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

September 17, 2024
Illinois Environmental Protection Agency
DWPC – Permits MC#15
Attn: 35 I.A.C. § 845.650(e) Alternative Source Demonstration Submittal
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Baldwin Power Plant Bottom Ash Pond; IEPA ID # W1578510001-06

Dear Mr. LeCrone:

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.650(e), Dynegy Midwest Generation, LLC (DMG) is submitting this Alternative Source Demonstration (ASD) for exceedances observed from the Quarter 2 2024 sampling event at the Baldwin Power Plant Bottom Ash Pond, identified by Illinois Environmental Protection Agency (IEPA) ID No. W1578510001-06.

This ASD is being submitted within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600. As required by 35 I.A.C. § 845.650 (e)(1), the ASD was placed on the facility's website within 24 hours of submittal to the agency.

One hard copy is provided with this submittal.

Sincerely,

Phil Morris, PE
Senior Director, Environmental

Enclosures
Alternate Source Demonstration, Quarter 2 2024, Bottom Ash Pond Baldwin Power Plant, Baldwin Illinois

Geosyntec consultants

engineers | scientists | innovators

ALTERNATIVE SOURCE DEMONSTRATION

Baldwin Power Plant Bottom Ash Pond
(Unit ID #601)
IEPA ID: W1578510001-06
35 IAC 845.650

Prepared for

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

Prepared by

Geosyntec Consultants, Inc.
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Worthington, Ohio 43085

Project Number: GLP8068

September 12, 2024

Geosyntec consultants

Alternative Source Demonstration

Baldwin Power Plant Bottom Ash Pond
(Unit ID #601)
IEPA ID: W1578510001-06
35 IAC 845.650

Prepared for

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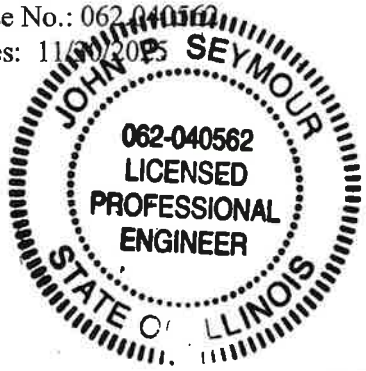

Project Number: GLP8068

September 12, 2024

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ACRONYMS AND ABBREVIATIONS

%	percent
‰	per mille
ASD	alternative source demonstration
BAP	Bottom Ash Pond
bgs	below ground surface
BPP	Baldwin Power Plant
CCR	coal combustion residuals
cm/s	centimeters per second
DMG	Dynegy Midwest Generation, LLC
FAPS	Fly Ash Pond System
GWPS	groundwater protection standard
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
LOE	line of evidence
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
NAVD88	North American Vertical Datum of 1988
NMDS	nonmetric multidimensional scaling
NPDES	National Pollutant Discharge Elimination System
NRT	Natural Resource Technology, Inc.
PC	principal component
PCA	principal component analysis
SEP	sequential extraction procedure
XRD	X-ray diffraction

EXECUTIVE SUMMARY

Groundwater samples were collected at the Baldwin Power Plant (BPP) Bottom Ash Pond (BAP) during April 2024 for the Quarter 2, 2024 compliance monitoring event (Event 5 [E005]). They were evaluated for statistically significant exceedances of the groundwater protection standards (GWPS) as described in Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.600. Exceedances were identified for the following constituents and wells in the Uppermost Aquifer (UA):

- Chloride and lithium at well MW-370
- Fluoride at well MW-392
- Fluoride at well MW-393

These results are similar to GWPS exceedances determined during previous quarterly monitoring events, with the exception of the fluoride exceedance at well MW-392, which was a new exceedance determined after the E005 monitoring event. An Alternative Source Demonstration (ASD) was submitted in accordance with 35 I.A.C. § 845.660, and subsequently approved, for chloride exceedance at MW-370 and fluoride exceedance at MW-393 following the Second Quarter 2023 sampling event. An ASD was also submitted in accordance with 35 I.A.C. § 845.660, and subsequently approved, for a lithium exceedance at MW-370 following the First Quarter 2024 sampling event.

This ASD has been prepared to only provide information pursuant to 35 I.A.C. § 845.650(e) for the BAL BAP as a result of the newly identified E005 fluoride exceedance at MW-392.

There are four lines of evidence (LOEs) that demonstrate the BPP BAP (and the Fly Ash Pond, the other regulated CCR unit at the BPP) are not the source of the fluoride GWPS exceedance in well MW-392 and did not contribute to the exceedance. These four lines of evidence are:

1. If the BAP were the source of fluoride in groundwater, BAP porewater concentrations are expected to be greater than the concentrations in the UA. However, fluoride concentrations in the BAP porewater are historically more than 10 times lower than the minimum fluoride concentrations detected at MW-392.

2. Compliance monitoring location MW-392 has a similar geochemical signature as upgradient monitoring well MW-358. Moreover, a statistical evaluation (via PCA) has shown that their groundwater compositions are distinct from the porewater geochemical signature.

3. The stable boron and lithium isotopic ratios in groundwater at MW-370, which is screened within similar bedrock interval and lithology as compliance well MW-392, are similar to the ratio in groundwater at upgradient monitoring well MW-358. The similarity of the geochemistry in upgradient and downgradient groundwater provides further evidence that the likely source is the natural geology.

4. Solid phase analysis of rock cores from the uppermost aquifer (i.e., bedrock) identified fluoride within the naturally occurring minerals of the shale bedrock, thereby providing an alternative source of fluoride in groundwater. Based on a review of literature, elevated concentrations of fluoride are known to occur in groundwater within the shale-limestone bedrock (i.e., uppermost aquifer at the BAP) and is likely due to the influence of the solid phase composition.

Therefore, the fluoride exceedance is due to geochemical conditions within the UA which result in the mobilization of naturally occurring fluoride from site solids. This information serves as the written ASD prepared in accordance with 35 I.A.C. § 845.650(e), demonstrating that the BAP did not contribute to the fluoride exceedance observed at well MW-392 during the Quarter 2, 2024 sampling event (E005), rather, it is attributable to mobilization of naturally occurring fluoride. Therefore, assessment of corrective measures is not required for this fluoride exceedance at the BAP.

1. INTRODUCTION

Geosyntec Consultants, Inc. has prepared this alternative source demonstration (ASD) on behalf of Dynegy Midwest Generation, LLC (DMG), regarding the Bottom Ash Pond coal combustion residuals (CCR) unit at the Baldwin Power Plant (BPP) near Baldwin, Illinois. The ASD is completed pursuant to Title 35 of the Illinois Administrative Code (35 I.A.C.) Part 845 ("Standards for the Disposal of CCR in Surface Impoundments") and was completed by September 17, 2024, within 60 days of determination of the exceedances (July 19, 2024), as required by 35 I.A.C. Section 845.650(e). This report applies specifically to the CCR Unit referred to as the Bottom Ash Pond (BAP), identification (ID) number (No.) 601, IEPA ID No. W1578510001-06, and National Inventory of Dams ID No. IL50721.

A statistical exceedance of fluoride above the site-specific groundwater protection standard (GWPS) of 4.0 milligrams per liter (mg/L) was determined at downgradient monitoring well MW-392 following the Second Quarter 2024 sampling event (Ramboll 2024a). Statistical exceedances of chloride at downgradient monitoring well MW-370 and fluoride at downgradient monitoring well MW-393 were also determined following the Second Quarter 2023 sampling event (Ramboll 2023a). An ASD previously submitted to address these chloride and fluoride statistical exceedances for Second Quarter 2023 (Geosyntec 2023) was accepted by the Illinois Environmental Protection Agency (IEPA) on November 28, 2023 (IEPA 2023). Additionally, a statistical exceedance of lithium at downgradient monitoring well MW-370 was also determined following the First Quarter 2024 sampling event (Ramboll 2024b). An ASD was also submitted for the lithium exceedance at MW-370 (Geosyntec 2024) which was accepted by IEPA on August 8, 2024 (IEPA 2024). Therefore, these exceedances are not addressed in this ASD.

Under 35 I.A.C. Section 845.650(e), the owner or operator of a CCR surface impoundment may submit a demonstration that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the groundwater protection standard resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction.

Pursuant to 35 I.A.C. Section 845.650(e), the lines of evidence (LOEs) documented in this ASD demonstrate that the BPP BAP CCR unit did not contribute to the GWPS exceedance for fluoride at downgradient monitoring well MW-392. Natural variability associated with the lithology of the aquifer is identified as the alternative source for the elevated fluoride concentrations at MW-392.

2. BACKGROUND

2.1 Site Location and Description

The BPP is in Randolph County and St. Clair County in southwest Illinois approximately 0.5 miles west-northwest of the village of Baldwin. The BPP property is bordered by Baldwin Road to the east; the village of Baldwin to the southeast; Illinois Central Gulf railroad tracks, State Road 154, and scattered residences to the south; the Kaskaskia River to the west; and farmland to the north. CCR impoundments present at the BPP include the BAP and the closed Fly Ash Pond System (FAPS), which included the West Fly Ash Pond, East Fly Ash Pond, and Old East Fly Ash Pond.

Non-CCR impoundments present at the BPP include the Secondary Pond, Tertiary Pond, and Baldwin Lake (BPP Cooling Pond). The locations of the CCR and non-CCR impoundments are shown in **Attachment 1**. The BAP is immediately north of the FAPS, which is a closed in-place CCR unit approved for closure by the IEPA on August 16, 2016.

2.2 Description of the CCR Unit

The BPP began operation in 1970 and initially burned bituminous coal from Illinois before switching to subbituminous coal in 1999. The BAP is an unlined surface impoundment with a surface area of approximately 177 acres used to store and dispose of sluiced bottom ash from the BPP, some of which is mined for beneficial reuse. The BAP is also used to temporarily store spray dry adsorption waste and to clarify plant process water, including other non-CCR station process wastewaters, which are then discharged in accordance with the station's National Pollutant Discharge Elimination System (NPDES) permit (AECOM 2016; IEPA 2016). The original construction date of the BAP is unknown but occurred sometime before 1981 based on a review of historical aerial photographs. Therefore, the unit is over 43 years old.

2.3 Geology and Hydrogeology

This section provides a summary of the site geology and hydrogeology; additional detail is provided in the Supplemental Hydrogeologic Site Characterization and Groundwater Monitoring Plan (Natural Resource Technology, Inc. [NRT] 2016) and the Hydrogeologic Site Characterization Report (Ramboll 2021).

Three hydrostratigraphic units are present at the BPP, which include the CCR, an unconsolidated Upper Unit, and a Bedrock Unit.

- CCR: Consists primarily of bottom ash, fly ash, and boiler slag and includes fill materials comprising predominantly of clays and silts excavated on-site for use in berm and road construction around the impoundment. Up to 28.2 feet of bottom ash has been observed towards the center of the BAP.
- Upper Unit (unconsolidated unit): Predominantly clay with silt and minor sand, silt layers, and occasional sand lenses, and includes lithologies identified as the Cahokia Formation, Peoria Loess, Equality Formation, and Vandalia Till. Thin sand seams present at the

contact between the Upper Unit and Bedrock Unit have been identified as potential migration pathways due to higher hydraulic conductivities in comparison to those in the surrounding clays (e.g., ~10^{-4} centimeters per second [cm/s] in sands compared with ~10^{-5} cm/s in clays) (Ramboll 2023b). Continuous sand seams have not been observed in the Upper Unit or immediately adjacent to the BAP. Due to the predominance of clay and only thin and intermittent sand lenses, this unit is not considered a continuous aquifer unit within the site boundary (NRT, 2016; Ramboll, 2021).

- Bedrock Unit: Pennsylvanian and Mississippian-aged interbedded shale and limestone continuously underlies the BPP and is considered the uppermost aquifer at the site. The top of bedrock ranges from 12.5 feet below ground surface (bgs) near the Kaskaskia River to 70 feet bgs within the East Fly Ash Pond (part of the FAPS). The Bedrock Unit is the uppermost aquifer, and ranges in thickness between 20 to 70 feet in thickness beneath the Site (Ramboll 2021).

A geologic cross-section originally included in the Hydrogeologic Site Characterization Report and locator map are provided as **Attachment 2**.

Groundwater at the site has previously been classified as Class II groundwater in accordance with 35 I.A.C. 620 based on the geometric mean hydraulic conductivity values measured in the monitoring wells screened in both the Upper Unit (3.2×10^{-5} cm/s) and the Bedrock Unit (5.0×10^{-6} cm/s) (NRT 2014).

The groundwater monitoring network for the BAP consists of 15 monitoring wells: 13 downgradient monitoring wells (MW-192, MW-193, MW-356, MW-369, MW-370, MW-382, MW-392, MW-393, MW-394, OW-256, OW-257, PZ-170, and PZ-182) and two background monitoring wells (MW-304 and MW-358) (**Attachment 1**). Monitoring wells are screened in both the uppermost aquifer (Bedrock Unit) from approximately 350 to 404 feet and the unconsolidated unit from 388 to 414 feet (North American Vertical Datum of 1988 [NAVD88]).

The potentiometric groundwater contours and generalized groundwater flow directions at the site are shown in **Attachment 3**. Groundwater flow in bedrock is toward the northwest in the eastern and central areas of the BAP, and southwest in the east area of the FAPS. Bedrock groundwater flows toward the Secondary and Tertiary Ponds, which were created in a former surface water drainage channel. Groundwater flow directions are generally consistent across sampling events. As shown in Attachment 3, MW-392 is upgradient of the FAPS. Therefore, the FAPS is not anticipated to influence the fluoride concentrations at MW-392.

3. ALTERNATIVE SOURCE DEMONSTRATION LINES OF EVIDENCE

This ASD for the fluoride GWPS exceedance at MW-392 is based on four LOEs. These LOEs are described and supported below.

3.1 LOE #1: BAP Porewater Concentrations of Fluoride are Lower than Groundwater Concentrations.

Porewater (*i.e.*, water within the CCR material of the BAP) samples have been collected from piezometer TPZ-164 since September 2018 and at five porewater wells (XPW-01, -02, -04, -05, and -06) since their installation in October 2022. Boring logs for TPZ-164 and XPW-01, -02, -04, -05, and -06 are provided in **Attachment 4**. CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" (USEPA 2014) and represents the material potentially leached from impoundments. The CCR materials are the primary source of constituent loading to the CCR porewater. Over an extended period (e.g., months to years), the CCR porewater reaches equilibrium with the CCR materials. The concentrations within the porewater are “the most representative data available for impoundments because these data are [field-collected] concentrations of leachate” (USEPA 2014). Porewater is therefore the most appropriate source term for potential flux out of CCR impoundments.

The fluoride concentrations reported for the porewater sampling locations are consistently less than the concentrations reported for fluoride at MW-392, as shown in **Figure 1**, making it improbable that the aqueous fluoride concentration would increase after it leached from the BAP. The highest detected fluoride concentration in the porewater is consistently more than 10 times lower than the maximum fluoride concentration reported at MW-392. The fluoride concentrations detected in the porewater samples are less than the lower confidence limits of fluoride concentrations reported at downgradient well MW-392 (4.07 mg/L calculated using a confidence band around a linear regression) (Ramboll 2024b), indicating that fluoride concentrations at MW-392 are not related to the BAP.

Given the generally conservative (non-reactive) nature of fluoride, its concentration is expected to remain stable or decrease along the flow path from the source due to dispersion and dilution. If the BAP were the source of fluoride in groundwater, BAP porewater concentrations would be expected to be greater than the concentrations in the groundwater.

3.2 LOE #2: MW-392 Has a Similar Ionic Composition to Upgradient Monitoring Well MW-358.

The groundwater at MW-392 has a similar ionic composition to the groundwater from background monitoring well MW-358, further indicating that MW-392 is not affected by the BAP. A Piper diagram, which is used for illustrating the relative concentration of major cations and anions in groundwater samples, shows that groundwater at MW-392 appears to be predominantly composed of chloride and monovalent cations, consistent with the composition of both background well

MW-358 and adjacent downgradient monitoring well MW-393, at which a previous fluoride exceedance was identified (**Figure 2**). This groundwater composition is different from the composition of samples of BAP porewater, which tends to have greater relative contributions of alkalinity, sulfate, and divalent cations such as calcium and magnesium (**Figure 2**).

Piper diagrams typically show the relative proportions and individual concentrations (respectively) of only major cations and anions. Advanced statistical approaches such as principal component analysis (PCA) or non-metric multidimensional scaling (NMDS) use a broader suite of analytes to evaluate the similarity or dissimilarity of different samples or groups and identify analytes that are main drivers for dissimilarities (Mumford et al., 2007).

PCA is often used to simplify large datasets with multiple variables by creating new uncorrelated variables known as principal components (PCs). The PCs are linear combinations of the original variables; the first few PCs typically capture most of the variation within the dataset. Factor loadings are calculated based on the correlation between PCs and the original variables. As such, variables with notably higher positive or negative factor loadings are main drivers of similarity or dissimilarity and clustering of samples. Factor scores are calculated based on the correlation between the combined chemical composition of each sample and the PCs. Samples with similar chemical compositions show similar factor scores and tend to cluster together on a PCA biplot.

In this ASD, the dataset used for PCA included 107 samples collected between 2022 and 2024 from background wells MW-304 and MW-358, downgradient wells MW-370, MW-392 and MW-393, and the BAP porewater wells.[1] The downgradient locations were selected based on observed statistical exceedances of the GWPS, the site hydrogeology and groundwater flow direction, and the spatial distribution of well locations. PCA requires that input variables have similar scales of measurement and variances. As such, data were standardized by mean-centering and scaling to unit variance prior to performing PCA. The fraction of total variation explained by each PC is shown in **Figure 3a**, with the first two PCs (Dimensions 1 and 2 on **Figure 3a**) accounting for approximately 69 percent (%) of the total variation in the datasets. Additionally, the quality of representation of each variable is presented in **Figure 3b,** demonstrating that for most variables, the majority of the variation is captured by the first two PCs.

PCA results are often visualized using biplots, where samples are projected on to the first two PCs (i.e., factor scores), and factor loadings are represented as vectors. The closer the data points are on the graph, the greater the similarity in their chemical composition. The biplot of PCA results from this study is shown on **Figure 4**, where the background samples are plotted in orange, the downgradient samples in dark blue, and the porewater samples in gray. The factor loadings, represented as vectors on the biplot, indicate that constituents such as calcium and barium are responsible for shifting the chemical signature of samples towards the porewater cluster. In contrast, constituents such as lithium, fluoride, and chloride are the main drivers for shifting chemical composition in the direction of the downgradient and background samples cluster. These

[1] Analytes included in this PCA include total alkalinity, boron, pH, barium, chloride, calcium, lithium, sulfate, and fluoride. The dataset used for PCA analysis is provided with this submission as **Attachment 5**.

results are generally consistent with the findings of the Piper diagram (**Figure 2**), which identified a higher relative abundance of chloride in the bedrock groundwater samples compared to CCR porewater.

Furthermore, as illustrated in the biplot (**Figure 4**), the porewater samples cluster separately from the downgradient and background wells. The biplot shows no overlap between the 95% bivariate confidence ellipses for: (i) porewater samples from within the BAP in gray, (ii) and downgradient and background bedrock groundwater samples in blue and orange (represented by the orange ellipse). These results are generally consistent with the findings of the Piper diagram (**Figure 2**), which identified clusters of porewater samples distinct from background and downgradient locations. Furthermore, the PCA demonstrates that background and downgradient samples cluster together, indicating that the chemical composition of the downgradient samples from MW-392 is relatively similar to background and other downgradient samples.

Clustering was further explored using Ward's hierarchical clustering method, a distance measure employed in agglomerative algorithms and commonly applied in hydrogeochemical studies. The analysis was performed on a scaled and centered dataset. As illustrated in the dendrogram (**Figure 5**), this analysis supported the distinction between porewater samples within the gray box and the combined group of downgradient and background groundwater wells in the orange box.

Non-metric multidimensional scaling (NMDS) analysis of the dataset from Q1 2023 to Q2 2024 was conducted to evaluate more recent site conditions and to further compare the combined chemical composition of porewater, background, and select downgradient samples. Additionally, the results of NMDS analysis can be used for validation of previous findings from PCA. As some wells were installed in 2022, the 2023 and 2024 samples are likely to be more representative of equilibrium conditions in the aquifer. While both PCA and NMDS aim to reduce dimensionality of multivariate datasets (e.g., the geochemical composition of waters) and visualize similarities among samples to interpret the underlying patterns, their methods are distinct. PCA relies on linear transformations and captures the maximum variance within datasets through orthogonal components, whereas NMDS utilizes non-metric rank orders to achieve a non-linear representation of the original distances between samples. Therefore, NMDS is more flexible in relation to input requirements, particularly as it does not require that datasets be normally distributed. NMDS analysis results are typically presented in two-dimensional space with arbitrary dimensions, where the distance between two samples is representative of their relative similarity.

The results of the NMDS on the BAL dataset are displayed in **Figure 6**. Qualitatively, the NMDS findings presented on **Figure 6** align closely with those from the PCA (**Figure 4**) and indicate that: (i) the porewater sample cluster (gray symbols) is separate from the downgradient (shades of blue) and background (shades of orange) samples; and (ii) the chemical compositions of the background and downgradient wells appear more similar to each other than to the composition of porewater. If BAP porewater was influencing the groundwater in downgradient wells MW-393 and MW-370, the groundwater geochemistry would be more similar to porewater. However, they are distinct and the similarity between upgradient and downgradient groundwater instead supports the conclusion that the groundwater composition is influenced by native lithology.

3.3 LOE #3: Stable Lithium and Boron Isotopes Provide Further Evidence that the UA has a Geochemical Signature Distinct from BAP Porewater.

Boron isotopes (^{11}B and ^{10}B) can be useful tracers in groundwater systems in sedimentary environments (United States Geological Survey, 2004). Depleted (lower; or more negative) boron isotope ratios (reported as $\delta^{11}B$, which is calculated as the ratio of $^{11}B/^{10}B$ relative to an international standard) are an indicator of CCR constituents in aqueous samples due to the depleted $\delta^{11}B$ found in source coal (Ruhl et al. 2014) and coal ash. Alternatively, sediments formed during deposition from marine environments, such as the shales identified within the uppermost aquifer at the site, can be enriched in $\delta^{11}B$ (i.e., more positive values) during deposition (Spivack et al. 1987).

Aqueous samples were collected from select locations to represent multiple lithologies and locations relevant to the BAP, as summarized in **Table 1**. These locations included TPZ-164 to represent BAP CCR porewater conditions, and upgradient well MW-358 and compliance well MW-370 to represent wells screened within the downgradient shale (including compliance wells MW-392 and MW-393 screened within similar bedrock interval and lithology). MW-370 and MW-392 in the bedrock UA generally have a consistent geochemical signature, as indicated by the outcome of the PCA described in Section 3.2. The samples were submitted to SmartGas Sciences, LLC (Columbus, Ohio) for analysis of total boron and stable boron isotopes and to Isodetect GmbH (Leipzig, Germany) for analysis of total lithium and stable lithium isotopes.

If the BAP porewater were influencing the groundwater within UA, a similar isotopic distribution for boron and lithium between the porewater and groundwater would be expected. However, the boron stable isotopic signatures for the BAP CCR porewater and groundwater at MW-370 are markedly different, providing further evidence that the UA groundwater, which is similar in composition at both MW-370 and MW-392 based on the PCA analyses (summarized in Section , is dissimilar to the BAP. For the submitted samples, porewater from TPZ-164 had the most depleted $\delta^{11}B$ value, with a reported $\delta^{11}B$ of 2.8 per mille (‰).

The BAP porewater has a boron isotopic composition consistent with the reported $\delta^{11}B$ range for Illinois basin coal-derived CCR of -8.8‰ to 6.3‰ (Ruhl et al 2014) (**Figure 7**). Upgradient well MW-358 and compliance well MW-370 both had more positive $\delta^{11}B$ values, with reported results of 31.1‰ and 32.4‰, respectively (**Table 1**). The enrichment of $\delta^{11}B$ in these groundwater samples is inconsistent with influences from CCR. Instead, these results are consistent with elevated $\delta^{11}B$ values typically detected in shale formations, with these more positive values due to deposition in marine environments (Spivack et al., 1987; Warner et al., 2013). Typical ranges detected for $\delta^{11}B$ in groundwater unimpacted by CCR are 4.0‰ to 34.0‰ (Buszka et al., 2007; Warner et al., 2013). MW-258, an upgradient well screened within the interbedded limestone and shale formation had a $\delta^{11}B$ value (14.2‰) that was lower than what was detected at shale lithologies at MW-358 and MW-370, but still isotopically distinct from BAP porewater. This variability in $\delta^{11}B$ values within the bedrock at the Site may be attributed to differences in mineralogy or depositional environment over time.

Lithium isotopes (^{7}Li and ^{6}Li) are similarly useful tracers in groundwater and have been identified as particularly applicable for distinguishing water containing CCR constituents (Harkness et al., 2015). Lithium isotope ratios (reported as $\delta^{7}Li$, which is calculated as the ratio of $^{7}Li/^{6}Li$ relative to an international standard) can be an indicator of CCR constituents, as coals have $\delta^{7}Li$ values ranging from -7.0 ‰ to 12.8‰, much lower than the ~31‰ commonly observed for seawater (Warner et al., 2014; Harkness et al., 2015). Release of ^{6}Li from exchangeable sites on clays within shale during burial and formation can significantly alter groundwater $\delta^{7}Li$ values compared to expectations based on the depositional environment (Warner et al., 2014).

MW-370 groundwater also has a lithium isotope composition ($\delta^{7}Li$ = 20.7‰) consistent with upgradient groundwater from shale lithologies at MW-358 ($\delta^{7}Li$ = 26.0‰), with slight differences potentially related to variations in burial history between the screening depths at these locations. The lithium data are provided in **Table 1** and presented on **Figure 8**, with the analytical laboratory report provided as **Attachment 6**. The lithium isotope signature for the BAP porewater ($\delta^{7}Li$ = 17.1‰) is somewhat similar to the bedrock lithium signature and is not consistent with the ranges of $\delta^{7}Li$ for other CCR material effluents ($\delta^{7}Li$ from -6.2 to 8.7‰; Harkness et al., 2015).

When examining the isotopic composition of MW-370 groundwaters using both boron and lithium isotope data in combination (**Figure 9**), it is clear that the BAP porewater is isotopically distinct for lithium and boron from all analyzed groundwaters. Together, these results provide further evidence that wells screened within the shale lithology, including at downgradient locations such as MW-392, is dissimilar to the BAP and instead are more strongly influenced by the bedrock lithology where they are screened. This is also consistent with results from both Piper diagram (**Figure 2**) and PCA analysis (**Figure 5**).

3.4 LOE #4: Fluoride Occurs Naturally in the Shale Bedrock of the Uppermost Aquifer.

Geosyntec reviewed the results of analyses completed on solid phase samples collected from the Site to support the conclusion that statistical exceedances of the site-specific fluoride GWPS at MW-392 are associated with the limestone and shale bedrock formation. Solid phase analysis identified fluoride within the bedrock of the uppermost aquifer at the Site – i.e., it is a naturally occurring inorganic substance within the mineral matrix of the bedrock (**Attachment 7**). The presence of fluoride within the solid phase of the uppermost aquifer (bedrock) likely contributes to elevated and naturally occurring fluoride in the groundwater.

Solid phase analysis of bedrock from compliance location MW-392 via X-ray diffraction (XRD) identified fluoride-bearing minerals in the solid phase materials (**Attachment 8**). The boring logs for MW-392 and MW-358 are provided in **Attachment 4**. Fluorapatite [$Ca_5(PO_4)_3F$], a fluoride-bearing mineral, was identified in samples collected from the shale formation at downgradient well MW-392 (**Table 2; Attachment 8**). The highest abundance of fluorapatite (2.7%) was identified in a sample collected at 80 to 82 feet below ground surface at downgradient well MW-392. This sample is at the same depth as the screened interval for MW-392. The presence of fluoride within

the aquifer solids of the shale in the uppermost aquifer, including the presence of a fluoride-bearing mineral, provide an alternative source for fluoride in groundwater other than the BAP.

Studies have found that fluoride concentrations in groundwater are comparable to or higher than those observed at MW-392 and are often found within the Pennsylvanian and Mississippian-aged interbedded shale and limestone of the uppermost aquifer. A USGS summary found that water within the upper parts of the Pennsylvanian-aged aquifers is generally similar throughout the Illinois and Indiana basins (Cable et al, 1971). This groundwater is influenced by the interaction with the variable interbedded rock types present in the uppermost aquifer at the BAP and can vary from a sodium bicarbonate to a sodium chloride type within a few feet of change in depth (Lloyd and Lyke 1995). Similarly, Lloyd and Lyke (1995) noted that "the fluoride content of the water [in Pennsylvanian-aged aquifers] is great enough to mottle the teeth of persons who drink it on a continual basis," with concentrations reported as high as 15 mg/L.

These results suggest that contact with Pennsylvanian-aged bedrock can result in natural variability in the reported fluoride concentrations in groundwater at ranges consistent with those detected at the site.

4. CONCLUSIONS

It has been demonstrated that the fluoride GWPS exceedance at MW-392 is not caused by a release from the BAP CCR unit, but instead is attributed to natural lithology at the site. The following summarizes the four LOEs used to support this demonstration:

1. If the BAP were the source of fluoride in groundwater, BAP porewater concentrations are expected to be greater than the concentrations in the UA. However, fluoride concentrations in the BAP porewater are historically more than 10 times lower than the minimum fluoride concentrations detected at MW-392.

2. Compliance monitoring location MW-392 has a similar geochemical signature as upgradient monitoring well MW-358. Moreover, a statistical evaluation (via PCA) has shown that their groundwater compositions are distinct from the porewater geochemical signature.

3. The stable boron and lithium isotopic ratios in groundwater at MW-370, which is screened within similar bedrock interval and lithology as compliance well MW-392, are similar to the ratio in groundwater at upgradient monitoring well MW-358. The similarity of the geochemistry in upgradient and downgradient groundwater provides further evidence that the likely source is the natural geology.

