium, total	mg/L	115
UA	G15D	Delin	2022/11/03	Calcium, total	mg/L	123
UA	G15D	Delin	2023/01/25	Calcium, total	mg/L	132
UA	G15D	Delin	2023/03/09	Calcium, total	mg/L	132
UA	G15D	Delin	2022/01/19	Chloride, total	mg/L	19.0
UA	G15D	Delin	2022/02/11	Chloride, total	mg/L	19.0
UA	G15D	Delin	2022/03/15	Chloride, total	mg/L	20.0
UA	G15D	Delin	2022/07/24	Chloride, total	mg/L	19.0
UA	G15D	Delin	2022/09/13	Chloride, total	mg/L	17.0
UA	G15D	Delin	2022/11/03	Chloride, total	mg/L	19.0
UA	G15D	Delin	2023/01/25	Chloride, total	mg/L	18.0
UA	G15D	Delin	2023/03/09	Chloride, total	mg/L	18.0
UA	G15D	Delin	2022/01/19	Cobalt, total	mg/L	0.0238
UA	G15D	Delin	2022/02/11	Cobalt, total	mg/L	0.0178
UA	G15D	Delin	2022/03/15	Cobalt, total	mg/L	0.0217
UA	G15D	Delin	2022/07/24	Cobalt, total	mg/L	0.00980
UA	G15D	Delin	2022/09/13	Cobalt, total	mg/L	0.00400
UA	G15D	Delin	2022/11/03	Cobalt, total	mg/L	0.00500
UA	G15D	Delin	2023/01/25	Cobalt, total	mg/L	0.00720
UA	G15D	Delin	2023/03/09	Cobalt, total	mg/L	0.00920
UA	G15D	Delin	2022/01/19	Magnesium, total	mg/L	30.6
UA	G15D	Delin	2022/02/11	Magnesium, total	mg/L	30.5
UA	G15D	Delin	2022/03/15	Magnesium, total	mg/L	30.7
UA	G15D	Delin	2022/07/24	Magnesium, total	mg/L	31.0
UA	G15D	Delin	2022/09/13	Magnesium, total	mg/L	26.8
UA	G15D	Delin	2022/11/03	Magnesium, total	mg/L	29.1
UA	G15D	Delin	2023/01/25	Magnesium, total	mg/L	30.8
UA	G15D	Delin	2023/03/09	Magnesium, total	mg/L	30.2
UA	G15D	Delin	2022/01/19	Potassium, total	mg/L	2.64
UA	G15D	Delin	2022/02/11	Potassium, total	mg/L	2.95
UA	G15D	Delin	2022/03/15	Potassium, total	mg/L	2.84
UA	G15D	Delin	2022/07/24	Potassium, total	mg/L	2.12
UA	G15D	Delin	2022/09/13	Potassium, total	mg/L	1.82
UA	G15D	Delin	2022/11/03	Potassium, total	mg/L	1.91
UA	G15D	Delin	2023/01/25	Potassium, total	mg/L	2.78
UA	G15D	Delin	2023/03/09	Potassium, total	mg/L	2.88
UA	G15D	Delin	2022/01/19	Sodium, total	mg/L	61.3
UA	G15D	Delin	2022/02/11	Sodium, total	mg/L	58.9
UA	G15D	Delin	2022/03/15	Sodium, total	mg/L	63.3
UA	G15D	Delin	2022/07/24	Sodium, total	mg/L	46.1

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G15D	Delin	2022/09/13	Sodium, total	mg/L	42.6
UA	G15D	Delin	2022/11/03	Sodium, total	mg/L	43.4
UA	G15D	Delin	2023/01/25	Sodium, total	mg/L	56.8
UA	G15D	Delin	2023/03/09	Sodium, total	mg/L	58.7
UA	G15D	Delin	2022/01/19	Sulfate, total	mg/L	362
UA	G15D	Delin	2022/02/11	Sulfate, total	mg/L	389
UA	G15D	Delin	2022/03/15	Sulfate, total	mg/L	375
UA	G15D	Delin	2022/07/24	Sulfate, total	mg/L	300
UA	G15D	Delin	2022/09/13	Sulfate, total	mg/L	310
UA	G15D	Delin	2022/11/03	Sulfate, total	mg/L	320
UA	G15D	Delin	2023/01/25	Sulfate, total	mg/L	377
UA	G15D	Delin	2023/03/09	Sulfate, total	mg/L	382
UA	G15D	Delin	2022/01/19	Temperature (Celsius)	degrees C	13.8
UA	G15D	Delin	2022/02/11	Temperature (Celsius)	degrees C	13.9
UA	G15D	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.7
UA	G15D	Delin	2022/07/24	Temperature (Celsius)	degrees C	16.6
UA	G15D	Delin	2022/09/13	Temperature (Celsius)	degrees C	15.7
UA	G15D	Delin	2022/11/03	Temperature (Celsius)	degrees C	16.7
UA	G15D	Delin	2023/01/25	Temperature (Celsius)	degrees C	13.5
UA	G15D	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.2
UA	G15D	Delin	2022/01/19	Total Dissolved Solids	mg/L	762
UA	G15D	Delin	2022/02/11	Total Dissolved Solids	mg/L	726
UA	G15D	Delin	2022/03/15	Total Dissolved Solids	mg/L	770
UA	G15D	Delin	2022/07/24	Total Dissolved Solids	mg/L	658
UA	G15D	Delin	2022/09/13	Total Dissolved Solids	mg/L	542
UA	G15D	Delin	2022/11/03	Total Dissolved Solids	mg/L	655
UA	G15D	Delin	2023/01/25	Total Dissolved Solids	mg/L	676
UA	G15D	Delin	2023/03/09	Total Dissolved Solids	mg/L	790
UA	G16S	Delin	2022/01/19	pH (field)	SU	6.7
UA	G16S	Delin	2022/02/10	pH (field)	SU	6.7
UA	G16S	Delin	2022/03/15	pH (field)	SU	6.7
UA	G16S	Delin	2022/07/24	pH (field)	SU	8.0
UA	G16S	Delin	2022/09/14	pH (field)	SU	6.7
UA	G16S	Delin	2022/11/03	pH (field)	SU	6.9
UA	G16S	Delin	2023/01/25	pH (field)	SU	7.3
UA	G16S	Delin	2023/03/09	pH (field)	SU	6.7
UA	G16S	Delin	2023/05/02	pH (field)	SU	7.0
UA	G16S	Delin	2023/09/27	pH (field)	SU	6.7
UA	G16S	Delin	2023/10/24	pH (field)	SU	6.5
UA	G16S	Delin	2022/01/19	Oxidation Reduction Potential	mV	-16.0
UA	G16S	Delin	2022/02/10	Oxidation Reduction Potential	mV	8.00
UA	G16S	Delin	2022/03/15	Oxidation Reduction Potential	mV	-1.00
UA	G16S	Delin	2022/07/24	Oxidation Reduction Potential	mV	-113
UA	G16S	Delin	2022/09/14	Oxidation Reduction Potential	mV	214
UA	G16S	Delin	2022/11/03	Oxidation Reduction Potential	mV	53.6
UA	G16S	Delin	2023/01/25	Oxidation Reduction Potential	mV	-6.60
UA	G16S	Delin	2023/03/09	Oxidation Reduction Potential	mV	116
UA	G16S	Delin	2023/05/02	Oxidation Reduction Potential	mV	-28.0
UA	G16S	Delin	2023/09/27	Oxidation Reduction Potential	mV	113
UA	G16S	Delin	2023/10/24	Oxidation Reduction Potential	mV	124
UA	G16S	Delin	2022/01/19	Eh	V	0.18
UA	G16S	Delin	2022/02/10	Eh	V	0.20
UA	G16S	Delin	2022/03/15	Eh	V	0.19
UA	G16S	Delin	2022/07/24	Eh	V	0.082
UA	G16S	Delin	2022/09/14	Eh	V	0.41

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G16S	Delin	2022/11/03	Eh	V	0.25
UA	G16S	Delin	2023/01/25	Eh	V	0.19
UA	G16S	Delin	2023/03/09	Eh	V	0.31
UA	G16S	Delin	2023/05/02	Eh	V	0.17
UA	G16S	Delin	2023/09/27	Eh	V	0.31
UA	G16S	Delin	2023/10/24	Eh	V	0.32
UA	G16S	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	242
UA	G16S	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	243
UA	G16S	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G16S	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	261
UA	G16S	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	262
UA	G16S	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	262
UA	G16S	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	253
UA	G16S	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	243
UA	G16S	Delin	2023/05/02	Alkalinity, bicarbonate	mg/L CaCO3	265
UA	G16S	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	276
UA	G16S	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	259
UA	G16S	Delin	2022/01/19	Barium, total	mg/L	0.0421
UA	G16S	Delin	2022/02/10	Barium, total	mg/L	0.0407
UA	G16S	Delin	2022/03/15	Barium, total	mg/L	0.0372
UA	G16S	Delin	2022/07/24	Barium, total	mg/L	0.0367
UA	G16S	Delin	2022/09/14	Barium, total	mg/L	0.0351
UA	G16S	Delin	2022/11/03	Barium, total	mg/L	0.0450
UA	G16S	Delin	2023/01/25	Barium, total	mg/L	0.0359
UA	G16S	Delin	2023/03/09	Barium, total	mg/L	0.0479
UA	G16S	Delin	2023/05/02	Barium, total	mg/L	0.0353
UA	G16S	Delin	2023/09/27	Barium, total	mg/L	0.0281
UA	G16S	Delin	2023/10/24	Barium, total	mg/L	0.0425
UA	G16S	Delin	2022/01/19	Boron, total	mg/L	7.24
UA	G16S	Delin	2022/02/10	Boron, total	mg/L	7.63
UA	G16S	Delin	2022/03/15	Boron, total	mg/L	6.74
UA	G16S	Delin	2022/07/24	Boron, total	mg/L	6.79
UA	G16S	Delin	2022/09/14	Boron, total	mg/L	5.96
UA	G16S	Delin	2022/11/03	Boron, total	mg/L	7.24
UA	G16S	Delin	2023/01/25	Boron, total	mg/L	7.18
UA	G16S	Delin	2023/03/09	Boron, total	mg/L	10.6
UA	G16S	Delin	2023/05/02	Boron, total	mg/L	6.72
UA	G16S	Delin	2023/09/27	Boron, total	mg/L	8.29
UA	G16S	Delin	2023/10/24	Boron, total	mg/L	5.85
UA	G16S	Delin	2022/01/19	Calcium, total	mg/L	147
UA	G16S	Delin	2022/02/10	Calcium, total	mg/L	142
UA	G16S	Delin	2022/03/15	Calcium, total	mg/L	128
UA	G16S	Delin	2022/07/24	Calcium, total	mg/L	153
UA	G16S	Delin	2022/09/14	Calcium, total	mg/L	137
UA	G16S	Delin	2022/11/03	Calcium, total	mg/L	148
UA	G16S	Delin	2023/01/25	Calcium, total	mg/L	133
UA	G16S	Delin	2023/03/09	Calcium, total	mg/L	137
UA	G16S	Delin	2023/05/02	Calcium, total	mg/L	141
UA	G16S	Delin	2023/09/27	Calcium, total	mg/L	143
UA	G16S	Delin	2023/10/24	Calcium, total	mg/L	157
UA	G16S	Delin	2022/01/19	Chloride, total	mg/L	17.0
UA	G16S	Delin	2022/02/10	Chloride, total	mg/L	17.0
UA	G16S	Delin	2022/03/15	Chloride, total	mg/L	17.0
UA	G16S	Delin	2022/07/24	Chloride, total	mg/L	17.0
UA	G16S	Delin	2022/09/14	Chloride, total	mg/L	16.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G16S	Delin	2022/11/03	Chloride, total	mg/L	16.0
UA	G16S	Delin	2023/01/25	Chloride, total	mg/L	17.0
UA	G16S	Delin	2023/03/09	Chloride, total	mg/L	18.0
UA	G16S	Delin	2023/05/02	Chloride, total	mg/L	17.0
UA	G16S	Delin	2023/09/27	Chloride, total	mg/L	17.0
UA	G16S	Delin	2023/10/24	Chloride, total	mg/L	16.0
UA	G16S	Delin	2022/01/19	Cobalt, total	mg/L	0.00540
UA	G16S	Delin	2022/02/10	Cobalt, total	mg/L	0.00490
UA	G16S	Delin	2022/03/15	Cobalt, total	mg/L	0.00450
UA	G16S	Delin	2022/07/24	Cobalt, total	mg/L	0.00710
UA	G16S	Delin	2022/09/14	Cobalt, total	mg/L	0.00400
UA	G16S	Delin	2022/11/03	Cobalt, total	mg/L	0.00530
UA	G16S	Delin	2023/01/25	Cobalt, total	mg/L	0.00460
UA	G16S	Delin	2023/03/09	Cobalt, total	mg/L	0.00380
UA	G16S	Delin	2023/05/02	Cobalt, total	mg/L	0.00410
UA	G16S	Delin	2023/09/27	Cobalt, total	mg/L	0.00460
UA	G16S	Delin	2023/10/24	Cobalt, total	mg/L	0.00360
UA	G16S	Delin	2023/05/02	Iron, dissolved	mg/L	<0.02
UA	G16S	Delin	2023/09/27	Iron, dissolved	mg/L	0.0804
UA	G16S	Delin	2022/01/19	Magnesium, total	mg/L	25.5
UA	G16S	Delin	2022/02/10	Magnesium, total	mg/L	25.3
UA	G16S	Delin	2022/03/15	Magnesium, total	mg/L	23.6
UA	G16S	Delin	2022/07/24	Magnesium, total	mg/L	25.5
UA	G16S	Delin	2022/09/14	Magnesium, total	mg/L	23.1
UA	G16S	Delin	2022/11/03	Magnesium, total	mg/L	24.0
UA	G16S	Delin	2023/01/25	Magnesium, total	mg/L	23.2
UA	G16S	Delin	2023/03/09	Magnesium, total	mg/L	24.5
UA	G16S	Delin	2023/05/02	Magnesium, total	mg/L	24.6
UA	G16S	Delin	2023/09/27	Magnesium, total	mg/L	24.7
UA	G16S	Delin	2023/10/24	Magnesium, total	mg/L	27.1
UA	G16S	Delin	2023/05/02	Manganese, dissolved	mg/L	10.2
UA	G16S	Delin	2023/09/27	Manganese, dissolved	mg/L	8.75
UA	G16S	Delin	2023/05/02	Phosphate, dissolved	mg/L	0.104
UA	G16S	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0370
UA	G16S	Delin	2022/01/19	Potassium, total	mg/L	3.60
UA	G16S	Delin	2022/02/10	Potassium, total	mg/L	3.81
UA	G16S	Delin	2022/03/15	Potassium, total	mg/L	3.64
UA	G16S	Delin	2022/07/24	Potassium, total	mg/L	3.70
UA	G16S	Delin	2022/09/14	Potassium, total	mg/L	3.38
UA	G16S	Delin	2022/11/03	Potassium, total	mg/L	3.69
UA	G16S	Delin	2023/01/25	Potassium, total	mg/L	3.42
UA	G16S	Delin	2023/03/09	Potassium, total	mg/L	3.67
UA	G16S	Delin	2023/05/02	Potassium, total	mg/L	3.56
UA	G16S	Delin	2023/09/27	Potassium, total	mg/L	3.61
UA	G16S	Delin	2023/10/24	Potassium, total	mg/L	3.84
UA	G16S	Delin	2023/05/02	Silicon, dissolved	mg/L	6.78
UA	G16S	Delin	2023/09/27	Silicon, dissolved	mg/L	6.83
UA	G16S	Delin	2022/01/19	Sodium, total	mg/L	41.3
UA	G16S	Delin	2022/02/10	Sodium, total	mg/L	40.8
UA	G16S	Delin	2022/03/15	Sodium, total	mg/L	39.7
UA	G16S	Delin	2022/07/24	Sodium, total	mg/L	36.4
UA	G16S	Delin	2022/09/14	Sodium, total	mg/L	34.5
UA	G16S	Delin	2022/11/03	Sodium, total	mg/L	36.0
UA	G16S	Delin	2023/01/25	Sodium, total	mg/L	34.0
UA	G16S	Delin	2023/03/09	Sodium, total	mg/L	39.8

