BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATION, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

NOTICE OF FILING

To: Pollution Control Board, Attn: Clerk
100 West Randolph Street
James R. Thompson Center
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Chicago, Illinois 60601-3218
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Division of Legal Counsel
Illinois Environmental Protection Agency
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
epa.dlc@illinois.gov

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the attached **PETITION FOR REVIEW OF ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S NON-CONCURRENCE WITH ALTERNATIVE SOURCE DEMONSTRATION UNDER 35 ILL. ADMIN. CODE PART 845 AND MOTION FOR STAY**; **APPEARANCES OF JOSHUA MORE, BINA JOSHI, AND SAMUEL RASCHE**; and a **CERTIFICATE OF SERVICE**, copies of which are herewith served upon you.

/s/ *Samuel A. Rasche*
Dated: December 2, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATION, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

APPEARANCE OF JOSHUA R. MORE
AND CONSENT TO E-MAIL SERVICE

I, Joshua R. More, hereby enter my appearance on behalf of DYNEGY MIDWEST GENERATION, LLC and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

Joshua.More@afslaw.com

/s/ *Joshua R. More*
Joshua R. More

Dated: December 2, 2024

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Attorney for Dynegy Midwest Generation, LLC

BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATION, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

APPEARANCE OF BINA JOSHI
AND CONSENT TO E-MAIL SERVICE

I, Bina Joshi, hereby enter my appearance on behalf of DYNEGY MIDWEST GENERATION, LLC and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

Bina.Joshi@afslaw.com

/s/ *Bina Joshi*
Bina Joshi

Dated: December 2, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATION, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

APPEARANCE OF SAMUEL A. RASCHE
AND CONSENT TO E-MAIL SERVICE

I, Samuel A. Rasche, hereby enter my appearance on behalf of DYNEGY MIDWEST GENERATION, LLC and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

Sam.Rasche@afslaw.com

/s/ *Samuel A. Rasche*
Samuel A. Rasche

Dated: December 2, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATING, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 2nd day of December, 2024:

I have electronically served a true and correct copy of the attached Petition for Review of Illinois Environmental Protection Agency's Non-Concurrence with Alternative Source Demonstration Under 35 Ill. Admin. Code Part 845 and Motion for Stay and Appearances of Joshua R. More, Bina Joshi, and Samuel A. Rasche by electronically filing with the Clerk of the Illinois Pollution Control Board and by e-mail upon the following persons:

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My e-mail address is sam.rasche@afslaw.com

The number of pages in the e-mail transmission is 420.

The e-mail transmission took place before 5:00 p.m.

/s/ Samuel A. Rasche
Samuel A. Rasche

Dated: December 2, 2024

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BEFORE THE

ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATION, LLC Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2025-________**

PETITION FOR REVIEW OF ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S NON-CONCURRENCE WITH ALTERNATIVE SOURCE DEMONSTRATION UNDER 35 ILL. ADM. CODE PART 845 AND MOTION FOR STAY

Petitioner Dynegy Midwest Generation, LLC ("DMG" or "Petitioner"), pursuant to Sections 105.200 *et seq.* and 845.650(e) of Title 35 of the Illinois Administrative Code, 35 Ill. Adm. Code §§ 105.200 *et seq.* and § 845.650(e), appeals the final decision of the Illinois Environmental Protection Agency ("IEPA" or the "Agency") that did not concur with the Alternative Source Demonstration for the Baldwin Power Plant Bottom Ash Pond submitted to the Agency on September 12, 2024 (the "Baldwin ASD"). IEPA's non-concurrence is stated in a letter from IEPA Division of Water Pollution Control Permit Section Manager Darin LeCrone to DMG dated October 3, 2024, and received by DMG on October 28, 2024, via U.S. Mail, which is attached as **Exhibit A** (the "IEPA Denial"). As detailed in Section below, the reasons and statutory bases articulated in the IEPA Denial are inadequate to support IEPA's nonconcurrence with the Baldwin ASD. The Baldwin ASD demonstrated the Baldwin Power Plant Bottom Ash Pond did not cause or contribute to detected exceedance of fluoride in well MW-392 and that an alternative source was responsible for the detected exceedance. The Denial is impermissibly vague, is directly inconsistent with other decisions made by the Agency, and is based on a request for information that is not required or necessary to support the Baldwin ASD. For the reasons set forth in Section III below, Petitioner also requests a partial stay of Part 845 requirements as they apply to the exceedance at issue in this Petition.