4. Solid phase analysis of rock cores from the uppermost aquifer (i.e., bedrock) identified fluoride within the naturally occurring minerals of the shale bedrock, thereby providing an alternative source of fluoride in groundwater. Based on a review of literature, elevated concentrations of fluoride are known to occur in groundwater within the shale-limestone bedrock (i.e., uppermost aquifer at the BAP) and are likely due to the influence of the solid phase composition.

The alternative source of fluoride is the shale bedrock lithology, whose geochemistry influences the groundwater composition. This demonstration meets the expectations in both 35 I.A.C. 845.650(e) and the technical manual for the Municipal Solid Waste Landfill federal regulatory program (Code of Federal Regulations, Title 40, Section 258) that a statistically significant increase may result from natural variation in groundwater quality and that the BAP is not the source of the increase in fluoride at MW-392 and does not contribute to the exceedance.

The information serves as the written ASD prepared in accordance with 35 IAC 845.650(e) demonstrating that the BAP CCR unit did not contribute to the GWPS exceedance for fluoride at MW-392. Therefore, implementation of corrective measures is not required for fluoride at the BAP CCR unit.

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TABLES

Table 1 - Boron and Lithium Isotope Analytical Results
Baldwin Power Plant - Bottom Ash Pond

Geosyntec Consultants, Inc.

Sample ID	Sample Location	Sample Description	Total Boron (µg/L)	$\delta^{11}B$ (‰)	+/- (2SE)	Total Lithium (µg/L)	$\delta^{7}Li$ (‰)	+/- (2SE)
20230206 TPZ-164	TPZ-164	Porewater	1116	2.8	1.2	28	17.1	0.75
20230206 Cooling Pond	Cooling Pond	Surface Water	240	5.7	1.2	3.1	35.2	0.74
20230206 MW-370	MW-370	Downgradient Shale	2061	32.4	1.2	227	20.7	0.73
20230206 PZ-170	PZ-170	Downgradient PMP	326	43.2	1.2	44	17.1	0.73
20230206 MW-158R	MW-158R	Background PMP	86	18.0	1.2	23	31.5	0.54
20230207 MW-358	MW-358	Background Deep Shale	1778	31.1	1.2	185	26.0	0.7
20230207 MW-258	MW-258	Background Shale	1248	14.2	1.2	--	--	--

Notes:

‰: parts per thousand (per mille)

µg/L: micrograms per liter

--: Sample not analyzed

PMP: potential migration pathway

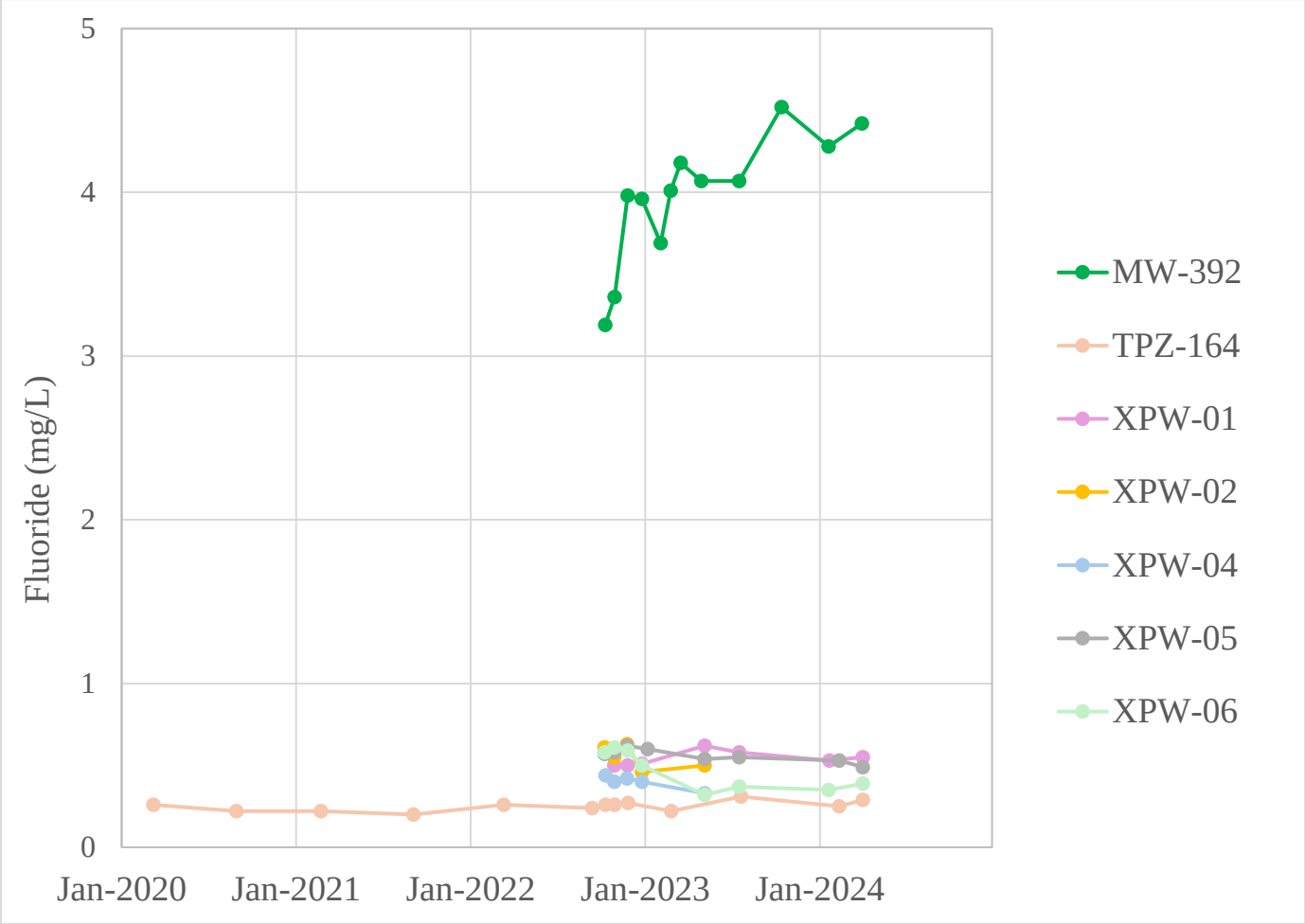
SE: standard error

Table 2 - Summary of Rietveld Quantitative Analysis
X-Ray Diffraction Results
Baldwin Power Plant

Well ID			**MW-358**	**MW-358**	**MW-392**	**MW-392**	**MW-392**
Depth (ft bgs)			**(47-49)**	**(86-88)**	**(32-33.5)**	**(66-68)**	**(80-82)**
Location			**Upgradient**	**Upgradient**	**Downgradient**	**Downgradient**	**Downgradient**
Boring Log Description			**Shallow Shale**	**Deeper Shale Body**	**Clay with increasing sand content**	**Shale**	**Shale transitioning to limestone**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	29.2	30.7	53.5	22.7	29.8
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	Mica	18.8	19.7	13.1	15.9	13.1
Albite	$NaAlSi_3O_8$	Feldspar	0.4	2.5	8.5	0.6	0.6
Microcline	$KAlSi_3O_8$	Feldspar	8.6	5.9	6.8	5.1	1.0
Diaspore	aAlO.OH	Oxyhydroxide	-	-	-	2.8	-
Magnetite	Fe_3O_4	Oxide	0.5	0.3		0.1	1.4
Anatase	TiO_2	Oxide	0.8	1.8	-	1.0	0.8
Calcite	$CaCO_3$	Carbonate	0.5	1.0	-	14.9	28.1
Fluorapatite	$Ca_5(PO_4)_3F$	Phosphate	-	-		0.2	2.7
Ankerite	$CaFe(CO_3)_2$	Carbonate	-	-		0.8	-
Clay Minerals							
Kaolinite	$Al_2Si_2O_5(OH)_4$	Kaolin	4.8	15.0	7.5	3.6	5.5
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \bullet 10H_2O$	Smectite	6.8	4.8	0.0	5.8	3.5
Nontronite	$Fe_2(Al,Si)_4O_{10}(OH)_2Na_{0.3}(H_2O)_4$	Smectite	4.6	4.3		3.3	4.2
Illite/Montmorillonite	$KAl_4(Si,Al)_8O_{10}(OH)_4 \bullet 4H_2O$	Mixed Layer I/S	8.8	2.7		7.1	3.6
Illite	$K(Al,Mg,Fe)_2(Si,Al)_4O_{10}(OH)_2$	Illite	15.0	9.2		10.4	4.1
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	Chlorite	1.3	2	7.0	6.1	1.6
Clay Minerals Total			41	38	15	36	23
Clays + Muscovite Total			60	58	28	52	36

Notes
Only samples collected within the shale bedrock are shown. Additional sample data is provided in Attachment 8.
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.
Sample depths are shown in feet below ground surface (ft bgs).
wt %: percentage by weight

FIGURES



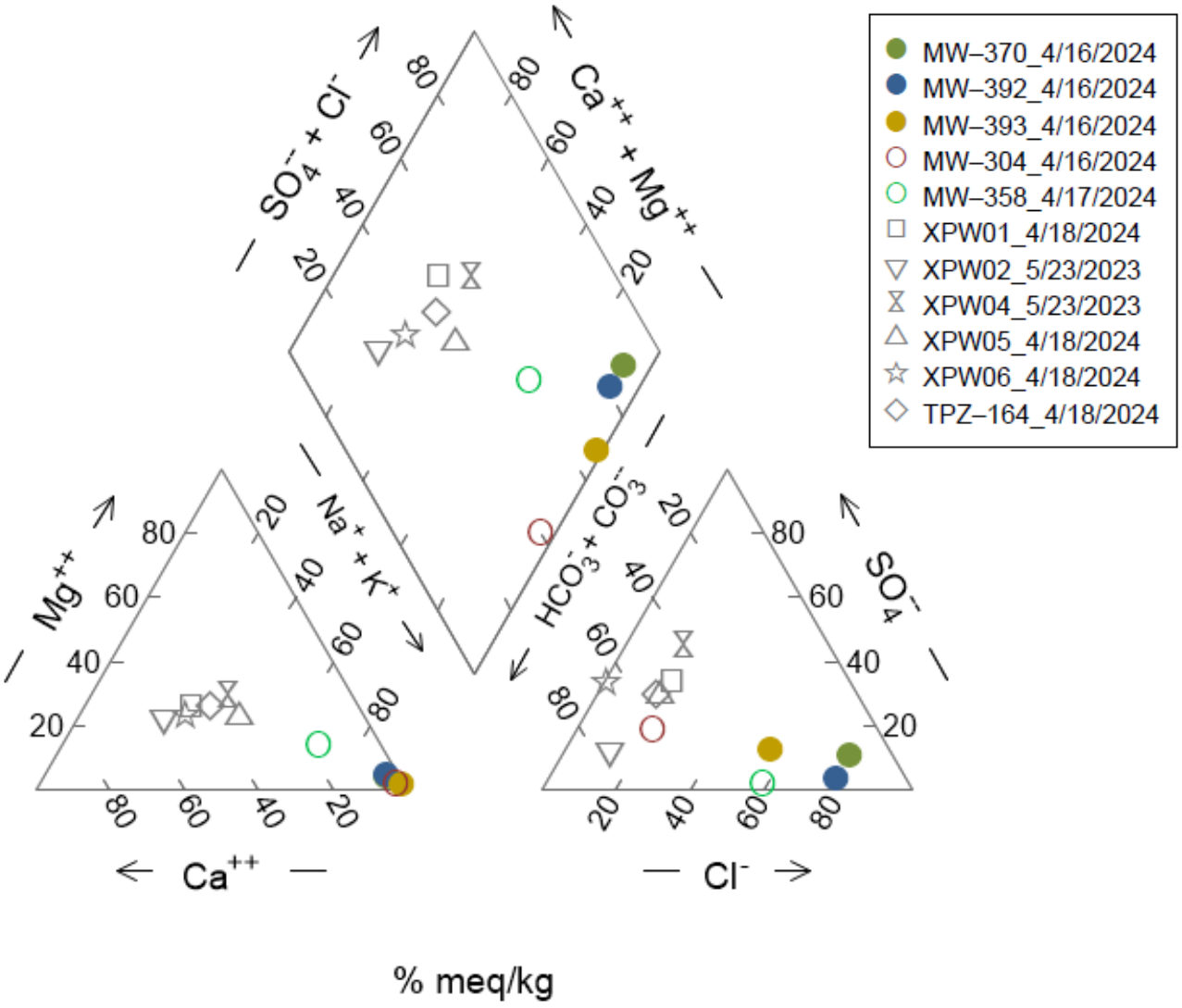
Notes:
mg/L: milligrams per liter

Fluoride Time Series Graph
Baldwin Power Plant

Geosyntec consultants

Columbus, Ohio | August 2024

Figure **1**



Notes:

1. Downgradient wells MW-370, MW-392 and MW-393 are shown with solid circle symbology. Background wells MW-304 and MW-358 are shown with hollow circle symbology. BAL BAP source water (i.e., XPW01-02, XPW04-06, and TPZ-164) are shown with hollow grey symbology.
2. % meq/kg: percent milliequivalents per kilogram.

Piper Diagram

Baldwin Power Plant – Bottom Ash Pond

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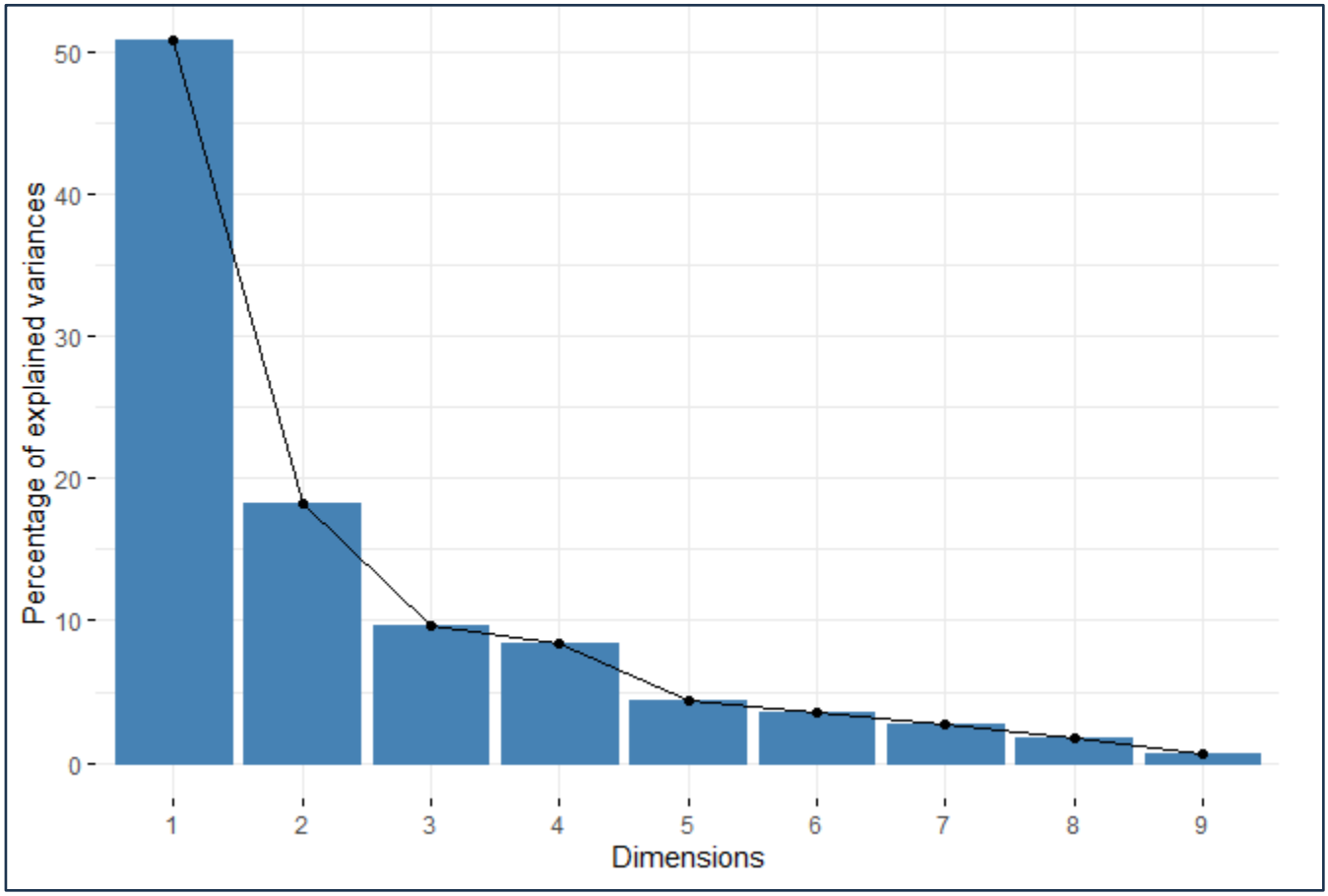
Figure **2**



Notes:

1. Samples collected between 2022 and 2024 from background wells MW-304 and MW-358, downgradient wells MW-370, MW-392 and MW-393, and porewater wells TPZ-164, XPW-01, XPW-02, XPW-04, XPW-05, and XPW-06 were included in the evaluation.

Principal Component Analysis - Quality of Representation of Principal Components

Baldwin Power Plant – Bottom Ash Pond

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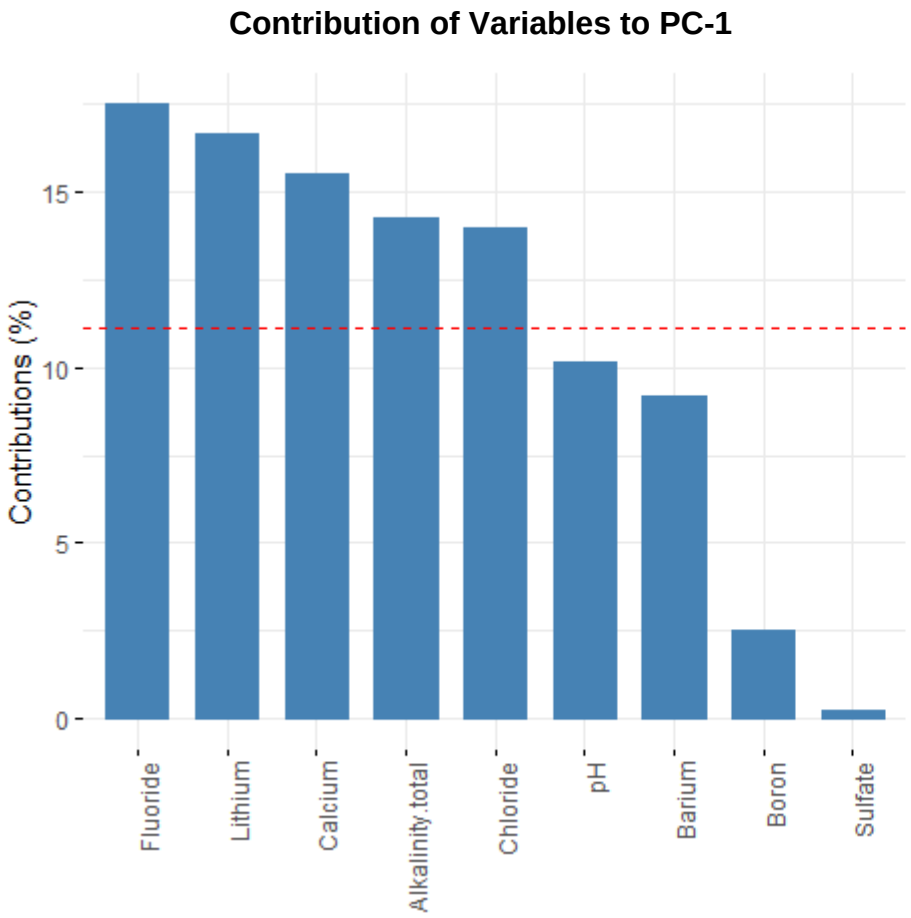
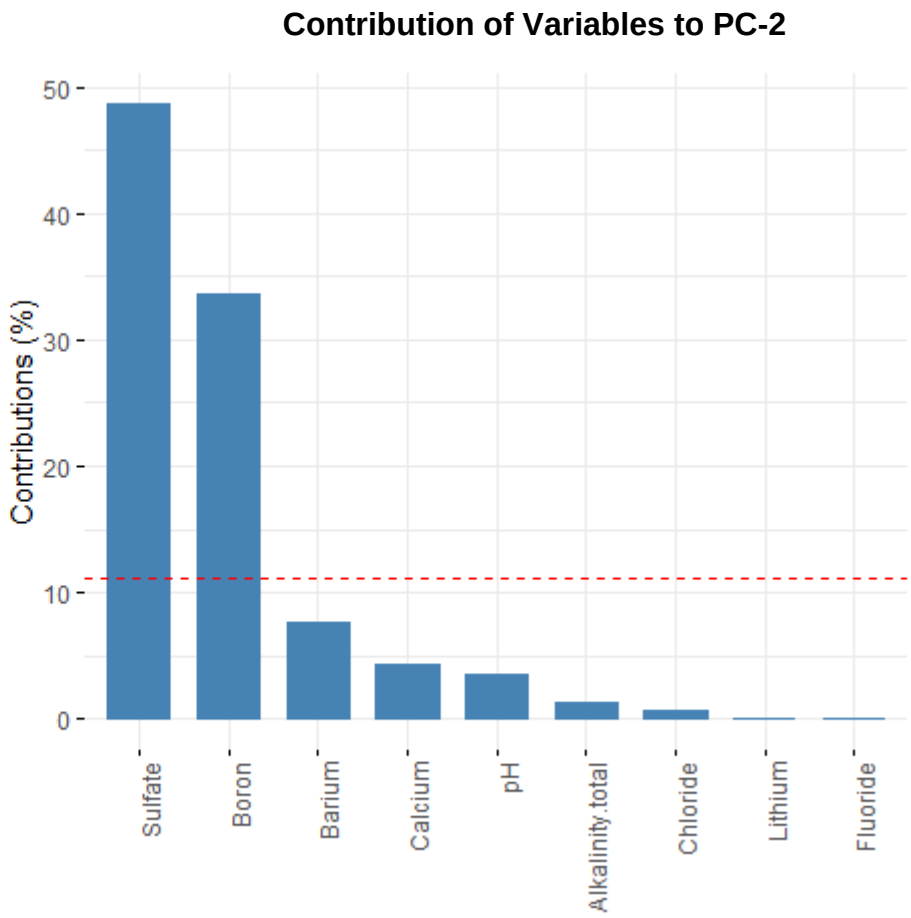
Figure **3a**





Notes:
1. The dashed red line represents the anticipated value for uniform contribution. The constituents with a contribution exceeding the reference line are considered significant in its contribution to each PC (principal component).

Contribution of Variables to First Two Principal Components
Baldwin Power Plant – Bottom Ash Pond

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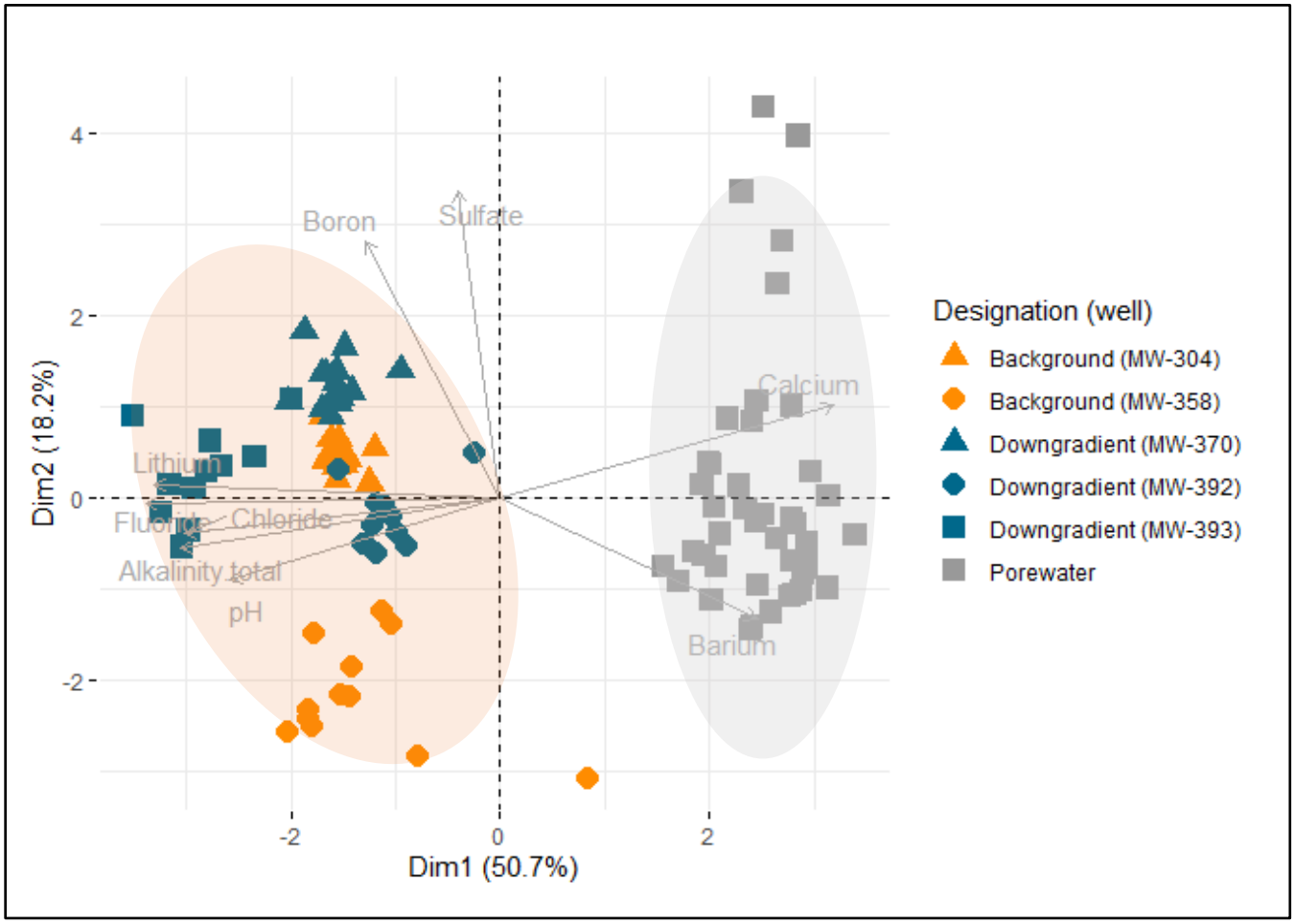
Figure **3b**



Notes:

1. The ellipse containing data points within the 95% confidence interval for each group is outlined and shaded in gray for porewater, and orange for background and downgradient groups.
2. The arrows signify the correlations between the constituents and the principal components.
   PCA – Principal Component Analysis
   Dim - Dimension

Principal Component Analysis Biplot

Baldwin Power Plant – Bottom Ash Pond

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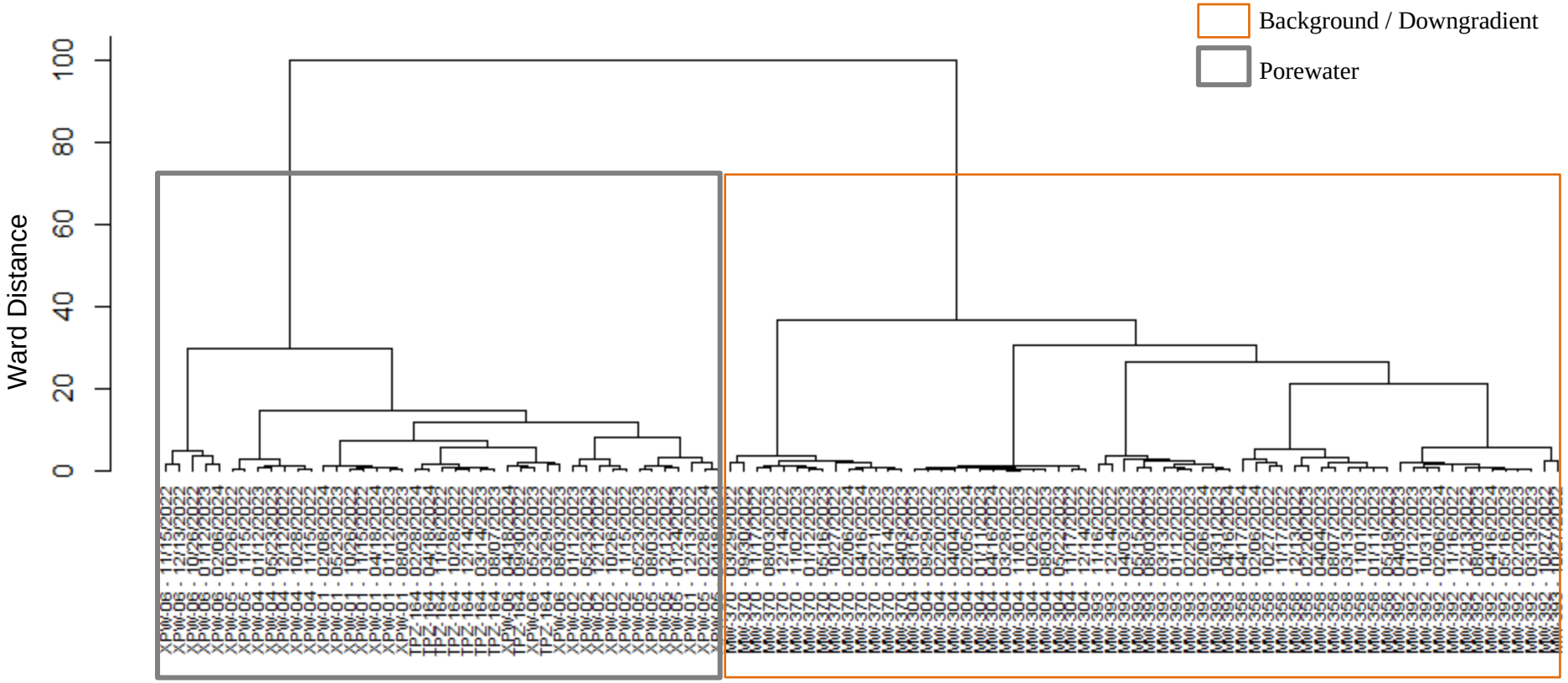
Figure **4**



Notes:

1. The cluster analysis used Euclidean distances, and Ward's method as the clustering algorithm.
2. In the dendrogram, samples on the same branch are more similar to each other. The samples with the highest similarity are on the closest branches.
3. The boxes around the branches represent the two clusters into which samples from each source grouped.
4. Porewater wells are in gray box with thicker lines, and background and downgradient wells are in orange.