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G16S	Delin	2023/05/02	Sodium, total	mg/L	37.8
UA	G16S	Delin	2023/09/27	Sodium, total	mg/L	35.2
UA	G16S	Delin	2023/10/24	Sodium, total	mg/L	39.8
UA	G16S	Delin	2022/01/19	Sulfate, total	mg/L	279
UA	G16S	Delin	2022/02/10	Sulfate, total	mg/L	271
UA	G16S	Delin	2022/03/15	Sulfate, total	mg/L	300
UA	G16S	Delin	2022/07/24	Sulfate, total	mg/L	249
UA	G16S	Delin	2022/09/14	Sulfate, total	mg/L	262
UA	G16S	Delin	2022/11/03	Sulfate, total	mg/L	272
UA	G16S	Delin	2023/01/25	Sulfate, total	mg/L	255
UA	G16S	Delin	2023/03/09	Sulfate, total	mg/L	299
UA	G16S	Delin	2023/05/02	Sulfate, total	mg/L	256
UA	G16S	Delin	2023/09/27	Sulfate, total	mg/L	229
UA	G16S	Delin	2023/10/24	Sulfate, total	mg/L	256
UA	G16S	Delin	2022/01/19	Temperature (Celsius)	degrees C	14.2
UA	G16S	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.2
UA	G16S	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.3
UA	G16S	Delin	2022/07/24	Temperature (Celsius)	degrees C	15.6
UA	G16S	Delin	2022/09/14	Temperature (Celsius)	degrees C	15.6
UA	G16S	Delin	2022/11/03	Temperature (Celsius)	degrees C	14.7
UA	G16S	Delin	2023/01/25	Temperature (Celsius)	degrees C	13.7
UA	G16S	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.3
UA	G16S	Delin	2023/05/02	Temperature (Celsius)	degrees C	14.6
UA	G16S	Delin	2023/09/27	Temperature (Celsius)	degrees C	14.9
UA	G16S	Delin	2023/10/24	Temperature (Celsius)	degrees C	14.6
UA	G16S	Delin	2022/01/19	Total Dissolved Solids	mg/L	720
UA	G16S	Delin	2022/02/10	Total Dissolved Solids	mg/L	684
UA	G16S	Delin	2022/03/15	Total Dissolved Solids	mg/L	742
UA	G16S	Delin	2022/07/24	Total Dissolved Solids	mg/L	710
UA	G16S	Delin	2022/09/14	Total Dissolved Solids	mg/L	338
UA	G16S	Delin	2022/11/03	Total Dissolved Solids	mg/L	655
UA	G16S	Delin	2023/01/25	Total Dissolved Solids	mg/L	670
UA	G16S	Delin	2023/03/09	Total Dissolved Solids	mg/L	694
UA	G16S	Delin	2023/05/02	Total Dissolved Solids	mg/L	672
UA	G16S	Delin	2023/09/27	Total Dissolved Solids	mg/L	686
UA	G16S	Delin	2023/10/24	Total Dissolved Solids	mg/L	674
UA	G16D	Delin	2022/01/19	pH (field)	SU	7.1
UA	G16D	Delin	2022/02/10	pH (field)	SU	6.8
UA	G16D	Delin	2022/03/15	pH (field)	SU	7.0
UA	G16D	Delin	2022/07/24	pH (field)	SU	8.0
UA	G16D	Delin	2022/09/14	pH (field)	SU	6.8
UA	G16D	Delin	2022/11/03	pH (field)	SU	6.9
UA	G16D	Delin	2023/01/25	pH (field)	SU	7.3
UA	G16D	Delin	2023/03/09	pH (field)	SU	6.8
UA	G16D	Delin	2022/01/19	Oxidation Reduction Potential	mV	-101
UA	G16D	Delin	2022/02/10	Oxidation Reduction Potential	mV	-74.0
UA	G16D	Delin	2022/03/15	Oxidation Reduction Potential	mV	-132
UA	G16D	Delin	2022/07/24	Oxidation Reduction Potential	mV	-234
UA	G16D	Delin	2022/09/14	Oxidation Reduction Potential	mV	191
UA	G16D	Delin	2022/11/03	Oxidation Reduction Potential	mV	-25.3
UA	G16D	Delin	2023/01/25	Oxidation Reduction Potential	mV	-122
UA	G16D	Delin	2023/03/09	Oxidation Reduction Potential	mV	-72.8
UA	G16D	Delin	2022/01/19	Eh	V	0.095
UA	G16D	Delin	2022/02/10	Eh	V	0.12
UA	G16D	Delin	2022/03/15	Eh	V	0.064

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G16D	Delin	2022/07/24	Eh	V	-0.039
UA	G16D	Delin	2022/09/14	Eh	V	0.39
UA	G16D	Delin	2022/11/03	Eh	V	0.17
UA	G16D	Delin	2023/01/25	Eh	V	0.074
UA	G16D	Delin	2023/03/09	Eh	V	0.12
UA	G16D	Delin	2022/01/19	Alkalinity, bicarbonate	mg/L CaCO3	228
UA	G16D	Delin	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G16D	Delin	2022/03/15	Alkalinity, bicarbonate	mg/L CaCO3	217
UA	G16D	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G16D	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	176
UA	G16D	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	181
UA	G16D	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	174
UA	G16D	Delin	2023/03/09	Alkalinity, bicarbonate	mg/L CaCO3	193
UA	G16D	Delin	2022/01/19	Barium, total	mg/L	0.0908
UA	G16D	Delin	2022/02/10	Barium, total	mg/L	0.0582
UA	G16D	Delin	2022/03/15	Barium, total	mg/L	0.0607
UA	G16D	Delin	2022/07/24	Barium, total	mg/L	0.0399
UA	G16D	Delin	2022/09/14	Barium, total	mg/L	0.0365
UA	G16D	Delin	2022/11/03	Barium, total	mg/L	0.0389
UA	G16D	Delin	2023/01/25	Barium, total	mg/L	0.0405
UA	G16D	Delin	2023/03/09	Barium, total	mg/L	0.0463
UA	G16D	Delin	2022/01/19	Boron, total	mg/L	2.89
UA	G16D	Delin	2022/02/10	Boron, total	mg/L	7.79
UA	G16D	Delin	2022/03/15	Boron, total	mg/L	4.16
UA	G16D	Delin	2022/07/24	Boron, total	mg/L	7.15
UA	G16D	Delin	2022/09/14	Boron, total	mg/L	6.51
UA	G16D	Delin	2022/11/03	Boron, total	mg/L	6.22
UA	G16D	Delin	2023/01/25	Boron, total	mg/L	7.53
UA	G16D	Delin	2023/03/09	Boron, total	mg/L	7.38
UA	G16D	Delin	2022/01/19	Calcium, total	mg/L	81.8
UA	G16D	Delin	2022/02/10	Calcium, total	mg/L	104
UA	G16D	Delin	2022/03/15	Calcium, total	mg/L	92.3
UA	G16D	Delin	2022/07/24	Calcium, total	mg/L	105
UA	G16D	Delin	2022/09/14	Calcium, total	mg/L	95.4
UA	G16D	Delin	2022/11/03	Calcium, total	mg/L	104
UA	G16D	Delin	2023/01/25	Calcium, total	mg/L	112
UA	G16D	Delin	2023/03/09	Calcium, total	mg/L	101
UA	G16D	Delin	2022/01/19	Chloride, total	mg/L	12.0
UA	G16D	Delin	2022/02/10	Chloride, total	mg/L	18.0
UA	G16D	Delin	2022/03/15	Chloride, total	mg/L	15.0
UA	G16D	Delin	2022/07/24	Chloride, total	mg/L	18.0
UA	G16D	Delin	2022/09/14	Chloride, total	mg/L	17.0
UA	G16D	Delin	2022/11/03	Chloride, total	mg/L	17.0
UA	G16D	Delin	2023/01/25	Chloride, total	mg/L	17.0
UA	G16D	Delin	2023/03/09	Chloride, total	mg/L	16.0
UA	G16D	Delin	2022/01/19	Cobalt, total	mg/L	<0.0001
UA	G16D	Delin	2022/02/10	Cobalt, total	mg/L	<0.0001
UA	G16D	Delin	2022/03/15	Cobalt, total	mg/L	<0.0001
UA	G16D	Delin	2022/07/24	Cobalt, total	mg/L	0.000500
UA	G16D	Delin	2022/09/14	Cobalt, total	mg/L	0.000500
UA	G16D	Delin	2022/11/03	Cobalt, total	mg/L	0.000300
UA	G16D	Delin	2023/01/25	Cobalt, total	mg/L	0.000400
UA	G16D	Delin	2023/03/09	Cobalt, total	mg/L	0.000300
UA	G16D	Delin	2022/01/19	Magnesium, total	mg/L	21.2
UA	G16D	Delin	2022/02/10	Magnesium, total	mg/L	28.8

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G16D	Delin	2022/03/15	Magnesium, total	mg/L	24.3
UA	G16D	Delin	2022/07/24	Magnesium, total	mg/L	27.8
UA	G16D	Delin	2022/09/14	Magnesium, total	mg/L	25.2
UA	G16D	Delin	2022/11/03	Magnesium, total	mg/L	26.3
UA	G16D	Delin	2023/01/25	Magnesium, total	mg/L	30.3
UA	G16D	Delin	2023/03/09	Magnesium, total	mg/L	26.5
UA	G16D	Delin	2022/01/19	Potassium, total	mg/L	1.50
UA	G16D	Delin	2022/02/10	Potassium, total	mg/L	1.88
UA	G16D	Delin	2022/03/15	Potassium, total	mg/L	1.57
UA	G16D	Delin	2022/07/24	Potassium, total	mg/L	1.72
UA	G16D	Delin	2022/09/14	Potassium, total	mg/L	1.57
UA	G16D	Delin	2022/11/03	Potassium, total	mg/L	1.68
UA	G16D	Delin	2023/01/25	Potassium, total	mg/L	1.77
UA	G16D	Delin	2023/03/09	Potassium, total	mg/L	1.72
UA	G16D	Delin	2022/01/19	Sodium, total	mg/L	26.3
UA	G16D	Delin	2022/02/10	Sodium, total	mg/L	24.8
UA	G16D	Delin	2022/03/15	Sodium, total	mg/L	19.8
UA	G16D	Delin	2022/07/24	Sodium, total	mg/L	23.3
UA	G16D	Delin	2022/09/14	Sodium, total	mg/L	21.7
UA	G16D	Delin	2022/11/03	Sodium, total	mg/L	23.2
UA	G16D	Delin	2023/01/25	Sodium, total	mg/L	23.8
UA	G16D	Delin	2023/03/09	Sodium, total	mg/L	22.2
UA	G16D	Delin	2022/01/19	Sulfate, total	mg/L	79.0
UA	G16D	Delin	2022/02/10	Sulfate, total	mg/L	198
UA	G16D	Delin	2022/03/15	Sulfate, total	mg/L	117
UA	G16D	Delin	2022/07/24	Sulfate, total	mg/L	198
UA	G16D	Delin	2022/09/14	Sulfate, total	mg/L	187
UA	G16D	Delin	2022/11/03	Sulfate, total	mg/L	203
UA	G16D	Delin	2023/01/25	Sulfate, total	mg/L	201
UA	G16D	Delin	2023/03/09	Sulfate, total	mg/L	183
UA	G16D	Delin	2022/01/19	Temperature (Celsius)	degrees C	14.1
UA	G16D	Delin	2022/02/10	Temperature (Celsius)	degrees C	14.3
UA	G16D	Delin	2022/03/15	Temperature (Celsius)	degrees C	14.5
UA	G16D	Delin	2022/07/24	Temperature (Celsius)	degrees C	15.7
UA	G16D	Delin	2022/09/14	Temperature (Celsius)	degrees C	17.0
UA	G16D	Delin	2022/11/03	Temperature (Celsius)	degrees C	14.9
UA	G16D	Delin	2023/01/25	Temperature (Celsius)	degrees C	13.1
UA	G16D	Delin	2023/03/09	Temperature (Celsius)	degrees C	14.3
UA	G16D	Delin	2022/01/19	Total Dissolved Solids	mg/L	400
UA	G16D	Delin	2022/02/10	Total Dissolved Solids	mg/L	488
UA	G16D	Delin	2022/03/15	Total Dissolved Solids	mg/L	430
UA	G16D	Delin	2022/07/24	Total Dissolved Solids	mg/L	552
UA	G16D	Delin	2022/09/14	Total Dissolved Solids	mg/L	380
UA	G16D	Delin	2022/11/03	Total Dissolved Solids	mg/L	470
UA	G16D	Delin	2023/01/25	Total Dissolved Solids	mg/L	510
UA	G16D	Delin	2023/03/09	Total Dissolved Solids	mg/L	496
UA	G17S	Delin	2022/07/24	pH (field)	SU	7.5
UA	G17S	Delin	2022/09/14	pH (field)	SU	6.6
UA	G17S	Delin	2022/11/02	pH (field)	SU	6.8
UA	G17S	Delin	2023/01/24	pH (field)	SU	6.7
UA	G17S	Delin	2022/07/24	Oxidation Reduction Potential	mV	-39.5
UA	G17S	Delin	2022/09/14	Oxidation Reduction Potential	mV	210
UA	G17S	Delin	2022/11/02	Oxidation Reduction Potential	mV	150
UA	G17S	Delin	2023/01/24	Oxidation Reduction Potential	mV	58.4
UA	G17S	Delin	2022/07/24	Eh	V	0.15