In support of this Petition and Motion for Stay, DMG states as follows:

I. BACKGROUND

Regulatory Background

1. IEPA regulates coal combustion residuals ("CCR") surface impoundments under 35 Ill. Adm. Code. Part 845 ("Part 845").[1] Part 845 includes requirements for regular groundwater monitoring. 35 Ill. Adm. Code § 845.650.

2. If, during groundwater monitoring, one or more constituents are detected and confirmed to be in exceedance of the groundwater protection standards in Section 845.600 ("GWPS"), a series of additional steps are triggered.

3. Within 60 days after detecting an exceedance of a GWPS, an owner or operator may submit an Alternative Source Demonstration ("ASD") to IEPA demonstrating "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 GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction." 35 Ill. Adm. Code § 845.650(e).

[1] Subsequent references in this petition to "Section 845.xxx" or "§ 845.xxx" shall be to 35 Ill. Adm. Code, Part 845, unless otherwise specified.

4. The ASD must "include a report that contains the factual or evidentiary basis for any conclusions and a certification of accuracy by a qualified professional engineer." *Id.*

5. IEPA must send a public notice of the ASD, and members of the public may submit written comments to IEPA within 14 days of the notice. *Id.*

6. Within 30 days after receiving an ASD, IEPA must provide a written response to the owner or operator of the CCR surface impoundment either concurring or not with the ASD. If IEPA concurs, the owner or operator must continue groundwater monitoring, but is not required to take additional actions in connection with the identified exceedance, including initiating an assessment of corrective measures. If IEPA does not concur, the owner or operator may petition the Board for review of the non-concurrence. *Id.*

7. Other requirements are prompted in the absence of an ASD, or in the event an ASD is denied and a stay is not granted. For example, within 90 days after detecting an exceedance of a GWPS, the owner or operator of the CCR surface impoundment must initiate an assessment of corrective measures. 35 Ill. Adm. Code § 845.660(a). The owner or operator must, within 90 days of initiating its assessment of corrective measures (or up to 60 days longer if an extension is requested and granted), submit to the Agency an assessment of corrective measures. *Id.* at § 845.660(a)(2). Within a year of completing the assessment of corrective measures, an owner or operator must submit a construction permit application and corrective action plan to IEPA identifying the selected remedy. *Id* at § 845.670(b).

B. DMG's Prior Accepted Alternative Source Demonstrations for the BAP

8. DMG owns and operates the Baldwin Power Plant ("Baldwin") located in Randolph County and St. Clair County in southwest Illinois, approximately 0.5 miles west-northwest of the

village of Baldwin. Baldwin includes the Bottom Ash Pond ("BAP"), a CCR surface impoundment regulated under Part 845.

9. On August 28, 2023, groundwater monitoring at Baldwin identified GWPS exceedances for chloride at monitoring well MW-370 and for fluoride at monitoring well MW-393. After notifying IEPA of the groundwater monitoring results,[2] on October 27, 2023, DMG submitted an alternative source demonstration (the "2023 ASD"), demonstrating that the BAP was not the cause of or contributing to the detected exceedances, and identifying "natural variability associated with the lithology of the aquifer" as the alternative source of the exceedances. Geosyntec, Alternative Source Demonstration, Baldwin Power Plant Bottom Ash Pond (Unit ID #601), IEPA ID: W1578510001-06, 35 IAC 845.650 (October 27, 2023) (attached as **Exhibit C).**