Dendrogram Graph from Cluster Analysis

Baldwin Power Plant

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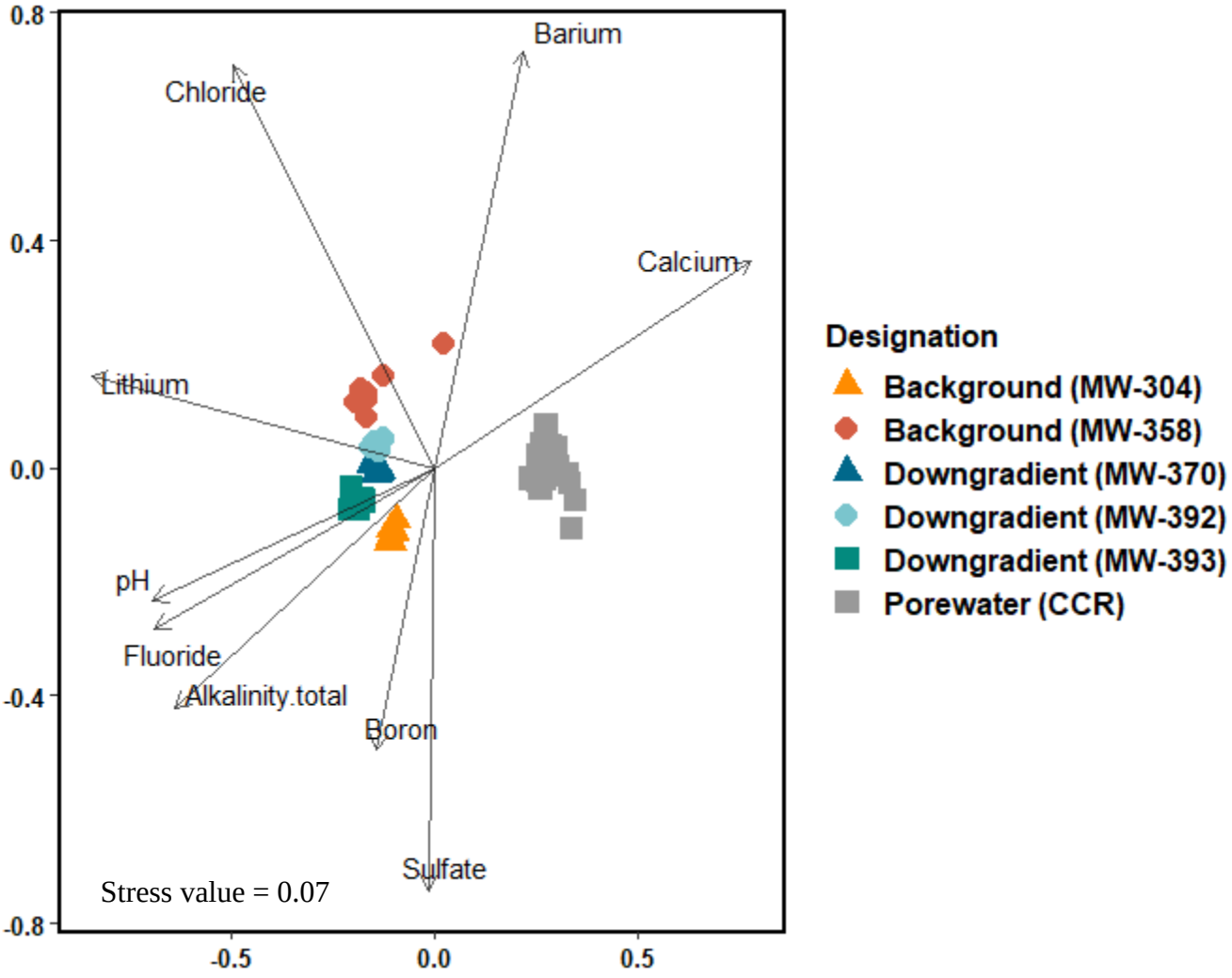
Figure **5**



Notes:
1. NMDS: Non-metric Multidimensional Scaling.
2. The arrows represent the correlation between the constituents and the NMDS axes.
3. The stress value represents the goodness of fit of the NMDS ordination in reduced dimensions to the observed dissimilarity. The stress value (0.07) from the analysis indicates an acceptable fit.

Non-Metric Multidimensional Scaling Plot

Baldwin Power Plant – Bottom Ash Pond

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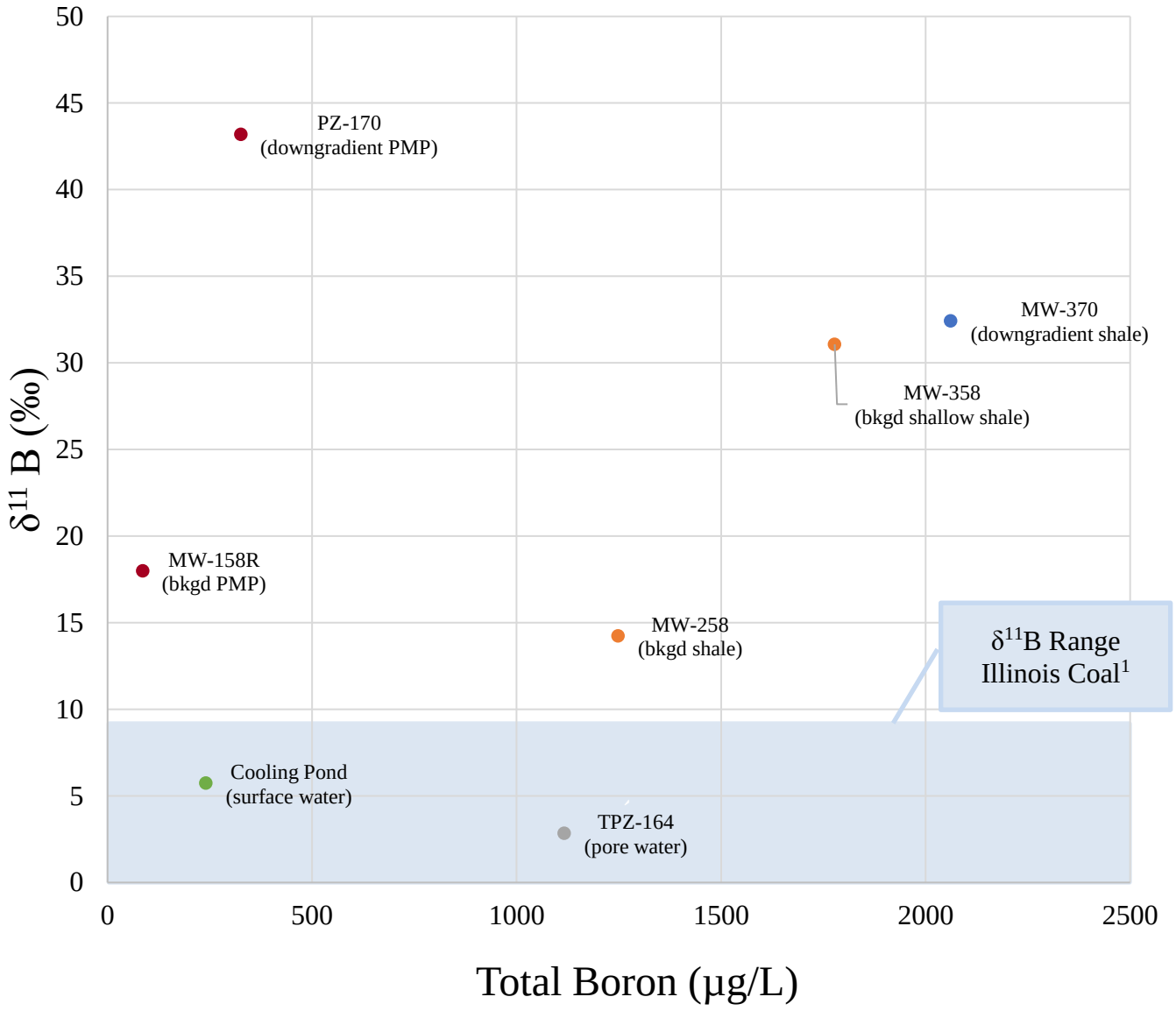
Columbus, Ohio | August 2024

Figure **6**



Notes:
1. $\delta^{11}B$ range from Ruhl et al 2014.
µg/L: micrograms per liter
‰: per mille
Bkgd: background
PMP: potential migration pathway

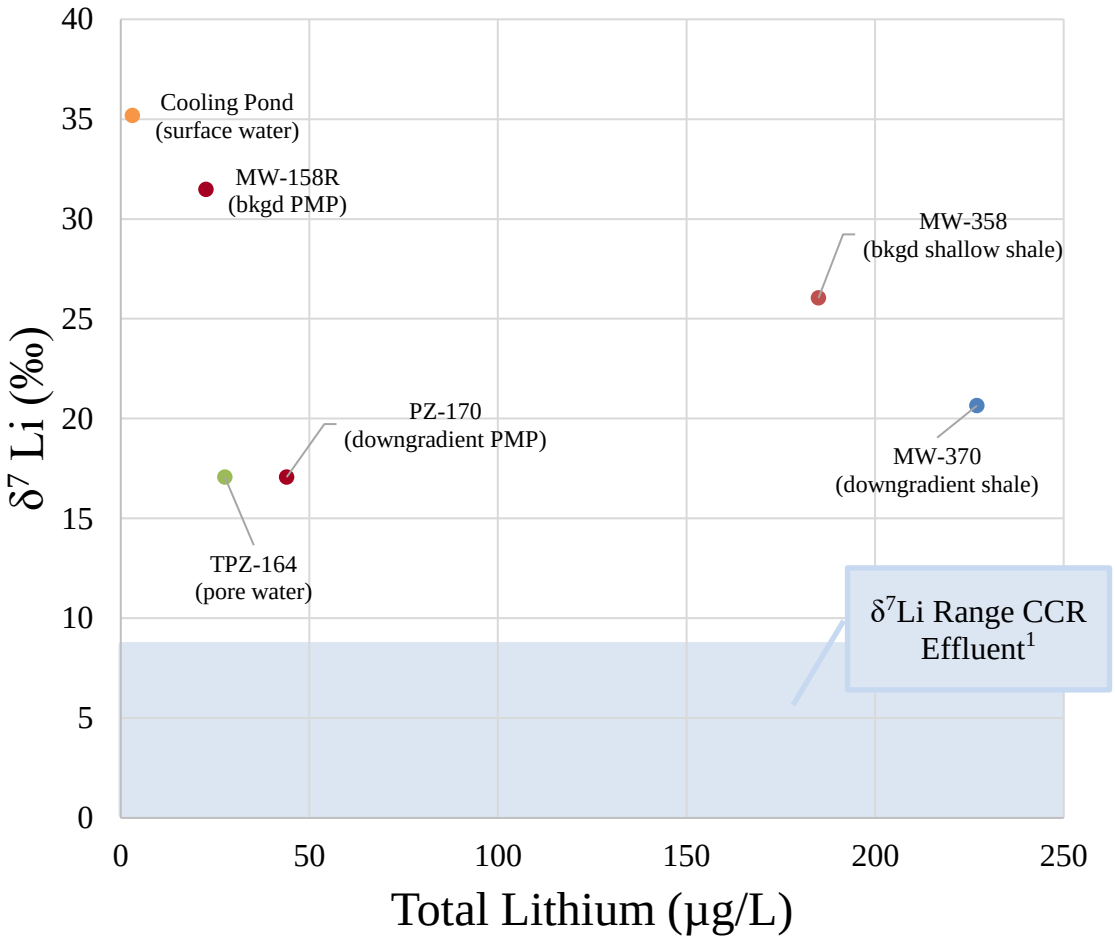
Boron Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Columbus, Ohio | August 2024

Figure **7**



Notes:
1. δ^7Li range from Ruhl et al 2015.
µg/L: micrograms per liter
‰: per mille
Bkgd: background
PMP: potential migration pathway

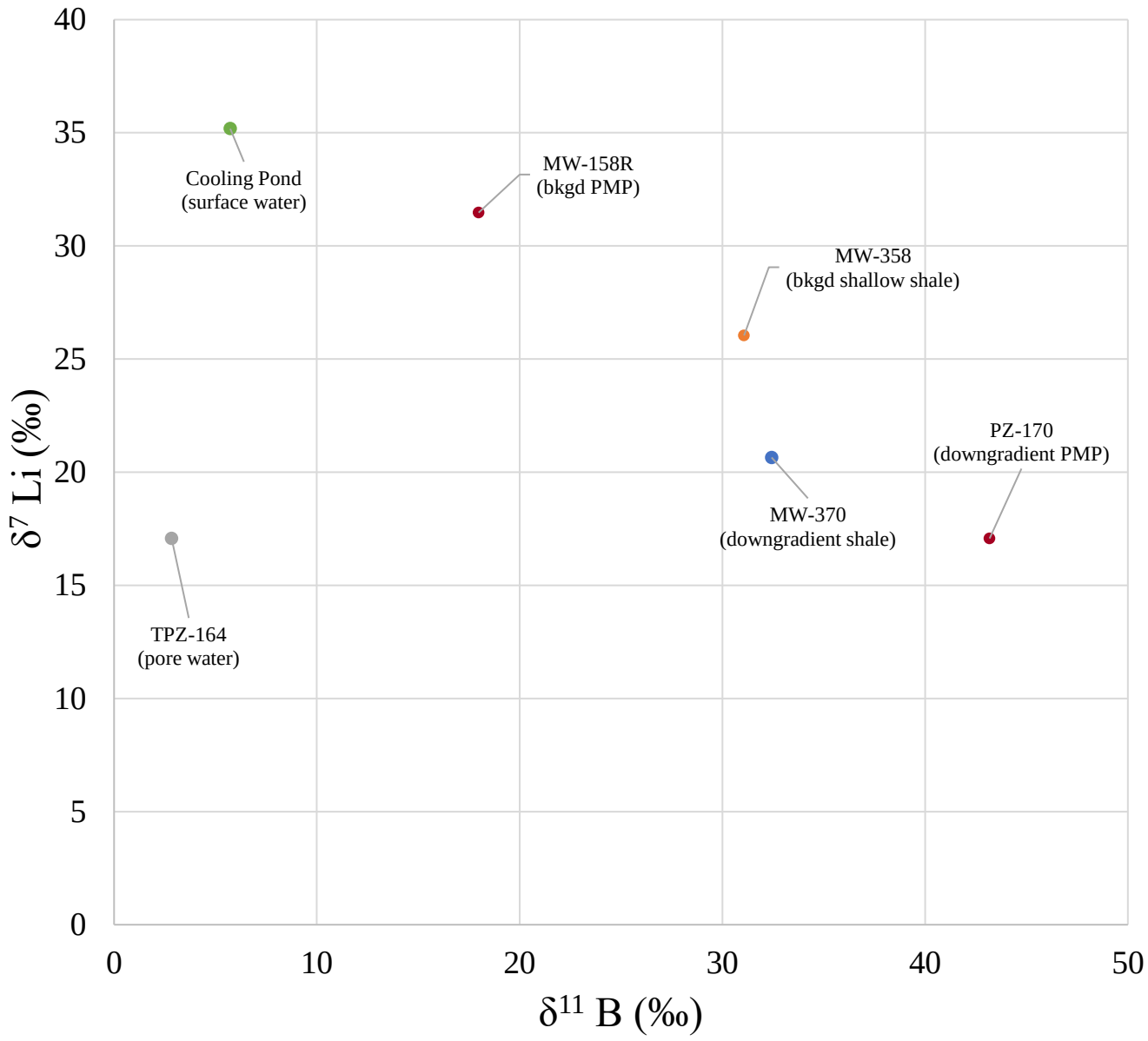
Lithium Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Columbus, Ohio | August 2024

Figure **8**



Notes:
µg/L: micrograms per liter
‰: per mille
Bkgd: background
PMP: potential migration pathway

Isotopic Composition of Lithium and Boron

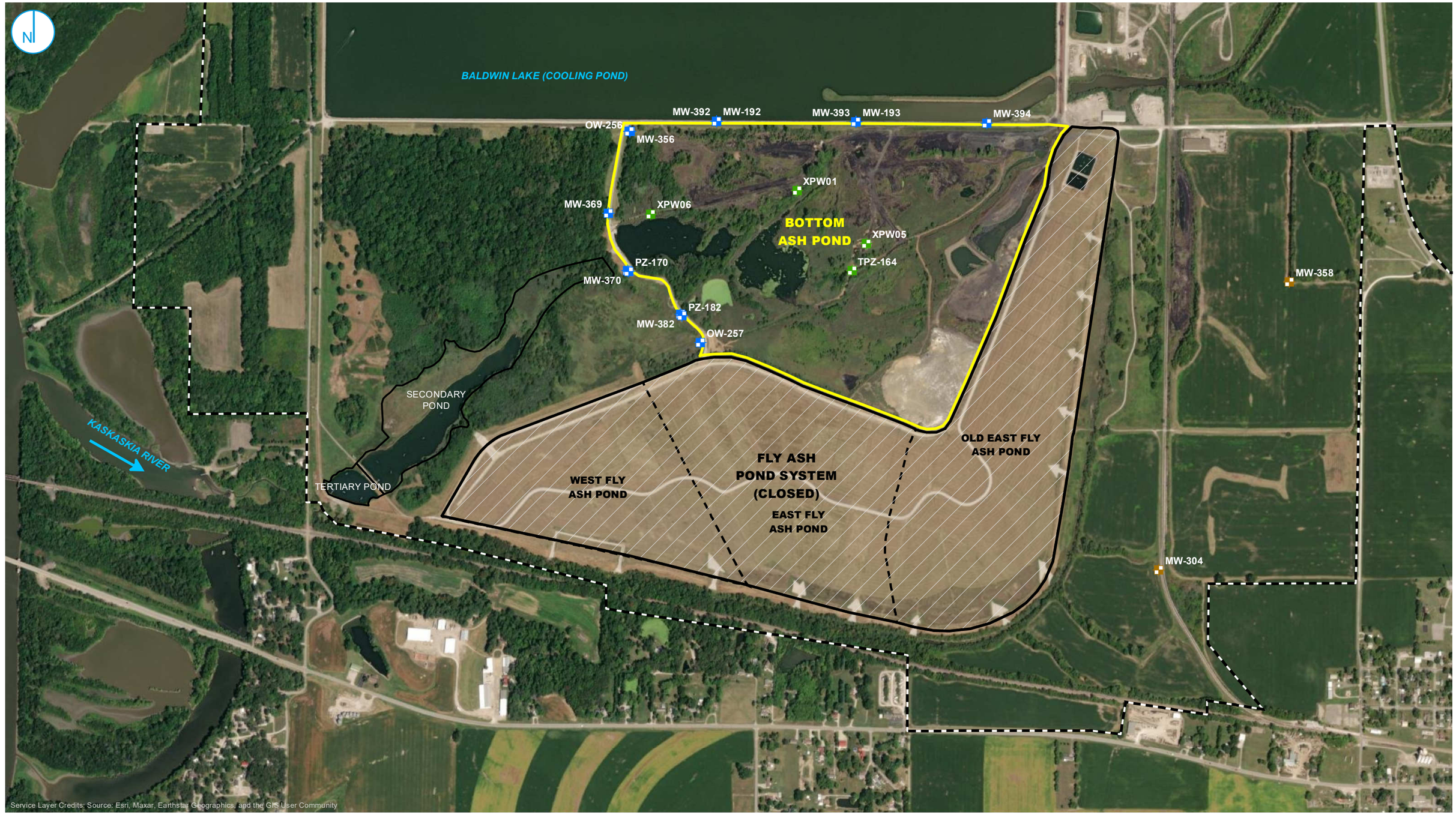
Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Columbus, Ohio | August 2024

Figure **9**

ATTACHMENT 1
Part 845 Groundwater Monitoring Network



BACKGROUND WELL
COMPLIANCE WELL
PORE WATER WELL

REGULATED UNIT (SUBJECT UNIT)
FLY ASH POND SYSTEM
SITE FEATURE
CAPPED AREA
PROPERTY BOUNDARY

0 400 800 Feet

35 IAC § 845.600 GROUNDWATER MONITORING SYSTEM

BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

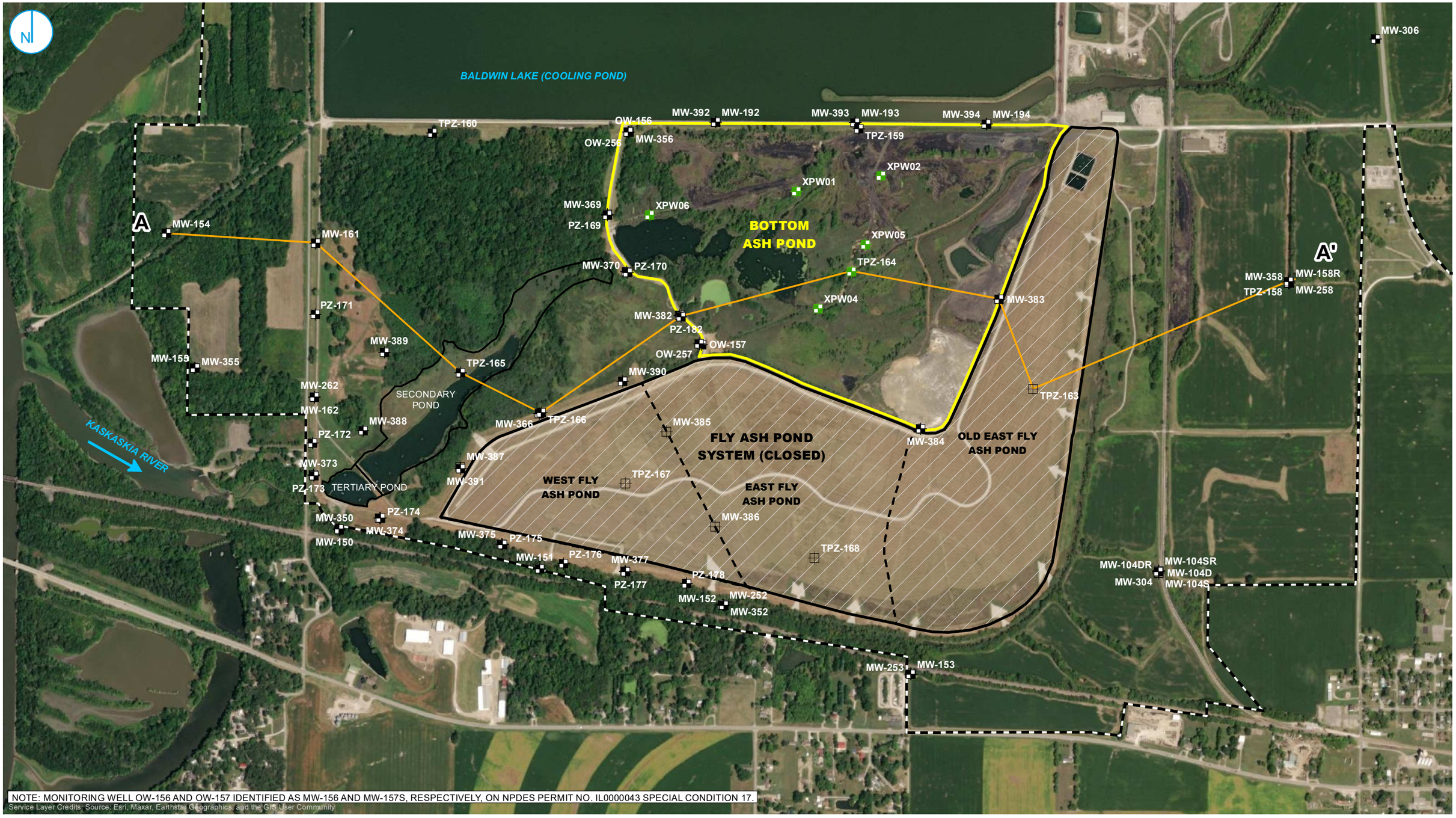
RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

PROJECT: 169000XXXX | DATED: 6/14/2024 | DESIGNER: GALARNMC

Y:\Mapping\Projects\22\22865\MXD\Alt_Source_Dem\Baldwin_AP\E003\Figure 2-1_BAL BAP Monitoring Well Network.mxd

ATTACHMENT 2
Geologic Cross Section



NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.

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

- MONITORING WELL AND PIEZOMETER LOCATION
- PORE WATER WELL
- CLOSED MONITORING WELL
- CCR SOURCEWATER SAMPLE

CROSS SECTION TRANSECT

- A to A'

0 400 800 Feet

- REGULATED UNIT (SUBJECT UNIT) FLY ASH
- POND SYSTEM (CLOSED)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

CROSS SECTION LOCATION MAP

ALTERNATE SOURCE DEMONSTRATION
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

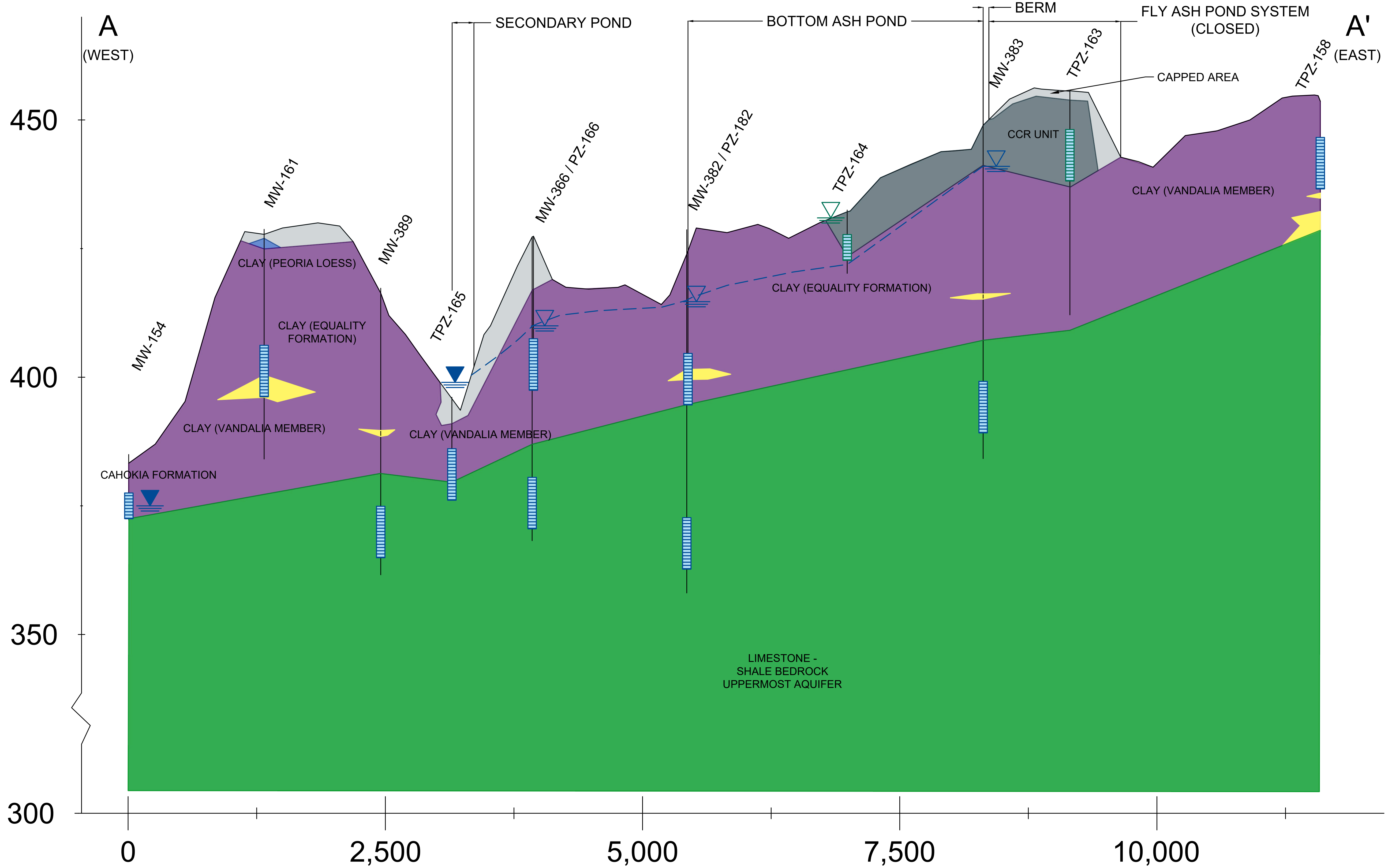
FIGURE 3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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 50X.
4. Groundwater elevations measured on September 15, 2020.



LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- FILL
- CLAY (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- BEDROCK / WEATHERED BEDROCK (INTERBEDDED SHALE, LIMESTONE, SANDSTONE, V. LITTLE SS)
- WELL SCREEN INTERVAL
- UPPERMOST AQUIFER POTENTIOMETRIC SURFACE
- UPPERMOST AQUIFER GROUNDWATER ELEVATION
- POREWATER ELEVATION
- OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)

20'
0
1,000'

CROSS SECTIONS A-A'

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT BOTTOM ASH POND

BALDWIN POWER PLANT
BALDWIN, ILINOIS

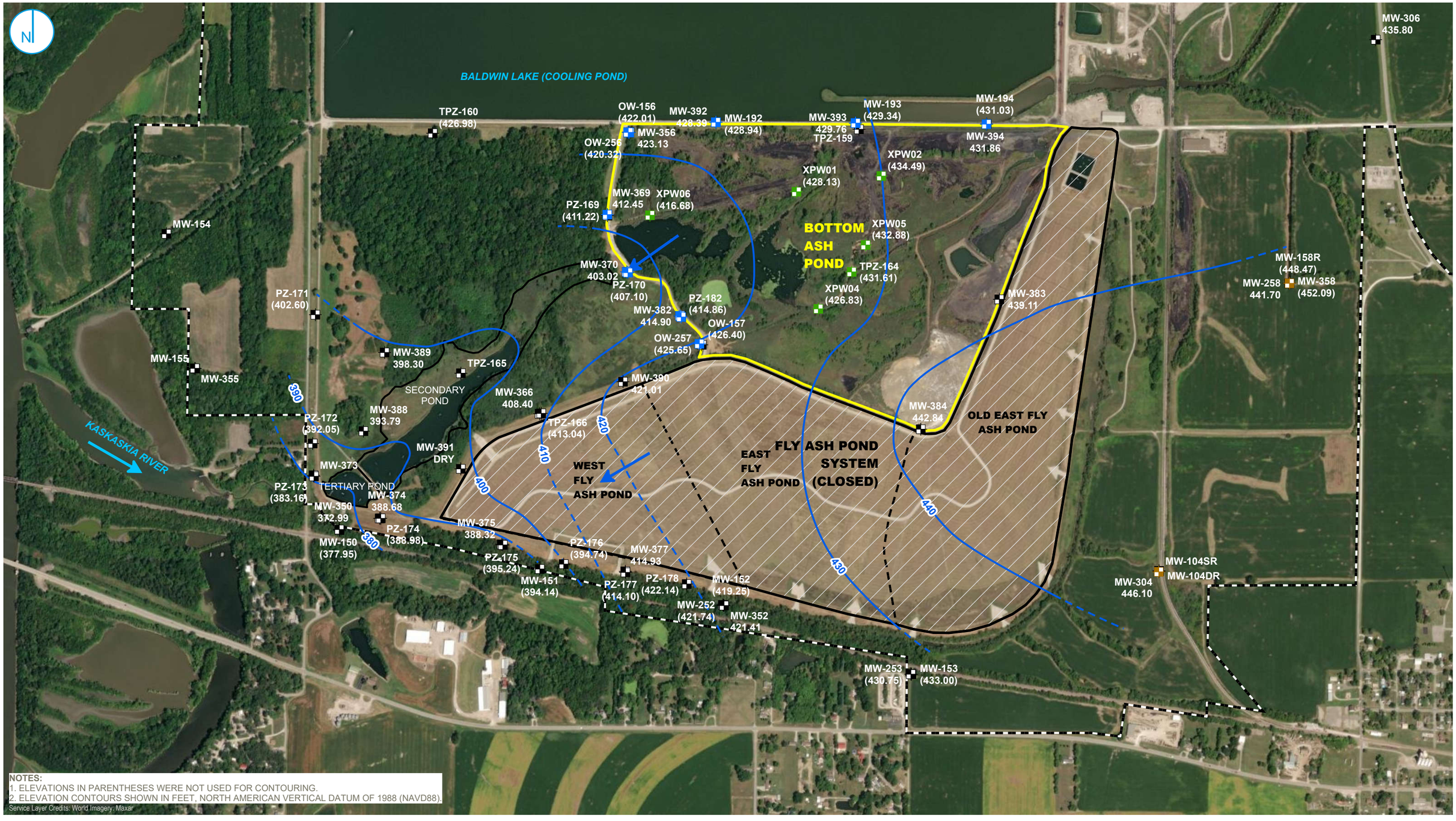
FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 3

Uppermost Aquifer Potentiometric Surface Map – April 15, 2024



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

Service Layer Credits: World Imagery: Maxar

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- MONITORING WELL
- PORE WATER WELL
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- FLY ASH POND SYSTEM (CLOSED)
- SITE FEATURE
- CAPPED AREA
- PROPERTY BOUNDARY

0 400 800 Feet

POTENTIOMETRIC SURFACE MAP
APRIL 15, 2024

2024 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
RAMBOLL

ATTACHMENT 4
Boring Logs

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		MW358

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	10/5/2022	10/8/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW358	Feet (NAVD88)	453.59 Feet (NAVD88)	6.0 inches

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

State Plane 556,726.26 N, 2,387,756.63 E E/W

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

Lat 38° 11' 42.9882"

Long -89° 50' 57.9018"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	180 97		1 2 3 4 5 6 7 8 9 10 11 12	0 - 3.8' **SILT:** ML, very dark grayish brown (10YR 3/2), organic material (0-10%), moist to wet. 2.1' dry. 3.8 - 8.9' **CLAYEY SILT:** ML/CL, light gray (10YR 7/2), very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/8) mottling (20-30%), dry. 8.9 - 13' **SILTY CLAY WITH SAND:** (CL/ML)S, grayish brown (10YR 5/2), strong brown (7.5YR 5/6) and very dark brown (10YR 2/2) mottling (20-30%), organic material (0-10%), low toughness, low to medium plasticity, stiff.	ML ML/CL (CL/ML)S										CS= Core Sample Measured Rock Quality Designation (RQD) was modified due to drilling methods, modified RQD equals the sum of recovered core sections greater than 4 inches in length divided by total core recovery.

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

Signature

Firm Ramboll
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Boring Number MW358 Page 2 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13		(CL/ML)S									
			13	13 - 17.8' **SILTY CLAY:** CL/ML, grayish brown (10YR 5/2), strong brown (7.5YR 5/6) and very dark brown (10YR 2/2) mottling (20-30%), low toughness, medium to high plasticity, stiff to very stiff.										
2 CS	60 60		15		CL/ML									
			16	16.1' mottling discontinues.										
			18	17.8 - 21' **SILTY CLAY WITH SAND:** (CL/ML)S, brown (10YR 5/3), strong brown (7.5YR 5/6) and gray (10YR 6/1) mottling (20-30%), gravel (5-15%), no dilatancy, high toughness, low to medium plasticity, hard, moist.	(CL/ML)S									
3 CS	48 36		20											
			21	21 - 26.5' **SHALE:** BDX (SH), dark gray (GLEY 1 4/N), weathered, thin bedding, moderately fractured.										
4 CORE	36 32		24	24' -25.2' wet.	BDX (SH)									RUN #4: Modified RQD = (21/32) = 66%
			26											
5 CORE	36 29		27	26.5 - 27.5' **LIMESTONE:** BDX (LS), dark gray (5Y 4/1), shaley, fossiliferous, very strong.	BDX (LS)									RUN #5: Modified RQD = (0/29) = 0%
			28	27.5 - 31.3' **SHALE:** BDX (SH), grayish black (N2), weathered, highly decomposed to residual soil, wet to moist.										
			29	29.3' thinly bedded, moderately decomposed.	BDX (SH)									
6 CORE	72 60		30	30' slightly decomposed to competent, moderately fractured.										RUN #6: Modified RQD = (45/60) = 75%
			31											
			32	31.3 - 32' **COAL:** COAL, black (N1).	COAL									

Boring Number MW358 Page 3 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	32 - 33' **SHALE:** BDX (SH), grayish black (N2), slightly decomposed to competent, moderately fractured, wet to moist.	BDX (SH)									
			34	33 - 36' **SHALEY LIMESTONE:** BDX (LS/SH), medium gray (N5), weathered, shaley, higly decomposed, slightly fractured.	BDX (LS/SH)									
			35											
7 CORE	72 71		36	36 - 40.8' **SHALEY LIMESTONE:** to **SHALE:** BDX (LS/SH), interbedded shale.										RUN #7: Modified RQD = (67/71) = 94%
			37											
			38		BDX (LS/SH)									
			39											
			40											
			41	40.8 - 42' **LIMESTONE:** BDX (LS), medium light gray (N6), strong to moderately fractured, slightly decomposed, narrow apertures.	BDX (LS)									
8 CORE	96 85		42	42 - 58.9' **SHALE:** BDX (SH), medium gray (N5) to medium dark gray (N4), weathered, weak, thinly bedded, moderately to highly fractured.										RUN #8: Modified RQD = (81/85) = 94%
			43											
			44											
			45											
			46											
			47		BDX (SH)									
			48	47.5' dark grayish brown (10YR 4/2), pale olive (5Y 6/4) discoloration, more competent.										
			49											
9 CORE	60 60		50	50.2' weak to moderate.										RUN #9: Modified RQD = (52/60) = 87%
			51	50.8' olive gray (5Y 5/2).										
			52											

Boring Number MW358 Page 4 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	42 - 58.9' **SHALE:** BDX (SH), medium gray (N5) to medium dark gray (N4), weathered, weak, thinly bedded, moderately to highly fractured. *(continued)* 52.2' dark grayish green (5GY 4/2).										
			54	54.1' medium dark gray (N4) to medium gray (N5), weak, highly decomposed, no visible bedding, dry.										
10 CORE	60 58		55		BDX (SH)									RUN #10: Modified RQD = (42/58) = 72%
			56	55.7' dark grayish green (5GY 4/2).										
			57	57.2' light brownish gray (10YR 6/2), thinly bedded, laminated.										
			58	58.2' medium dark gray (N4), strong, intensely fractured, thinly bedded.										
			59	58.9 - 64' **LIMESTONE:** BDX (LS), medium gray (N5), very strong, moderately fractured, visible laminations.										
11 CORE	36 31		60											RUN #11: Modified RQD = (8/31) = 26%
			61		BDX (LS)									
			62											
12 CORE	36 36		63											RUN #12: Modified RQD = (31/36) = 86%
			64	64 - 75.3' **SHALE:** BDX (SH), medium dark gray (N4) to medium gray (N5), strong, thinly bedded to laminated, moderately fractured. 64.3' grayish green (5GY 5/2), weathered, weak, decomposed.										
13 CORE	48 48		66											RUN #13: Modified RQD = (43/48) = 90%
			67											
			68		BDX (SH)									
			69											
			70	69.3' medium dark gray (N4), weathered, moderate strength.										
14 CORE	60 58		71											RUN# 14: Modified RQD = (57/58) = 99%
			72											

Boring Number MW358 Page 5 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	64 - 75.3' **SHALE:** BDX (SH), medium dark gray (N4) to medium gray (N5), strong, thinly bedded to laminated, moderately fractured. *(continued)*	BDX (SH)									
			74											
15 CORE	60 56		75											RUN #15: Modified RQD = Not Recorded
			76	75.3 - 77.1' **LIMESTONE:** BDX (LS), gray (5Y 6/1), fossiliferous, very strong.	BDX (LS)									
			77											
			78	77.1 - 78.2' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak to moderate strength, moderately decomposed.	BDX (SH)									
			79	78.2 - 84.8' **LIMESTONE:** BDX (LS), medium dark gray (N4) to medium gray (N5), shaley, fossiliferous, very strong, moderately fractured, laminations (0-5%).										
16 CORE	60 51		80											RUN #16: Modified RQD = (23/51) = 45%
			81											
			82		BDX (LS)									
			83											
			84											
			85	84.8 - 90' **SHALE:** BDX (SH), dark gray (N3), weathered, weak to moderate strength, moderately decomposed, moderately fractured, thin bedding.										
17 CORE	60 60		86											RUN #17: Modified RQD = (28/60) = 47%
			87											
			88		BDX (SH)									
			89											
			90	90' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		MW392

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	9/9/2022	9/26/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW392	Feet (NAVD88)	434.07 Feet (NAVD88)	6.0 inches

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

State Plane 558,140.20 N, 2,382,717.92 E E/W

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

Lat 38° 11' 57.132"

Long -89° 52' 0.9632"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 46		0	0 - 1.2' **FILL, WELL-GRADED GRAVEL WITH CLAY:** GW-GC, pinkish gray (7.5YR 6/2), angular, moist.	(FILL) GW-GC									CS= Core Sample Measured Rock Quality Designation (RQD) was modified due to drilling methods, modified RQD equals the sum of recovered core sections greater than 4 inches in length divided by total core recovery.
			1	1.2 - 16' **FILL, LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.										
			2											
			3											
			4											
			5											
			6		(FILL) CL									
			7											
			8											
			9											
2 CS	120 62		10											
			11											
			12											

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

Signature

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Boring Number MW392 Page 2 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	1.2 - 16' **FILL, LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist. *(continued)*	(FILL) CL									
			14											
			15											
			16	16 - 20' **LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.										
			17											
			18		CL									
			19											
3 CS	120 33		20	20 - 33' **LEAN CLAY:** CL, pinkish gray (7.5YR 6/2), sand (0-5%), medium to high plasticity, stiff, moist.										
			21											
			22											
			23											
			24											
			25											
			26		CL									
			27											
			28											
			29											
4 CS	120 104		30	30' increasing sand and gravel content.										
			31											
			32											

Boring Number MW392 Page 3 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	20 - 33' **LEAN CLAY:** CL, pinkish gray (7.5YR 6/2), sand (0-5%), medium to high plasticity, stiff, moist. *(continued)*	CL									
			34	33 - 35' **WELL-GRADED SAND WITH SILT AND GRAVEL:** (SW-SM)g, fine to medium sand, dry.	(SW-SM)g									
			35	35 - 36.5' **SANDY SILT WITH GRAVEL:** s(ML)g, light yellowish brown (10YR 6/4), dry.	s(ML)g									
			36											
			37	36.5 - 39' **CLAYEY SILT:** ML/CL, gray (7.5YR 5/1), sand (5-10%), coal (0-5%), gravel (0-5%), dry.	ML/CL									
			38											
			39	39 - 40' **SILTY CLAY:** CL/ML, sand (0-5%), low to medium plasticity, stiff.	CL/ML									
5 CS	120 108		40	40 - 48' **SILT WITH SAND:** (ML)s, light brownish gray (10YR 6/2), dry.										
			41											
			42											
			43											
			44	44' increasing clay content.	(ML)s									
			45	45' (2.5Y 6/2).										
			46											
			47											
			48	48 - 52' **SILT:** ML, gray (2.5Y 5/1), sand (0-5%), dry.										
			49											
6 CS	84 81		50		ML									
			51											
			52											

Boring Number MW392 Page 4 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			52	52 - 57' **SHALE:** BDX (SH), dark gray (5Y 4/1), highly weathered, hard, dry.										
			53	53' very dark gray (7.5YR 3/1).										
			54											
			55		BDX (SH)									
			56											
			57											
7 CORE	60 4			57 - 57.5' **LIMESTONE:** BDX (LS), gray (5Y 6/1), slightly fractured.	BDX (LS)									RUN #7: Modified RQD = 0% (No Solid Recovery > 4")
			58	57.5 - 70' **SHALE:** BDX (SH), dark gray (5Y 4/1), weathered, soft, moderately fractured to highly fractured limestone beds (0-5%).										
			59											
			60											
			61											
8 CORE	96 78		62											RUN #8: Modified RQD = (28/78) = 36%
			63											
			64		BDX (SH)									
			65											
			66											
			67	66.3' - 67.2' highly fractured, very soft, wet.										
			68											
			69											
			70											
9 CORE	120 62		71	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures.	BDX (LS)									RUN #9: Modified RQD = (28/78) = 36%
			72											

Boring Number MW392 Page 5 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures. *(continued)*	BDX (LS)									
			74											
			75	74.4 - 81.8' **SHALE:** BDX (SH), medium dark gray (N4) to dark gray (N3), slightly weathered, moderately fractured, thinly bedded.	BDX (SH)									
			76											
			77											
			78											
			79											
10 CORE	48 48		80											RUN #10: Modified RQD = (28/48) = 58%
			81											
			82	81.8 - 84' **LIMESTONE:** BDX (LS), medium light gray (N6), shaley, fossiliferous, moderately fractured, thinly bedded.	BDX (LS)									
			83	83.2' medium gray (N5).										
			84	84' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		MW393

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	9/9/2022	10/4/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW393	Feet (NAVD88)	434.59 Feet (NAVD88)	6.0 inches

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

State Plane 558,133.57 N, 2,383,944.49 E E/W

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

Lat 38° 11' 57.027"

Long -89° 51' 45.5976"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 86		0	0 - 1' **FILL, WELL-GRADED GRAVEL:** GW, pinkish gray (7.5YR 6/2), angular, moist.	(FILL) GW									CS= Core Sample
			1	1 - 20' **FILL, LEAN CLAY:** CL, brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.	(FILL) CL									Measured Rock Quality Designation (RQD) was modified due to drilling methods, modified RQD equals the sum of recovered core sections greater than 4 inches in length divided by total core recovery.
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
2 CS	120 120		10	10' sand (0-5%), iron concretions (0-5%).										
			11											
			12											

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

Signature

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Boring Number MW393 Page 2 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	1 - 20' **FILL, LEAN CLAY:** CL, brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist. *(continued)*										
			14											
			15											
			16		(FILL) CL									
			17											
			18	18' medium to high plasticity.										
			19											
3 CS	120 120		20	20 - 24' **LEAN CLAY:** CL, light brown (7.5YR 6/4), mottling, sand (0-5%), medium to high plasticity, cohesive, moist.										
			21											
			22		CL									
			23											
			24	24 - 27' **CLAYEY SAND:** SC, gray (10YR 6/1), fine to medium sand, wet.										
			25											
			26		SC									
			27	27 - 31' **SILT WITH SAND:** (ML)s, dark gray (7.5YR 4/1), sand (0-5%), moist.										
			28											
			29		(ML)s									
4 CS	120 105		30	30' coal fragments (0-5%).										
			31	31 - 40' **SILTY CLAY:** CL/ML, dark gray (7.5Y 4/1), organic material (0-5%), gravel (0-5%), stiff to very stiff, moist.										
			32		CL/ML									

Boring Number MW393 Page 3 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	31 - 40' **SILTY CLAY:** CL/ML, dark gray (7.5Y 4/1), organic material (0-5%), gravel (0-5%), stiff to very stiff, moist. *(continued)*	CL/ML									
			34											
			35											
			36											
			37											
			38											
			39											
5 CS	120 120		40	40 - 50' **SILT:** ML, grayish brown (2.5Y 5/2), very stiff to hard, platy, dry.	ML									
			41											
			42											
			43											
			44											
			45											
			46											
			47											
			48											
			49											
6 CS	120 92		50	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry.	ML									
			51											
			52											

Boring Number MW393 Page 4 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			50	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry. *(continued)*	ML									
			55	55 - 57' **CLAYEY SILT:** ML/CL, gray (10YR 6/1), sand (0-5%), gravel (0-5%), medium plasticity, moist.	ML/CL									
			57	57 - 60' **LIMESTONE:** BDX (LS), gray (10YR 6/1), rock flour and angular chips (<2").	BDX (LS)									
7 CORE	120 60		60	60 - 70' **SHALE:** BDX (SH), medium gray (N5), weathered, very weak, residual soil, soft, slightly fractured.	BDX (SH)									RUN #7: Modified RQD = (31/60) = 52%
8 CORE	42 40		70	70 - 73.5' **LIMESTONE:** BDX (LS), medium dark gray (N4), weathered, shaley, thinly bedded, moderately fractured.	BDX (LS)									RUN #8: Modified RQD = (32/40) = 80%
			72											

Boring Number MW393 Page 5 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	70 - 73.5' **LIMESTONE:** BDX (LS), medium dark gray (N4), weathered, shaley, thinly bedded, moderately fractured. *(continued)* 72' medium gray (N5).	BDX (LS)									
9 CORE	78 40		74	73.5 - 85' **SHALE:** BDX (SH), medium gray (N5), weathered, moderately to slightly fractured, thinly laminated.										RUN #9: Modified RQD = (30/40) = 75%
			75											
			76											
			77											
			78											
			79		BDX (SH)									
10 CORE	60 45		80											RUN #10: Modified RQD = (34/45) = 76%
			81											
			82											
			83											
			84	83.5' more competent.										
			85	85' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		MW394

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	9/25/2022	10/5/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW394	Feet (NAVD88)	435.51 Feet (NAVD88)	6.0 inches

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

State Plane 558,123.63 N, 2,385,095.76 E E/W

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

Lat 38° 11' 56.8911"

Long -89° 51' 31.1756"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	72 / 67		0	0 - 2.6' **FILL, WELL-GRADED GRAVEL WITH CLAY:** GW-GC, brown (10YR 4/3), angular, moist.	(FILL) GW-GC									CS= Core Sample Measured Rock Quality Designation (RQD) was modified due to drilling methods, modified RQD equals the sum of recovered core sections greater than 4 inches in length divided by total core recovery.
			1											
			2											
			3	2.6 - 20' **LEAN CLAY:** CL, brown (10YR 5/3), reddish brown bottling (20%), sand (0-5%), low to medium plasticity, very stiff to hard, moist.					4					
			4											
			5						4					
2 CS	120 / 120		6											
			7		CL				2.5					
			8						3.5					
			9						2					
				9.2' brown (7.5YR 5/3), medium to high plasticity.										
			10						2					
			11						3					
			12						2.25					

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

Boring Number MW394 Page 2 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	2.6 - 20' **LEAN CLAY:** CL, brown (10YR 5/3), reddish brown bottling (20%), sand (0-5%), low to medium plasticity, very stiff to hard, moist. *(continued)*					2.25					
			14	14' low to medium plasticity.										
			15						2.5					
3 CS	120 120		16		CL									
			17	16.5' increasing sand and gravel content, gray (GLEY 1 5/1) iron concretions (50%).										
			18											
			19											
			20	20 - 22.1' **SILTY SAND:** SM, yellowish brown (10YR 5/6), fine sand, clay (0-5%), moist.										
			21		SM									
			22	22.1 - 36.8' **LEAN CLAY:** CL, dark yellowish brown (10YR 4/4), greenish gray (GLEY 1 5/10Y) and yellowish brown (10YR 5/6) mottling, sand (0-5%), medium to high plasticity, hard, moist.					4.5					
			23											
			24						4.5					
			25											
			26						4.5					
4 CS	120 112		27		CL				4.5					
			28						4.5					
			29						4.5					
			30						4.5					
			31						4.5					
			32						4.5					

Boring Number MW394 Page 3 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	22.1 - 36.8' **LEAN CLAY:** CL, dark yellowish brown (10YR 4/4), greenish gray (GLEY 1 5/10Y) and yellowish brown (10YR 5/6) mottling, sand (0-5%), medium to high plasticity, hard, moist. *(continued)*					3.75					
			34						4.25					
			35	34.4' olive yellow (5Y 6/6), low to medium plasticity.	CL				4.5					
5 CS	120 113		36											
			37	36.8 - 48' **Weathered SHALE Bedrock:** BDX (SH), pale olive (5Y 6/3), weathered, argillaceous, fissile, moist.										
			38											
			39											
			40	40' olive gray (5Y 5/2).										
			41											
			42		BDX (SH)									
			43											
			44											
			45											
6 CS	96 96		46											
			47											
			48	48 - 58' **LIMESTONE:** to **SHALE:** BDX (LS), olive gray (5Y 4/2), interbedded limestone and shale, fissile.										
			49											
			50	50' - 50.2' limestone, very strong.	BDX (LS)									
			51											
			52											

Boring Number MW394 Page 4 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	48 - 58' **LIMESTONE:** to **SHALE:** BDX (LS), olive gray (5Y 4/2), interbedded limestone and shale, fissile. *(continued)*										
7 CS	48 48		54	53.7' - 53.9' limestone, very strong. 54' - 55.6' dark gray (10YR 4/1) to gray (10YR 5/1), more competent.										
			55		BDX (LS)									
			56	55.6' gray (10YR 6/1) to dark gray (10YR 4/1), more competent.										
			57											
8 CORE	18 14		58	58 - 59.7' **LIMESTONE:** BDX (LS), medium gray (N5), shaley, laminated, moderately fractured.										RUN #8: Modified RQD = (4/14) = 29%
			59		BDX (LS)									
9 CORE	60 60		60	59.7 - 68' **SHALE:** BDX (SH), medium dark gray (N4), weathered, very weak to weak, thinly bedded, moderately fractured.										RUN #9: Modified RQD = (48/60) = 80%
			61											
			62											
			63											
			64		BDX (SH)									
10 CORE	57 56		65	64.5 - 67.2' highly decomposed, weathered, wet.										RUN #10: Modified RQD = Not Recorded
			66											
			67											
			68	68 - 68.4' **LIMESTONE:** BDX (LS), light olive gray (5Y 6/2) to olive gray (5/2).	BDX (LS)									
			69	68.4 - 70.8' **SHALE:** BDX (SH), medium dark gray (N4), weathered, very weak to weak, thinly bedded, moderately fractured.										
11 CORE	68 68		70		BDX (SH)									RUN #11: Modified RQD = (42/68) = 62%
			71	70.8 - 71' **LIMESTONE:** BDX (LS), dark gray (N3), shaley.	BDX (LS)									
			72	71 - 77.6' **SHALE:** BDX (SH), dark gray (N3),										

Boring Number MW394 Page 5 of 5

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	strong, thinly bedded, moderately fractured. 71 - 77.6' **SHALE:** BDX (SH), dark gray (N3), strong, thinly bedded, moderately fractured. *(continued)*										
			74											
12 CORE	60 59		75		BDX (SH)									RUN #12: Modified RQD = (44/59) = 75%
			76											
			77											
			78	77.6 - 80' **LIMESTONE:** BDX (LS), medium gray (N5), shaley, weak, moderately fractured.										
			79		BDX (LS)									
13 CORE	60 48		80	80 - 85' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak, thinly bedded, moderately fractured, moist to wet.										RUN #13: Modified RQD = (40/48) = 83%
			81											
			82											
			83		BDX (SH)									
			84											
			85	85' End of Boring.										

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-370

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Mark Baetje Bulldog Drilling	11/20/2015	11/24/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-370	Feet (NAVD88)	418.67 Feet (NAVD88)	8.3 inches

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

State Plane 556,826.50 N, 2,381,936.14 E E/Ⓦ

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

Lat 38° 11' 44.1702"

Long -89° 52' 10.8084"

Local Grid Location ☐N ☐S Feet ☐E ☐W Feet

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			1	0 - 2' **SILTY CLAY** CL/ML.	CL/ML								0-28' Blind Drilled. See log PZ-170 for soil description.
			2	2 - 4' Shelby Tube Sample.									
			4	4 - 8' **SILTY CLAY** CL/ML.	CL/ML								
			8	8 - 10' **SILTY CLAY** to **LEAN CLAY:** CL/ML.	CL/ML								
			10	10 - 12' **LEAN CLAY:** CL.	CL								
			12										

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

Signature

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

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12	12 - 14' Shelby Tube Sample.									
			14	14 - 24' **SILTY CLAY** CL/ML.	CL/ML								
			24	24 - 26' Shelby Tube Sample.									
			26	26 - 28' **SILTY CLAY** CL/ML.	CL/ML								
1 SS	10 10	23 50/4"	28	28 - 28.4' **LEAN CLAY:** CL, yellowish brown (10YR 5/4), trace angular limestone gravel, soft, medium plasticity, moist.	CL								
1 CORE	60 18.5		29	28.4 - 28.9' **SHALE:** BDX (SH), gray, highly decomposed, very weak.	BDX (SH)								Core 1, RQD=51%
			30	28.9 - 38.1' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to moderately narrow apertures), medium to thickly bedded, microcrystalline, moderately decomposed, very strong.	BDX (LS/SH)								
			31										
			32										

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			33	28.9 - 38.1' **SHALEY LIMESTONE**: BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to moderately narrow apertures), medium to thickly bedded, microcrystalline, moderately decomposed, very strong. *(continued)*										
2 CORE	51.5 12		34	33.9' - 38.1' gray, greenish gray in fractures, trace fossils, moderately to highly decomposed, slightly to moderately disintegrated, clay in shoe with a hard, reddish brown inclusion.									Core 2, RQD=0%
			35		BDX (LS/SH)								
			36	36' - 37.9' vertical fracture.									
			37										
			38										
3 CORE	24 25		39	38.1 - 44' **SHALE**: BDX (SH), bluish gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 3, RQD=40%
			40										
4 CORE	24 11		41	40.6' - 40.8 shaley limestone layer, light gray to gray, microcrystalline, moderately decomposed, very strong.	BDX (SH)								Core 4, RQD=0%
5 CORE	36 32		42	41.1' - 43.2 gray, moderately to highly decomposed.									Core 5, RQD=78%
			43										
			44										
6 CORE	12 28		45	44 - 45.7' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to narrow apertures), thin to medium bedded, microcrystalline, slightly decomposed, clay cement in apertures, very strong.	BDX (LS/SH)								Core 6, RQD=29%
7 CORE	45 27		46	45' shale layer, bluish gray, moderately fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 7, RQD=65%
			47	45.7 - 52.2' **SHALE:** BDX (SH), bluish gray, moderately fractured (tight to narrow), highly decomposed, weak.									
			48										
			49		BDX (SH)								
8 CORE	24 30		50										Core 8, RQD=78%
			51										
9 CORE	24 24		52										Core 9, RQD=0%

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				52' clay cement.									
10 CORE	24 36		53	52.2 - 61.7' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (very narrow to narrow), thin to medium bedded, microcrystalline, slightly decomposed, cemented clay in apertures, very strong.									Core 10, RQD=0%
			54	52.7' - 53' clayey sand in aperture. 53' - 53.1 shale bed, bluish gray, fossiliferous, moderately fractured (very narrow to narrow), highly decomposed, weak.									
			55	53.1' white to bluish gray, gray in the fractures (extremely narrow to moderately narrow apertures), thinly to medium bedded, slightly to moderately disintegrated.									
11 CORE	24 30		56	55.7' moderately disintegrated.									Core 11, RQD=18%
			57		BDX (LS/SH)								
			58										
12 CORE	30 27			58.1' highly decomposed.									Core 12, RQD=39%
			59										
			60										
13 CORE	36 53		61										Core 13, RQD=89%
			62	61.7 - 65.3' **LIMESTONE:** BDX (LS).									
			63										
					BDX (LS)								
			64										
			65										
				65.3 - 66' Overdrilled for Well Installation.									
			66	66' End of Boring.									Bedrock corehole reamed 6" in diameter to 66' for well installation.