Attachment I. Site Groundwater Data

Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G17S	Delin	2022/09/14	Eh	V	0.40
UA	G17S	Delin	2022/11/02	Eh	V	0.34
UA	G17S	Delin	2023/01/24	Eh	V	0.25
UA	G17S	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	150
UA	G17S	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G17S	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	155
UA	G17S	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	148
UA	G17S	Delin	2022/07/24	Barium, total	mg/L	0.0547
UA	G17S	Delin	2022/09/14	Barium, total	mg/L	0.0554
UA	G17S	Delin	2022/11/02	Barium, total	mg/L	0.0427
UA	G17S	Delin	2023/01/24	Barium, total	mg/L	0.0414
UA	G17S	Delin	2022/07/24	Boron, total	mg/L	2.76
UA	G17S	Delin	2022/09/14	Boron, total	mg/L	2.43
UA	G17S	Delin	2022/11/02	Boron, total	mg/L	2.59
UA	G17S	Delin	2023/01/24	Boron, total	mg/L	2.71
UA	G17S	Delin	2022/07/24	Calcium, total	mg/L	60.1
UA	G17S	Delin	2022/09/14	Calcium, total	mg/L	59.5
UA	G17S	Delin	2022/11/02	Calcium, total	mg/L	62.7
UA	G17S	Delin	2023/01/24	Calcium, total	mg/L	58.1
UA	G17S	Delin	2022/07/24	Chloride, total	mg/L	17.0
UA	G17S	Delin	2022/09/14	Chloride, total	mg/L	18.0
UA	G17S	Delin	2022/11/02	Chloride, total	mg/L	16.0
UA	G17S	Delin	2023/01/24	Chloride, total	mg/L	14.0
UA	G17S	Delin	2022/07/24	Cobalt, total	mg/L	0.00160
UA	G17S	Delin	2022/09/14	Cobalt, total	mg/L	0.000400
UA	G17S	Delin	2022/11/02	Cobalt, total	mg/L	0.000300
UA	G17S	Delin	2023/01/24	Cobalt, total	mg/L	0.000300
UA	G17S	Delin	2022/07/24	Magnesium, total	mg/L	16.7
UA	G17S	Delin	2022/09/14	Magnesium, total	mg/L	16.5
UA	G17S	Delin	2022/11/02	Magnesium, total	mg/L	17.6
UA	G17S	Delin	2023/01/24	Magnesium, total	mg/L	16.3
UA	G17S	Delin	2022/07/24	Potassium, total	mg/L	1.41
UA	G17S	Delin	2022/09/14	Potassium, total	mg/L	1.34
UA	G17S	Delin	2022/11/02	Potassium, total	mg/L	1.37
UA	G17S	Delin	2023/01/24	Potassium, total	mg/L	1.27
UA	G17S	Delin	2022/07/24	Sodium, total	mg/L	28.1
UA	G17S	Delin	2022/09/14	Sodium, total	mg/L	26.4
UA	G17S	Delin	2022/11/02	Sodium, total	mg/L	27.1
UA	G17S	Delin	2023/01/24	Sodium, total	mg/L	25.9
UA	G17S	Delin	2022/07/24	Sulfate, total	mg/L	97.0
UA	G17S	Delin	2022/09/14	Sulfate, total	mg/L	112
UA	G17S	Delin	2022/11/02	Sulfate, total	mg/L	99.0
UA	G17S	Delin	2023/01/24	Sulfate, total	mg/L	99.0
UA	G17S	Delin	2022/07/24	Temperature (Celsius)	degrees C	17.5
UA	G17S	Delin	2022/09/14	Temperature (Celsius)	degrees C	17.8
UA	G17S	Delin	2022/11/02	Temperature (Celsius)	degrees C	17.0
UA	G17S	Delin	2023/01/24	Temperature (Celsius)	degrees C	15.9
UA	G17S	Delin	2022/07/24	Total Dissolved Solids	mg/L	352
UA	G17S	Delin	2022/09/14	Total Dissolved Solids	mg/L	352
UA	G17S	Delin	2022/11/02	Total Dissolved Solids	mg/L	372
UA	G17S	Delin	2023/01/24	Total Dissolved Solids	mg/L	342
UA	G17D	Delin	2022/07/24	pH (field)	SU	7.7
UA	G17D	Delin	2022/09/14	pH (field)	SU	6.5
UA	G17D	Delin	2022/11/02	pH (field)	SU	6.9
UA	G17D	Delin	2023/01/24	pH (field)	SU	6.8

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G17D	Delin	2022/07/24	Oxidation Reduction Potential	mV	-193
UA	G17D	Delin	2022/09/14	Oxidation Reduction Potential	mV	205
UA	G17D	Delin	2022/11/02	Oxidation Reduction Potential	mV	85.6
UA	G17D	Delin	2023/01/24	Oxidation Reduction Potential	mV	-52.5
UA	G17D	Delin	2022/07/24	Eh	V	0.00053
UA	G17D	Delin	2022/09/14	Eh	V	0.40
UA	G17D	Delin	2022/11/02	Eh	V	0.28
UA	G17D	Delin	2023/01/24	Eh	V	0.14
UA	G17D	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	172
UA	G17D	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G17D	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G17D	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G17D	Delin	2022/07/24	Barium, total	mg/L	0.0468
UA	G17D	Delin	2022/09/14	Barium, total	mg/L	0.0353
UA	G17D	Delin	2022/11/02	Barium, total	mg/L	0.0371
UA	G17D	Delin	2023/01/24	Barium, total	mg/L	0.0384
UA	G17D	Delin	2022/07/24	Boron, total	mg/L	4.15
UA	G17D	Delin	2022/09/14	Boron, total	mg/L	3.81
UA	G17D	Delin	2022/11/02	Boron, total	mg/L	4.01
UA	G17D	Delin	2023/01/24	Boron, total	mg/L	4.13
UA	G17D	Delin	2022/07/24	Calcium, total	mg/L	80.3
UA	G17D	Delin	2022/09/14	Calcium, total	mg/L	77.0
UA	G17D	Delin	2022/11/02	Calcium, total	mg/L	77.5
UA	G17D	Delin	2023/01/24	Calcium, total	mg/L	73.3
UA	G17D	Delin	2022/07/24	Chloride, total	mg/L	17.0
UA	G17D	Delin	2022/09/14	Chloride, total	mg/L	16.0
UA	G17D	Delin	2022/11/02	Chloride, total	mg/L	17.0
UA	G17D	Delin	2023/01/24	Chloride, total	mg/L	16.0
UA	G17D	Delin	2022/07/24	Cobalt, total	mg/L	0.00220
UA	G17D	Delin	2022/09/14	Cobalt, total	mg/L	0.000500
UA	G17D	Delin	2022/11/02	Cobalt, total	mg/L	0.000400
UA	G17D	Delin	2023/01/24	Cobalt, total	mg/L	0.000600
UA	G17D	Delin	2022/07/24	Magnesium, total	mg/L	21.5
UA	G17D	Delin	2022/09/14	Magnesium, total	mg/L	20.2
UA	G17D	Delin	2022/11/02	Magnesium, total	mg/L	21.1
UA	G17D	Delin	2023/01/24	Magnesium, total	mg/L	19.9
UA	G17D	Delin	2022/07/24	Potassium, total	mg/L	1.44
UA	G17D	Delin	2022/09/14	Potassium, total	mg/L	1.32
UA	G17D	Delin	2022/11/02	Potassium, total	mg/L	1.31
UA	G17D	Delin	2023/01/24	Potassium, total	mg/L	1.28
UA	G17D	Delin	2022/07/24	Sodium, total	mg/L	28.9
UA	G17D	Delin	2022/09/14	Sodium, total	mg/L	27.1
UA	G17D	Delin	2022/11/02	Sodium, total	mg/L	28.1
UA	G17D	Delin	2023/01/24	Sodium, total	mg/L	26.0
UA	G17D	Delin	2022/07/24	Sulfate, total	mg/L	143
UA	G17D	Delin	2022/09/14	Sulfate, total	mg/L	144
UA	G17D	Delin	2022/11/02	Sulfate, total	mg/L	155
UA	G17D	Delin	2023/01/24	Sulfate, total	mg/L	146
UA	G17D	Delin	2022/07/24	Temperature (Celsius)	degrees C	17.2
UA	G17D	Delin	2022/09/14	Temperature (Celsius)	degrees C	18.3
UA	G17D	Delin	2022/11/02	Temperature (Celsius)	degrees C	16.9
UA	G17D	Delin	2023/01/24	Temperature (Celsius)	degrees C	15.6
UA	G17D	Delin	2022/07/24	Total Dissolved Solids	mg/L	414
UA	G17D	Delin	2022/09/14	Total Dissolved Solids	mg/L	292
UA	G17D	Delin	2022/11/02	Total Dissolved Solids	mg/L	440

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G17D	Delin	2023/01/24	Total Dissolved Solids	mg/L	408
UA	G19S	Delin	2022/07/27	pH (field)	SU	7.4
UA	G19S	Delin	2022/09/14	pH (field)	SU	6.2
UA	G19S	Delin	2022/11/02	pH (field)	SU	6.4
UA	G19S	Delin	2023/01/24	pH (field)	SU	7.8
UA	G19S	Delin	2023/05/03	pH (field)	SU	6.8
UA	G19S	Delin	2023/09/28	pH (field)	SU	6.4
UA	G19S	Delin	2023/10/23	pH (field)	SU	6.4
UA	G19S	Delin	2022/07/27	Oxidation Reduction Potential	mV	36.1
UA	G19S	Delin	2022/09/14	Oxidation Reduction Potential	mV	225
UA	G19S	Delin	2022/11/02	Oxidation Reduction Potential	mV	50.2
UA	G19S	Delin	2023/01/24	Oxidation Reduction Potential	mV	26.1
UA	G19S	Delin	2023/05/03	Oxidation Reduction Potential	mV	111
UA	G19S	Delin	2023/09/28	Oxidation Reduction Potential	mV	127
UA	G19S	Delin	2023/10/23	Oxidation Reduction Potential	mV	151
UA	G19S	Delin	2022/07/27	Eh	V	0.23
UA	G19S	Delin	2022/09/14	Eh	V	0.42
UA	G19S	Delin	2022/11/02	Eh	V	0.24
UA	G19S	Delin	2023/01/24	Eh	V	0.22
UA	G19S	Delin	2023/05/03	Eh	V	0.31
UA	G19S	Delin	2023/09/28	Eh	V	0.32
UA	G19S	Delin	2023/10/23	Eh	V	0.35
UA	G19S	Delin	2022/07/27	Alkalinity, bicarbonate	mg/L CaCO3	184
UA	G19S	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	185
UA	G19S	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	191
UA	G19S	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	184
UA	G19S	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	183
UA	G19S	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	192
UA	G19S	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	181
UA	G19S	Delin	2022/07/27	Barium, total	mg/L	0.120
UA	G19S	Delin	2022/09/14	Barium, total	mg/L	0.128
UA	G19S	Delin	2022/11/02	Barium, total	mg/L	0.0868
UA	G19S	Delin	2023/01/24	Barium, total	mg/L	0.0864
UA	G19S	Delin	2023/05/03	Barium, total	mg/L	0.0893
UA	G19S	Delin	2023/09/28	Barium, total	mg/L	0.0741
UA	G19S	Delin	2023/10/23	Barium, total	mg/L	0.101
UA	G19S	Delin	2022/07/27	Boron, total	mg/L	0.712
UA	G19S	Delin	2022/09/14	Boron, total	mg/L	0.515
UA	G19S	Delin	2022/11/02	Boron, total	mg/L	0.449
UA	G19S	Delin	2023/01/24	Boron, total	mg/L	0.573
UA	G19S	Delin	2023/05/03	Boron, total	mg/L	0.655
UA	G19S	Delin	2023/09/28	Boron, total	mg/L	0.668
UA	G19S	Delin	2023/10/23	Boron, total	mg/L	0.743
UA	G19S	Delin	2022/07/27	Calcium, total	mg/L	67.5
UA	G19S	Delin	2022/09/14	Calcium, total	mg/L	62.3
UA	G19S	Delin	2022/11/02	Calcium, total	mg/L	65.9
UA	G19S	Delin	2023/01/24	Calcium, total	mg/L	61.8
UA	G19S	Delin	2023/05/03	Calcium, total	mg/L	63.7
UA	G19S	Delin	2023/09/28	Calcium, total	mg/L	62.5
UA	G19S	Delin	2023/10/23	Calcium, total	mg/L	70.1
UA	G19S	Delin	2022/07/27	Chloride, total	mg/L	54.0
UA	G19S	Delin	2022/09/14	Chloride, total	mg/L	69.0
UA	G19S	Delin	2022/11/02	Chloride, total	mg/L	72.0
UA	G19S	Delin	2023/01/24	Chloride, total	mg/L	69.0
UA	G19S	Delin	2023/05/03	Chloride, total	mg/L	53.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G19S	Delin	2023/09/28	Chloride, total	mg/L	62.0
UA	G19S	Delin	2023/10/23	Chloride, total	mg/L	60.0
UA	G19S	Delin	2022/07/27	Cobalt, total	mg/L	0.00160
UA	G19S	Delin	2022/09/14	Cobalt, total	mg/L	0.000800
UA	G19S	Delin	2022/11/02	Cobalt, total	mg/L	0.000500
UA	G19S	Delin	2023/01/24	Cobalt, total	mg/L	0.000700
UA	G19S	Delin	2023/05/03	Cobalt, total	mg/L	0.000400
UA	G19S	Delin	2023/09/28	Cobalt, total	mg/L	0.000200
UA	G19S	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G19S	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G19S	Delin	2023/09/28	Iron, dissolved	mg/L	0.487
UA	G19S	Delin	2022/07/27	Magnesium, total	mg/L	20.9
UA	G19S	Delin	2022/09/14	Magnesium, total	mg/L	19.5
UA	G19S	Delin	2022/11/02	Magnesium, total	mg/L	21.2
UA	G19S	Delin	2023/01/24	Magnesium, total	mg/L	20.3
UA	G19S	Delin	2023/05/03	Magnesium, total	mg/L	20.6
UA	G19S	Delin	2023/09/28	Magnesium, total	mg/L	19.3
UA	G19S	Delin	2023/10/23	Magnesium, total	mg/L	21.7
UA	G19S	Delin	2023/05/03	Manganese, dissolved	mg/L	0.0225
UA	G19S	Delin	2023/09/28	Manganese, dissolved	mg/L	0.0105
UA	G19S	Delin	2023/05/03	Phosphate, dissolved	mg/L	<0.005
UA	G19S	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.0520
UA	G19S	Delin	2022/07/27	Potassium, total	mg/L	1.25
UA	G19S	Delin	2022/09/14	Potassium, total	mg/L	1.20
UA	G19S	Delin	2022/11/02	Potassium, total	mg/L	1.21
UA	G19S	Delin	2023/01/24	Potassium, total	mg/L	1.17
UA	G19S	Delin	2023/05/03	Potassium, total	mg/L	1.26
UA	G19S	Delin	2023/09/28	Potassium, total	mg/L	1.24
UA	G19S	Delin	2023/10/23	Potassium, total	mg/L	1.37
UA	G19S	Delin	2023/05/03	Silicon, dissolved	mg/L	6.50
UA	G19S	Delin	2023/09/28	Silicon, dissolved	mg/L	6.50
UA	G19S	Delin	2022/07/27	Sodium, total	mg/L	37.4
UA	G19S	Delin	2022/09/14	Sodium, total	mg/L	35.6
UA	G19S	Delin	2022/11/02	Sodium, total	mg/L	37.8
UA	G19S	Delin	2023/01/24	Sodium, total	mg/L	33.9
UA	G19S	Delin	2023/05/03	Sodium, total	mg/L	38.3
UA	G19S	Delin	2023/09/28	Sodium, total	mg/L	35.7
UA	G19S	Delin	2023/10/23	Sodium, total	mg/L	39.6
UA	G19S	Delin	2022/07/27	Sulfate, total	mg/L	45.0
UA	G19S	Delin	2022/09/14	Sulfate, total	mg/L	46.0
UA	G19S	Delin	2022/11/02	Sulfate, total	mg/L	38.0
UA	G19S	Delin	2023/01/24	Sulfate, total	mg/L	36.0
UA	G19S	Delin	2023/05/03	Sulfate, total	mg/L	40.0
UA	G19S	Delin	2023/09/28	Sulfate, total	mg/L	34.0
UA	G19S	Delin	2023/10/23	Sulfate, total	mg/L	43.0
UA	G19S	Delin	2022/07/27	Temperature (Celsius)	degrees C	19.4
UA	G19S	Delin	2022/09/14	Temperature (Celsius)	degrees C	17.1
UA	G19S	Delin	2022/11/02	Temperature (Celsius)	degrees C	17.1
UA	G19S	Delin	2023/01/24	Temperature (Celsius)	degrees C	14.7
UA	G19S	Delin	2023/05/03	Temperature (Celsius)	degrees C	16.0
UA	G19S	Delin	2023/09/28	Temperature (Celsius)	degrees C	15.4
UA	G19S	Delin	2023/10/23	Temperature (Celsius)	degrees C	16.3
UA	G19S	Delin	2022/07/27	Total Dissolved Solids	mg/L	390
UA	G19S	Delin	2022/09/14	Total Dissolved Solids	mg/L	332
UA	G19S	Delin	2022/11/02	Total Dissolved Solids	mg/L	398