10. The 2023 ASD presented four lines of evidence to support its conclusion. First, the 2023 ASD demonstrated that [c]hloride and fluoride concentrations in the BAP porewater are historically more than 10 times lower than the chloride concentrations observed at MW-370 and the fluoride concentrations observed at MW-393." *Id.* at 9. Second, the 2023 ASD demonstrated that "[c]ompliance monitoring locations MW-370 and MW-393 have similar geochemical signatures as upgradient monitoring well MW-343" and "a statistical evaluation has shown that their groundwater compositions are distinct from the porewater geochemical signature." *Id.* Third, the 2023 ASD demonstrated that "stable boron isotopic ratio in groundwater at MW-370 is similar to the same ratio in groundwater at upgradient monitoring well MW-358 and dissimilar form the BAP porewater," indicating that "groundwater geochemistry at MW-370 is not influenced by the

[2] Ramboll, 35 I.A.C. § 845.610(b)(3)(D) Groundwater Monitoring Data and Detected Exceedances, 2023 Quarter 2, Bottom Ash Pond, Baldwin Power Plant, Baldwin, Illinois (August 28, 2023) (available at https://www.luminant.com/documents/ccr/il-ccr/Baldwin/2023/2023-Baldwin%20BAP%202nd%20quarter%2035%20IAC%20845%20GW%20report-Baldwin-Bottom%20Ash%20Pond-W1578510001-06.pdf). The 2023 Quarter 2 Groundwater Monitoring report is incorporated by reference into this ASD.

BAP." *Id.* In support of these lines of evidence and conclusions, the 2023 ASD included diagrams of the BAP groundwater monitoring network, a geologic cross section of the area, and a potentiometric surface map of the uppermost aquifer. *Id.* at Attachments 1-3.

11. Finally, the 2023 ASD demonstrated that "[s]olid phase analysis of rock cores from the uppermost aquifer (i.e., bedrock) identified chloride and fluoride within the naturally occurring minerals of the bedrock" and "elevated concentrations of chloride and 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 solid phase composition." *Id.* at 9. In support of this line of evidence, the 2023 ASD included laboratory analytical reports for solid phase anions and x-ray diffraction of bedrock soil samples, as well as the underlying soil boring logs. *Id.* at 8, Attachments 4-6.

12. Based upon the above lines of evidence, the 2023 ASD concluded that "the chloride GWPS exceedance at MW-370 and the fluoride GWPS exceedance at MW-393 are not caused by a release from the BAP CCR unit," and that the "alternative source of both chloride and fluoride is the influence of the shale bedrock lithology on the groundwater composition." *Id.*

13. In response to feedback provided by IEPA on unrelated previously submitted ASDs, on November 10, 2023, DMG submitted a comment letter to IEPA containing additional support for the 2023 ASD. Letter from Geosyntec to Heather Mullenax Re: Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration Addendum (November 10, 2023) (attached as **Exhibit D).** With that letter, DMG provided additional boring logs and sampling and analytical data (much of which had previously been submitted to IEPA through permit applications that were referenced in the 2023 ASD). *Id.* at 2-3. That letter also explained "The multiple lines of evidence analysis for the Baldwin BAP ASD demonstrates, among other findings, that natural variability associated with the shale bedrock lithology of the aquifer is the source of the elevated chloride

concentrations at MW-370 and elevated fluoride concentrations at MW-393" demonstrated by the "solid phase laboratory analytical data form bedrock samples collected at the site in Attachments 4 and 6 of the ASD submittal." *Id.* at 1, 4.

14. On November 28, IEPA issued a letter concurring with the 2023 ASD (the "2023 Concurrence") (attached as **Exhibit E**). In the concurrence letter, IEPA stated that, "based on the provided evidence, the Illinois EPA concurs that the chloride and fluoride exceedances found in MW-370 and MW-393, respectively, do not come from the Baldwin Power Plant Bottom Ash Pond" and that it "also concurs that the likely source of the exceedances come[sic] from native bedrock." *Id.*

15. In July of 2024, DMG submitted an additional ASD for a detected lithium exceedance at MW-370 ("July 2024 ASD"). Geosyntec, Alternative Source Demonstration, Baldwin Power Plant Bottom Ash Pond (Unit ID #601), IEPA ID: W1578510001-06, 35 IAC 845.650 (July 8, 2024) (available at https://www.luminant.com/documents/ccr/il-ccr/Baldwin/2024/2024%2007%2009%20Baldwin%20BAP%20845.650%20ASD-W1578510001-06.pdf) (excerpts attached as **Exhibit F)**. The July 2024 ASD similarly identified the shale bedrock as the alternative source of the exceedance. *Id.* at 11. Again, in support of this conclusion, the July 2024 ASD provided laboratory analysis of soil boring samples, as well as the underlying soil boring logs. *Id.* at 8-9, Attachments 4, 7, & 9.