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		PZ-170

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Chad Dutton Bulldog Drilling	7/29/2015	7/29/2015	hollow stem auger

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
PZ-170	Feet (NAVD88)	418.58 Feet (NAVD88)	8.3 inches

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

State Plane 556,822.69 N, 2,381,944.92 E E/Ⓦ

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

Lat 38° 11' 44.106"

Long -89° 52' 10.6752"

Local Grid Location ☐N ☐S Feet ☐E ☐W Feet

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 8	4 5 6 9	1	0 - 2' **SILTY CLAY** CL/ML, yellowish brown (10YR 5/6), trace brown (10YR 5/3) and very dark brown (10YR 2/2) mottling, silt (15-25%), trace roots, grass, gravel, and coarse sand, cohesive, nonplastic to low plasticity, hard (>4.5 tsf), dry.	CL/ML								
2 ST	24 21		2 3 4	2 - 4' Shelby Tube Sample.									ST2: 24" push at 500lbs of pressure.
3 SS	24 15	2 3 5 7	5	4 - 8' **SILTY CLAY** CL/ML, yellowish brown (10YR 5/6), trace brown (10YR 5/3) and very dark brown (10YR 2/2) mottling, silt (5-15%), trace very fine sand and gravel, low plasticity, very stiff to hard (2.5->4.5 tsf), dry.									
4 SS	24 17	3 5 8 8	6 7 8	6' - 7.4' trace gray (10YR 5/1) mottling.	CL/ML								
5 SS	24 17	3 4 6 6	9	8 - 10' **SILTY CLAY** to **LEAN CLAY:** CL/ML, yellowish brown (10YR 5/6), trace brown (10YR 5/3) and very dark brown (10YR 2/2) mottling, silt (5-15%), trace very fine sand and gravel, silt content decreases with depth, clay content increases with depth, medium plasticity, very stiff (3.25 tsf), dry.	CL/ML								
6 SS	24 20	3 4 5 5	10 11	10 - 12' **LEAN CLAY:** CL, brown (5YR 4/3), trace very dark brown (10YR 2/2) mottling, trace silt, silt content increasing with depth, medium to high plasticity, stiff (1.75-2.0 tsf).	CL								ST7: 24" push at 250lbs of pressure.
7 ST	24 24		12 13	12 - 14' Shelby Tube Sample.									

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

Signature

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

NATURAL RESOURCE TECHNOLOGY

Boring Number PZ-170

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			14	12 - 14' Shelby Tube Sample. *(continued)*									
8 SS	24 21	3 5 7 8	15	14 - 24' **SILTY CLAY** CL/ML, yellowish brown (10YR 5/6), trace brown (10YR 5/3) and very dark brown (10YR 2/2) mottling, silt (10-20%), trace gravel, cohesive, low plasticity, stiff to very stiff (1.0-3.0 tsf), dry to moist. 14.9' - 15.3' very dark brown (10YR 2/2) mottling.									
9 SS	24 24	2 4 4 6	16	16' - 18.5' increaed very dark brown (10YR 2/2) mottling (5-15%), very fine sand (0-10%), trace fine gravel, subangular, cohesive, low to medium plasticity, dry to moist. 16.8' - 17.1' very dark brown (10YR 2/2) mottling.									
10 SS	24 24	1 3 3 3	17										
			18	18' - 20' silt (15-25%), very fine sand (0-10%), trace fine gravel, medium plasticity, moist.									
			19	19' layer of gravel (2" thick, subangular to subrounded).	CL/ML								
11 SS	24 20	1 2 5 7	20	19.8' very soft (0.25 tsf). 20' - 24' subangular to subrounded gravel, low plasticity, dry to moist.									
			21	20.8' increased gravel content (10-15%). 21.2' decrease in gravel content (5-15%).									
12 SS	24 20.5	3 6 8 10	22										
			23										
13 ST	24 24		24	24 - 26' Shelby Tube Sample.									ST13: 24" push at 650lbs of pressure.
			25										
14 SS	24 22	3 6 12 14	26	26 - 28.2' **SILTY CLAY** CL/ML, yellowish brown (10YR 5/6), trace brown (10YR 5/3) and very dark brown (10YR 2/2) mottling, silt (10-30%), very fine sand (0-15%), trace fine subangular to subrounded gravel, gravel decreases with depth to no gravel, trace <1mm thick very fine sand seams, cohesive, low to medium plasticity, plasticity increasing with depth, very stiff to hard (2.0->4.5 tsf), moist, decreasing silt and sand content with depth.	CL/ML								
15 SS	24 22	9 17 24 35	27										
			28										
			29	28.2 - 30' **LEAN CLAY:** CL, very dark gray (2.5Y 3/1), trace silt, cohesive, medium to high plasticity, hard (>4.5 tsf), dry. 28.5' black (2.5Y 2.5/1). 28.9' greenish gray (GLEY 1 6/1).	CL								
16 SS	17 13	11 30 50 for 5"	30	30 - 31.1' **SHALE:** to **LEAN CLAY:** BDX (SH), greenish gray (GLEY 1 6/1), trace silt, cohesive, medium to high plasticity, dry, shale (residual soil to highly decomposed, very weak, fissile).	BDX (SH)								
			31	31.1' End of Boring.									Hollow Stem Auger Refusal at 31.1 ft bgs on Shale Bedrock.

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Energy Complex	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: MW-370
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 44.170" Long. -89° 52' 10.808" or	
Facility ID	St. Plane 556,826.50 ft. N, 2,381,936.14 ft. E. E/Ⓦ	Date Well Installed: 11/25/2015
Type of Well: mw	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Mark Baetje; Bulldog Drilling
Distance from Waste/Source: ft. / State: Illinois	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	Gov. Lot Number:

A. Protective pipe, top elevation ____ ft. (NAVD88)

B. Well casing, top elevation 420.85 ft. (NAVD88)

C. Land surface elevation 418.67 ft. (NAVD88)

D. Surface seal, bottom 417.7 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

17. Source of water (attach analysis, if required):
Village of Baldwin

E. Bentonite seal, top 389.7 ft. (NAVD88) or 29.0 ft.

F. Fine sand, top ____ ft. (NAVD88) or ____ ft.

G. Filter pack, top 367.7 ft. (NAVD88) or 51.0 ft.

H. Screen joint, top 365.7 ft. (NAVD88) or 53.0 ft.

I. Well bottom 355.7 ft. (NAVD88) or 63.0 ft.

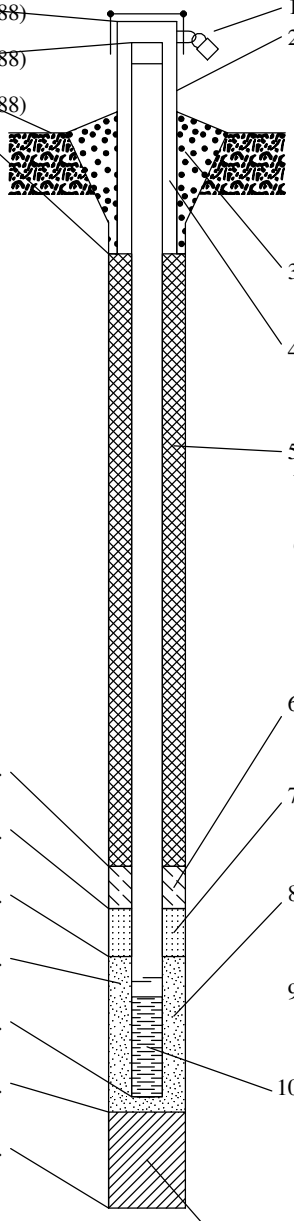
J. Filter pack, bottom 355.2 ft. (NAVD88) or 63.5 ft.

K. Borehole, bottom 352.7 ft. (NAVD88) or 66.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 4.0 in.
   b. Length: 5.0 ft.
   c. Material: Steel ☒ / Other ☐
   d. Additional protection? ☒ Yes ☐ No
   If yes, describe: Three steel bollards
3. Surface seal: Bentonite ☐ / Concrete ☒ / Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ / Sand / Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☐
   b. ____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight . . . Bentonite slurry ☐
   d. 30 % Bentonite . . . Bentonite-cement grout ☒
   e. ____ Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ / Tremie pumped ☒ / Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
   c. ____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. ____
   b. Volume added ____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   a. Unimin Corporation, FILTERSIL
   b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ / Flush threaded PVC schedule 80 ☐ / ____ Other ☐
10. Screen material: Schedule 40 PVC
    a. Screen Type: Factory cut ☒ / Continuous slot ☐ / ____ Other ☐
    b. Manufacturer ____
    c. Slot size: 0.010 in.
    d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐
    2.1' of bentonite chips, 0.4' of bedrock drill cuttings Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 2/26/2016

Signature: Brad Rueter

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

KELRON ENVIRONMENTAL
Incorporated

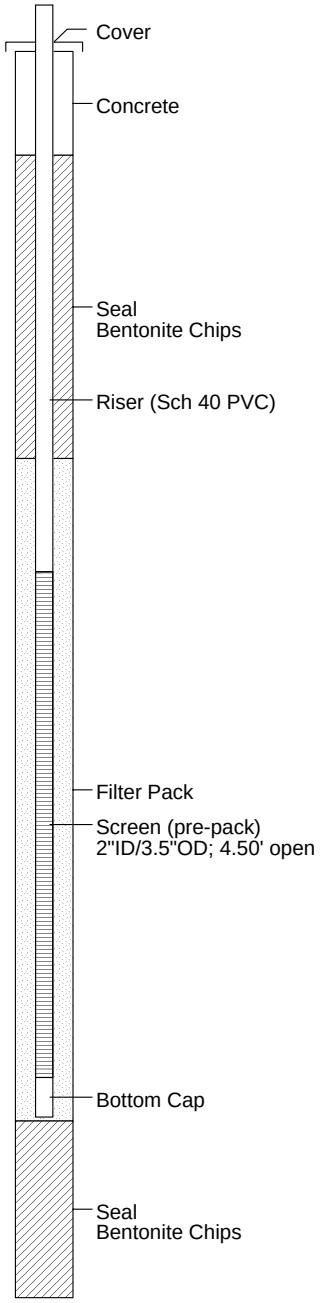
LOG OF PROBEHOLE TPZ-164

Phase II Hydrogeologic Investigation
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.

Date Completed	: 08/26/2013	Driller	: John Gates
Hole Diameter	: 8 1/2" OD / 4 1/4" ID	Geologist	: Stuart Cravens (Kelron)
Drilling Method	: HSA (CME-55LC)	Ground Elevation	: 432.50
Sampling Method	: Split Spoon / Shelby Tube	Casing (MP) Elevation	: 435.10
Drilling Company	: Bulldog Drilling, LLC	X,Y Coordinates	: 2383909, 556829

Depth in Feet	DESCRIPTION	Surf. Elev. 432.50	Samples	Blow Count	Recovery inches	Qp TSF	USCS	GRAPHIC
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry							
1								
2								
		430						
3	- moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay							
		429						
4			1		17/24		AR	
	- wet	428						
5								
		427						
6								
		426						
7								
		425						
8								
		424						
9	CLAY (lean), stiff, medium to high plasticity, dark gray (10YR 4/1), moist - @8.9' - light yellowish brown (10YR 6/4) with <10% light gray mottling - @9.3' - gray (10YR 6/1) with 25-50% brownish-yellow mottling (10YR 6/6)		2	3 3 5	18/18		CL	
		423						
10								
	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422						
11			3		23/24		CL	
		421						
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS							
		420						
		419						

Well: TPZ-164
Elev.: 435.10



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KELRON ENVIRONMENTAL
Incorporated

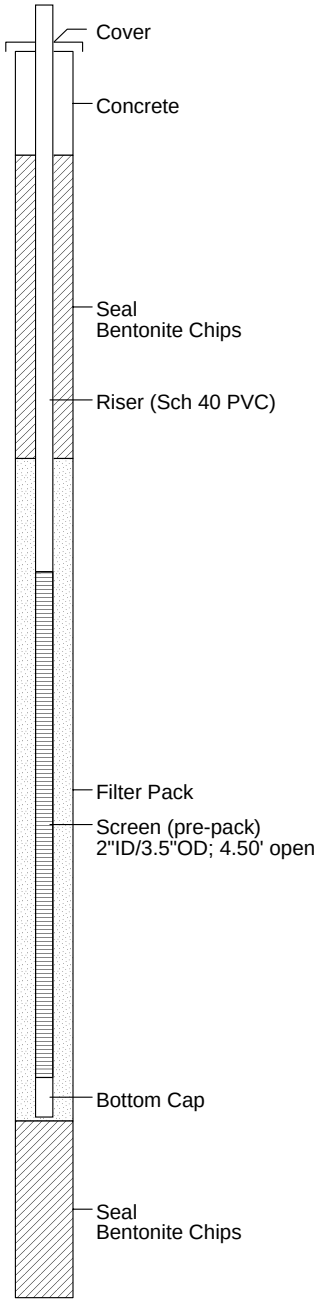
LOG OF PROBEHOLE TPZ-164

Phase II Hydrogeologic Investigation
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.

Date Completed	: 08/26/2013	Driller	: John Gates
Hole Diameter	: 8 1/2" OD / 4 1/4" ID	Geologist	: Stuart Cravens (Kelron)
Drilling Method	: HSA (CME-55LC)	Ground Elevation	: 432.50
Sampling Method	: Split Spoon / Shelby Tube	Casing (MP) Elevation	: 435.10
Drilling Company	: Bulldog Drilling, LLC	X,Y Coordinates	: 2383909, 556829

Depth in Feet	DESCRIPTION	Surf. Elev. 432.50	Samples	Blow Count	Recovery inches	Qp TSF	USCS	GRAPHIC
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry							
1								
2								
		430						
3	- moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay							
		429						
4			1		17/24		AR	
	- wet	428						
5								
		427						
6								
		426						
7								
		425						
8								
		424						
9	CLAY (lean), stiff, medium to high plasticity, dark gray (10YR 4/1), moist - @8.9' - light yellowish brown (10YR 6/4) with <10% light gray mottling - @9.3' - gray (10YR 6/1) with 25-50% brownish-yellow mottling (10YR 6/6)		2	3 3 5	18/18		CL	
		423						
10								
	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422						
11			3		23/24		CL	
		421						
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS							
		420						
		419						

Well: TPZ-164
Elev.: 435.10



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RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		XPW01

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Arlen Little Cascade Drilling	9/23/2022	9/23/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
XPW01	Feet (NAVD88)	435.12 Feet (NAVD88)	6.0 inches

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

State Plane 557,530.38 N, 2,383,427.03 E E/W

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

Lat 38° 11' 51.0807"

Long -89° 51' 52.1047"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 45		0	0 - 0.5' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, organic material (5-10%), loose, wet.	(FILL) SM									CS= Core Sample
			1	0.5 - 1.5' **FILL, SILTY CLAY:** CL/ML, medium to high plasticity, stiff.	(FILL) CL/ML				1					
			2	1.5 - 3.2' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, wet.	(FILL) SM									
			3	3.2 - 4.1' **FILL, SILTY CLAY:** CL/ML, gray (10YR 5/1), medium plasticity, soft, moist.	(FILL) CL/ML				0.5					
			4	4.1 - 11' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, wet.										
			5	5.4' very dark gray.										
			6											
			7		(FILL) SM									
			8											
			9											
2 CS	48 30		10											
			11	11 - 11.9' **FILL, ASH (Coal):** SW-SM, black (10YR 2/1), silt to sand-sized ash, wet.	(FILL) SW-SM									
			12											

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
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Fax: (414)837-3608

Boring Number XPW01 Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	11.9 - 14' **SILTY CLAY:** CL/ML, dark grayish brown (10YR 4/2), yellowish brown to gray (10YR 5/1) mottling (10-20%), medium to high plasticity, very stiff, moist. *(continued)*	CL/ML				2.75					
			14	14' End of Boring.					3					

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		XPW02

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Arlen Little Cascade Drilling	9/24/2022	9/24/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
XPW02	Feet (NAVD88)	434.86 Feet (NAVD88)	6.0 inches

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

State Plane 557,667.96 N, 2,384,171.76 E E/W

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

Lat 38° 11' 52.4167"

Long -89° 51' 42.7697"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 120		0	0 - 9.5' **FILL, ASH (Coal):** SM, greenish black (GLEY 1 2.5/1), silt to sand-sized ash, gravel (0-5%), loose, moist.	(FILL) SM									CS=Core Sample
			1											
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
2 CS	48 48		10	9.5 - 11' **FILL, ASH (Coal):** SW-SM, reddish black (2.5YR 2.5/1), silt to sand-sized ash, silt (5-15%), moist to wet.	(FILL) SW-SM									
			11	11 - 14' **SILTY CLAY:** CL/ML, dark greenish gray (GLEY 1 4/1), medium to high plasticity, stiff to very stiff, moist.	CL/ML				1.25					
			12											

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
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Fax: (414)837-3608

Boring Number XPW02 Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	11 - 14' **SILTY CLAY:** CL/ML, dark greenish gray (GLEY 1 4/1), medium to high plasticity, stiff to very stiff, moist. *(continued)* 13' yellowish brown (10YR 5/4).	CL/ML				2.5 2					
			14	14' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		XPW04

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	9/24/2022	9/24/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
XPW04	Feet (NAVD88)	430.59 Feet (NAVD88)	6.0 inches

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

State Plane 556,502.51 N, 2,383,618.45 E E/W

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

Lat 38° 11' 40.9132"

Long -89° 51' 49.7489"

Local Grid Location: Feet ☐ N ☐ S, Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 85		0	0 - 6' **FILL, ASH (Coal):** SM, black (10YR 2/1) to very dark gray (10YR 3/1), silt to sand-sized ash, clay (5-15%), gravel (0-5%), wood (0-5%), moist.	(FILL) SM									CS=Core Sample
			6	6 - 16.5' **FILL, ASH (Coal):** SW, black (10YR 2/1), sand-sized ash, silt (10-20%), clay (0-5%), loose, wet.	(FILL) SW									
2 CS	60 60		10											
			12											

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
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Boring Number XPW04 Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	6 - 16.5' **FILL, ASH (Coal):** SW, black (10YR 2/1), sand-sized ash, silt (10-20%), clay (0-5%), loose, wet. *(continued)*	(FILL) SW									
			14											
3 CS	60 50.4		15	15' interbedded silty clay.										
			16											
			17	16.5 - 20' **SILTY CLAY:** CL/ML, greenish gray (GLEY 1 6/1), yellowish brown mottling (10%), sand (0-5%), medium to high plasticity, very stiff, moist.	CL/ML				2.75					
			18						3.25					
			19						3.5					
			20	20' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		XPW05

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Blake Weller Cascade Drilling	9/24/2022	9/24/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
XPW05	Feet (NAVD88)	434.12 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 557,062.95 N, 2,384,034.20 E E/W
1/4 of 1/4 of Section , T N, R
Lat 38° 11' 46.4401"
Long -89° 51' 44.5179"
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 55		0	0 - 21.9' **ASH (Coal):** (SW)g, black (10YR 2/1) to very dark gray (10YR 3/1), sand-sized ash, silt (5-15%), clay (0-5%), organic material (0-5%), loose, moist.	(SW)g									
			1											
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
2 CS	120 88		10											
			11											
			12											

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

Boring Number XPW05 Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	0 - 21.9' **ASH (Coal):** (SW)g, black (10YR 2/1) to very dark gray (10YR 3/1), sand-sized ash, silt (5-15%), clay (0-5%), organic material (0-5%), loose, moist. *(continued)*										
			14											
			15	15' saturated.										
			16											
			17		(SW)g									
			18											
			19											
3 CS	120 120		20											
			21											
			22	21.9 - 24.5' **ASH (Coal):** ML, dark gray (10YR 4/1) to dark grayish brown (10YR 4/2), silt-sized ash, clay (5-15%), sand (0-5%), non-plastic, wet.										
			23		ML									
			24											
			25	24.5 - 28.2' **ASH (Coal):** (SW)g, black (10YR 2/1), sand-sized ash, silt (5-15%), loose, wet.										
			26		(SW)g									
			27											
			28											
			29	28.2 - 30' **SILTY CLAY:** CL/ML, gray (10YR 5/1), light yellowish brown (10YR 6/4) mottling, sand (0-5%), very stiff to hard, medium plasticity, moist.	CL/ML				3.5					
			30	30' End of Boring.					4.5					

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Power Plant		XPW06

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Arlen Little Cascade Drilling	9/22/2022	9/22/2022	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
XPW06	Feet (NAVD88)	418.06 Feet (NAVD88)	6.0 inches

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

State Plane 557,323.97 N, 2,382,140.04 E E/W

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

Lat 38° 11' 49.0814"

Long -89° 52' 8.2353"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	IL	Baldwin

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	72 72		0	0 - 5' **FILL, ASH (Coal):** SM, black (10YR 2/1) to very dark grayish brown (10YR 3/2), silt to sand-sized ash, angular gravel (5-15%), clay (5-15%), loose, moist.	(FILL) SM									CS=Core Sample
			5	5 - 5.4' **FILL, ASH (Coal):** CL/ML, dark greenish gray (GLEY 1 4/1), medium plasticity, soft.	(FILL) CL/ML									
2 CS	120 120		6	5.4 - 9.9' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, clay (5-15%), loose, moist.	(FILL) SM									
			7	7 - 9.9' interbedded silty clay.										
			10	9.9 - 16' **SILTY CLAY:** CL/ML, greenish gray (GLEY 1 6/1), sand (0-5%), organic material (0-5%), medium to high plasticity, very stiff, moist. 10.5' light olive brown (2.5Y 5/3), yellowish brown to reddish brown mottling (50%).	CL/ML									

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

Signature

Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

Boring Number XPW06 Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	9.9 - 16' **SILTY CLAY:** CL/ML, greenish gray (GLEY 1 6/1), sand (0-5%), organic material (0-5%), medium to high plasticity, very stiff, moist. *(continued)*										
			14	13.7' dark greenish gray (GLEY 1 4/1), reddish brown mottling (10%).	CL/ML									
			15											
			16	16' End of Boring.										

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: XPW01
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 51.1" Long. -89° 51' 52.1" or	
Facility ID	St. Plane 557,530 ft. N, 2,383,427 ft. E. E /Ⓦ	Date Well Installed: 09/23/2022
Type of Well	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Arlen Little
Distance from Waste/Source ft. / State: IL	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known / Gov. Lot Number: ____	Cascade Drilling

A. Protective pipe, top elevation 438.45 ft. (NAVD88)

B. Well casing, top elevation 437.66 ft. (NAVD88)

C. Land surface elevation 435.12 ft. (NAVD88)

D. Surface seal, bottom 434.1 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

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

E. Bentonite seal, top 434.1 ft. (NAVD88) or 1.0 ft.

F. Fine sand, top 431.1 ft. (NAVD88) or 4.0 ft.

G. Filter pack, top 430.1 ft. (NAVD88) or 5.0 ft.

H. Screen joint, top 428.1 ft. (NAVD88) or 7.0 ft.

I. Well bottom 423.1 ft. (NAVD88) or 12.0 ft.

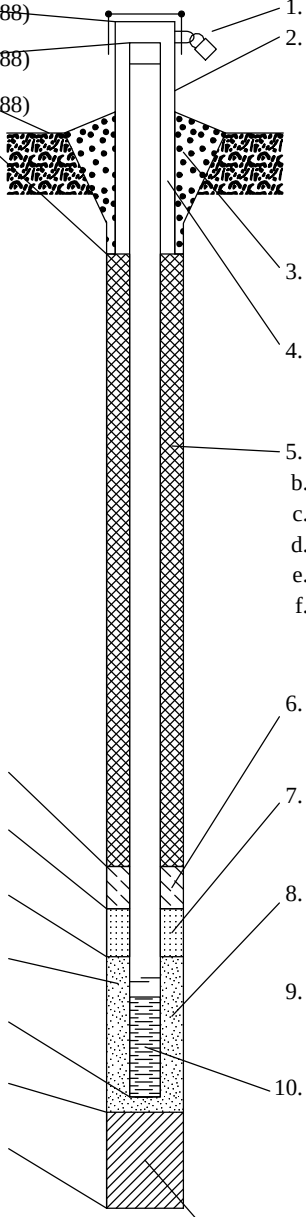
J. Filter pack, bottom 421.1 ft. (NAVD88) or 14.0 ft.

K. Borehole, bottom 421.1 ft. (NAVD88) or 14.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



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

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 12/16/2022

Signature ____ Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant

Facility License, Permit or Monitoring No.:

Facility ID:

Type of Well:

Distance from Waste/Source: ft.

State: IL

Local Grid Location of Well: ft. ☐ N. ☐ S. ft. ☐ E. ☐ W.

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

Lat. 38° 11' 52.4" Long. -89° 51' 42.8" or

St. Plane 557,668 ft. N, 2,384,172 ft. E. E /Ⓦ

Section Location of Waste/Source: ☐ E ☐ W

1/4 of 1/4 of Sec. , T. N, R.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Gov. Lot Number:

Well Name: XPW02

Date Well Installed: 09/24/2022

Well Installed By: (Person's Name and Firm)

Arlen Little

Cascade Drilling

A. Protective pipe, top elevation 438.60 ft. (NAVD88)

B. Well casing, top elevation 437.92 ft. (NAVD88)

C. Land surface elevation 434.86 ft. (NAVD88)

D. Surface seal, bottom 433.9 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe

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

E. Bentonite seal, top 433.9 ft. (NAVD88) or 1.0 ft.

F. Fine sand, top 430.9 ft. (NAVD88) or 4.0 ft.

G. Filter pack, top 429.9 ft. (NAVD88) or 5.0 ft.

H. Screen joint, top 428.9 ft. (NAVD88) or 6.0 ft.

I. Well bottom 423.9 ft. (NAVD88) or 11.0 ft.

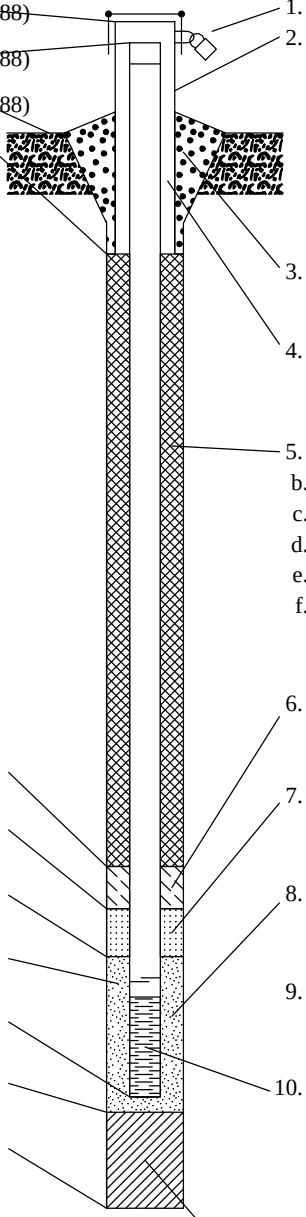
J. Filter pack, bottom 422.9 ft. (NAVD88) or 12.0 ft.

K. Borehole, bottom 420.9 ft. (NAVD88) or 14.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



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

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

Date Modified: 12/16/2022

Signature

Firm: Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: XPW04
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 40.9" Long. -89° 51' 49.7" or	
Facility ID	St. Plane 556,503 ft. N, 2,383,618 ft. E. E /Ⓦ	Date Well Installed: 10/05/2022
Type of Well	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Arlen Little
Distance from Waste/Source ft. / State: IL	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known / Gov. Lot Number: ____	Cascade Drilling

A. Protective pipe, top elevation 434.91 ft. (NAVD88)

B. Well casing, top elevation 434.58 ft. (NAVD88)

C. Land surface elevation 430.59 ft. (NAVD88)

D. Surface seal, bottom 429.6 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

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

E. Bentonite seal, top 429.6 ft. (NAVD88) or 1.0 ft.

F. Fine sand, top 426.1 ft. (NAVD88) or 4.5 ft.

G. Filter pack, top 425.1 ft. (NAVD88) or 5.5 ft.

H. Screen joint, top 424.1 ft. (NAVD88) or 6.5 ft.

I. Well bottom 414.1 ft. (NAVD88) or 16.5 ft.

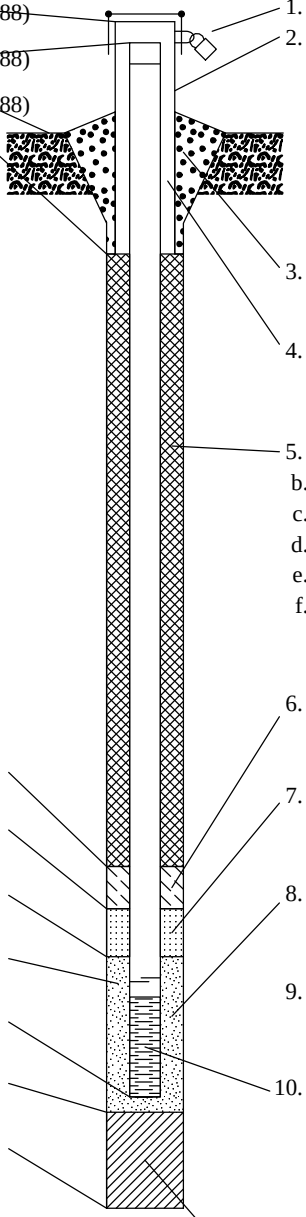
J. Filter pack, bottom 413.1 ft. (NAVD88) or 17.5 ft.