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G19S	Delin	2023/01/24	Total Dissolved Solids	mg/L	366
UA	G19S	Delin	2023/05/03	Total Dissolved Solids	mg/L	334
UA	G19S	Delin	2023/09/28	Total Dissolved Solids	mg/L	390
UA	G19S	Delin	2023/10/23	Total Dissolved Solids	mg/L	350
UA	G19D	Delin	2022/07/27	pH (field)	SU	7.5
UA	G19D	Delin	2022/09/14	pH (field)	SU	6.2
UA	G19D	Delin	2022/11/02	pH (field)	SU	6.7
UA	G19D	Delin	2023/01/24	pH (field)	SU	6.7
UA	G19D	Delin	2023/05/03	pH (field)	SU	7.0
UA	G19D	Delin	2023/09/28	pH (field)	SU	6.4
UA	G19D	Delin	2023/10/23	pH (field)	SU	6.6
UA	G19D	Delin	2022/07/27	Oxidation Reduction Potential	mV	39.8
UA	G19D	Delin	2022/09/14	Oxidation Reduction Potential	mV	223
UA	G19D	Delin	2022/11/02	Oxidation Reduction Potential	mV	50.8
UA	G19D	Delin	2023/01/24	Oxidation Reduction Potential	mV	50.3
UA	G19D	Delin	2023/05/03	Oxidation Reduction Potential	mV	91.0
UA	G19D	Delin	2023/09/28	Oxidation Reduction Potential	mV	125
UA	G19D	Delin	2023/10/23	Oxidation Reduction Potential	mV	146
UA	G19D	Delin	2022/07/27	Eh	V	0.23
UA	G19D	Delin	2022/09/14	Eh	V	0.42
UA	G19D	Delin	2022/11/02	Eh	V	0.24
UA	G19D	Delin	2023/01/24	Eh	V	0.25
UA	G19D	Delin	2023/05/03	Eh	V	0.29
UA	G19D	Delin	2023/09/28	Eh	V	0.32
UA	G19D	Delin	2023/10/23	Eh	V	0.34
UA	G19D	Delin	2022/07/27	Alkalinity, bicarbonate	mg/L CaCO3	166
UA	G19D	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	158
UA	G19D	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	171
UA	G19D	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	144
UA	G19D	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G19D	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	181
UA	G19D	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G19D	Delin	2022/07/27	Barium, total	mg/L	0.110
UA	G19D	Delin	2022/09/14	Barium, total	mg/L	0.160
UA	G19D	Delin	2022/11/02	Barium, total	mg/L	0.104
UA	G19D	Delin	2023/01/24	Barium, total	mg/L	0.0999
UA	G19D	Delin	2023/05/03	Barium, total	mg/L	0.103
UA	G19D	Delin	2023/09/28	Barium, total	mg/L	0.0986
UA	G19D	Delin	2023/10/23	Barium, total	mg/L	0.135
UA	G19D	Delin	2022/07/27	Boron, total	mg/L	0.615
UA	G19D	Delin	2022/09/14	Boron, total	mg/L	0.496
UA	G19D	Delin	2022/11/02	Boron, total	mg/L	0.637
UA	G19D	Delin	2023/01/24	Boron, total	mg/L	0.655
UA	G19D	Delin	2023/05/03	Boron, total	mg/L	0.772
UA	G19D	Delin	2023/09/28	Boron, total	mg/L	0.621
UA	G19D	Delin	2023/10/23	Boron, total	mg/L	0.809
UA	G19D	Delin	2022/07/27	Calcium, total	mg/L	54.9
UA	G19D	Delin	2022/09/14	Calcium, total	mg/L	51.1
UA	G19D	Delin	2022/11/02	Calcium, total	mg/L	55.6
UA	G19D	Delin	2023/01/24	Calcium, total	mg/L	49.8
UA	G19D	Delin	2023/05/03	Calcium, total	mg/L	53.2
UA	G19D	Delin	2023/09/28	Calcium, total	mg/L	51.8
UA	G19D	Delin	2023/10/23	Calcium, total	mg/L	57.3
UA	G19D	Delin	2022/07/27	Chloride, total	mg/L	28.0
UA	G19D	Delin	2022/09/14	Chloride, total	mg/L	26.0

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G19D	Delin	2022/11/02	Chloride, total	mg/L	27.0
UA	G19D	Delin	2023/01/24	Chloride, total	mg/L	25.0
UA	G19D	Delin	2023/05/03	Chloride, total	mg/L	26.0
UA	G19D	Delin	2023/09/28	Chloride, total	mg/L	25.0
UA	G19D	Delin	2023/10/23	Chloride, total	mg/L	27.0
UA	G19D	Delin	2022/07/27	Cobalt, total	mg/L	0.000100
UA	G19D	Delin	2022/09/14	Cobalt, total	mg/L	<0.0001
UA	G19D	Delin	2022/11/02	Cobalt, total	mg/L	<0.0001
UA	G19D	Delin	2023/01/24	Cobalt, total	mg/L	<0.0001
UA	G19D	Delin	2023/05/03	Cobalt, total	mg/L	0.000400
UA	G19D	Delin	2023/09/28	Cobalt, total	mg/L	0.00120
UA	G19D	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G19D	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G19D	Delin	2023/09/28	Iron, dissolved	mg/L	<0.0115
UA	G19D	Delin	2022/07/27	Magnesium, total	mg/L	15.6
UA	G19D	Delin	2022/09/14	Magnesium, total	mg/L	14.9
UA	G19D	Delin	2022/11/02	Magnesium, total	mg/L	16.6
UA	G19D	Delin	2023/01/24	Magnesium, total	mg/L	15.1
UA	G19D	Delin	2023/05/03	Magnesium, total	mg/L	15.7
UA	G19D	Delin	2023/09/28	Magnesium, total	mg/L	15.0
UA	G19D	Delin	2023/10/23	Magnesium, total	mg/L	16.5
UA	G19D	Delin	2023/05/03	Manganese, dissolved	mg/L	0.00360
UA	G19D	Delin	2023/09/28	Manganese, dissolved	mg/L	0.00140
UA	G19D	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0150
UA	G19D	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.0520
UA	G19D	Delin	2022/07/27	Potassium, total	mg/L	1.29
UA	G19D	Delin	2022/09/14	Potassium, total	mg/L	1.24
UA	G19D	Delin	2022/11/02	Potassium, total	mg/L	1.30
UA	G19D	Delin	2023/01/24	Potassium, total	mg/L	1.21
UA	G19D	Delin	2023/05/03	Potassium, total	mg/L	1.31
UA	G19D	Delin	2023/09/28	Potassium, total	mg/L	1.27
UA	G19D	Delin	2023/10/23	Potassium, total	mg/L	1.43
UA	G19D	Delin	2023/05/03	Silicon, dissolved	mg/L	5.98
UA	G19D	Delin	2023/09/28	Silicon, dissolved	mg/L	6.01
UA	G19D	Delin	2022/07/27	Sodium, total	mg/L	29.0
UA	G19D	Delin	2022/09/14	Sodium, total	mg/L	27.9
UA	G19D	Delin	2022/11/02	Sodium, total	mg/L	29.4
UA	G19D	Delin	2023/01/24	Sodium, total	mg/L	26.5
UA	G19D	Delin	2023/05/03	Sodium, total	mg/L	30.7
UA	G19D	Delin	2023/09/28	Sodium, total	mg/L	27.2
UA	G19D	Delin	2023/10/23	Sodium, total	mg/L	31.4
UA	G19D	Delin	2022/07/27	Sulfate, total	mg/L	41.0
UA	G19D	Delin	2022/09/14	Sulfate, total	mg/L	44.0
UA	G19D	Delin	2022/11/02	Sulfate, total	mg/L	41.0
UA	G19D	Delin	2023/01/24	Sulfate, total	mg/L	41.0
UA	G19D	Delin	2023/05/03	Sulfate, total	mg/L	46.0
UA	G19D	Delin	2023/09/28	Sulfate, total	mg/L	35.0
UA	G19D	Delin	2023/10/23	Sulfate, total	mg/L	43.0
UA	G19D	Delin	2022/07/27	Temperature (Celsius)	degrees C	18.6
UA	G19D	Delin	2022/09/14	Temperature (Celsius)	degrees C	18.6
UA	G19D	Delin	2022/11/02	Temperature (Celsius)	degrees C	17.8
UA	G19D	Delin	2023/01/24	Temperature (Celsius)	degrees C	14.9
UA	G19D	Delin	2023/05/03	Temperature (Celsius)	degrees C	15.8
UA	G19D	Delin	2023/09/28	Temperature (Celsius)	degrees C	15.5
UA	G19D	Delin	2023/10/23	Temperature (Celsius)	degrees C	17.6

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G19D	Delin	2022/07/27	Total Dissolved Solids	mg/L	310
UA	G19D	Delin	2022/09/14	Total Dissolved Solids	mg/L	310
UA	G19D	Delin	2022/11/02	Total Dissolved Solids	mg/L	314
UA	G19D	Delin	2023/01/24	Total Dissolved Solids	mg/L	302
UA	G19D	Delin	2023/05/03	Total Dissolved Solids	mg/L	282
UA	G19D	Delin	2023/09/28	Total Dissolved Solids	mg/L	290
UA	G19D	Delin	2023/10/23	Total Dissolved Solids	mg/L	278
UA	G20S	Delin	2022/07/24	pH (field)	SU	7.9
UA	G20S	Delin	2022/09/15	pH (field)	SU	6.4
UA	G20S	Delin	2022/11/03	pH (field)	SU	6.7
UA	G20S	Delin	2023/01/26	pH (field)	SU	7.0
UA	G20S	Delin	2023/05/03	pH (field)	SU	6.9
UA	G20S	Delin	2023/09/27	pH (field)	SU	6.6
UA	G20S	Delin	2023/10/24	pH (field)	SU	6.3
UA	G20S	Delin	2022/07/24	Oxidation Reduction Potential	mV	-18.6
UA	G20S	Delin	2022/09/15	Oxidation Reduction Potential	mV	145
UA	G20S	Delin	2022/11/03	Oxidation Reduction Potential	mV	69.9
UA	G20S	Delin	2023/01/26	Oxidation Reduction Potential	mV	-0.800
UA	G20S	Delin	2023/05/03	Oxidation Reduction Potential	mV	71.0
UA	G20S	Delin	2023/09/27	Oxidation Reduction Potential	mV	99.0
UA	G20S	Delin	2023/10/24	Oxidation Reduction Potential	mV	113
UA	G20S	Delin	2022/07/24	Eh	V	0.18
UA	G20S	Delin	2022/09/15	Eh	V	0.34
UA	G20S	Delin	2022/11/03	Eh	V	0.26
UA	G20S	Delin	2023/01/26	Eh	V	0.20
UA	G20S	Delin	2023/05/03	Eh	V	0.27
UA	G20S	Delin	2023/09/27	Eh	V	0.29
UA	G20S	Delin	2023/10/24	Eh	V	0.31
UA	G20S	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G20S	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G20S	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	142
UA	G20S	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	149
UA	G20S	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	141
UA	G20S	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	164
UA	G20S	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	147
UA	G20S	Delin	2022/07/24	Barium, total	mg/L	0.0586
UA	G20S	Delin	2022/09/15	Barium, total	mg/L	0.0459
UA	G20S	Delin	2022/11/03	Barium, total	mg/L	0.0562
UA	G20S	Delin	2023/01/26	Barium, total	mg/L	0.0313
UA	G20S	Delin	2023/05/03	Barium, total	mg/L	0.0472
UA	G20S	Delin	2023/09/27	Barium, total	mg/L	0.0430
UA	G20S	Delin	2023/10/24	Barium, total	mg/L	0.0573
UA	G20S	Delin	2022/07/24	Boron, total	mg/L	4.84
UA	G20S	Delin	2022/09/15	Boron, total	mg/L	3.24
UA	G20S	Delin	2022/11/03	Boron, total	mg/L	4.49
UA	G20S	Delin	2023/01/26	Boron, total	mg/L	3.77
UA	G20S	Delin	2023/05/03	Boron, total	mg/L	3.69
UA	G20S	Delin	2023/09/27	Boron, total	mg/L	3.58
UA	G20S	Delin	2023/10/24	Boron, total	mg/L	4.45
UA	G20S	Delin	2022/07/24	Calcium, total	mg/L	72.1
UA	G20S	Delin	2022/09/15	Calcium, total	mg/L	63.5
UA	G20S	Delin	2022/11/03	Calcium, total	mg/L	72.5
UA	G20S	Delin	2023/01/26	Calcium, total	mg/L	75.2
UA	G20S	Delin	2023/05/03	Calcium, total	mg/L	66.7
UA	G20S	Delin	2023/09/27	Calcium, total	mg/L	67.0

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G20S	Delin	2023/10/24	Calcium, total	mg/L	74.2
UA	G20S	Delin	2022/07/24	Chloride, total	mg/L	19.0
UA	G20S	Delin	2022/09/15	Chloride, total	mg/L	17.0
UA	G20S	Delin	2022/11/03	Chloride, total	mg/L	16.0
UA	G20S	Delin	2023/01/26	Chloride, total	mg/L	14.0
UA	G20S	Delin	2023/05/03	Chloride, total	mg/L	19.0
UA	G20S	Delin	2023/09/27	Chloride, total	mg/L	16.0
UA	G20S	Delin	2023/10/24	Chloride, total	mg/L	18.0
UA	G20S	Delin	2022/07/24	Cobalt, total	mg/L	0.000200
UA	G20S	Delin	2022/09/15	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2022/11/03	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2023/01/26	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2023/05/03	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2023/09/27	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G20S	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G20S	Delin	2023/09/27	Iron, dissolved	mg/L	0.0501
UA	G20S	Delin	2022/07/24	Magnesium, total	mg/L	19.3
UA	G20S	Delin	2022/09/15	Magnesium, total	mg/L	17.4
UA	G20S	Delin	2022/11/03	Magnesium, total	mg/L	19.4
UA	G20S	Delin	2023/01/26	Magnesium, total	mg/L	20.1
UA	G20S	Delin	2023/05/03	Magnesium, total	mg/L	19.1
UA	G20S	Delin	2023/09/27	Magnesium, total	mg/L	18.9
UA	G20S	Delin	2023/10/24	Magnesium, total	mg/L	20.1
UA	G20S	Delin	2023/05/03	Manganese, dissolved	mg/L	0.00310
UA	G20S	Delin	2023/09/27	Manganese, dissolved	mg/L	<0.0012
UA	G20S	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0340
UA	G20S	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0580
UA	G20S	Delin	2022/07/24	Potassium, total	mg/L	1.23
UA	G20S	Delin	2022/09/15	Potassium, total	mg/L	1.19
UA	G20S	Delin	2022/11/03	Potassium, total	mg/L	1.35
UA	G20S	Delin	2023/01/26	Potassium, total	mg/L	1.39
UA	G20S	Delin	2023/05/03	Potassium, total	mg/L	1.25
UA	G20S	Delin	2023/09/27	Potassium, total	mg/L	1.31
UA	G20S	Delin	2023/10/24	Potassium, total	mg/L	1.39
UA	G20S	Delin	2023/05/03	Silicon, dissolved	mg/L	6.30
UA	G20S	Delin	2023/09/27	Silicon, dissolved	mg/L	6.49
UA	G20S	Delin	2022/07/24	Sodium, total	mg/L	35.8
UA	G20S	Delin	2022/09/15	Sodium, total	mg/L	33.9
UA	G20S	Delin	2022/11/03	Sodium, total	mg/L	35.4
UA	G20S	Delin	2023/01/26	Sodium, total	mg/L	29.6
UA	G20S	Delin	2023/05/03	Sodium, total	mg/L	39.0
UA	G20S	Delin	2023/09/27	Sodium, total	mg/L	34.0
UA	G20S	Delin	2023/10/24	Sodium, total	mg/L	37.8
UA	G20S	Delin	2022/07/24	Sulfate, total	mg/L	143
UA	G20S	Delin	2022/09/15	Sulfate, total	mg/L	143
UA	G20S	Delin	2022/11/03	Sulfate, total	mg/L	143
UA	G20S	Delin	2023/01/26	Sulfate, total	mg/L	148
UA	G20S	Delin	2023/05/03	Sulfate, total	mg/L	145
UA	G20S	Delin	2023/09/27	Sulfate, total	mg/L	138
UA	G20S	Delin	2023/10/24	Sulfate, total	mg/L	145
UA	G20S	Delin	2022/07/24	Temperature (Celsius)	degrees C	16
UA	G20S	Delin	2022/09/15	Temperature (Celsius)	degrees C	16.1
UA	G20S	Delin	2022/11/03	Temperature (Celsius)	degrees C	15.6
UA	G20S	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.7