16. On August 8, 2024, IEPA issued a letter concurring with the July 2024 ASD (the "2024 Concurrence") (attached as **Exhibit G).** In the 2024 Concurrence, IEPA stated that, "[b]ased on the provided evidence," it concurred with DMG's conclusion that the BAP did not cause the lithium exceedance and that "the likely source of the exceedance come[sic] from shale bedrock." *Id.*

C. DMG's September 2024 Alternative Source Demonstration

17. On July 19, 2024, groundwater monitoring at the BAP detected an additional GWPS exceedance for fluoride at well MW-392. Ramboll, 35 I.A.C. § 845.610(b)(3)(D), Groundwater Monitoring Data and Detected Exceedances, Quarter 2, 2024, Bottom Ash Pond, Baldwin Power Plant, Baldwin, Illinois (July 19, 2024).[3] DMG notified IEPA of its groundwater monitoring results, including the new fluoride exceedance, by submitting those results to the Agency, placed the results on its Part 845 public website for the BAP, and contracted with an environmental consultant to further investigate the cause of the GWPS exceedance. *Id.*

18. On September 12, 2024, DMG submitted the Baldwin ASD to IEPA. The Baldwin ASD concluded that the BAP did not cause or contribute to the fluoride exceedance at MW-392 and that naturally occurring fluoride in the shale bedrock was the cause of the exceedance. The lines of evidence and conclusions reached in the Baldwin ASD are consistent with the 2023 ASD and July 2024 ASD submitted for the BAP. The Baldwin ASD is attached as **Exhibit B**.

19. The Baldwin ASD identified four lines of evidence in support of the conclusion that an alternative source, and not the BAP, is the cause of and the BAP did not contribute to the fluoride exceedance at MW-392. **Exhibit B** at 10. First, consistent with the 2023 ASD for fluoride, the Baldwin ASD demonstrated that "BAP concentrations of fluoride are lower than groundwater concentrations." *Id.* at 4. As with the 2023 ASD accepted by IEPA, the Baldwin ASD provided porewater data and boring logs as evidence of fluoride concentrations within the BAP. *Id.* The Baldwin ASD explained that if "the BAP were the source of fluoride in groundwater, BAP porewater concentrations would be expected to be greater than the concentrations in the

[3] Available at https://www.luminant.com/documents/ccr/il-ccr/Baldwin/2024/2024-Baldwin%20BAP%202024%202nd%20quarter%2035%20IAC%20845%20GW%20report-Baldwin-Bottom%20Ash%20Pond-W1578510001-06.pdf. This groundwater monitoring report is incorporated by reference into this Petition.

groundwater." *Id.* However, "fluoride concentrations in the BAP are historically more than 10 times lower than the minimum fluoride concentrations detected at MW-392," indicating that the BAP is not the cause of the fluoride exceedance. *Id.* at 10.

20. Second, and consistent with both the October 2023 and July 2024 ASDs accepted by IEPA, the Baldwin ASD demonstrated MW-392 "has a similar ionic composition to the groundwater from background monitoring well MW-358." *Id.* at 4. The Baldwin ASD presented piper diagrams and the results of principle component analysis demonstrating that the groundwater compositions of wells MW-392 and MW-358 "are distinct from the porewater geochemical signature," further indicating that the BAP is not the cause of the fluoride exceedance. *Id.* at 10.