K. Borehole, bottom 410.6 ft. (NAVD88) or 20.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



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

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 12/16/2022

Signature ____ Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: XPW05
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 46.4" Long. -89° 51' 44.5" or St. Plane 557,063 ft. N, 2,384,034 ft. E / Ⓦ	
Facility ID		Date Well Installed: 09/24/2022
Type of Well	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm): Arlen Little; Cascade Drilling
Distance from Waste/Source: ____ ft. / State: IL	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Gov. Lot Number: ____

A. Protective pipe, top elevation 437.57 ft. (NAVD88)

B. Well casing, top elevation 437.27 ft. (NAVD88)

C. Land surface elevation 434.12 ft. (NAVD88)

D. Surface seal, bottom 433.1 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

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

E. Bentonite seal, top 433.1 ft. (NAVD88) or 1.0 ft.

F. Fine sand, top 418.1 ft. (NAVD88) or 16.0 ft.

G. Filter pack, top 417.1 ft. (NAVD88) or 17.0 ft.

H. Screen joint, top 416.1 ft. (NAVD88) or 18.0 ft.

I. Well bottom 406.1 ft. (NAVD88) or 28.0 ft.

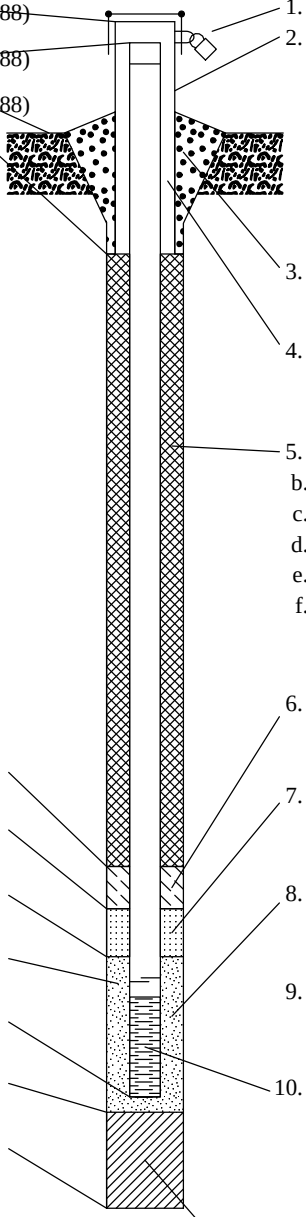
J. Filter pack, bottom 405.1 ft. (NAVD88) or 29.0 ft.

K. Borehole, bottom 404.1 ft. (NAVD88) or 30.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



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

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 12/16/2022

Signature: 

Firm: Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant	Local Grid Location of Well: ____ ft. ☐ N. ☐ S. ____ ft. ☐ E. ☐ W.	Well Name: XPW06
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 49.1" Long. -89° 52' 8.2" or St. Plane 557,324 ft. N, 2,382,140 ft. E. E/Ⓦ	
Facility ID		Date Well Installed: 09/22/2022
Type of Well	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Arlen Little
Distance from Waste/Source ft. / State IL	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Gov. Lot Number: ____ Cascade Drilling

A. Protective pipe, top elevation 418.06 ft. (NAVD88)

B. Well casing, top elevation 417.72 ft. (NAVD88)

C. Land surface elevation 418.06 ft. (NAVD88)

D. Surface seal, bottom 417.1 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

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

E. Bentonite seal, top 417.1 ft. (NAVD88) or 1.0 ft.

F. Fine sand, top 415.1 ft. (NAVD88) or 3.0 ft.

G. Filter pack, top 414.1 ft. (NAVD88) or 4.0 ft.

H. Screen joint, top 413.1 ft. (NAVD88) or 5.0 ft.

I. Well bottom 408.1 ft. (NAVD88) or 10.0 ft.

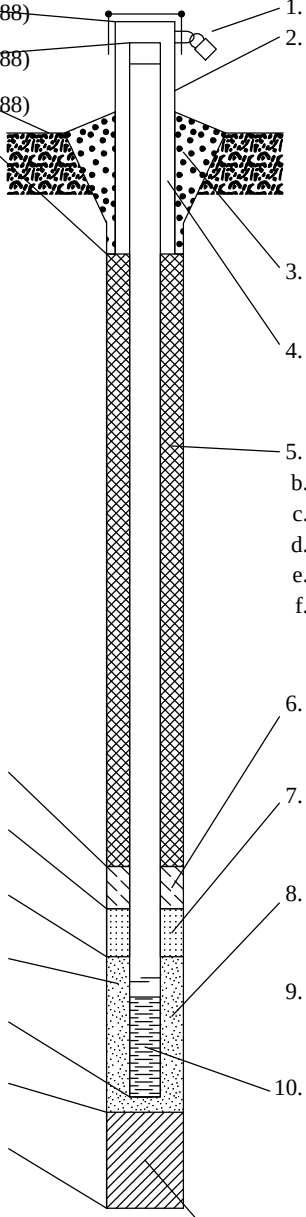
J. Filter pack, bottom 406.1 ft. (NAVD88) or 12.0 ft.

K. Borehole, bottom 402.1 ft. (NAVD88) or 16.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



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

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 12/16/2022

Signature ____ Firm Ramboll
234 W Florida Street, 5th Floor, Milwaukee, WI 53204
Tel: (414)837-3607
Fax: (414)837-3608

ATTACHMENT 5
PCA Data Summary

ELECTRONIC PCA DATA FOR ATTACHMENT 5
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
BALDWIN POWER PLANT
BOTTOM ASH POND
COLLINSVILLE, IL

Well	HSU	Date	Well Type	pH (SU)	Alkalinity, total (mg/L)	Barium (mg/L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Lithium (mg/L)	Sulfate (mg/L)
MW-304	BU	03/28/2022	Background	7.78	843	0.0194	1.71	14.5	161	1.76	0.0829	198
MW-304	BU	09/29/2022	Background	7.72	836	0.0183	1.75	10.2	174	1.70	0.0861	199
MW-304	BU	10/26/2022	Background	7.89	825	0.0186	1.76	10.8	175	1.72	0.0869	193
MW-304	BU	11/17/2022	Background	7.87	818	0.0209	1.91	9.48	175	1.7	0.0635	218
MW-304	BU	12/14/2022	Background	7.82	833	0.0191	2.16	10	181	1.82	0.0756	216
MW-304	BU	01/11/2023	Background	7.83	844	0.0173	1.68	8.5	185	1.68	0.0819	209
MW-304	BU	02/20/2023	Background	7.75	854	0.0216	1.75	10.7	186	1.67	0.0818	228
MW-304	BU	03/15/2023	Background	7.77	814	0.0206	1.89	10.6	173	1.67	0.094	208
MW-304	BU	04/04/2023	Background	7.75	853	0.0324	1.69	8.9	168	1.81	0.0808	210
MW-304	BU	05/22/2023	Background	7.51	836	0.0199	1.7	9.63	162	1.72	0.0603	208
MW-304	BU	08/03/2023	Background	7.92	838	0.0201	1.6	11.4	160	1.70	0.0779	188
MW-304	BU	11/01/2023	Background	7.81	855	0.0199	1.7	12	166	1.91	0.0807	191
MW-304	BU	02/05/2024	Background	7.70	818	0.0295	1.5	12.4	155	1.77	0.0763	185
MW-304	BU	04/16/2024	Background	7.81	805	0.0199	1.7	13.0	161	1.69	0.0823	195
MW-358	BU	10/27/2022	Background	7.93	633	0.0933	1.1	12.8	688	2.43	0.0621	108
MW-358	BU	11/17/2022	Background	7.83	758	0.1720	1.25	15.8	992	2.36	0.0592	101
MW-358	BU	12/13/2022	Background	8.45	859	0.168	1.67	19	1120	2.1	0.0696	71
MW-358	BU	01/11/2023	Background	7.59	841	0.165	1.38	14.0	1200	2.73	0.0957	34
MW-358	BU	02/20/2023	Background	8.38	847	0.201	1.42	13.2	1330	2.87	0.102	16
MW-358	BU	03/13/2023	Background	7.73	856	0.166	1.51	10.9	1340	3.07	0.115	8
MW-358	BU	04/04/2023	Background	7.71	851	0.261	1.45	11.4	1370	3.13	0.105	31
MW-358	BU	05/19/2023	Background	7.62	835	0.192	1.6	12.5	1300	3.31	0.0778	10
MW-358	BU	08/07/2023	Background	8.00	843	0.235	1.6	9.9	1290	3.36	0.0961	9
MW-358	BU	11/01/2023	Background	7.89	840	0.162	1.38	11.3	1310	3.59	0.0921	11
MW-358	BU	02/06/2024	Background	7.91	712	0.215	0.771	30.3	917	2.4	0.115	20
MW-358	BU	04/17/2024	Background	7.69	532	0.12	0.277	59.4	458	1.53	0.0425	19
MW-370	BU	03/29/2022	Downgradient	7.55	391	0.024	1.6	34.2	1470	3.15	0.223	270
MW-370	BU	09/30/2022	Downgradient	7.64	403	0.0589	2.67	51.4	1520	2.98	0.21	273
MW-370	BU	10/27/2022	Downgradient	6.88	389	0.0380	1.84	39.6	1320	3.11	0.137	250
MW-370	BU	11/17/2022	Downgradient	7.79	388	0.0292	1.74	36.8	1450	3.06	0.110	278
MW-370	BU	12/14/2022	Downgradient	7.52	394	0.0325	2.34	44.7	1430	3.12	0.118	263
MW-370	BU	01/12/2023	Downgradient	7.50	393	0.0272	1.75	38.4	1470	3.07	0.133	253
MW-370	BU	02/21/2023	Downgradient	7.46	389	0.0303	1.95	40.6	1570	2.86	0.146	273
MW-370	BU	03/14/2023	Downgradient	7.45	402	0.029	1.9	40	1340	2.96	0.160	251
MW-370	BU	04/03/2023	Downgradient	7.53	386	0.0308	2.1	37.4	1280	3.16	0.158	253
MW-370	BU	05/16/2023	Downgradient	7.47	399	0.0321	1.85	37.0	1360	3.07	0.12	253
MW-370	BU	08/03/2023	Downgradient	7.79	399	0.033	1.73	41.4	1310	3.06	0.134	243
MW-370	BU	11/02/2023	Downgradient	7.61	413	0.0285	2.0	41.1	1420	3.7	0.124	273
MW-370	BU	02/06/2024	Downgradient	7.39	410	0.0417	1.69	40.1	1460	3.28	0.169	257
MW-370	BU	04/16/2024	Downgradient	7.59	393	0.042	1.76	39.5	1460	3.33	0.17	247
MW-392	BU	10/27/2022	Downgradient	6.98	446	0.029	1.57	22.1	334	3.19	0.0474	149
MW-392	BU	11/16/2022	Downgradient	7.98	388	0.046	1.72	27.2	648	3.36	0.0512	83
MW-392	BU	12/13/2022	Downgradient	7.70	381	0.0462	2.33	30	918	3.98	0.0646	50
MW-392	BU	01/12/2023	Downgradient	7.63	413	0.042	1.66	47.1	888	3.96	0.076	47
MW-392	BU	02/20/2023	Downgradient	7.60	370	0.0399	1.97	30.4	909	3.69	0.0799	68
MW-392	BU	03/13/2023	Downgradient	7.67	381	0.0397	1.92	28.1	896	4.01	0.0767	57
MW-392	BU	04/03/2023	Downgradient	7.73	379	0.057	2.7	30.5	834	4.18	0.117	61
MW-392	BU	05/16/2023	Downgradient	7.54	372	0.0414	1.92	25.6	827	4.07	0.0675	63
MW-392	BU	08/03/2023	Downgradient	7.86	359	0.0407	1.82	26.0	878	4.07	0.0733	55
MW-392	BU	10/31/2023	Downgradient	7.65	384	0.0615	1.91	50.8	871	4.52	0.114	66
MW-392	BU	02/06/2024	Downgradient	7.64	378	0.0551	1.74	25.3	863	4.28	0.108	59
MW-392	BU	04/16/2024	Downgradient	7.67	371	0.0521	1.86	25.0	868	4.42	0.0746	42
MW-393	BU	10/27/2022	Downgradient	7.45	641	0.02	1.83	9	436	5.86	0.0767	285
MW-393	BU	11/16/2022	Downgradient	8.11	672	0.03	1.53	11	475	5.95	0.0722	280
MW-393	BU	12/14/2022	Downgradient	8.64	666	0.0246	2.04	11	445	5.79	0.0603	263
MW-393	BU	01/12/2023	Downgradient	7.89	812	0.0288	1.61	14.7	633	8.02	0.0807	232
MW-393	BU	02/20/2023	Downgradient	7.95	822	0.0304	1.74	11	640	7.66	0.0853	214
MW-393	BU	03/13/2023	Downgradient	8.03	859	0.0273	1.79	7.9	606	8.21	0.0668	186
MW-393	BU	04/03/2023	Downgradient	8.12	833	0.0481	2.76	8.6	648	9.27	0.123	209
MW-393	BU	05/15/2023	Downgradient	8.28	914	0.0261	1.72	8.4	745	8.42	0.0442	123
MW-393	BU	08/03/2023	Downgradient	8.36	862	0.0269	1.66	6.0	610	7.32	0.0593	134
MW-393	BU	10/31/2023	Downgradient	8.19	827	0.0582	1.59	7.9	723	9.63	0.0672	184
MW-393	BU	02/06/2024	Downgradient	8.12	831	0.06	1.63	6.4	741	9.27	0.1100	206
MW-393	BU	04/16/2024	Downgradient	8.16	816	0.04	1.83	7.1	779	9.22	0.0714	217
TPZ-164	CCR	03/29/2022	CCR	7.31	198	0.11	1.56	55.4	50	0.26	0.0167	227
TPZ-164	CCR	09/30/2022	CCR	7.14	206	0.17	2.04	68.5	52	0.24	0.0243	150
TPZ-164	CCR	10/28/2022	CCR	7.31	276	0.06	1.47	67.6	57	0.26	0.0140	127
TPZ-164	CCR	11/16/2022	CCR	7.56	250	0.06	1.38	61.8	46	0.26	0.0085	123
TPZ-164	CCR	12/14/2022	CCR	7.34	233	0.05	1.54	60.9	55	0.27	0.0114	120
TPZ-164	CCR	03/14/2023	CCR	7.21	283	0.06	1.30	70	43	0.22	0.0101	113
TPZ-164	CCR	08/07/2023	CCR	7.38	293	0.07	1.23	70	51	0.31	0.0151	109
TPZ-164	CCR	02/28/2024	CCR	7.13	285	0.07	0.92	75	52	0.25	0.0099	130
TPZ-164	CCR	04/18/2024	CCR	7.25	275	0.07	1.05	77	49	0.29	0.0115	118
XPW-01	CCR	10/26/2022	CCR	7.03	203	0.10	0.93	65.4	21	0.61	0.0142	98
XPW-01	CCR	11/15/2022	CCR	6.98	205	0.11	1.03	72.5	22	0.50	0.0127	105
XPW-01	CCR	12/13/2022	CCR	6.57	204	0.27	0.94	81.5	25	0.50	0.0354	120
XPW-01	CCR	01/12/2023	CCR	6.86	212	0.11	0.88	67.5	26	0.51	0.0132	119
XPW-01	CCR	05/23/2023	CCR	7	163	0.0743	0.649	55.1	21	0.62	0.0083	62
XPW-01	CCR	08/03/2023	CCR	6.75	218	0.103	0.893	71.5	28	0.58	0.0117	82
XPW-01	CCR	02/08/2024	CCR	6.6	217	0.116	0.961	84.8	49	0.53	0.0116	126
XPW-01	CCR	04/18/2024	CCR	6.88	204	0.0952	0.563	70.2	46	0.55	0.01	112
XPW-02	CCR	10/26/2022	CCR	7.57	427	0.205	1.18	121	33	0.61	0.0233	22
XPW-02	CCR	11/15/2022	CCR	7.6	426	0.194	1.2	115	30	0.55	0.0194	20
XPW-02	CCR	12/12/2022	CCR	7.53	374	0.257	1.52	110	32	0.63	0.023	37
XPW-02	CCR	01/12/2023	CCR	7.32	337	0.125	0.87	88.5	29	0.46	0.0108	43
XPW-02	CCR	05/23/2023	CCR	7.05	359	0.185	1.08	101	36	0.5	0.0147	41
XPW-04	CCR	10/28/2022	CCR	8.31	222	0.161	1.28	47.9	55	0.44	0.0108	119
XPW-04	CCR	11/15/2022	CCR	8.4	226	0.171	1.15	53.2	56	0.4	0.0066	124
XPW-04	CCR	12/12/2022	CCR	8.04	217	0.196	1.38	51.1	55	0.42	0.0136	120
XPW-04	CCR	01/12/2023	CCR	7.96	226	0.156	0.835	49.6	54	0.4	0.009	119
XPW-04	CCR	05/23/2023	CCR	8.23	200	0.172	0.921	56.2	45	0.33	0.0056	173
XPW-05	CCR	10/26/2022	CCR	7.82	180	0.104	1.02	43.9	46	0.57	0.0053	123
XPW-05	CCR	11/15/2022	CCR	7.67	180	0.12	1.16	43.5	46	0.58	0.0039	132
XPW-05	CCR	12/12/2022	CCR	7.18	212	0.19	1.25	43.6	48	0.62	0.0093	137
XPW-05	CCR	01/24/2023	CCR	7.3	192	0.208	1.57	40.2	48	0.6	0.008	125
XPW-05	CCR	05/23/2023	CCR	7.16	218	0.212	1.08	45.8	47	0.54	0.0027	110
XPW-05	CCR	08/03/2023	CCR	7.17	229	0.223	0.928	49.1	46	0.55	0.0054	89
XPW-05	CCR	02/28/2024	CCR	7.19	238	0.284	0.977	56.2	47	0.53	0.0093	123
XPW-05	CCR	04/18/2024	CCR	7.03	267	0.294	0.87	60.4	51	0.49	0.0061	114
XPW-06	CCR	10/26/2022	CCR	7.22	370	0.274	2.29	130	25	0.58	0.0118	575
XPW-06	CCR	11/15/2022	CCR	7.27	372	0.198	4.64	164	18	0.61	0.0019	475
XPW-06	CCR	12/13/2022	CCR	7.04	371	0.246	3.86	174	18	0.59	0.0075	508
XPW-06	CCR	01/12/2023	CCR	7.25	278	0.1	3.38	112	10	0.5	0.0031	391
XPW-06	CCR	05/23/2023	CCR	7.23	247	0.161	2.11	75.9	6	0.32	0.0019	171
XPW-06	CCR	08/03/2023	CCR	6.96	195	0.142	1.55	61.6	2	0.37	0.006	117
XPW-06	CCR	02/06/2024	CCR	7.28	244	0.201	2.91	90.6	5	0.35	0.0057	315
XPW-06	CCR	04/18/2024	CCR	7.16	256	0.129	2.64	69.3	2	0.39	0.0058	103

Notes:
mg/L = milligrams per liter
TDS= Total Dissolved Solids
SU= standard units
HSU = hydrostratigraphic unit
CCR = coal combustion residual
BU = Bedrock Unit

ATTACHMENT 6

Lithium Isotope Ratio Laboratory Analytical Report

130 Stone Rd. W
Guelph, ON N1G 3Z2
(519) 822-2265

Analytical Results

SiREM File Reference: S-9990

Client: Geosyntec Consultants, Inc.
Client Project Number: GLP8063
Date Samples Received: August 24, 2023
Date Samples Analyzed: August/September 2023
IsoDetect Internal Project No: 23-71-GG

Client Sample ID	SiREM Reference ID	Isodetect Reference ID	Client Sample Date	δ^7Li	2SD	Lithium Concentration
				[‰]	[‰]	ug/L
Cooling Pond - 20230821	23-14918	23-71-GG-01	21-Aug-23	35.18	0.74	3.1
MW158R - 20230822	23-14919	23-71-GG-02	22-Aug-23	31.47	0.54	22.6
PZ170-20230821	23-14920	23-71-GG-03	21-Aug-23	16.95	0.73	44.0
TPZ164-20230821	23-14921	23-71-GG-04	21-Aug-23	17.07	0.75	27.6
MW370-20230821	23-14922	23-71-GG-05	21-Aug-23	20.65	0.73	227.0
MW358-20230822	23-14923	23-71-GG-06	22-Aug-23	26.04	0.70	185.0

Comments:
Method: Compound Specific Isotope Analysis (CSIA)
-- = not applicable
2SD= standard deviation, calculated from two independent consecutive measurements
ug/L = micrograms per liter
n.m. = not measured

Analyst: Brooke Rapien
Brooke Rapien
Laboratory Technician II

Results approved:
Brent G. Paulter
Chemistry Services Manager

Date: October 10, 2023

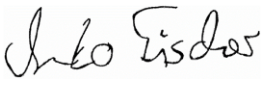
Isodetect
Umweltmonitoring GmbH

06th of October 2023

Analytical report

Ordering party:	SiREM 130 Stone Rd. West Guelph, Ontario, Canada N1G 3Z2
Contact person:	Ximena Druar Brent G. Pautler, Ph.D.
Contractor:	Isodetect GmbH Deutscher Platz 5b 04103 Leipzig Germany
Person in charge:	Kevin Kuntze, Ph.D. Phone: +49 341 35535851 Mail: kuntze@isodetect.de Anko Fischer, Ph.D. Phone: +49 341 35535855 Mail: fischer@isodetect.de
Samples received:	11.09.2023
Project ID/ Field site:	S-9990
Internal Project No.:	23-71-GG
Scope on analysis:	6 x isotope ratio of Li

Dr. Kevin Kuntze



Dr. Anko Fischer

Isodetect
Umweltmonitoring GmbH

Analysis results

Well/sample	Lab ID	**δ^7Li [‰]**	2SD [‰]	Li [µg/l]
Cooling Pond - 20230821	23-71-GG-01	35.18	0.74	3.1
MW158R-20230821	23-71-GG-02	31.47	0.54	22.6
PZ170-20230821	23-71-GG-03	16.95	0.73	44.0
TPT164-20230821	23-71-GG-04	17.07	0.75	27.6
MW370-20230821	23-71-GG-05	20.65	0.73	227.0
MW358-20230821	23-71-GG-06	26.04	0.70	185.0

The analyses were carried out by MC-ICP-MS using an internal standardization and external calibration with bracketing isotope standard reference materials (SRMs), for which Li delta value (δ^7Li) was calculated against LSVEC NIST 8545 RM. The standard deviation (2SD) was calculated from two independent consecutive measurements.

Chain of Custody for CSIA of organic pollutants

Isodetect Umweltmonitoring GmbH

Contact information				Project information			
Company:	SiREM	Email:	xdruar@siremlab.com	Project ID:	Baldwin GW Compliance	Field site:	
Contact:	Ximena Druar	Address:	130 Stone Road W, Guelph, ON N1G 3Z2 Canada	Project description:			
Phone:	519-880-5424			Sampled by:		Company:	Geosyntec

Client Sample ID/ Sampling point	Sampling Date	Sampling Time	Matrix	Conditions (e.g. Temp., O_2, R_h, pH)	Sampling type[$]	Sample volume for CSIA	Fixative[#]	CSIA for[*]	Isotope ratio[^]	Other Notes (e.g. troubles, weather)
Cooling Pond - 20230821	8/21/2023	13:20	Water		2	2x500mL V V		Total & Stable Li Isotopes		S-9990
MW158R-20230822	8/22/2023	13:50	Water		2	2x500mL V V		Total & Stable Li Isotopes		S-9990
PZ170-20230821	8/21/2023	11:25	Water		2	2x500mL V V		Total & Stable Li Isotopes		S-9990
TPZ164-20230821	8/21/2023	10:45	Water		2	2x500mL V V		Total & Stable Li Isotopes		S-9990
MW370-20230821	8/21/2023	12:10	Water		21 ST	2x500mL V		Total & Stable Li Isotopes		S-9990
MW358-20230822	8/22/2023	12:15	Water		2	2x500mL V V		Total & Stable Li Isotopes		S-9990

[$] 1 – Submersible pump, 2 – Suction pump, 3 – Bailer, 4 – Tap/outlet, 5 – Trial pit, 6 – Percussion drilling, 7 – Direct push sampling, 8 – Hand excavation, 9 – others (give sampling type)

* 1 – BTEX, 2 – halogenated VOC, 3 – PAH, 4 – Fuel additives (MTBE, ETBE, TAME, TAEE etc.), 5 – Explosives (TNT, RDX, dinitrotoluene, nitrobenzenes etc.), 6 – Petroleum hydrocarbons (e.g. alkylated benzenes, alkanes etc.), 7 – Chlorobenzenes, 8 – Gas hydrocarbons (e.g. methane, ethane, propane, butane, etc.), 9 – Pesticides (HCH, DDT, phenoxy acids, atrazine, bromacil, etc.), 10 – others (give target compounds)

^ 1 – $^{13}C/^{12}C$, 2 – $^{2}H/^{1}H$, 3 – $^{37}Cl/^{35}Cl$, 4 – $^{15}N/^{14}N$, 5 – $^{81}Br/^{79}Br$, 6 – others (give target isotope ratio)

1 – NaOH, 2 – $Na_3PO_4 \cdot 12H_2O$, 3 – HCl, 4 – H_2SO_4, 5 – none, 6 – others (give preservative)

Relinquished by		Received by		Relinquished by		Received by	
Signature:	Susan Thomas	Signature:		Signature:		Signature:	
Name:	Susan Thomas	Name:	Vazquez Ramos Jose	Name:		Name:	
Company:	SiREM	Company:	Isodetect GmbH	Company:		Company:	
Date/Time:	9-6-2023	Date/Time:	11.09.2023	Date/Time:		Date/Time:	

Isodetect GmbH, Deutscher Platz 5b, 04103 Leipzig, Germany
Phone: +49 (0)341-355-35851, Fax: +49 (0)341-355-35852, Email: kuntze@isodetect.de www.isodetect.de

Isodetect Umweltmonitoring GmbH

ATTACHMENT 7
Solid Phase Anions Laboratory Analytical Report

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

28-February-2023

Ramboll Americas Engineering Solutions, Inc.
Attn : Evvan Plank

P.O# Box 4873
Syrascuse, New York
13221-7873, USA

Phone: 315-463-7554
Fax:

Date Rec. : 24 November 2022
LR Report: **CA19226-NOV22**
Reference: Baldwin Power Plant Drilling

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)	12: MW-392 (66-68)
Sample Date & Time					06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00	26-Sep-22 12:00
Cl [µg/g]	15-Dec-22	20:55	---	---	22	70	34	45
SO4 [µg/g]	15-Dec-22	20:55	29-Dec-22	13:45	50	620	280	100
F [%]	08-Dec-22	18:18	12-Dec-22	08:47	0.091	0.091	0.42	0.095
TKN [as N %]	30-Nov-22	09:28	02-Dec-22	11:00	0.06	0.05	< 0.01	0.05
Ra226 [Bq/g]	12-Dec-22	08:48	12-Dec-22	14:33	0.07	< 0.01	0.09	< 0.01

Catharine Arnold

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

OnLine LIMS

0003246129

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

LR Report : **CA19226-NOV22**

ATTACHMENT 8
X-ray Diffraction Laboratory Analytical Report

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Environmental Services*
Project Number/ LIMS No.	*Custom XRD/MI4508-DEC22*
Sample Receipt:	*December 7, 2022*
Sample Analysis:	*December 15, 2022*
Reporting Date:	*April 24, 2023*

Instrument:	BRUKER AXS D8 Advance Diffractometer
Test Conditions (Bulk):	Co radiation, 35 kV, 40 mA; Detector: LYNXEYE Regular Scanning: Step: 0.02°, Step time: 0.75s, 2θ range: 6-80°
Test Conditions (Clay):	Co radiation, 35 kV, 40 mA; Detector: LYNXEYE Regular Scanning: Step: 0.02°, Step time: 1s, 2θ range: 3-80° Clay Section Scanning: Step: 0.01°, Step time:0.2s, 2θ range: 3-40°
***Interpretations*:**	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva and Topas software.
***Detection Limit*:**	0.5-2%. Strongly dependent on crystallinity.

Contents:

Kim Gibbs, H.B.Sc., P.Geo.
Senior Mineralogist

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

ACCREDITATION: SGS Natural Resources Lakefield is accredited to the requirements of ISO/IEC 17025 for specific tests as listed on our scope of accreditation, including geochemical, mineralogical and trade mineral tests. To view a list of the accredited methods, please visit the following website and search SGS Canada Inc. - Minerals: https://www.scc.ca/en/search/palcan.

Method Summary

The Rietveld Method of Mineral Identification by XRD (ME-LR-MIN-MET-MN-D05) method used by SGS Natural Resources is accredited to the requirements of ISO/IEC 17025.

***Mineral Identification and Interpretation*:**

Mineral identification and interpretation involves matching the diffraction pattern of an unknown material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) database and released on software as Powder Diffraction Files (PDF).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds, except when internal standards have been added by request. Mineral proportions may be strongly influenced by crystallinity, crystal structure and preferred orientations. Mineral or compound identification and quantitative analysis results should be accompanied by supporting chemical assay data or other additional tests.

Clay Mineral Separation and Identification:

Clay minerals are typically fine-grained (<2 µm) phyllosilicates in sedimentary rock. Due to the poor crystallinity and fine size of clay minerals, separation of the clay fraction from bulk samples by centrifuge is required. A slide of the oriented clay fraction is prepared and scanned followed by a series of procedures (the addition of ethylene glycol and high temperature heating). Clay minerals are identified by their individual diffraction patterns and changes in their diffraction pattern after different treatments. Clay speciation and mineral identification of the bulk sample are performed using DIFFRACplus EVA (Bruker AXS).

Quantitative Rietveld Analysis:

Quantitative Rietveld Analysis is performed by using Topas 4.2 (Bruker AXS), a graphics based profile analysis program built around a non-linear least squares fitting system, to determine the amount of different phases present in a multicomponent sample. Whole pattern analyses are predicated by the fact that the X-ray diffraction pattern is a total sum of both instrumental and specimen factors. Unlike other peak intensity-based methods, the Rietveld method uses a least squares approach to refine a theoretical line profile until it matches the obtained experimental patterns.