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G20S	Delin	2023/05/03	Temperature (Celsius)	degrees C	15.1
UA	G20S	Delin	2023/09/27	Temperature (Celsius)	degrees C	15.5
UA	G20S	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.1
UA	G20S	Delin	2022/07/24	Total Dissolved Solids	mg/L	400
UA	G20S	Delin	2022/09/15	Total Dissolved Solids	mg/L	380
UA	G20S	Delin	2022/11/03	Total Dissolved Solids	mg/L	392
UA	G20S	Delin	2023/01/26	Total Dissolved Solids	mg/L	380
UA	G20S	Delin	2023/05/03	Total Dissolved Solids	mg/L	372
UA	G20S	Delin	2023/09/27	Total Dissolved Solids	mg/L	400
UA	G20S	Delin	2023/10/24	Total Dissolved Solids	mg/L	384
UA	G20D	Delin	2022/07/24	pH (field)	SU	8.1
UA	G20D	Delin	2022/09/15	pH (field)	SU	7.3
UA	G20D	Delin	2022/11/03	pH (field)	SU	7.0
UA	G20D	Delin	2023/01/26	pH (field)	SU	7.2
UA	G20D	Delin	2023/05/03	pH (field)	SU	7.0
UA	G20D	Delin	2023/09/27	pH (field)	SU	6.9
UA	G20D	Delin	2023/10/24	pH (field)	SU	6.7
UA	G20D	Delin	2022/07/24	Oxidation Reduction Potential	mV	-212
UA	G20D	Delin	2022/09/15	Oxidation Reduction Potential	mV	143
UA	G20D	Delin	2022/11/03	Oxidation Reduction Potential	mV	23.3
UA	G20D	Delin	2023/01/26	Oxidation Reduction Potential	mV	-64.1
UA	G20D	Delin	2023/05/03	Oxidation Reduction Potential	mV	49.0
UA	G20D	Delin	2023/09/27	Oxidation Reduction Potential	mV	88.0
UA	G20D	Delin	2023/10/24	Oxidation Reduction Potential	mV	109
UA	G20D	Delin	2022/07/24	Eh	V	-0.017
UA	G20D	Delin	2022/09/15	Eh	V	0.33
UA	G20D	Delin	2022/11/03	Eh	V	0.22
UA	G20D	Delin	2023/01/26	Eh	V	0.13
UA	G20D	Delin	2023/05/03	Eh	V	0.24
UA	G20D	Delin	2023/09/27	Eh	V	0.28
UA	G20D	Delin	2023/10/24	Eh	V	0.30
UA	G20D	Delin	2022/07/24	Alkalinity, bicarbonate	mg/L CaCO3	172
UA	G20D	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	155
UA	G20D	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	168
UA	G20D	Delin	2023/01/26	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G20D	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	171
UA	G20D	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	184
UA	G20D	Delin	2023/10/24	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G20D	Delin	2022/07/24	Barium, total	mg/L	0.0892
UA	G20D	Delin	2022/09/15	Barium, total	mg/L	0.0922
UA	G20D	Delin	2022/11/03	Barium, total	mg/L	0.0877
UA	G20D	Delin	2023/01/26	Barium, total	mg/L	0.104
UA	G20D	Delin	2023/05/03	Barium, total	mg/L	0.0852
UA	G20D	Delin	2023/09/27	Barium, total	mg/L	0.0865
UA	G20D	Delin	2023/10/24	Barium, total	mg/L	0.0799
UA	G20D	Delin	2022/07/24	Boron, total	mg/L	2.93
UA	G20D	Delin	2022/09/15	Boron, total	mg/L	2.52
UA	G20D	Delin	2022/11/03	Boron, total	mg/L	2.42
UA	G20D	Delin	2023/01/26	Boron, total	mg/L	2.88
UA	G20D	Delin	2023/05/03	Boron, total	mg/L	2.50
UA	G20D	Delin	2023/09/27	Boron, total	mg/L	2.64
UA	G20D	Delin	2023/10/24	Boron, total	mg/L	2.16
UA	G20D	Delin	2022/07/24	Calcium, total	mg/L	90.5
UA	G20D	Delin	2022/09/15	Calcium, total	mg/L	77.1
UA	G20D	Delin	2022/11/03	Calcium, total	mg/L	85.7

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G20D	Delin	2023/01/26	Calcium, total	mg/L	88.1
UA	G20D	Delin	2023/05/03	Calcium, total	mg/L	77.7
UA	G20D	Delin	2023/09/27	Calcium, total	mg/L	81.1
UA	G20D	Delin	2023/10/24	Calcium, total	mg/L	87.6
UA	G20D	Delin	2022/07/24	Chloride, total	mg/L	15.0
UA	G20D	Delin	2022/09/15	Chloride, total	mg/L	14.0
UA	G20D	Delin	2022/11/03	Chloride, total	mg/L	14.0
UA	G20D	Delin	2023/01/26	Chloride, total	mg/L	15.0
UA	G20D	Delin	2023/05/03	Chloride, total	mg/L	14.0
UA	G20D	Delin	2023/09/27	Chloride, total	mg/L	14.0
UA	G20D	Delin	2023/10/24	Chloride, total	mg/L	14.0
UA	G20D	Delin	2022/07/24	Cobalt, total	mg/L	0.000600
UA	G20D	Delin	2022/09/15	Cobalt, total	mg/L	0.000400
UA	G20D	Delin	2022/11/03	Cobalt, total	mg/L	0.000200
UA	G20D	Delin	2023/01/26	Cobalt, total	mg/L	0.000800
UA	G20D	Delin	2023/05/03	Cobalt, total	mg/L	<0.0001
UA	G20D	Delin	2023/09/27	Cobalt, total	mg/L	<0.0001
UA	G20D	Delin	2023/10/24	Cobalt, total	mg/L	<0.0001
UA	G20D	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G20D	Delin	2023/09/27	Iron, dissolved	mg/L	<0.0115
UA	G20D	Delin	2022/07/24	Magnesium, total	mg/L	22.6
UA	G20D	Delin	2022/09/15	Magnesium, total	mg/L	19.4
UA	G20D	Delin	2022/11/03	Magnesium, total	mg/L	21.6
UA	G20D	Delin	2023/01/26	Magnesium, total	mg/L	22.2
UA	G20D	Delin	2023/05/03	Magnesium, total	mg/L	21.0
UA	G20D	Delin	2023/09/27	Magnesium, total	mg/L	21.2
UA	G20D	Delin	2023/10/24	Magnesium, total	mg/L	22.1
UA	G20D	Delin	2023/05/03	Manganese, dissolved	mg/L	0.0138
UA	G20D	Delin	2023/09/27	Manganese, dissolved	mg/L	<0.0012
UA	G20D	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0150
UA	G20D	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0250
UA	G20D	Delin	2022/07/24	Potassium, total	mg/L	1.40
UA	G20D	Delin	2022/09/15	Potassium, total	mg/L	1.25
UA	G20D	Delin	2022/11/03	Potassium, total	mg/L	1.31
UA	G20D	Delin	2023/01/26	Potassium, total	mg/L	1.69
UA	G20D	Delin	2023/05/03	Potassium, total	mg/L	1.81
UA	G20D	Delin	2023/09/27	Potassium, total	mg/L	1.29
UA	G20D	Delin	2023/10/24	Potassium, total	mg/L	1.42
UA	G20D	Delin	2023/05/03	Silicon, dissolved	mg/L	6.46
UA	G20D	Delin	2023/09/27	Silicon, dissolved	mg/L	5.68
UA	G20D	Delin	2022/07/24	Sodium, total	mg/L	21.9
UA	G20D	Delin	2022/09/15	Sodium, total	mg/L	20.0
UA	G20D	Delin	2022/11/03	Sodium, total	mg/L	21.7
UA	G20D	Delin	2023/01/26	Sodium, total	mg/L	21.6
UA	G20D	Delin	2023/05/03	Sodium, total	mg/L	23.6
UA	G20D	Delin	2023/09/27	Sodium, total	mg/L	20.2
UA	G20D	Delin	2023/10/24	Sodium, total	mg/L	22.5
UA	G20D	Delin	2022/07/24	Sulfate, total	mg/L	141
UA	G20D	Delin	2022/09/15	Sulfate, total	mg/L	141
UA	G20D	Delin	2022/11/03	Sulfate, total	mg/L	149
UA	G20D	Delin	2023/01/26	Sulfate, total	mg/L	133
UA	G20D	Delin	2023/05/03	Sulfate, total	mg/L	140
UA	G20D	Delin	2023/09/27	Sulfate, total	mg/L	129
UA	G20D	Delin	2023/10/24	Sulfate, total	mg/L	143
UA	G20D	Delin	2022/07/24	Temperature (Celsius)	degrees C	15.7

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G20D	Delin	2022/09/15	Temperature (Celsius)	degrees C	21.4
UA	G20D	Delin	2022/11/03	Temperature (Celsius)	degrees C	18.1
UA	G20D	Delin	2023/01/26	Temperature (Celsius)	degrees C	13.3
UA	G20D	Delin	2023/05/03	Temperature (Celsius)	degrees C	15.4
UA	G20D	Delin	2023/09/27	Temperature (Celsius)	degrees C	15.4
UA	G20D	Delin	2023/10/24	Temperature (Celsius)	degrees C	15.2
UA	G20D	Delin	2022/07/24	Total Dissolved Solids	mg/L	404
UA	G20D	Delin	2022/09/15	Total Dissolved Solids	mg/L	376
UA	G20D	Delin	2022/11/03	Total Dissolved Solids	mg/L	398
UA	G20D	Delin	2023/01/26	Total Dissolved Solids	mg/L	396
UA	G20D	Delin	2023/05/03	Total Dissolved Solids	mg/L	390
UA	G20D	Delin	2023/09/27	Total Dissolved Solids	mg/L	394
UA	G20D	Delin	2023/10/24	Total Dissolved Solids	mg/L	384
UA	G21S	Delin	2022/07/28	pH (field)	SU	7.3
UA	G21S	Delin	2022/09/15	pH (field)	SU	6.6
UA	G21S	Delin	2022/11/03	pH (field)	SU	6.8
UA	G21S	Delin	2023/01/25	pH (field)	SU	7.2
UA	G21S	Delin	2023/05/03	pH (field)	SU	6.8
UA	G21S	Delin	2023/09/27	pH (field)	SU	6.6
UA	G21S	Delin	2023/10/23	pH (field)	SU	6.6
UA	G21S	Delin	2022/07/28	Oxidation Reduction Potential	mV	99.5
UA	G21S	Delin	2022/09/15	Oxidation Reduction Potential	mV	210
UA	G21S	Delin	2022/11/03	Oxidation Reduction Potential	mV	189
UA	G21S	Delin	2023/01/25	Oxidation Reduction Potential	mV	5.20
UA	G21S	Delin	2023/05/03	Oxidation Reduction Potential	mV	86.0
UA	G21S	Delin	2023/09/27	Oxidation Reduction Potential	mV	35.0
UA	G21S	Delin	2023/10/23	Oxidation Reduction Potential	mV	156
UA	G21S	Delin	2022/07/28	Eh	V	0.29
UA	G21S	Delin	2022/09/15	Eh	V	0.41
UA	G21S	Delin	2022/11/03	Eh	V	0.38
UA	G21S	Delin	2023/01/25	Eh	V	0.20
UA	G21S	Delin	2023/05/03	Eh	V	0.28
UA	G21S	Delin	2023/09/27	Eh	V	0.23
UA	G21S	Delin	2023/10/23	Eh	V	0.35
UA	G21S	Delin	2022/07/28	Alkalinity, bicarbonate	mg/L CaCO3	152
UA	G21S	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	140
UA	G21S	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	151
UA	G21S	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	143
UA	G21S	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	150
UA	G21S	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	161
UA	G21S	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	150
UA	G21S	Delin	2022/07/28	Barium, total	mg/L	0.0314
UA	G21S	Delin	2022/09/15	Barium, total	mg/L	0.0286
UA	G21S	Delin	2022/11/03	Barium, total	mg/L	0.0405
UA	G21S	Delin	2023/01/25	Barium, total	mg/L	0.0299
UA	G21S	Delin	2023/05/03	Barium, total	mg/L	0.0320
UA	G21S	Delin	2023/09/27	Barium, total	mg/L	0.0299
UA	G21S	Delin	2023/10/23	Barium, total	mg/L	0.0509
UA	G21S	Delin	2022/07/28	Boron, total	mg/L	3.87
UA	G21S	Delin	2022/09/15	Boron, total	mg/L	4.12
UA	G21S	Delin	2022/11/03	Boron, total	mg/L	5.00
UA	G21S	Delin	2023/01/25	Boron, total	mg/L	4.34
UA	G21S	Delin	2023/05/03	Boron, total	mg/L	4.34
UA	G21S	Delin	2023/09/27	Boron, total	mg/L	4.30
UA	G21S	Delin	2023/10/23	Boron, total	mg/L	3.39