21. Third, and consistent with both the October 2023 and July 2024 ASDs accepted by IEPA, the Baldwin ASD demonstrated that "stable lithium and boron isotopes provide further evidence that the [uppermost aquifer] has a geochemical signature distinct from BAP porewater." *Id.* at 7. The Baldwin ASD explained that boron from Illinois coal and coal ash typically has "depleted isotope ratios" and that "BAP porewater has a boron isotopic composition consistent with . . . Illinois basin coal-derived CCR." *Id.* In contrast, "sediments formed during deposition from marine environments, such as the shales identified within the uppermost aquifer" at Baldwin can have "enriched" boron isotope ratios, and groundwater collected from the bedrock shale (from wells MW-358 and MW-370) and downgradient wells (MW-392 and MW-393) is consistent with this fact. *Id.* Analysis of lithium isotopes yielded similar results. *Id.* at 8. Accordingly, the Baldwin ASD concluded that "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." *Id.* at 8.

22. Finally, and again consistent with both the October 2023 and July 2024 ASDs accepted by IEPA, the Baldwin ASD demonstrated that fluoride is present "within the naturally occurring minerals of the shale bedrock, thereby providing an alternative source of fluoride in groundwater." *Id.* at 10. As with the previous ASDs accepted by IEPA, the Baldwin ASD reached this conclusion based on "solid phase analysis of rock cores from the uppermost aquifer" including solid phase anion analysis and X-ray diffraction. *Id.* at 8. To support its conclusion the Baldwin ASD provided laboratory analytical reports and boring logs (the same supporting documents provided to characterize the shale bedrock in the prior ASDs accepted by IEPA). *Id.* at 8-9, Attachments 4, 7 & 8.

23. Based on the above lines of evidence, the Baldwin ASD concluded that "the alternative source of fluoride is the shale bedrock lithology, whose geochemistry influences the groundwater composition" and that "the BAP CCR unit did not contribute to the GWPS exceedance for fluoride at MW-392." *Id.* at 10.

24. While IEPA concurred with the 2023 ASD and July 2024 ASD, IEPA issued a denial letter for the Baldwin ASD.

C. The IEPA Denial

25. On October 28, 2024, IPGC received the IEPA Denial, a one-page letter from IEPA dated October 3, 2024, notifying IPGC of IEPA's non-concurrence with the Baldwin ASD. The IEPA Denial states that IEPA "does not concur" due to a single multi-part "data gap." **Exhibit A**.

26. IEPA's "data gap" states "[c]haracterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD." *Id.* This statement is expanded by two bullet points: The first states "35 IAC 845.640(a) requires evidence of field collection methods and field and laboratory quality control and quality assurance." ("Data Gap 1"). The second states, "35 IAC 845.650(e) requires alternative source data as evidence of

the alternative source, see item 1(a)(i) above. SW836 chapter 1, incorporated by reference in 35 IAC 845, states that regulatory decisions must be made with environmental data." ("Data Gap 2").

27. The Denial does not otherwise explain the "data gap" or address the contents of the Baldwin ASD. Nor does the Denial acknowledge that IEPA previously accepted an ASD identifying the same alternative source for the same constituent using the same evidence and supporting documentation.

II. Discussion

28. IEPA's Denial is both legally and factually insufficient to form the basis of a final Agency decision. IEPA's "data gaps" are impermissibly vague and ambiguous, inconsistent with the Agency's precedent in previous ASD decisions, and not supported by IEPA's regulatory authority or the requirements set forth under Section 845.650.

A. IEPA's Denial is Insufficient to Provide Notice of the Bases for the Denial

29. As an initial matter, IEPA's Denial lacks sufficient clarity to allow DMG to ascertain either why IEPA found the data and analysis in the Baldwin ASD to be lacking or what additional information DMG could have included in the Baldwin ASD for IEPA to concur. Because a petitioner bears the burden of proof in an appeal of an ASD nonconcurrence, fundamental fairness requires that the Agency's denial provide "notice of what evidence [petitioner] needs to establish its case." *Centralia Environmental Services, Inc. v. IEPA*, PCB 89-170, slip op. at 6 (May 10, 1990); *see also, Pulitzer Community Newspapers, Inc. v. IEPA*, PCB 90-142, slip op. at 6 (Dec. 20, 1990). IEPA's Denial fails to provide such notice.