Rietveld refinement is completed with a set of minerals specifically identified for the sample. Zero values indicate that the mineral was included in the refinement calculations, but the calculated concentration was less than 0.05wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	MW-358 (13-15) DEC4508-1 (wt %)	MW-358 (47-49) DEC4508-2 (wt %)	MW-358 (86-88) DEC4508-3 (wt %)	MW-392 (80-82) DEC4508-4 (wt %)	MW-392 (32-33.5) DEC4508-5 (wt %)	MW-393 (24-25.5) DEC4508-6 (wt %)	MW-394 (20.5-22) DEC4508-7 (wt %)	MW-392 (66-68) DEC4508-8 (wt %)
Quartz	52.7	29.2	30.7	29.8	52.1	64.1	55.4	22.7
Muscovite	7.7	18.8	19.7	13.1	9.0	5.5	7.6	15.9
Albite	12.3	0.4	2.5	0.6	9.1	6.4	12.8	0.6
Microcline	7.3	8.6	5.9	1.0	6.5	10.1	7.3	5.1
Diaspore	0.3	-	-	-	-	0.2	0.5	2.8
Magnetite	0.9	0.5	0.3	1.4	0.1	0.0	0.1	0.1
Anatase	0.2	0.8	1.8	0.8	0.6	0.3	0.3	1.0
Calcite	-	0.5	1.0	28.1	0.0	0.0	0.2	14.9
Fluorapatite	-	-	-	2.7	0.3	-	0.2	0.2
Ankerite	-	-	-	-	1.4	0.9	0.5	0.8
Clay								
Kaolinite	5.3	4.8	15.0	5.5	6.8	3.2	4.2	3.6
Montmorillonite-12A	4.9	6.8	4.8	-	-	-	-	5.8
Montmorillonite-14A	-	-	-	3.5	3.3	3.5	3.6	-
Nontronite	0.6	4.6	4.3	4.2	1.6	1.4	0.5	3.3
Illite/Mont - 11A	-	8.8	2.7	3.6	2.7	2.1	3.0	7.1
Illite	5.0	15.0	9.2	4.1	0.7	1.0	0.6	10.4
Chlorite IIb	2.6	1.3	2.0	1.6	5.8	1.2	3.1	6.1
TOTAL	100	100	100	100	100	100	100	100

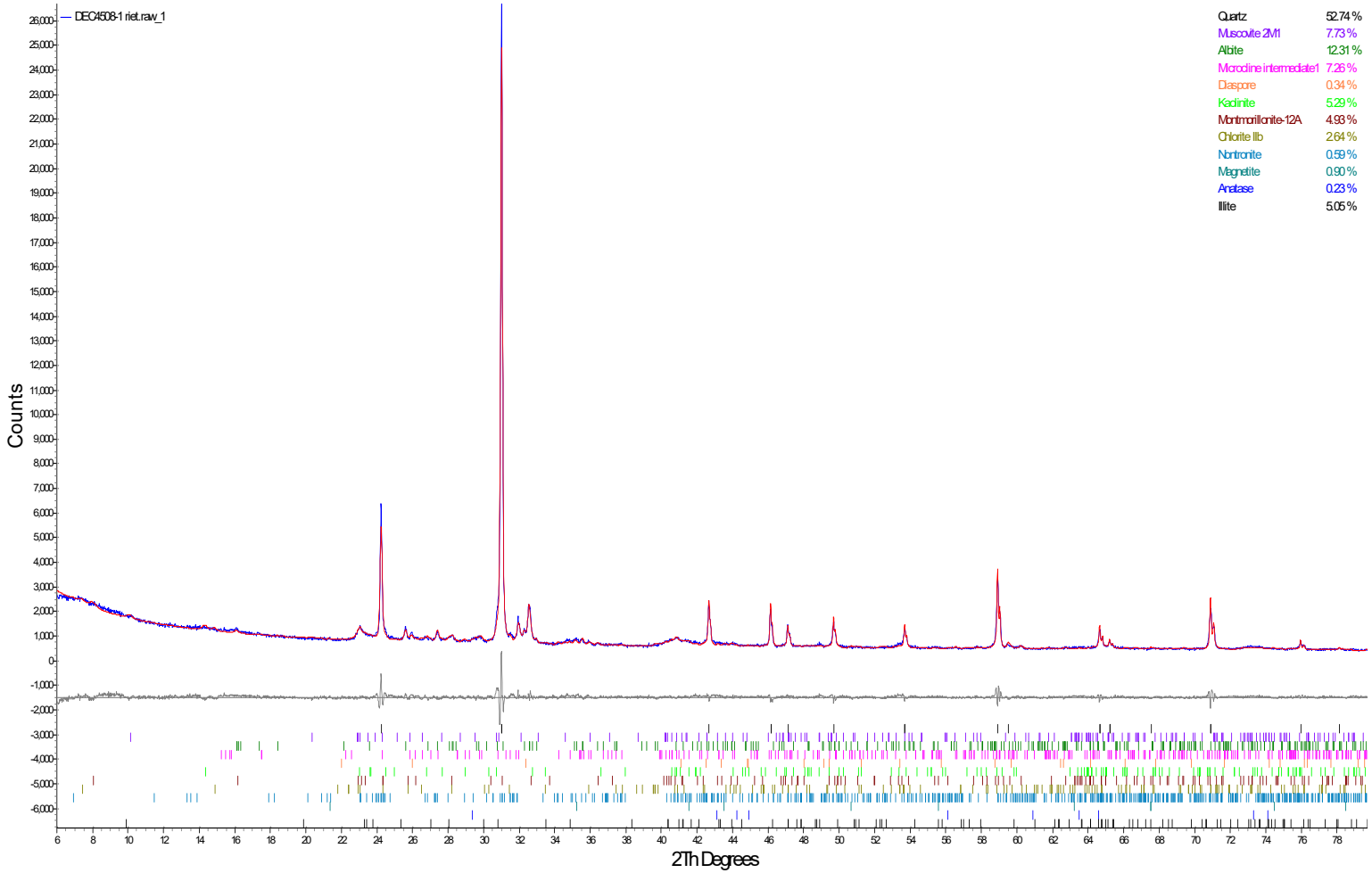
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

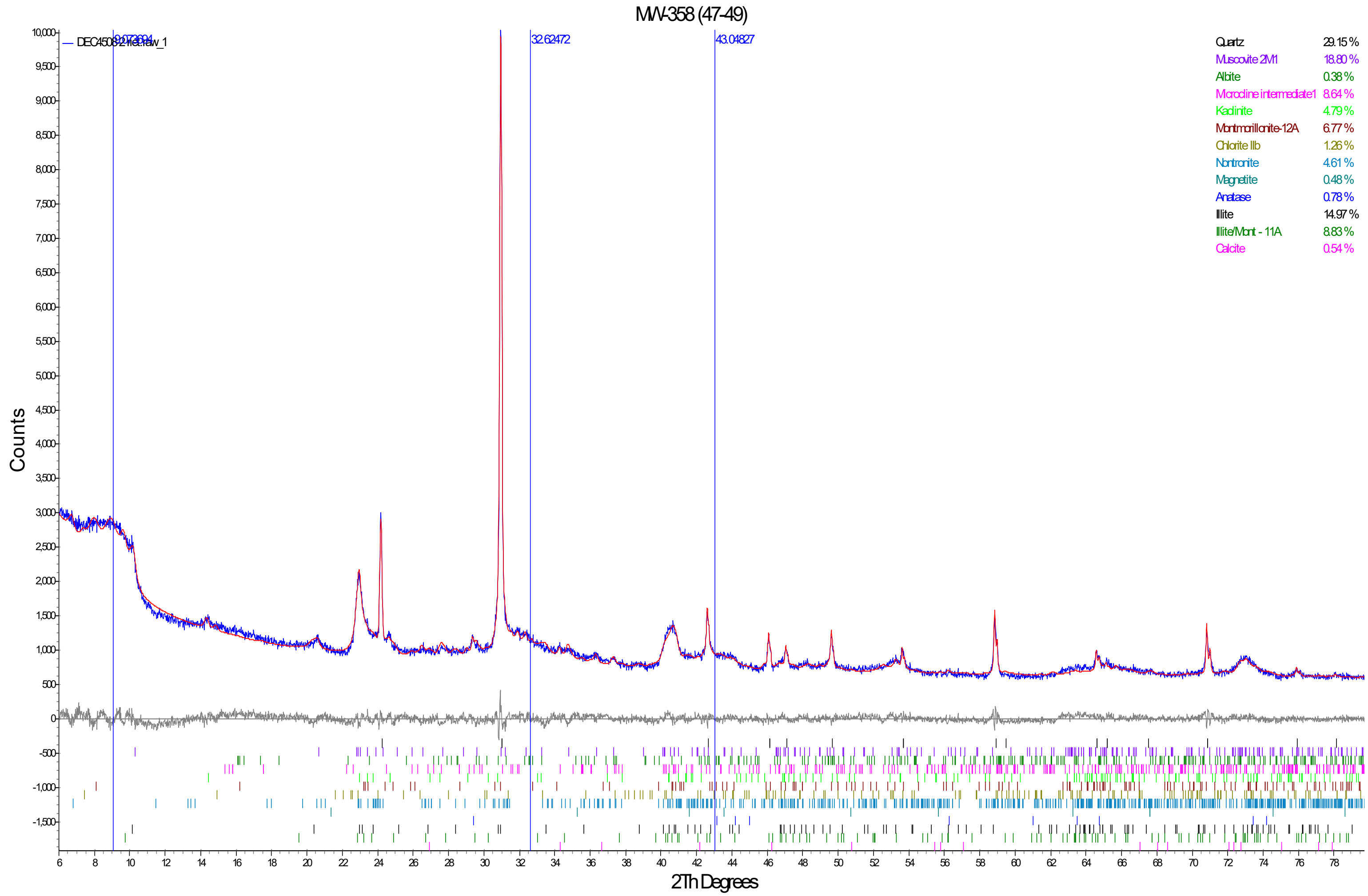
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

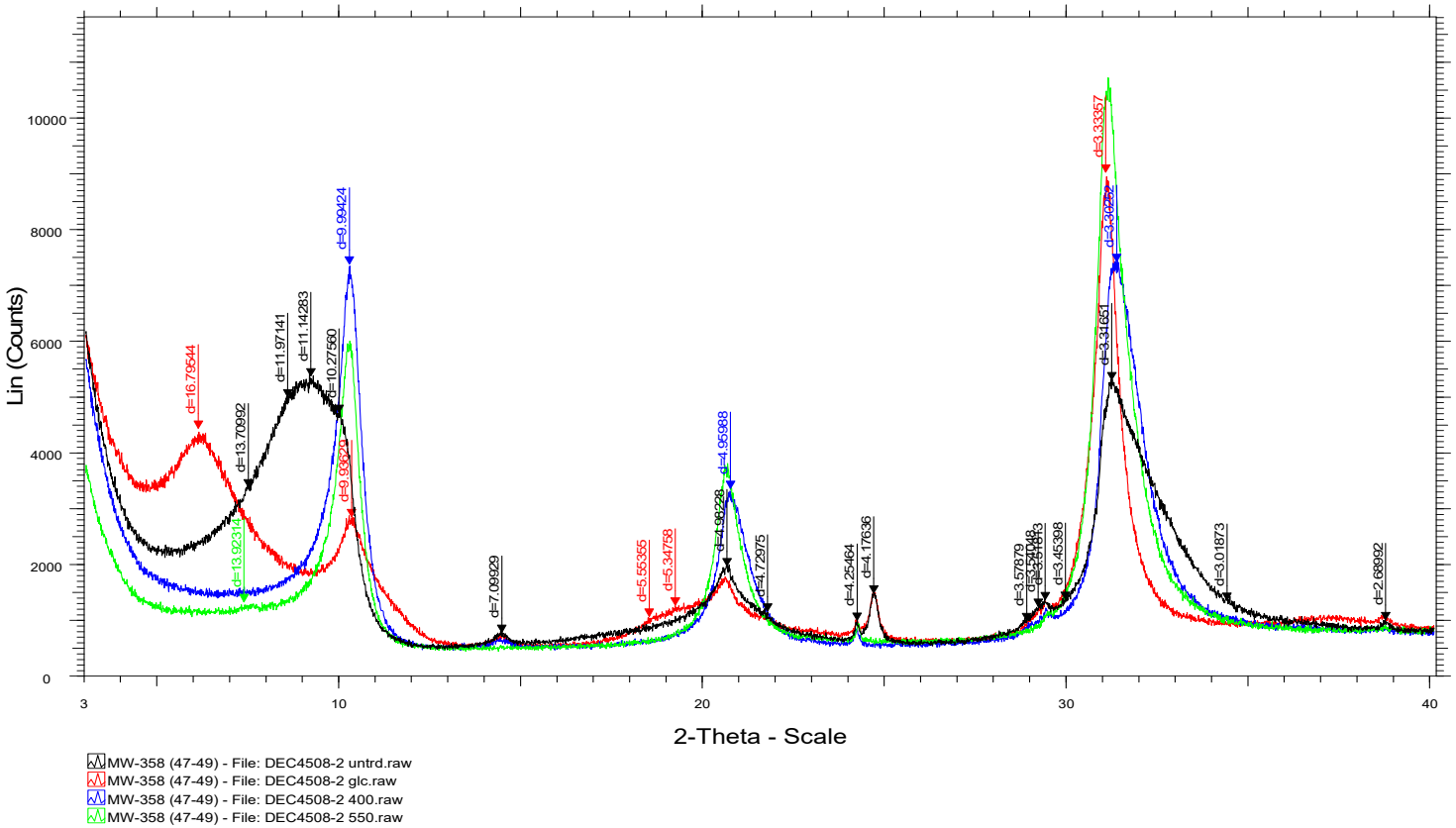
Mineral/Compound	Formula
Quartz	SiO_2
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Albite	$NaAlSi_3O_8$
Microcline	$KAlSi_3O_8$
Diaspore	aAlO.OH
Magnetite	Fe_3O_4
Anatase	TiO_2
Calcite	$CaCO_3$
Fluorapatite	$Ca_5(PO_4)_3F$
Ankerite	$CaFe(CO_3)_2$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot 10H_2O$
Nontronite	$Fe_2(Al,Si)_4O_{10}(OH)_2Na_{0.3}(H_2O)_4$
Illite/Mont	$KAl_4(Si,Al)_8O_{10}(OH)_4 \cdot 4H_2O$
Illite	$(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}[(OH)_2,(H_2O)]$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$

MW-358 (13-15)


DEC4508-1 riet.raw_1
Counts
2Th Degrees
Quartz 52.74 %
Muscovite 2M1 7.73 %
Albite 12.31 %
Microcline intermediate1 7.26 %
Diaspore 0.34 %
Kaolinite 5.29 %
Montmorillonite-12A 4.93 %
Chlorite IIb 2.64 %
Nontronite 0.59 %
Magnetite 0.90 %
Anatase 0.23 %
Illite 5.05 %


MW-358 (47-49)
DEC4508-2-fie.raw_1
32.62472
43.04827
Counts
2Th Degrees
Quartz 29.15 %
Muscovite 2M1 18.80 %
Albite 0.38 %
Microcline intermediate1 8.64 %
Kaolinite 4.79 %
Montmorillonite-12A 6.77 %
Chlorite IIb 1.26 %
Nontronite 4.61 %
Magnetite 0.48 %
Anatase 0.78 %
Illite 14.97 %
Illite/Mont - 11A 8.83 %
Calcite 0.54 %

MW-358 (47-49)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2-Theta - Scale
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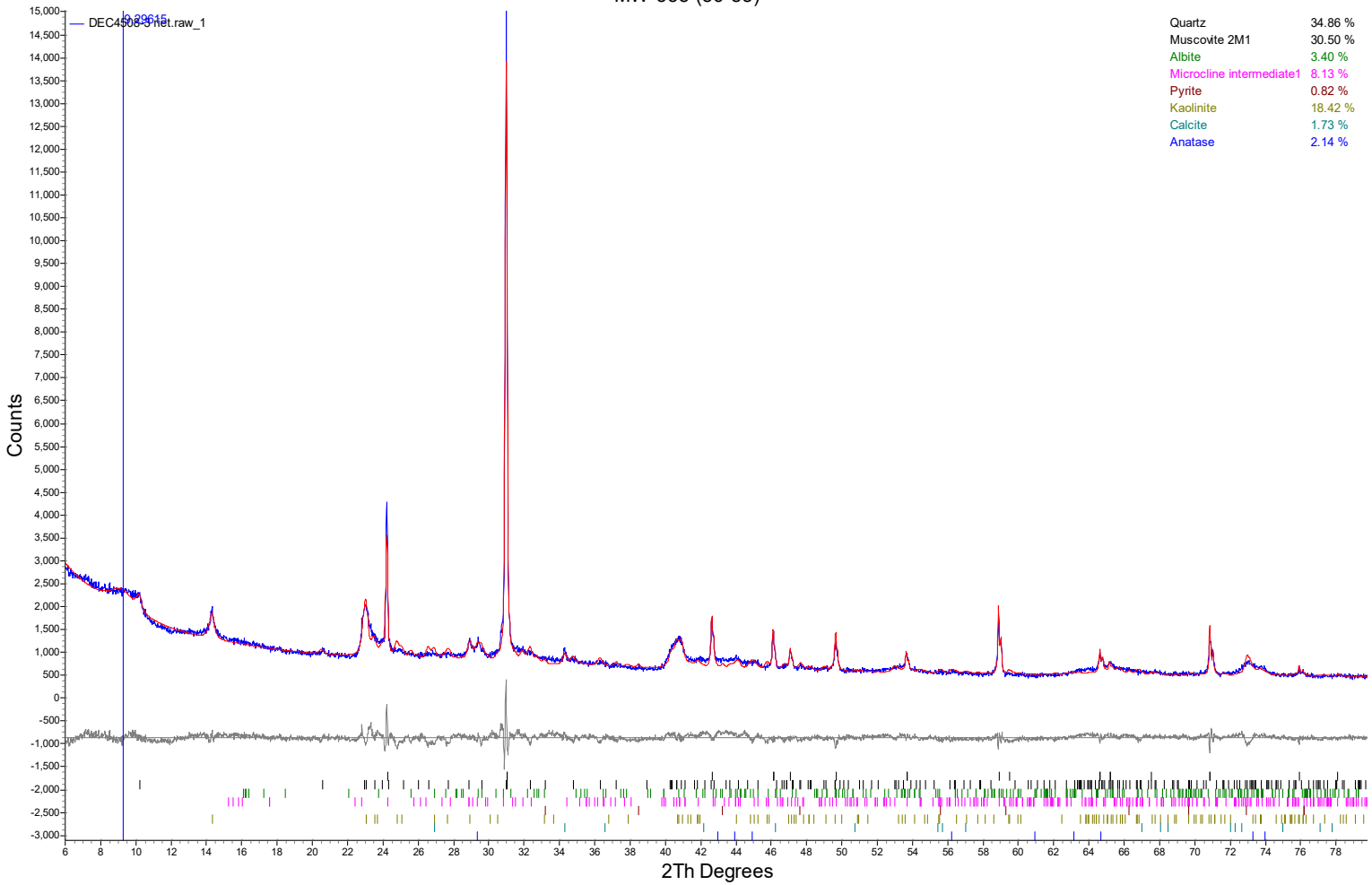
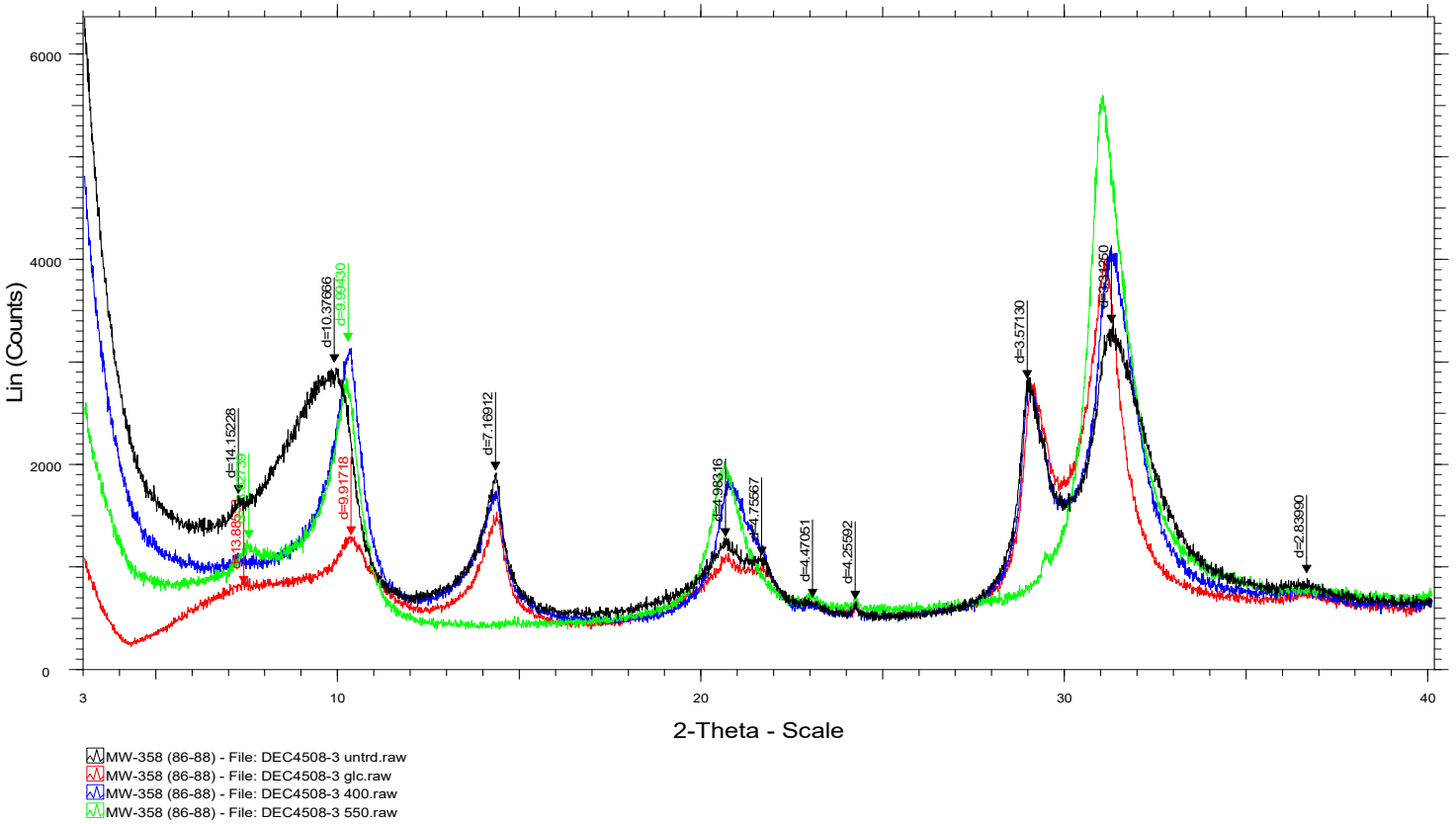
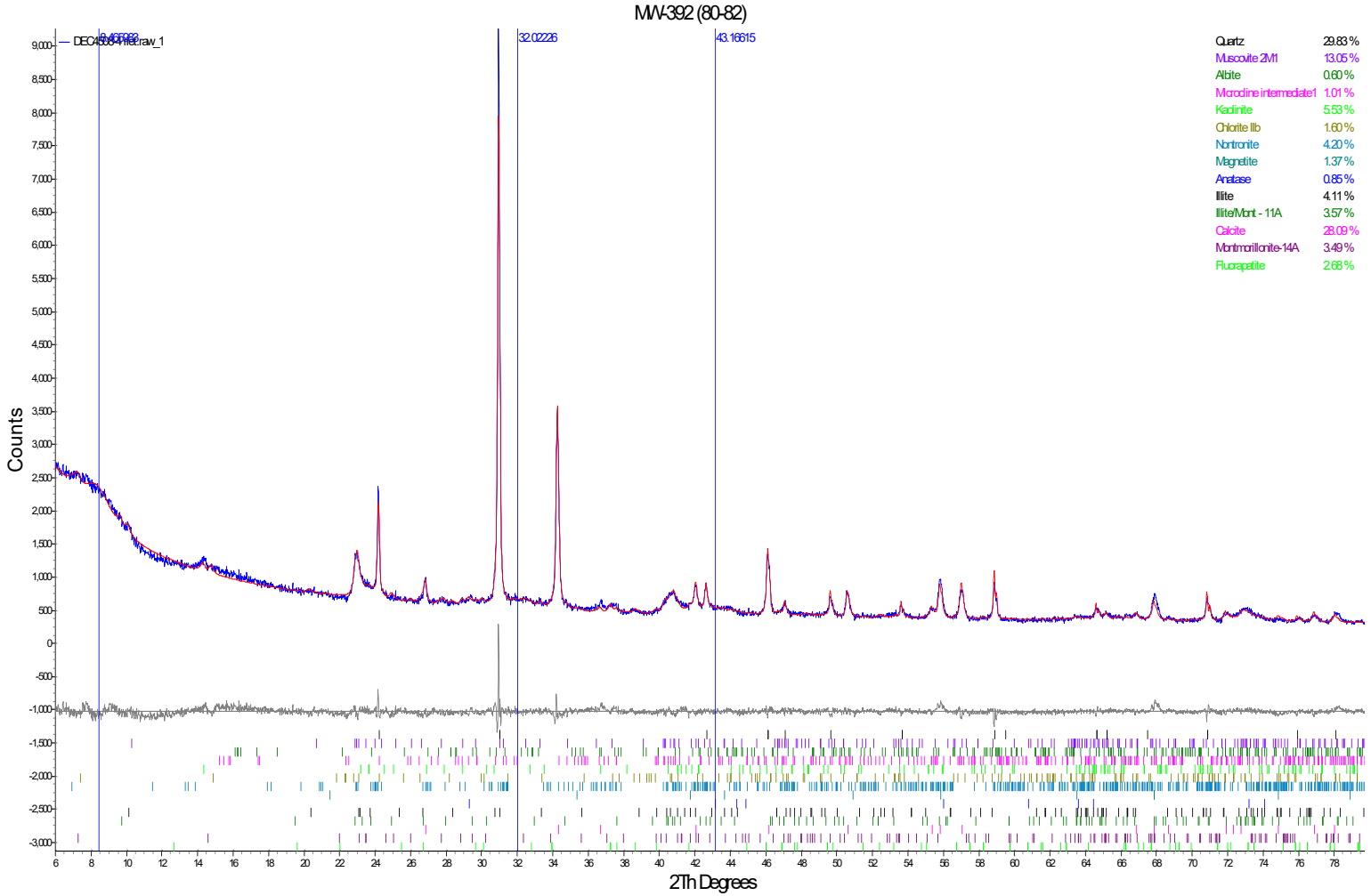
d=13.70992
d=13.92319
d=11.97141
d=11.14283
d=10.27560
d=9.99424
d=9.93021
d=7.09929
d=5.55355
d=5.34758
d=4.99228
d=4.95988
d=4.72975
d=4.25464
d=4.17636
d=3.57879
d=3.45398
d=3.33357
d=3.30252
d=3.31061
d=3.01873
d=2.69992
MW-358 (47-49) - File: DEC4508-2 untrd.raw
MW-358 (47-49) - File: DEC4508-2 glc.raw
MW-358 (47-49) - File: DEC4508-2 400.raw
MW-358 (47-49) - File: DEC4508-2 550.raw

MW-358 (86-88)

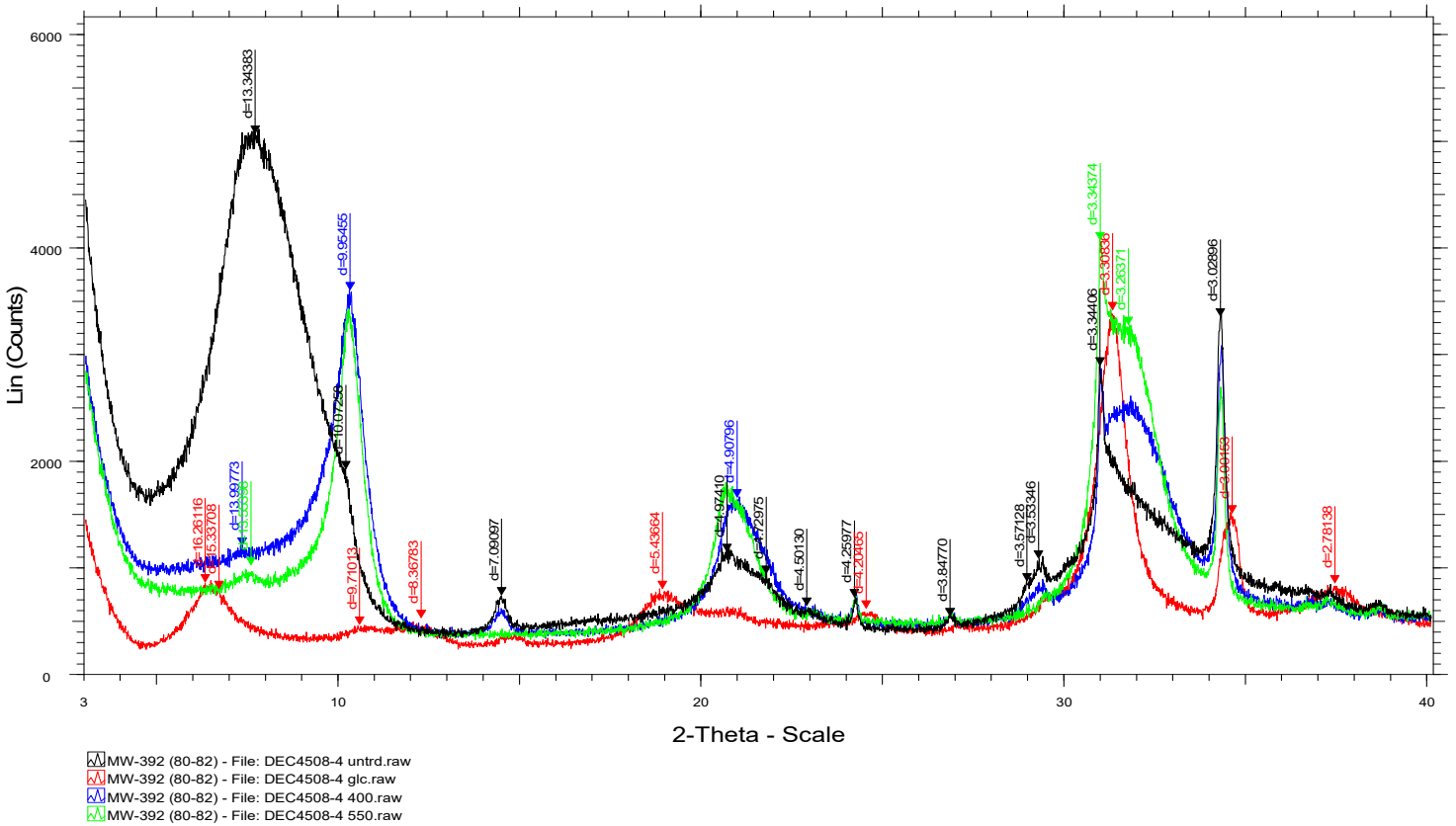

DEC4508-3 net.raw_1
Quartz 34.86 %
Muscovite 2M1 30.50 %
Albite 3.40 %
Microcline intermediate1 8.13 %
Pyrite 0.82 %
Kaolinite 18.42 %
Calcite 1.73 %
Anatase 2.14 %
Counts
2Th Degrees