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G21S	Delin	2022/07/28	Calcium, total	mg/L	106
UA	G21S	Delin	2022/09/15	Calcium, total	mg/L	101
UA	G21S	Delin	2022/11/03	Calcium, total	mg/L	111
UA	G21S	Delin	2023/01/25	Calcium, total	mg/L	103
UA	G21S	Delin	2023/05/03	Calcium, total	mg/L	107
UA	G21S	Delin	2023/09/27	Calcium, total	mg/L	105
UA	G21S	Delin	2023/10/23	Calcium, total	mg/L	116
UA	G21S	Delin	2022/07/28	Chloride, total	mg/L	21.0
UA	G21S	Delin	2022/09/15	Chloride, total	mg/L	19.0
UA	G21S	Delin	2022/11/03	Chloride, total	mg/L	18.0
UA	G21S	Delin	2023/01/25	Chloride, total	mg/L	20.0
UA	G21S	Delin	2023/05/03	Chloride, total	mg/L	20.0
UA	G21S	Delin	2023/09/27	Chloride, total	mg/L	19.0
UA	G21S	Delin	2023/10/23	Chloride, total	mg/L	20.0
UA	G21S	Delin	2022/07/28	Cobalt, total	mg/L	0.000900
UA	G21S	Delin	2022/09/15	Cobalt, total	mg/L	0.000600
UA	G21S	Delin	2022/11/03	Cobalt, total	mg/L	0.000400
UA	G21S	Delin	2023/01/25	Cobalt, total	mg/L	0.000400
UA	G21S	Delin	2023/05/03	Cobalt, total	mg/L	0.000500
UA	G21S	Delin	2023/09/27	Cobalt, total	mg/L	0.000300
UA	G21S	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G21S	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G21S	Delin	2023/09/27	Iron, dissolved	mg/L	<0.0115
UA	G21S	Delin	2022/07/28	Magnesium, total	mg/L	25.8
UA	G21S	Delin	2022/09/15	Magnesium, total	mg/L	23.9
UA	G21S	Delin	2022/11/03	Magnesium, total	mg/L	26.0
UA	G21S	Delin	2023/01/25	Magnesium, total	mg/L	25.2
UA	G21S	Delin	2023/05/03	Magnesium, total	mg/L	26.0
UA	G21S	Delin	2023/09/27	Magnesium, total	mg/L	25.9
UA	G21S	Delin	2023/10/23	Magnesium, total	mg/L	27.9
UA	G21S	Delin	2023/05/03	Manganese, dissolved	mg/L	<0.0025
UA	G21S	Delin	2023/09/27	Manganese, dissolved	mg/L	<0.0012
UA	G21S	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0370
UA	G21S	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0180
UA	G21S	Delin	2022/07/28	Potassium, total	mg/L	2.23
UA	G21S	Delin	2022/09/15	Potassium, total	mg/L	2.27
UA	G21S	Delin	2022/11/03	Potassium, total	mg/L	2.27
UA	G21S	Delin	2023/01/25	Potassium, total	mg/L	2.29
UA	G21S	Delin	2023/05/03	Potassium, total	mg/L	2.29
UA	G21S	Delin	2023/09/27	Potassium, total	mg/L	2.41
UA	G21S	Delin	2023/10/23	Potassium, total	mg/L	2.40
UA	G21S	Delin	2023/05/03	Silicon, dissolved	mg/L	6.53
UA	G21S	Delin	2023/09/27	Silicon, dissolved	mg/L	6.75
UA	G21S	Delin	2022/07/28	Sodium, total	mg/L	52.0
UA	G21S	Delin	2022/09/15	Sodium, total	mg/L	53.7
UA	G21S	Delin	2022/11/03	Sodium, total	mg/L	57.0
UA	G21S	Delin	2023/01/25	Sodium, total	mg/L	52.3
UA	G21S	Delin	2023/05/03	Sodium, total	mg/L	59.3
UA	G21S	Delin	2023/09/27	Sodium, total	mg/L	54.9
UA	G21S	Delin	2023/10/23	Sodium, total	mg/L	60.8
UA	G21S	Delin	2022/07/28	Sulfate, total	mg/L	326
UA	G21S	Delin	2022/09/15	Sulfate, total	mg/L	324
UA	G21S	Delin	2022/11/03	Sulfate, total	mg/L	287
UA	G21S	Delin	2023/01/25	Sulfate, total	mg/L	294
UA	G21S	Delin	2023/05/03	Sulfate, total	mg/L	287

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G21S	Delin	2023/09/27	Sulfate, total	mg/L	281
UA	G21S	Delin	2023/10/23	Sulfate, total	mg/L	309
UA	G21S	Delin	2022/07/28	Temperature (Celsius)	degrees C	19.8
UA	G21S	Delin	2022/09/15	Temperature (Celsius)	degrees C	15.1
UA	G21S	Delin	2022/11/03	Temperature (Celsius)	degrees C	14.4
UA	G21S	Delin	2023/01/25	Temperature (Celsius)	degrees C	12.6
UA	G21S	Delin	2023/05/03	Temperature (Celsius)	degrees C	14.6
UA	G21S	Delin	2023/09/27	Temperature (Celsius)	degrees C	15.0
UA	G21S	Delin	2023/10/23	Temperature (Celsius)	degrees C	15.8
UA	G21S	Delin	2022/07/28	Total Dissolved Solids	mg/L	616
UA	G21S	Delin	2022/09/15	Total Dissolved Solids	mg/L	590
UA	G21S	Delin	2022/11/03	Total Dissolved Solids	mg/L	632
UA	G21S	Delin	2023/01/25	Total Dissolved Solids	mg/L	626
UA	G21S	Delin	2023/05/03	Total Dissolved Solids	mg/L	614
UA	G21S	Delin	2023/09/27	Total Dissolved Solids	mg/L	640
UA	G21S	Delin	2023/10/23	Total Dissolved Solids	mg/L	620
UA	G21D	Delin	2022/07/28	pH (field)	SU	7.7
UA	G21D	Delin	2022/09/15	pH (field)	SU	6.9
UA	G21D	Delin	2022/11/03	pH (field)	SU	7.1
UA	G21D	Delin	2023/01/25	pH (field)	SU	7.5
UA	G21D	Delin	2023/05/03	pH (field)	SU	7.2
UA	G21D	Delin	2023/09/27	pH (field)	SU	6.8
UA	G21D	Delin	2023/10/23	pH (field)	SU	7.0
UA	G21D	Delin	2022/07/28	Oxidation Reduction Potential	mV	-222
UA	G21D	Delin	2022/09/15	Oxidation Reduction Potential	mV	194
UA	G21D	Delin	2022/11/03	Oxidation Reduction Potential	mV	-55.4
UA	G21D	Delin	2023/01/25	Oxidation Reduction Potential	mV	-156
UA	G21D	Delin	2023/05/03	Oxidation Reduction Potential	mV	478
UA	G21D	Delin	2023/09/27	Oxidation Reduction Potential	mV	-52.0
UA	G21D	Delin	2023/10/23	Oxidation Reduction Potential	mV	86.0
UA	G21D	Delin	2022/07/28	Eh	V	-0.027
UA	G21D	Delin	2022/09/15	Eh	V	0.39
UA	G21D	Delin	2022/11/03	Eh	V	0.14
UA	G21D	Delin	2023/01/25	Eh	V	0.041
UA	G21D	Delin	2023/05/03	Eh	V	0.67
UA	G21D	Delin	2023/09/27	Eh	V	0.14
UA	G21D	Delin	2023/10/23	Eh	V	0.28
UA	G21D	Delin	2022/07/28	Alkalinity, bicarbonate	mg/L CaCO3	183
UA	G21D	Delin	2022/09/15	Alkalinity, bicarbonate	mg/L CaCO3	174
UA	G21D	Delin	2022/11/03	Alkalinity, bicarbonate	mg/L CaCO3	176
UA	G21D	Delin	2023/01/25	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G21D	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	172
UA	G21D	Delin	2023/09/27	Alkalinity, bicarbonate	mg/L CaCO3	178
UA	G21D	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	174
UA	G21D	Delin	2022/07/28	Barium, total	mg/L	0.0583
UA	G21D	Delin	2022/09/15	Barium, total	mg/L	0.0540
UA	G21D	Delin	2022/11/03	Barium, total	mg/L	0.0481
UA	G21D	Delin	2023/01/25	Barium, total	mg/L	0.0451
UA	G21D	Delin	2023/05/03	Barium, total	mg/L	0.0449
UA	G21D	Delin	2023/09/27	Barium, total	mg/L	0.0541
UA	G21D	Delin	2023/10/23	Barium, total	mg/L	0.0518
UA	G21D	Delin	2022/07/28	Boron, total	mg/L	2.99
UA	G21D	Delin	2022/09/15	Boron, total	mg/L	2.81
UA	G21D	Delin	2022/11/03	Boron, total	mg/L	2.88
UA	G21D	Delin	2023/01/25	Boron, total	mg/L	3.16

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G21D	Delin	2023/05/03	Boron, total	mg/L	3.11
UA	G21D	Delin	2023/09/27	Boron, total	mg/L	3.91
UA	G21D	Delin	2023/10/23	Boron, total	mg/L	2.63
UA	G21D	Delin	2022/07/28	Calcium, total	mg/L	103
UA	G21D	Delin	2022/09/15	Calcium, total	mg/L	96.7
UA	G21D	Delin	2022/11/03	Calcium, total	mg/L	104
UA	G21D	Delin	2023/01/25	Calcium, total	mg/L	95.6
UA	G21D	Delin	2023/05/03	Calcium, total	mg/L	101
UA	G21D	Delin	2023/09/27	Calcium, total	mg/L	99.8
UA	G21D	Delin	2023/10/23	Calcium, total	mg/L	108
UA	G21D	Delin	2022/07/28	Chloride, total	mg/L	19.0
UA	G21D	Delin	2022/09/15	Chloride, total	mg/L	18.0
UA	G21D	Delin	2022/11/03	Chloride, total	mg/L	18.0
UA	G21D	Delin	2023/01/25	Chloride, total	mg/L	17.0
UA	G21D	Delin	2023/05/03	Chloride, total	mg/L	18.0
UA	G21D	Delin	2023/09/27	Chloride, total	mg/L	17.0
UA	G21D	Delin	2023/10/23	Chloride, total	mg/L	17.0
UA	G21D	Delin	2022/07/28	Cobalt, total	mg/L	0.00280
UA	G21D	Delin	2022/09/15	Cobalt, total	mg/L	0.00250
UA	G21D	Delin	2022/11/03	Cobalt, total	mg/L	0.00190
UA	G21D	Delin	2023/01/25	Cobalt, total	mg/L	0.00210
UA	G21D	Delin	2023/05/03	Cobalt, total	mg/L	0.00250
UA	G21D	Delin	2023/09/27	Cobalt, total	mg/L	0.00150
UA	G21D	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G21D	Delin	2023/05/03	Iron, dissolved	mg/L	1.36
UA	G21D	Delin	2023/09/27	Iron, dissolved	mg/L	0.985
UA	G21D	Delin	2022/07/28	Magnesium, total	mg/L	24.4
UA	G21D	Delin	2022/09/15	Magnesium, total	mg/L	23.1
UA	G21D	Delin	2022/11/03	Magnesium, total	mg/L	23.8
UA	G21D	Delin	2023/01/25	Magnesium, total	mg/L	24.4
UA	G21D	Delin	2023/05/03	Magnesium, total	mg/L	25.0
UA	G21D	Delin	2023/09/27	Magnesium, total	mg/L	24.7
UA	G21D	Delin	2023/10/23	Magnesium, total	mg/L	25.7
UA	G21D	Delin	2023/05/03	Manganese, dissolved	mg/L	0.197
UA	G21D	Delin	2023/09/27	Manganese, dissolved	mg/L	0.140
UA	G21D	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0340
UA	G21D	Delin	2023/09/27	Phosphate, dissolved	mg/L	0.0250
UA	G21D	Delin	2022/07/28	Potassium, total	mg/L	1.57
UA	G21D	Delin	2022/09/15	Potassium, total	mg/L	1.45
UA	G21D	Delin	2022/11/03	Potassium, total	mg/L	1.47
UA	G21D	Delin	2023/01/25	Potassium, total	mg/L	1.46
UA	G21D	Delin	2023/05/03	Potassium, total	mg/L	1.59
UA	G21D	Delin	2023/09/27	Potassium, total	mg/L	1.50
UA	G21D	Delin	2023/10/23	Potassium, total	mg/L	1.65
UA	G21D	Delin	2023/05/03	Silicon, dissolved	mg/L	5.90
UA	G21D	Delin	2023/09/27	Silicon, dissolved	mg/L	5.92
UA	G21D	Delin	2022/07/28	Sodium, total	mg/L	32.4
UA	G21D	Delin	2022/09/15	Sodium, total	mg/L	32.8
UA	G21D	Delin	2022/11/03	Sodium, total	mg/L	34.4
UA	G21D	Delin	2023/01/25	Sodium, total	mg/L	31.2
UA	G21D	Delin	2023/05/03	Sodium, total	mg/L	36.0
UA	G21D	Delin	2023/09/27	Sodium, total	mg/L	32.3
UA	G21D	Delin	2023/10/23	Sodium, total	mg/L	35.6
UA	G21D	Delin	2022/07/28	Sulfate, total	mg/L	208
UA	G21D	Delin	2022/09/15	Sulfate, total	mg/L	224

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G21D	Delin	2022/11/03	Sulfate, total	mg/L	233
UA	G21D	Delin	2023/01/25	Sulfate, total	mg/L	213
UA	G21D	Delin	2023/05/03	Sulfate, total	mg/L	219
UA	G21D	Delin	2023/09/27	Sulfate, total	mg/L	230
UA	G21D	Delin	2023/10/23	Sulfate, total	mg/L	229
UA	G21D	Delin	2022/07/28	Temperature (Celsius)	degrees C	15.9
UA	G21D	Delin	2022/09/15	Temperature (Celsius)	degrees C	15.1
UA	G21D	Delin	2022/11/03	Temperature (Celsius)	degrees C	14.4
UA	G21D	Delin	2023/01/25	Temperature (Celsius)	degrees C	13.5
UA	G21D	Delin	2023/05/03	Temperature (Celsius)	degrees C	14.5
UA	G21D	Delin	2023/09/27	Temperature (Celsius)	degrees C	15.4
UA	G21D	Delin	2023/10/23	Temperature (Celsius)	degrees C	15.9
UA	G21D	Delin	2022/07/28	Total Dissolved Solids	mg/L	518
UA	G21D	Delin	2022/09/15	Total Dissolved Solids	mg/L	462
UA	G21D	Delin	2022/11/03	Total Dissolved Solids	mg/L	515
UA	G21D	Delin	2023/01/25	Total Dissolved Solids	mg/L	516
UA	G21D	Delin	2023/05/03	Total Dissolved Solids	mg/L	522
UA	G21D	Delin	2023/09/27	Total Dissolved Solids	mg/L	542
UA	G21D	Delin	2023/10/23	Total Dissolved Solids	mg/L	500
UA	G22S	Delin	2022/07/25	pH (field)	SU	7.6
UA	G22S	Delin	2022/07/27	pH (field)	SU	7.5
UA	G22S	Delin	2022/09/14	pH (field)	SU	5.7
UA	G22S	Delin	2022/11/02	pH (field)	SU	6.7
UA	G22S	Delin	2023/01/24	pH (field)	SU	6.7
UA	G22S	Delin	2023/05/03	pH (field)	SU	6.9
UA	G22S	Delin	2023/09/28	pH (field)	SU	6.5
UA	G22S	Delin	2023/10/23	pH (field)	SU	6.6
UA	G22S	Delin	2022/07/25	Oxidation Reduction Potential	mV	95.7
UA	G22S	Delin	2022/07/27	Oxidation Reduction Potential	mV	64.7
UA	G22S	Delin	2022/09/14	Oxidation Reduction Potential	mV	232
UA	G22S	Delin	2022/11/02	Oxidation Reduction Potential	mV	64.1
UA	G22S	Delin	2023/01/24	Oxidation Reduction Potential	mV	-4.00
UA	G22S	Delin	2023/05/03	Oxidation Reduction Potential	mV	95.0
UA	G22S	Delin	2023/09/28	Oxidation Reduction Potential	mV	112
UA	G22S	Delin	2023/10/23	Oxidation Reduction Potential	mV	153
UA	G22S	Delin	2022/07/25	Eh	V	0.29
UA	G22S	Delin	2022/07/27	Eh	V	0.25
UA	G22S	Delin	2022/09/14	Eh	V	0.42
UA	G22S	Delin	2022/11/02	Eh	V	0.26
UA	G22S	Delin	2023/01/24	Eh	V	0.19
UA	G22S	Delin	2023/05/03	Eh	V	0.29
UA	G22S	Delin	2023/09/28	Eh	V	0.31
UA	G22S	Delin	2023/10/23	Eh	V	0.35
UA	G22S	Delin	2022/07/25	Alkalinity, bicarbonate	mg/L CaCO3	159
UA	G22S	Delin	2022/07/27	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G22S	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	163
UA	G22S	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	162
UA	G22S	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	156
UA	G22S	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	161
UA	G22S	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	169
UA	G22S	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	165
UA	G22S	Delin	2022/07/25	Barium, total	mg/L	0.0820
UA	G22S	Delin	2022/07/27	Barium, total	mg/L	0.0785
UA	G22S	Delin	2022/09/14	Barium, total	mg/L	0.105
UA	G22S	Delin	2022/11/02	Barium, total	mg/L	0.0784