30. In "Data Gap 1" IEPA references 35 Ill. Adm. Code 640(a), stating it "requires evidence of field collection methods and field and laboratory quality control and assurance." **Exhibit A.** However, the Baldwin ASD did provide soil boring logs, as well as a laboratory analytical report including chain of custody documentation for the sampling conducted of the

bedrock. **Exhibit B** at 8-9; Declaration of Melinda W. Hahn at 7 (December 2, 2024) (attached as **Exhibit H**). The Baldwin ASD also relied upon and included similar documentation regarding the bedrock sampling as the previously approved 2023 ASD and July 2024 ASD. It is not clear from the text of the Denial why IEPA believes this supporting documentation is lacking or what additional documentation IEPA seeks. To the extent IEPA is seeking *additional* supporting documentation, the Denial provides no explanation of what that additional documentation might be.

31. Similarly, "Data Gap 2" references 35 Ill. Adm. Code 845.650(e) and states that it "requires alternative source data," and "that regulatory decisions must be made with environmental data." **Exhibit A.** Again, the Baldwin ASD *did* provide environmental data of the alternative source – the sampling and analysis of rock cores from the bedrock. **Exhibit B** at 8-9; **Exhibit H** at 7-8. Nothing in the Denial indicates if or why IEPA determined this information is not "environmental data." Nor does this "Data Gap" explain what "environmental data," if any, IEPA believes is missing. Again, the environmental data the Baldwin ASD relies upon for the alternative source (i.e. the bedrock) is the same as that included in the approved 2023 ASD and July 2024 ASD. Adding to the confusion, "Data Gap 2" directs DMG to "see item 1(a)(i) above." But the Denial is a single page letter consisting of three un-numbered bullet points – there is no "item 1(a)(i)" to be seen.[4]

32. IEPA's vague and contradictory Denial provides DMG an insufficient explanation of the Agency's reason(s) for Denial, including what additional facts or evidence, if any, the

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[4] The Denial also mistakenly refers to the "Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration (ASD) for ar*senic*." **Exhibit A** (emphasis added). As there was no detected exceedance for arsenic and the ASD deals only with fluoride, DMG assumes that this was simply a typo. Further evidencing the lack of attention paid to the Denial, the letter is incorrectly addressed to DMG's sister company, Illinois Power Generating Company.

Agency believes DMG must have put forward to prevail in its ASD. Even if DMG had full notice of the "Data Gaps" prior to preparing the Baldwin ASD, there is no way to determine from the text of the Denial what information, if any, DMG could have added to the Baldwin ASD to satisfy the Agency. **Exhibit H** at 7. The Denial forces DMG to play a guessing game both in this appeal as well as in the preparation of future ASDs. This outcome is fundamentally unfair and contrary to Illinois law. *See Cassens and Sons, Inc. v. IEPA*, PCB 01-102, slip op. at 10 (Nov. 18, 2004).

B. IEPA's Denial is Arbitrary and Inconsistent with Prior Decisions.

33. IEPA's Denial is also improper, and should not be upheld, because it is directly and arbitrarily inconsistent with the Agency's prior decisions regarding the BAP. As explained above, DMG submitted two prior ASDs for the BAP identifying natural variability in the uppermost bedrock aquifer as an alternative source of detected GWPS exceedances. *See* 2023 ASD at 9; July 2024 ASD at 11; **Exhibit H** at 3-5. IEPA, after reviewing DMG's "provided evidence," concurred with these previous ASDs, including their conclusion that the native shale bedrock is the source of the chloride, fluoride, and lithium exceedances detected at wells MW-370 and MW-393. **Exhibit E**; **Exhibit G**. IEPA's Denial of the Baldwin ASD inexplicably reaches the opposite conclusion for the fluoride exceedance at well MW-392.