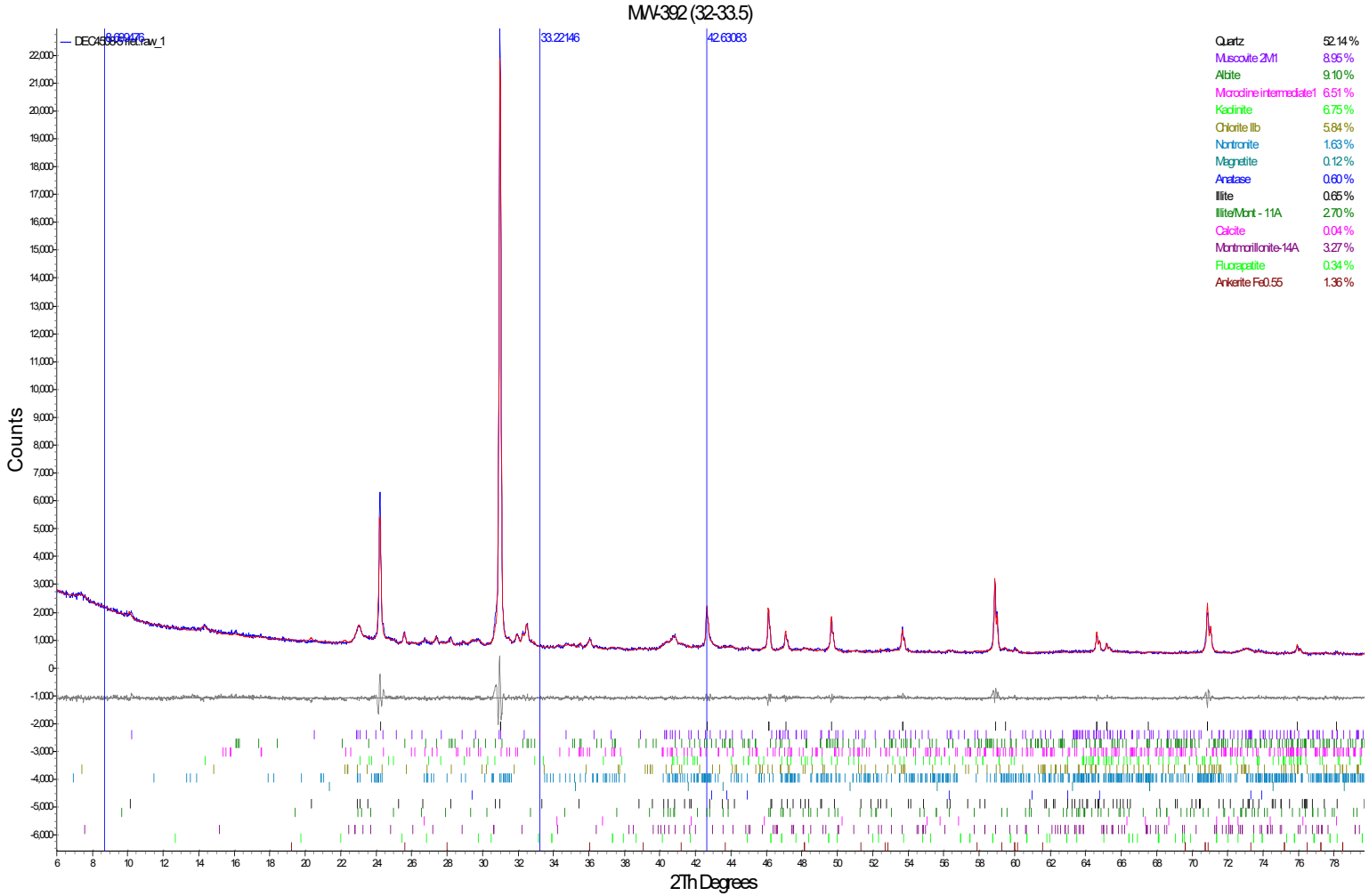
MW-358 (86-88)


Lin (Counts)
6000
4000
2000
0
3
10
20
30
40
2-Theta - Scale
d=14.15228
d=10.37666
d=9.99430
d=9.91718
d=7.16912
d=4.98316
d=4.75567
d=4.47051
d=4.25592
d=3.57130
d=3.34950
d=2.83990
MW-358 (86-88) - File: DEC4508-3 untrd.raw
MW-358 (86-88) - File: DEC4508-3 glc.raw
MW-358 (86-88) - File: DEC4508-3 400.raw
MW-358 (86-88) - File: DEC4508-3 550.raw

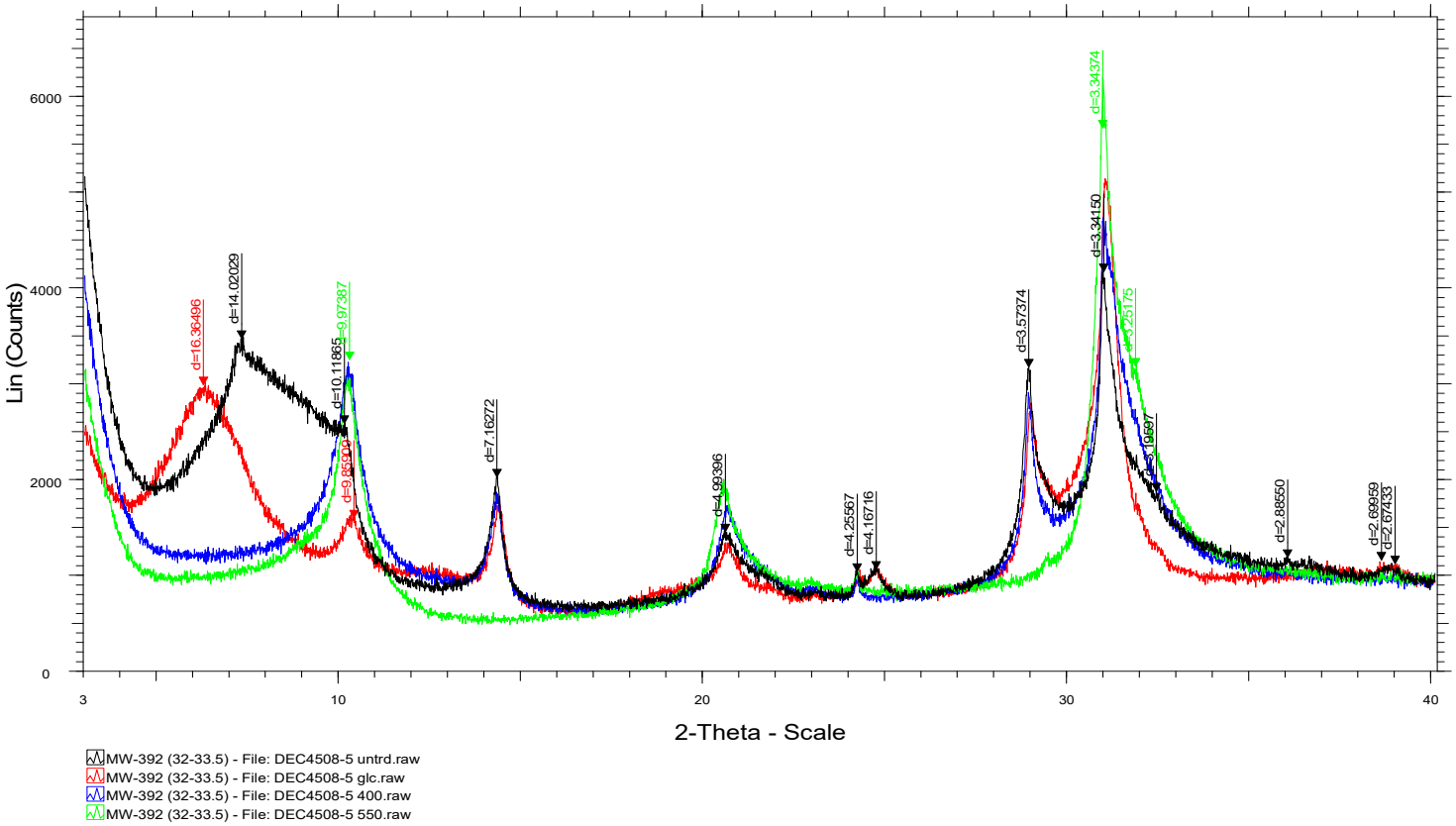

MW-392 (80-82)
DEC4508-Filter.raw_1
6.46868
32.02226
43.16615
Quartz 29.83 %
Muscovite 2M1 13.05 %
Albite 0.60 %
Microcline intermediate1 1.01 %
Kaolinite 5.53 %
Chlorite IIb 1.60 %
Nontronite 4.20 %
Magnetite 1.37 %
Anatase 0.85 %
Illite 4.11 %
Illite/Mont - 11A 3.57 %
Calcite 28.09 %
Montmorillonite-14A 3.49 %
Fluorapatite 2.68 %
Counts
2Th Degrees

MW-392 (80-82)


Lin (Counts)
6000
4000
2000
0
3
10
20
30
40
2-Theta - Scale
d=13.34383
d=9.95455
d=10.07238
d=16.26116
d=5.33708
d=13.99773
d=9.71013
d=8.36783
d=7.09097
d=5.43664
d=4.97410
d=4.90796
d=4.72975
d=4.50130
d=4.25977
d=4.20435
d=3.84770
d=3.57128
d=3.53346
d=3.34374
d=3.34406
d=3.30639
d=3.26371
d=3.02896
d=2.78138
MW-392 (80-82) - File: DEC4508-4 untrd.raw
MW-392 (80-82) - File: DEC4508-4 glc.raw
MW-392 (80-82) - File: DEC4508-4 400.raw
MW-392 (80-82) - File: DEC4508-4 550.raw


MW-392 (32-33.5)
DEC4508met.raw_1
8.859476
33.22146
42.63083
Quartz 52.14 %
Muscovite 2M1 8.95 %
Albite 9.10 %
Microcline intermediate1 6.51 %
Kaolinite 6.75 %
Chlorite IIb 5.84 %
Nontronite 1.63 %
Magnetite 0.12 %
Anatase 0.60 %
Illite 0.65 %
Illite/Mont - 11A 2.70 %
Calcite 0.04 %
Montmorillonite-14A 3.27 %
Fluorapatite 0.34 %
Ankerite Fe0.55 1.36 %
Counts
2Th Degrees

MW-392 (32-33.5)


Lin (Counts)
6000
4000
2000
0
3
10
20
30
40
2-Theta - Scale
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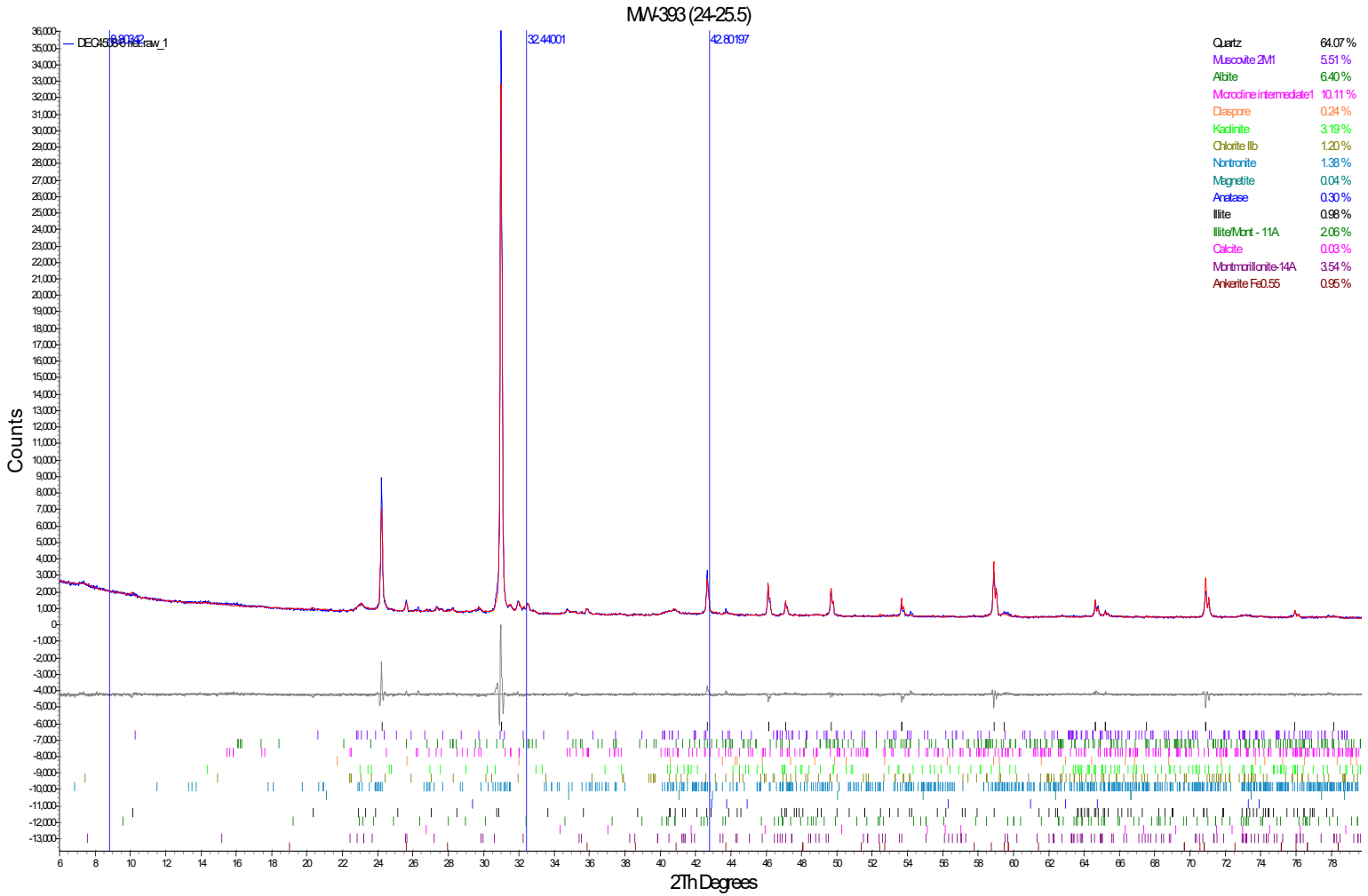
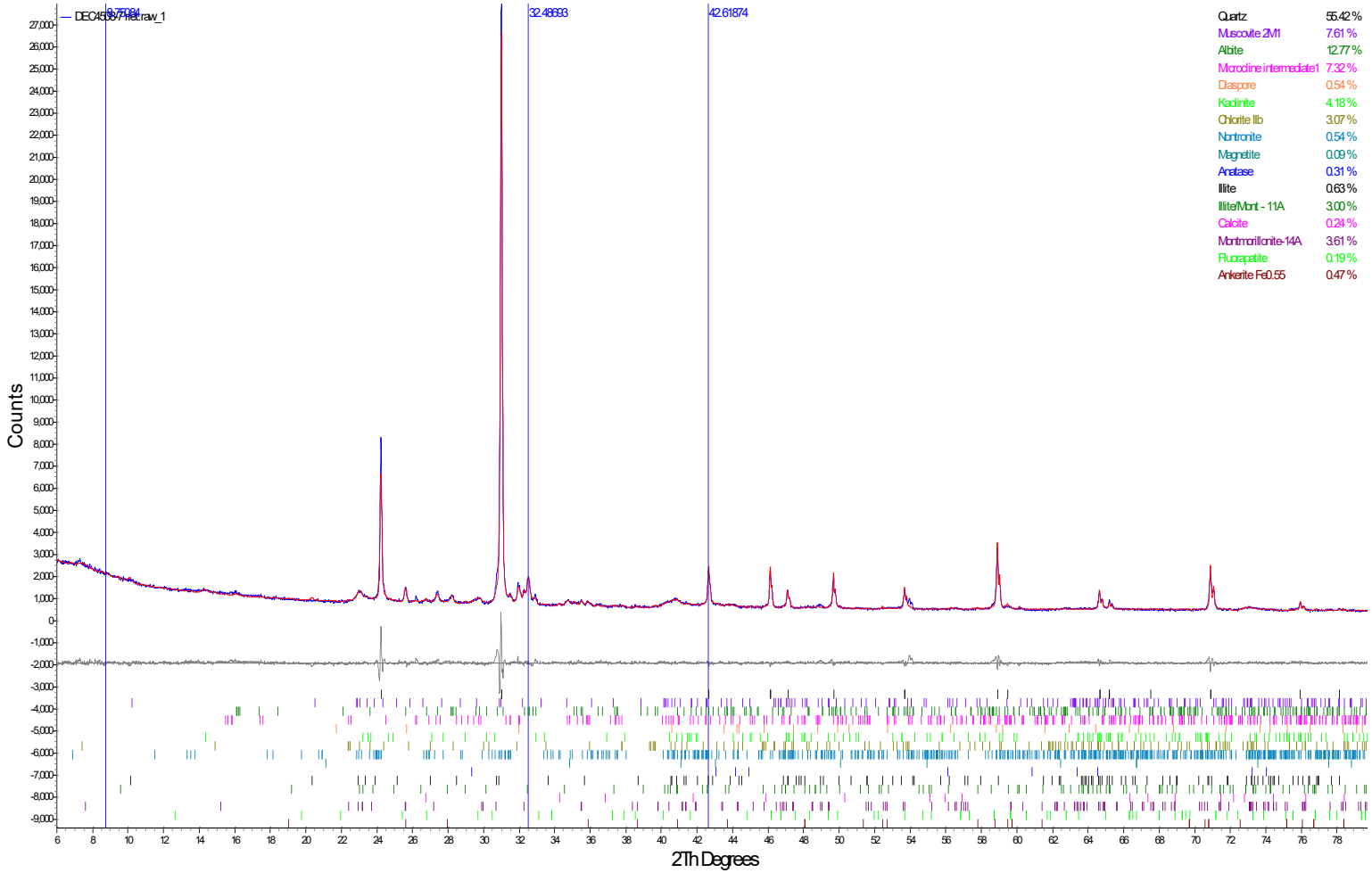
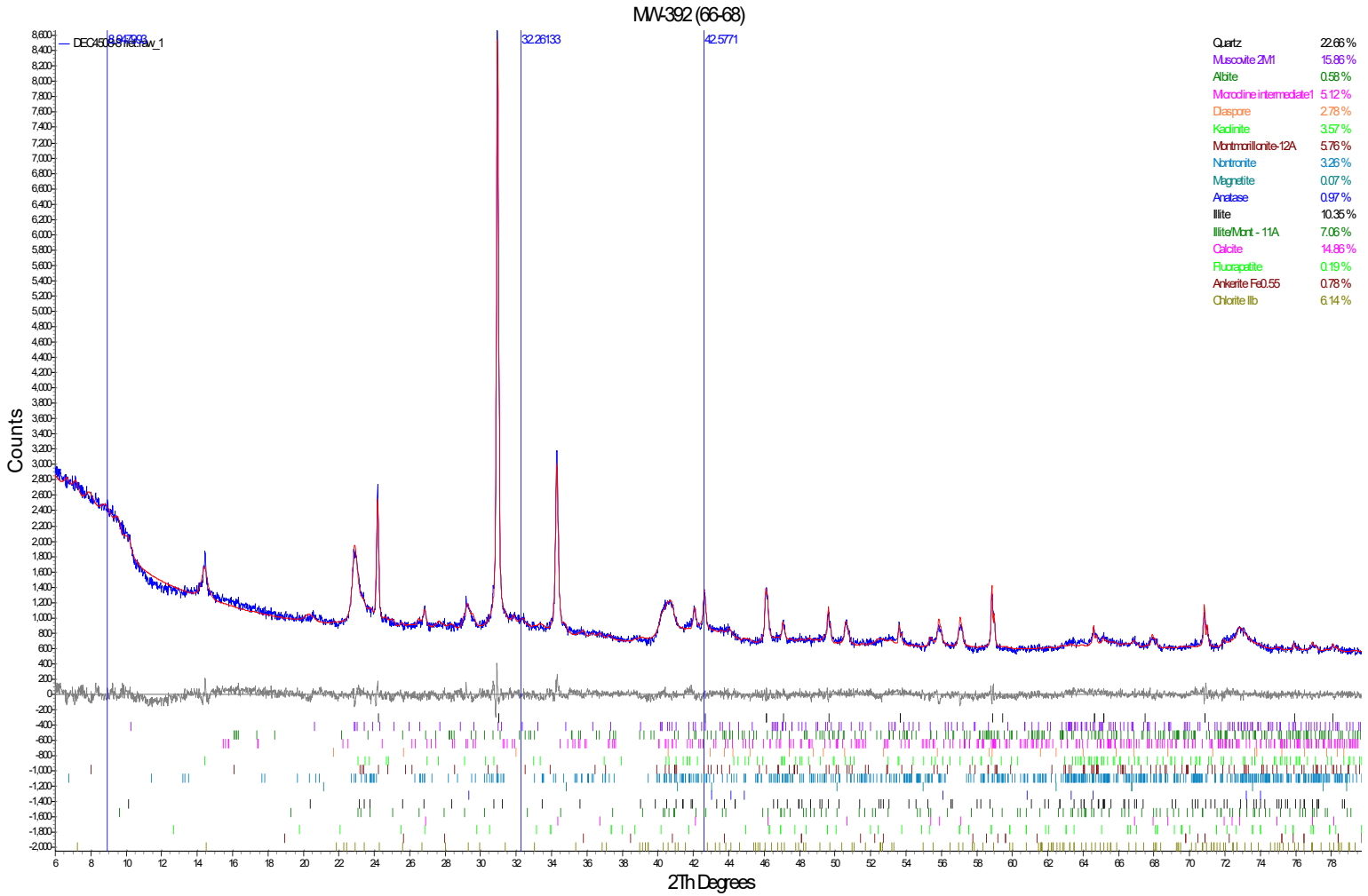
d=14.02029
d=10.11865
d=9.97387
d=9.85904
d=7.16272
d=4.99396
d=4.25567
d=4.16716
d=3.57374
d=3.34374
d=3.34150
d=3.25175
d=3.19697
d=2.88550
d=2.69959
d=2.67433
MW-392 (32-33.5) - File: DEC4508-5 untrd.raw
MW-392 (32-33.5) - File: DEC4508-5 glc.raw
MW-392 (32-33.5) - File: DEC4508-5 400.raw
MW-392 (32-33.5) - File: DEC4508-5 550.raw

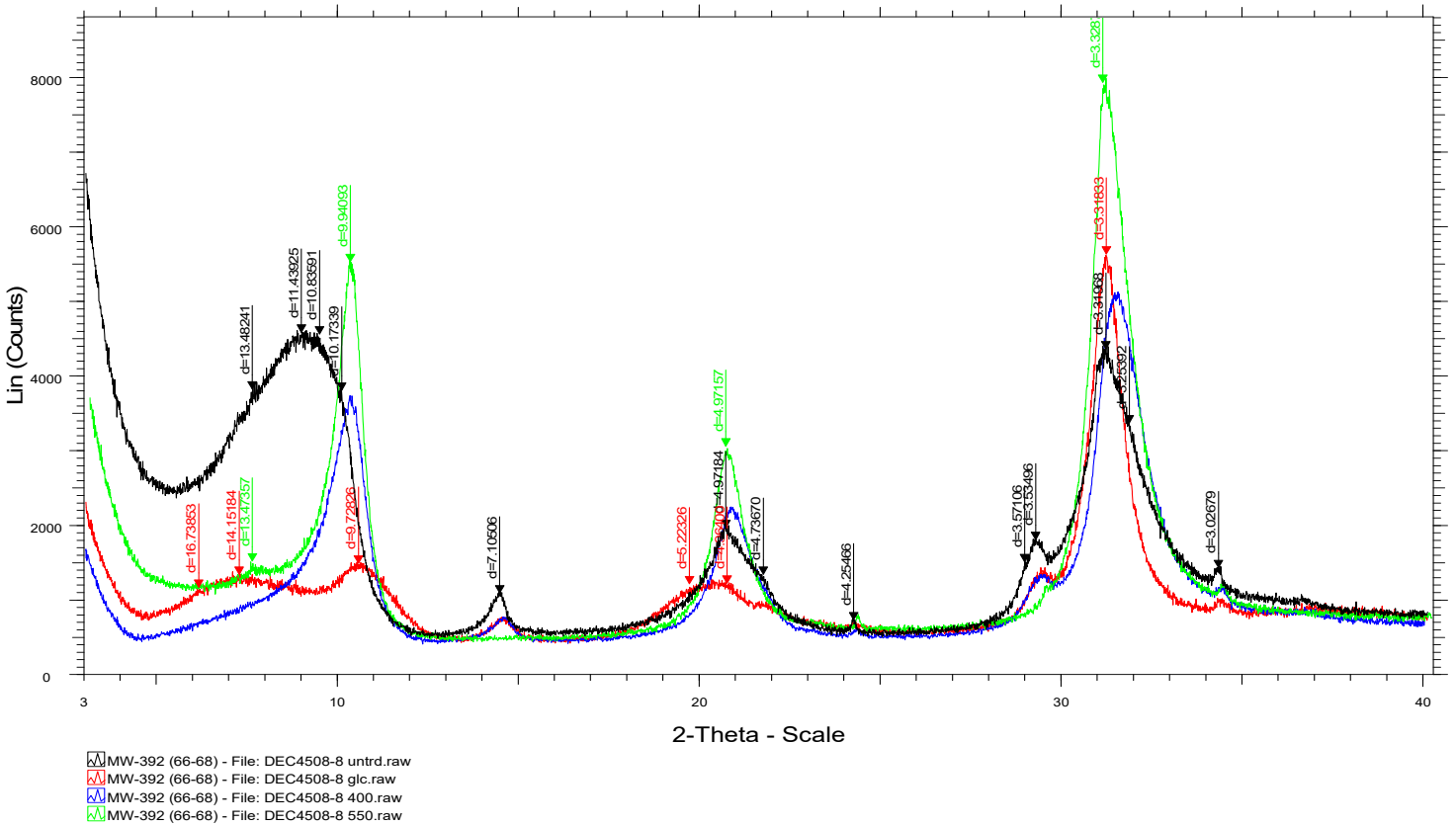

MW-393 (24-25.5)
DEC4508-mid.raw_1
8.80342
32.44001
42.80197
Quartz 64.07 %
Muscovite 2M1 5.51 %
Albite 6.40 %
Microcline intermediate1 10.11 %
Diaspore 0.24 %
Kaolinite 3.19 %
Chlorite IIb 1.20 %
Nontronite 1.38 %
Magnetite 0.04 %
Anatase 0.30 %
Illite 0.98 %
Illite/Mont - 11A 2.06 %
Calcite 0.03 %
Montmorillonite-14A 3.54 %
Ankerite Fe0.55 0.95 %
Counts
2Th Degrees

MW-394 (20.5-22)


DEC4508-mt.raw_1
32.48693
42.61874
Counts
2Th Degrees
Quartz 55.42 %
Muscovite 2M1 7.61 %
Albite 12.77 %
Microcline intermediate1 7.32 %
Diaspore 0.54 %
Kaolinite 4.18 %
Chlorite IIb 3.07 %
Nontronite 0.54 %
Magnetite 0.09 %
Anatase 0.31 %
Illite 0.63 %
Illite/Mont - 11A 3.00 %
Calcite 0.24 %
Montmorillonite-14A 3.61 %
Fluorapatite 0.19 %
Ankerite Fe0.55 0.47 %


MW-392 (66-68)
8.842999
32.26133
42.5771
Quartz 22.66 %
Muscovite 2M1 15.86 %
Albite 0.58 %
Microcline intermediate1 5.12 %
Diaspore 2.78 %
Kaolinite 3.57 %
Montmorillonite-12A 5.76 %
Nontronite 3.26 %
Magnetite 0.07 %
Anatase 0.97 %
Illite 10.35 %
Illite/Mont - 11A 7.06 %
Calcite 14.86 %
Fluorapatite 0.19 %
Ankerite Fe0.55 0.78 %
Chlorite IIb 6.14 %
Counts
2Th Degrees

MW-392 (66-68)


Lin (Counts)
0
2000
4000
6000
8000
3
10
20
30
40
2-Theta - Scale
d=13.48241
d=11.43925
d=10.83691
d=10.17339
d=9.94093
d=16.73853
d=14.15184
d=13.47357
d=9.72826
d=7.10506
d=5.22326
d=4.97157
d=4.97184
d=4.73670
d=4.25466
d=3.57106
d=3.53496
d=3.32812
d=3.31693
d=3.31693
d=3.22592
d=3.02679
MW-392 (66-68) - File: DEC4508-8 untrd.raw
MW-392 (66-68) - File: DEC4508-8 glc.raw
MW-392 (66-68) - File: DEC4508-8 400.raw
MW-392 (66-68) - File: DEC4508-8 550.raw