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G22S	Delin	2023/01/24	Barium, total	mg/L	0.0799
UA	G22S	Delin	2023/05/03	Barium, total	mg/L	0.0830
UA	G22S	Delin	2023/09/28	Barium, total	mg/L	0.0795
UA	G22S	Delin	2023/10/23	Barium, total	mg/L	0.0765
UA	G22S	Delin	2022/07/25	Boron, total	mg/L	1.39
UA	G22S	Delin	2022/07/27	Boron, total	mg/L	1.35
UA	G22S	Delin	2022/09/14	Boron, total	mg/L	1.10
UA	G22S	Delin	2022/11/02	Boron, total	mg/L	1.16
UA	G22S	Delin	2023/01/24	Boron, total	mg/L	1.27
UA	G22S	Delin	2023/05/03	Boron, total	mg/L	1.36
UA	G22S	Delin	2023/09/28	Boron, total	mg/L	1.29
UA	G22S	Delin	2023/10/23	Boron, total	mg/L	1.17
UA	G22S	Delin	2022/07/25	Calcium, total	mg/L	60.3
UA	G22S	Delin	2022/07/27	Calcium, total	mg/L	56.5
UA	G22S	Delin	2022/09/14	Calcium, total	mg/L	55.2
UA	G22S	Delin	2022/11/02	Calcium, total	mg/L	56.5
UA	G22S	Delin	2023/01/24	Calcium, total	mg/L	50.8
UA	G22S	Delin	2023/05/03	Calcium, total	mg/L	55.4
UA	G22S	Delin	2023/09/28	Calcium, total	mg/L	55.0
UA	G22S	Delin	2023/10/23	Calcium, total	mg/L	60.3
UA	G22S	Delin	2022/07/25	Chloride, total	mg/L	23.0
UA	G22S	Delin	2022/07/27	Chloride, total	mg/L	23.0
UA	G22S	Delin	2022/09/14	Chloride, total	mg/L	22.0
UA	G22S	Delin	2022/11/02	Chloride, total	mg/L	23.0
UA	G22S	Delin	2023/01/24	Chloride, total	mg/L	22.0
UA	G22S	Delin	2023/05/03	Chloride, total	mg/L	22.0
UA	G22S	Delin	2023/09/28	Chloride, total	mg/L	21.0
UA	G22S	Delin	2023/10/23	Chloride, total	mg/L	22.0
UA	G22S	Delin	2022/07/25	Cobalt, total	mg/L	0.000100
UA	G22S	Delin	2022/07/27	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2022/09/14	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2022/11/02	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2023/01/24	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2023/05/03	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2023/09/28	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G22S	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G22S	Delin	2023/09/28	Iron, dissolved	mg/L	<0.0115
UA	G22S	Delin	2022/07/25	Magnesium, total	mg/L	17.1
UA	G22S	Delin	2022/07/27	Magnesium, total	mg/L	15.9
UA	G22S	Delin	2022/09/14	Magnesium, total	mg/L	15.6
UA	G22S	Delin	2022/11/02	Magnesium, total	mg/L	15.6
UA	G22S	Delin	2023/01/24	Magnesium, total	mg/L	15.8
UA	G22S	Delin	2023/05/03	Magnesium, total	mg/L	16.4
UA	G22S	Delin	2023/09/28	Magnesium, total	mg/L	16.3
UA	G22S	Delin	2023/10/23	Magnesium, total	mg/L	17.2
UA	G22S	Delin	2023/05/03	Manganese, dissolved	mg/L	<0.0025
UA	G22S	Delin	2023/09/28	Manganese, dissolved	mg/L	<0.0012
UA	G22S	Delin	2023/05/03	Phosphate, dissolved	mg/L	0.0520
UA	G22S	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.0950
UA	G22S	Delin	2022/07/25	Potassium, total	mg/L	1.18
UA	G22S	Delin	2022/07/27	Potassium, total	mg/L	1.18
UA	G22S	Delin	2022/09/14	Potassium, total	mg/L	1.18
UA	G22S	Delin	2022/11/02	Potassium, total	mg/L	1.19
UA	G22S	Delin	2023/01/24	Potassium, total	mg/L	1.09

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G22S	Delin	2023/05/03	Potassium, total	mg/L	1.22
UA	G22S	Delin	2023/09/28	Potassium, total	mg/L	1.19
UA	G22S	Delin	2023/10/23	Potassium, total	mg/L	1.35
UA	G22S	Delin	2023/05/03	Silicon, dissolved	mg/L	6.40
UA	G22S	Delin	2023/09/28	Silicon, dissolved	mg/L	6.50
UA	G22S	Delin	2022/07/25	Sodium, total	mg/L	29.1
UA	G22S	Delin	2022/07/27	Sodium, total	mg/L	28.6
UA	G22S	Delin	2022/09/14	Sodium, total	mg/L	29.1
UA	G22S	Delin	2022/11/02	Sodium, total	mg/L	29.1
UA	G22S	Delin	2023/01/24	Sodium, total	mg/L	26.1
UA	G22S	Delin	2023/05/03	Sodium, total	mg/L	31.3
UA	G22S	Delin	2023/09/28	Sodium, total	mg/L	27.9
UA	G22S	Delin	2023/10/23	Sodium, total	mg/L	31.8
UA	G22S	Delin	2022/07/25	Sulfate, total	mg/L	74.0
UA	G22S	Delin	2022/07/27	Sulfate, total	mg/L	65.0
UA	G22S	Delin	2022/09/14	Sulfate, total	mg/L	70.0
UA	G22S	Delin	2022/11/02	Sulfate, total	mg/L	63.0
UA	G22S	Delin	2023/01/24	Sulfate, total	mg/L	61.0
UA	G22S	Delin	2023/05/03	Sulfate, total	mg/L	63.0
UA	G22S	Delin	2023/09/28	Sulfate, total	mg/L	66.0
UA	G22S	Delin	2023/10/23	Sulfate, total	mg/L	64.0
UA	G22S	Delin	2022/07/25	Temperature (Celsius)	degrees C	16.4
UA	G22S	Delin	2022/07/27	Temperature (Celsius)	degrees C	29.5
UA	G22S	Delin	2022/09/14	Temperature (Celsius)	degrees C	19.6
UA	G22S	Delin	2022/11/02	Temperature (Celsius)	degrees C	18.2
UA	G22S	Delin	2023/01/24	Temperature (Celsius)	degrees C	15.0
UA	G22S	Delin	2023/05/03	Temperature (Celsius)	degrees C	17.0
UA	G22S	Delin	2023/09/28	Temperature (Celsius)	degrees C	15.7
UA	G22S	Delin	2023/10/23	Temperature (Celsius)	degrees C	17.1
UA	G22S	Delin	2022/07/25	Total Dissolved Solids	mg/L	318
UA	G22S	Delin	2022/07/27	Total Dissolved Solids	mg/L	306
UA	G22S	Delin	2022/09/14	Total Dissolved Solids	mg/L	214
UA	G22S	Delin	2022/11/02	Total Dissolved Solids	mg/L	328
UA	G22S	Delin	2023/01/24	Total Dissolved Solids	mg/L	316
UA	G22S	Delin	2023/05/03	Total Dissolved Solids	mg/L	302
UA	G22S	Delin	2023/09/28	Total Dissolved Solids	mg/L	324
UA	G22S	Delin	2023/10/23	Total Dissolved Solids	mg/L	286
UA	G22D	Delin	2022/07/27	pH (field)	SU	7.8
UA	G22D	Delin	2022/09/14	pH (field)	SU	6.8
UA	G22D	Delin	2022/11/02	pH (field)	SU	6.5
UA	G22D	Delin	2023/01/24	pH (field)	SU	6.8
UA	G22D	Delin	2023/05/03	pH (field)	SU	7.0
UA	G22D	Delin	2023/09/28	pH (field)	SU	6.5
UA	G22D	Delin	2023/10/23	pH (field)	SU	6.7
UA	G22D	Delin	2022/07/27	Oxidation Reduction Potential	mV	-171
UA	G22D	Delin	2022/09/14	Oxidation Reduction Potential	mV	219
UA	G22D	Delin	2022/11/02	Oxidation Reduction Potential	mV	82.6
UA	G22D	Delin	2023/01/24	Oxidation Reduction Potential	mV	15.5
UA	G22D	Delin	2023/05/03	Oxidation Reduction Potential	mV	10.0
UA	G22D	Delin	2023/09/28	Oxidation Reduction Potential	mV	22.0
UA	G22D	Delin	2023/10/23	Oxidation Reduction Potential	mV	151
UA	G22D	Delin	2022/07/27	Eh	V	0.022
UA	G22D	Delin	2022/09/14	Eh	V	0.40
UA	G22D	Delin	2022/11/02	Eh	V	0.28
UA	G22D	Delin	2023/01/24	Eh	V	0.21

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G22D	Delin	2023/05/03	Eh	V	0.20
UA	G22D	Delin	2023/09/28	Eh	V	0.22
UA	G22D	Delin	2023/10/23	Eh	V	0.35
UA	G22D	Delin	2022/07/27	Alkalinity, bicarbonate	mg/L CaCO3	187
UA	G22D	Delin	2022/09/14	Alkalinity, bicarbonate	mg/L CaCO3	180
UA	G22D	Delin	2022/11/02	Alkalinity, bicarbonate	mg/L CaCO3	177
UA	G22D	Delin	2023/01/24	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G22D	Delin	2023/05/03	Alkalinity, bicarbonate	mg/L CaCO3	173
UA	G22D	Delin	2023/09/28	Alkalinity, bicarbonate	mg/L CaCO3	182
UA	G22D	Delin	2023/10/23	Alkalinity, bicarbonate	mg/L CaCO3	174
UA	G22D	Delin	2022/07/27	Barium, total	mg/L	0.141
UA	G22D	Delin	2022/09/14	Barium, total	mg/L	0.130
UA	G22D	Delin	2022/11/02	Barium, total	mg/L	0.0892
UA	G22D	Delin	2023/01/24	Barium, total	mg/L	0.0920
UA	G22D	Delin	2023/05/03	Barium, total	mg/L	0.0995
UA	G22D	Delin	2023/09/28	Barium, total	mg/L	0.118
UA	G22D	Delin	2023/10/23	Barium, total	mg/L	0.120
UA	G22D	Delin	2022/07/27	Boron, total	mg/L	0.635
UA	G22D	Delin	2022/09/14	Boron, total	mg/L	0.562
UA	G22D	Delin	2022/11/02	Boron, total	mg/L	0.579
UA	G22D	Delin	2023/01/24	Boron, total	mg/L	0.717
UA	G22D	Delin	2023/05/03	Boron, total	mg/L	0.683
UA	G22D	Delin	2023/09/28	Boron, total	mg/L	0.896
UA	G22D	Delin	2023/10/23	Boron, total	mg/L	0.847
UA	G22D	Delin	2022/07/27	Calcium, total	mg/L	59.8
UA	G22D	Delin	2022/09/14	Calcium, total	mg/L	55.9
UA	G22D	Delin	2022/11/02	Calcium, total	mg/L	58.9
UA	G22D	Delin	2023/01/24	Calcium, total	mg/L	53.4
UA	G22D	Delin	2023/05/03	Calcium, total	mg/L	54.8
UA	G22D	Delin	2023/09/28	Calcium, total	mg/L	55.1
UA	G22D	Delin	2023/10/23	Calcium, total	mg/L	60.8
UA	G22D	Delin	2022/07/27	Chloride, total	mg/L	21.0
UA	G22D	Delin	2022/09/14	Chloride, total	mg/L	20.0
UA	G22D	Delin	2022/11/02	Chloride, total	mg/L	20.0
UA	G22D	Delin	2023/01/24	Chloride, total	mg/L	21.0
UA	G22D	Delin	2023/05/03	Chloride, total	mg/L	21.0
UA	G22D	Delin	2023/09/28	Chloride, total	mg/L	20.0
UA	G22D	Delin	2023/10/23	Chloride, total	mg/L	21.0
UA	G22D	Delin	2022/07/27	Cobalt, total	mg/L	0.000700
UA	G22D	Delin	2022/09/14	Cobalt, total	mg/L	0.000300
UA	G22D	Delin	2022/11/02	Cobalt, total	mg/L	0.000200
UA	G22D	Delin	2023/01/24	Cobalt, total	mg/L	0.000200
UA	G22D	Delin	2023/05/03	Cobalt, total	mg/L	0.000300
UA	G22D	Delin	2023/09/28	Cobalt, total	mg/L	0.000500
UA	G22D	Delin	2023/10/23	Cobalt, total	mg/L	<0.0001
UA	G22D	Delin	2023/05/03	Iron, dissolved	mg/L	<0.02
UA	G22D	Delin	2023/09/28	Iron, dissolved	mg/L	0.183
UA	G22D	Delin	2022/07/27	Magnesium, total	mg/L	16.0
UA	G22D	Delin	2022/09/14	Magnesium, total	mg/L	15.4
UA	G22D	Delin	2022/11/02	Magnesium, total	mg/L	15.7
UA	G22D	Delin	2023/01/24	Magnesium, total	mg/L	16.0
UA	G22D	Delin	2023/05/03	Magnesium, total	mg/L	15.6
UA	G22D	Delin	2023/09/28	Magnesium, total	mg/L	16.0
UA	G22D	Delin	2023/10/23	Magnesium, total	mg/L	17.1
UA	G22D	Delin	2023/05/03	Manganese, dissolved	mg/L	0.0417

Attachment I. Site Groundwater Data
Geochemical Conceptual Site Model
Joppa East Ash Pond
Joppa Power Plant
Joppa, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
UA	G22D	Delin	2023/09/28	Manganese, dissolved	mg/L	0.0532
UA	G22D	Delin	2023/05/03	Phosphate, dissolved	mg/L	<0.005
UA	G22D	Delin	2023/09/28	Phosphate, dissolved	mg/L	0.126
UA	G22D	Delin	2022/07/27	Potassium, total	mg/L	1.16
UA	G22D	Delin	2022/09/14	Potassium, total	mg/L	1.10
UA	G22D	Delin	2022/11/02	Potassium, total	mg/L	1.08
UA	G22D	Delin	2023/01/24	Potassium, total	mg/L	0.986
UA	G22D	Delin	2023/05/03	Potassium, total	mg/L	1.39
UA	G22D	Delin	2023/09/28	Potassium, total	mg/L	1.35
UA	G22D	Delin	2023/10/23	Potassium, total	mg/L	1.25
UA	G22D	Delin	2023/05/03	Silicon, dissolved	mg/L	5.67
UA	G22D	Delin	2023/09/28	Silicon, dissolved	mg/L	5.60
UA	G22D	Delin	2022/07/27	Sodium, total	mg/L	19.1
UA	G22D	Delin	2022/09/14	Sodium, total	mg/L	18.9
UA	G22D	Delin	2022/11/02	Sodium, total	mg/L	19.2
UA	G22D	Delin	2023/01/24	Sodium, total	mg/L	18.3
UA	G22D	Delin	2023/05/03	Sodium, total	mg/L	20.1
UA	G22D	Delin	2023/09/28	Sodium, total	mg/L	19.2
UA	G22D	Delin	2023/10/23	Sodium, total	mg/L	21.3
UA	G22D	Delin	2022/07/27	Sulfate, total	mg/L	33.0
UA	G22D	Delin	2022/09/14	Sulfate, total	mg/L	40.0
UA	G22D	Delin	2022/11/02	Sulfate, total	mg/L	38.0
UA	G22D	Delin	2023/01/24	Sulfate, total	mg/L	36.0
UA	G22D	Delin	2023/05/03	Sulfate, total	mg/L	37.0
UA	G22D	Delin	2023/09/28	Sulfate, total	mg/L	37.0
UA	G22D	Delin	2023/10/23	Sulfate, total	mg/L	40.0
UA	G22D	Delin	2022/07/27	Temperature (Celsius)	degrees C	18.4
UA	G22D	Delin	2022/09/14	Temperature (Celsius)	degrees C	30.4
UA	G22D	Delin	2022/11/02	Temperature (Celsius)	degrees C	16.9
UA	G22D	Delin	2023/01/24	Temperature (Celsius)	degrees C	15.1
UA	G22D	Delin	2023/05/03	Temperature (Celsius)	degrees C	17.2
UA	G22D	Delin	2023/09/28	Temperature (Celsius)	degrees C	16.6
UA	G22D	Delin	2023/10/23	Temperature (Celsius)	degrees C	16.7
UA	G22D	Delin	2022/07/27	Total Dissolved Solids	mg/L	272
UA	G22D	Delin	2022/09/14	Total Dissolved Solids	mg/L	150
UA	G22D	Delin	2022/11/02	Total Dissolved Solids	mg/L	294
UA	G22D	Delin	2023/01/24	Total Dissolved Solids	mg/L	278
UA	G22D	Delin	2023/05/03	Total Dissolved Solids	mg/L	264
UA	G22D	Delin	2023/09/28	Total Dissolved Solids	mg/L	296
UA	G22D	Delin	2023/10/23	Total Dissolved Solids	mg/L	252

Notes:
< = results is less than detection limit
B = Background
C = Compliance
Delin = Delination
HSU = Hydrostratigraphic Unit
CCR = Coal Combustion Residuals
LAU = Lower Aquifer Unit
UA = Uppermost Aquifer
mg/L = milligrams per liter
SU = standard units
V = volts

ATTACHMENT J

Memorandum – Draft Evaluation of Partition Coefficients – Joppa East Ash Pond

Geosyntec consultants

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Memorandum

Date: May 24, 2022

To: David Mitchell, Stu Cravens, Vic Modeer
Electric Energy Inc.