34. Critically, the lines of evidence presented in the October 2023 ASD and July 2024 ASD are the same as those presented in the Baldwin ASD, and the same or analogous data and supporting documentation was provided in all three ASDs. **Exhibit H** at 8-9; *compare* October 2023 ASD at ii-iii, 10, *with* July 2024 ASD at ii-iii, 11, *and* Baldwin ASD at ii-iii, 10. Specifically regarding the evidence of the alternative source, the apparent focus of IEPA's Denial, in all three ASDs DMG provided sampling and analysis of rock cores from the site bedrock, and included supplementary documentation in the form of soil boring logs, isotope ratio laboratory analytical reports with chain of custody documentation, and quantitative x-ray diffraction analytical reports

with a method summary. *Id.* There is no rational basis for the conclusion that this information was sufficient in October 2023 and July 2024, but suddenly the basis for a "data gap" in September 2024.

35. The *only* difference between the denied Baldwin ASD and the two prior accepted ASDs is that the 2nd Quarter 2024 groundwater monitoring detected an exceedance at a new well, MW-392. **Exhibit H** at 8. However, the lines of evidence, and data and supporting documentation, are equally applicable to the fluoride exceedance in MW-392 as they were to the exceedances discussed in the 2023 ASD and July 2024 ASD. *Id.* MW-392 is screened with the same bedrock uppermost aquifer as wells MW-370 and MW-393 at issue in the October 2023 and July 2024 ASDs. **Exhibit H** at 3-5, 8-9; Baldwin ASD at 2-3. Since DMG has already demonstrated, and IEPA has concurred, that this *specific* bedrock formation is a source of fluoride in groundwater, it is logical and not unexpected that fluoride would be detected in additional wells screened within the same formation. *Id.*

36. Regardless, IEPA's Denial does not present any supposed differences between monitoring wells as a basis for its decision. Instead, the Denial claims to rely on "data gaps" in the "[c]haracterization . . . of alternative source." **Exhibit A.** But the alternative source identified in the Baldwin ASD is the same source identified in the October 2023 and July 2024 ASDs, and it was characterized using the same methods and supporting materials in all three ASDs. **Exhibit H** at 8-9; *compare* October 2023 ASD at 8 *with* July 2024 ASD at 8-9 *and* Baldwin ASD at 8-9. Thus, even if there was a scientific basis to distinguish the Baldwin ASD from the two prior ASDs accepted by IEPA (there is not), IEPA's stated "data gaps" would still be illogical and insufficient to form a basis for its decision.

37. IEPA repeatedly accepted an alternative source characterization as adequate and then, without notice or explanation, appears to have found the *same* characterization of the *same* source to be inadequate only months later. The "data gaps" are thus arbitrary and illogical, and as such inadequate to form a basis for the IEPA's Denial.

C. There are no "Data Gaps" in the Baldwin ASD.

38. Finally, regardless of what IEPA intended to request, the Baldwin ASD sufficiently proves by a preponderance of the evidence that the BAP is not the cause of or contributing to the fluoride exceedance at MW-392 and that naturally occurring fluoride in bedrock is the cause of the exceedance. Any additional data or analysis requested by IEPA is not necessary to support the conclusions of the Baldwin ASD and is not required by Section 845.650(e). The regulation requires only that DMG submit a "demonstration . . . that a source other than the CCR surface impoundment caused the contamination and that the CCR surface impoundment did not contribute to the contamination." 35 Ill. Adm. Code § 845.650(e). In support of the demonstration, the regulations require that an ASD "include a report that contains the factual or evidentiary basis for any conclusions and a certification of accuracy by a qualified professional engineer. *Id.* The Baldwin ASD report does just that through a scientifically supported analysis that contains multiple lines of evidence and is certified by a qualified professional engineer. **Exhibit B**; *see also,* **Exhibit H** at 4, 7-8. Any further information identified by IEPA's "data gaps" is not necessary to form a "factual and evidentiary basis" for the conclusions reached in an ASD. The information would not lead to a different conclusion, and the fact that it was not submitted is inadequate to support the Agency's nonconcurrence with the Baldwin ASD.