Copies to: Brian Hennings - Ramboll

From: Allison Kreinberg, Ryan Fimmen – Geosyntec Consultants, Inc.

Subject: Draft Evaluation of Partition Coefficient Results – Joppa East Ash Pond CCR Unit 401, Joppa Power Plant, Joppa, Illinois

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INTRODUCTION

Electric Energy, Inc. currently operates the Joppa Power Plant (JPP) and its associated ash ponds located in Joppa, Illinois. The East Ash Pond (EAP) (Vistra identification [ID] No. 401; Illinois Environmental Protection Agency [IEPA] ID No. W1270100004-02; National Inventory of Dams [NID] No. IL50714) is an active 111-acre unlined surface impoundment used to manage CCR and non-CCR waste streams at the JPP. Geosyntec Consultants (Geosyntec) is assisting Electric Energy, Inc. with Part 845 compliance at the Site.

Electric Energy, Inc. is currently preparing a Construction Permit application for the EAP as required under Section 845.220. As part of the Construction Permit application, groundwater modeling is being completed for known potential exceedances of groundwater protection standards (GWPS) identified in the Operating Permit (Burns & McDonnell, 2021). In the Operating Permit (October 2021), Burns & McDonnell identified potential GWPS exceedances for several constituents potentially associated with the EAP, including boron, pH (field), and sulfate. An evaluation of potential exceedances of applicable GWPS found that the pH potential exceedances are not related to the EAP (Ramboll, 2022). Batch adsorption testing was conducted for boron to generate site-specific partition coefficients. This technical memorandum summarizes the results of the batch adsorption testing and calculation of partition coefficients.

BATCH ATTENUATION TESTING

In 2021, Geosyntec conducted a field investigation at the EAP which included completion of three (3) soil/rock borings ranging in depth from 50 to 80 feet below ground surface. As part of that investigation, soil and groundwater samples were submitted to SiREM Laboratories (Guelph, ON) for batch solid/liquid partitioning testing.

One groundwater sample (G07) and one soil sample (SB-03) were used for batch attenuation testing at five (5) soil:solution ratios (**Table 1**), each ran in duplicate. For each treatment, 0.1 L of groundwater was brought into contact with varying amounts of soil (0.004 to 0.2 kg) and equilibrated over a seven-day period. Each microcosm was amended (i.e., spiked) with boric acid (H_3BO_3) to achieve the desired initial concentration (5 mg/L) of boron (**Table 2**).

An initial sample of the stock solution for each experimental design was collected on Day 0, and a control sample (i.e., only amended G07 groundwater with no aquifer solids) was collected on Day 7 after tumbling in polypropylene bottleware to evaluate any loss due to interactions with the bottleware or changes in ambient conditions. Duplicates were constructed for each microcosm, including the control samples. After seven days of contact time, an aliquot of the free liquid was collected and filtered through a 0.45-micron (µm) filter prior to analysis for dissolved concentrations of boron. The oxidation/reduction potential (redox) and pH were measured for each batch test at the beginning and end of the contact period and in the control samples.

Data obtained from the test (**Table 3**) were used to construct isotherms for boron; 5-point isotherms were constructed by averaging duplicate results for each soil:solution ratio. Mathematical fitting was used to calculate the attenuation distribution coefficients (K_d), assuming linear adsorption. The linear adsorption equation was used:

$$q_e = K_d \times C_e \qquad \text{Eq. 1}$$

where q_e is the mass of constituent adsorbed to the solid phase at equilibrium, C_e is the remaining aqueous constituent concentration at equilibrium, and K_d is the linear sorption coefficient (reported in liters per kilogram [L/kg]). The data showed a deviation from a linear trend, and so were also fitted using non-linear isotherms. The non-linear Langmuir isotherm was used:

$$q_e = \frac{q_m K_L C_e}{1 + K_L C_e} \qquad \text{Eq. 2}$$

where q_m is the inverse of the slope and K_L is the Langmuir distribution coefficient. The adsorption data were linearized according to:

$$\frac{C_e}{q_e} = \frac{1}{(K_L \times q_m)} + \frac{C_e}{q_m} \qquad \text{Eq. 3}$$

A common non-linear Freundlich equation was also used:

$$q_e = K_F(C_e)^{1/n} \qquad \text{Eq. 4}$$

where q_e is the mass of constituent adsorbed to the solid phase at equilibrium, C_e is the remaining aqueous constituent concentration at equilibrium, K_F is the Freundlich distribution coefficient, and $1/n$ is a non-linearity constant. The adsorption data were plotted as log-transformed values to perform the non-linear isotherm fitting using the linearized Freundlich equation:

$$log(q_e) = \log(K_F) + (1/n)\log(C_e) \qquad \text{Eq. 5}$$

The calculated linear, Langmuir, and Freundlich distribution coefficients (K_d, K_L, and K_F, respectively) and $1/n$ values are shown in **Table 4**.

SUMMARY OF RESULTS

The partition coefficient values for G07 are presented in **Table 4**. A figure which shows the linear, Langmuir, and Freundlich isotherms for boron is provided in **Appendix A**.

All boron partition coefficients for G07 were calculated using four of the five datapoints provided by batch attenuation testing. The results for the 1:27.3 soil:solution ratio were excluded because they consistently reduced the goodness-of-fit of each isotherm, and resulted in unrealistic values for both the partition coefficients (i.e., negative values) and isotherm fitting parameters (i.e., 1/n). Removal of the 1:27.3 soil:solution ratio also resulted in a more conservative linear partition coefficient. The linear boron partition coefficient of 2.4 L/kg, calculated using the four-point isotherm, was chosen for G07 based on its goodness-of-fit ($R^2 > 0.99$) and comparability to other values reported in the literature, which range from 0.19 to 1.3 L/kg depending on pH conditions and the amount of sorbent present (EPRI, 2005; Strenge & Peterson, 1989). Despite their high goodness-of-fit, both the linearized Langmuir and Freundlich isotherms yielded partition coefficients orders of magnitude higher than anticipated relative to values reported in the literature.

REFERENCES

Burns & McDonnell. 2021. Initial Operating Permit Joppa East Ash Pond. October

EPRI, 2005. *Chemical Constituents In Coal Combustion Product Leachate: Boron. Final Report 1005258.*

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022. *Evaluation of Potential GWPS Exceedances, Joppa Power Plant, East Ash Pond, CCR Unit 401, May 2022.*

Strenge, D. and Peterson, S. 1989. Chemical Data Bases for the Multimedia Environmental Pollutant Assessment System (MEPAS) (No. PNL-7145). Pacific Northwest National Laboratory, Richland, WA (USA).

TABLES

Table 1 - Batch Attenuation Testing Data Summary
Joppa EAP

Groundwater Sample ID	**Soil Sample ID**	**Soil: Water Ratio**
G07	SB-03 (57.5-62.5, 63.5-70.0 ft bgs)	2:1.3
		1:1.2
		1:5.6
		1:11.0
		1:27.3

Notes:

ft bgs = feet below ground surface

Table 2 - Microcosm Amendment and Target Concentration
Joppa EAP

Groundwater Sample ID	**Soil Sample ID**	**Compound**	**Amendment**	**Target Concentration (mg/L)**
G07	SB-03 (57.5-62, 63.5-70.0 ft bgs)	Boron	7.89 mL of a 2 g/L H_3BO_3	5

Notes:

ft bgs - feet below ground surface

mg/L - milligrams per liter

mL - milliliters

H_3BO_3 - boric acid

Table 3 - Batch Attenuation Testing Results, G07
Joppa EAP

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Date	Day	Replicate	Dissolved Boron mg/L	pH SU	ORP mV
G07	--	Water Control Only	23-Dec-21	0	G07-1a	5.8	7.23	81
					G07-2a	5.4	7.3	73
					Average Concentration (mg/L)	**5.6**	**7.3**	**77**
			30-Dec-21	7	G07-1	4.1	7.14	193
					G07-2	4.3	7.09	168
					Average Concentration (mg/L)	**4.2**	**7.1**	**181**
	SB-03	2:1.3 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	SB-03: G07 2:1-1	2.5	6.85	148
					SB-03: G07 2:1-2	3.1	6.75	132
					Average Concentration (mg/L)	**2.8**	**6.8**	**140**
		1:1.2 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	SB-03: G07 1:1-1	3.1	6.84	146
					SB-03: G07 1:1-2	3.1	6.95	142
					Average Concentration (mg/L)	**3.1**	**6.9**	**144**
		1:5.6 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	SB-03: G07 1:5-1	3.8	6.96	134
					SB-03: G07 1:5-2	4.3	6.91	135
					Average Concentration (mg/L)	**4.1**	**6.9**	**135**
		1:11 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	SB-03: G07 1:10-1	4.4	6.98	136
					SB-03: G07 1:10-2	4.4	6.89	131
					Average Concentration (mg/L)	**4.4**	**6.9**	**134**
		1:27.3 Soil:Water Ratio	23-Dec-21	0				
			30-Dec-21	7	SB-03: G07 1:20-1	4.5	7.08	146
					SB-03: G07 1:20-2	4.4	6.92	150
					Average Concentration (mg/L)	**4.5**	**7.0**	**148**

Notes:

mg/L - milligrams per liter

mV - millivolts

SU - Standard Units

ORP - oxidation/reduction potential

Table 4 - Partition Coefficient Results, G07
Joppa EAP

Materials	Analyte	Isotherm	Variable	Value
G07/SB-03	Boron	Linear	R^2	0.998
			K_D (L/kg)	2.40
		Langmuir	R^2	0.982
			q_m (mg/g)	0.06
			K_L (L/kg)	5.66E+04
		Freundlich	R^2	0.999
			1/n	0.83
			K_F (L/kg)	86.4

Notes:

K_D - linear partition coefficient

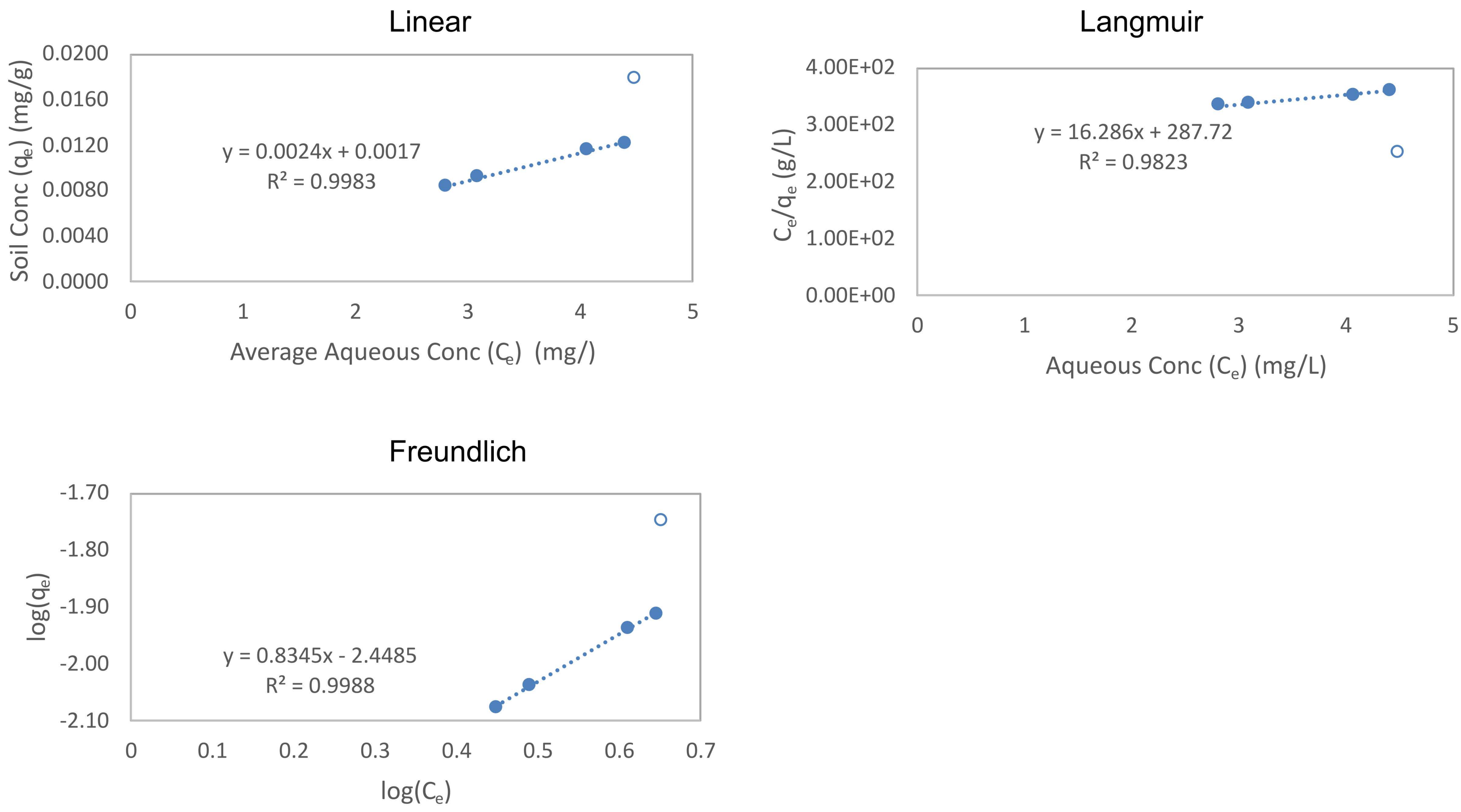
K_L - Langmuir partition coefficient

K_F - Freundlich partition coefficient

q_m - inverse of the slope of the linearized Langmuir isotherm

n - non-linearity constant of the Freundlich isotherm

APPENDIX A
BATCH TESTING ISOTHERM PLOTS



Notes:

q_e - mass of constituent adsorbed to the solid phase
C_e - remaining aqueous constituent concentration
mg/L - milligrams per liter
mg/g - milligrams per gram
g/L - grams per liter

The results from the 1:27.3 soil:solution ratio, shown as hollow symbols, were not used to calculate the partition coefficients.

G07 Boron Partitioning Coefficients
Joppa Power Plant EAP
Joppa, Illinois

Geosyntec
consultants

Columbus, OH

May 2022

Figure
1