1. <u>"Dat Gap 1"</u>

39. "Data Gap 1" asserts that "35 IAC 845.640(a) requires evidence of field collection methods and field and laboratory quality control and quality assurance." **Exhibit A.** But there is

no legal or technical basis for the application of this statement to an ASD. First, there is no failure to comply with Section 845.640, which applies to a CCR surface impoundment's "*groundwater monitoring program*" and does not apply to data requirements for ASDs under Section 845.650(e). *See* 35 Ill. Adm. Code § 845.640 (emphasis added). Section 845.640(a) provides:

> a) The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells required by Section 845.630. The owner or operator of the CCR surface impoundment must develop a sampling and analysis program that includes procedures and techniques for:
>
> 1) Sample Collection;
> 2) Sample preservation and shipment;
> 3) Analytical procedures;
> 4) Chain of custody control; and
> 5) Quality assurance and control.

DMG submitted a groundwater monitoring program with its operating permit application for the BAP that is consistent with the requirements of Section 845.640, including containing the procedures and techniques in Section 845.640(a). Burns McDonnell, Initial Operating Permit, Baldwin Power Plant Bottom Ash Pond (October 25, 2021).[5] DMG collected and analyzed samples in accordance with that groundwater monitoring program as part of its quarterly sampling that discovered the fluoride exceedance at well MW-392. Ramboll, 25 I.A.C. § 845.610(b)(3)(D), Groundwater Monitoring Data and Detected Exceedances, Quarter 2, 2024, Bottom Ash Pond, Baldwin Power Plant, Baldwin, Illinois (July 19, 2024) (incorporated by reference). Thus, DMG is compliant with Section 845.640(a) as it applies.

[5] DMG's Initial Operating Permit application is available at https://www.luminant.com/documents/ccr/il-ccr/Baldwin/2021/2021%2010%2030%20Baldwin%20BAP%20Op%20Permit%20App%20W1578510001-06.pdf and is incorporated by reference into this Petition. IEPA has not yet issued a final operating permit with an approved groundwater monitoring program for the BAP. In the interim, DMG has, through agreement with IEPA, been monitoring in accordance with the proposed groundwater monitoring program submitted with its operating permit.

40. Nothing in Part 845 requires further analysis under Section 845.640 for purpose of an ASD. Section 845.640 does not mention, refer to, or otherwise imply that the requirements applicable to groundwater monitoring programs were intended to apply to the preparation of ASDs, nor does Section 845.650(e).

41. Regardless, as explained above the Baldwin ASD *did* provide underlying documentation to support its identification of an alternative source, including boring logs, a lithium isotope ratio laboratory analytical report with chain of custody documentation, and a quantitative x-ray diffraction analytical report with a method summary. **Exhibit B** at ii-iii, 8-9; **Exhibit H** at 7. Providing additional information regarding "field collection methods and field and laboratory quality control and quality assurance" will not change the conclusions of the Baldwin ASD. Accordingly, "Data Gap 1" does not identify any shortcoming in the Baldwin ASD.

2. "Data Gap 2"

42. With "Data Gap 2," IEPA appears to suggest that characterization and monitoring in accordance with Section 845.640 is required because SW846 states that the Agency must make regulatory decisions based on "environmental data." **Exhibit A**. However, there is also no requirement in Part 845, including Section 845.650(e), that SW846 apply to an ASD.[6] Nonetheless, the Baldwin ASD was prepared using quality environmental data as contemplated by SW846. **Exhibit B** at ii-iii, 8-9; **Exhibit H** at 4, 7-9. DMG prepared the Baldwin ASD in

[6] The plain language of the Part 845 rules does not require the utilization of SW846 for purposes of an ASD. While SW846 is incorporated by reference into Part 845 by Section 845.150, the only substantive provision of Part 845 requiring analysis using SW846 is Section 845.640(j), which applies to analyzing groundwater monitoring samples taken under a groundwater monitoring program and is not at issue here. 35 Ill. Adm. Code § 845.640(j). The text of SW846 itself makes clear that methods in that document are not "mandatory" unless specifically specified as such by regulation. United States Environmental Protection Agency ("USEPA"), SW-846 Update V, (July 2014) at 1.

accordance with industry guidance and standards to ensure that the data presented was the best available for the intended use. *See* **Exhibit H** at 4, 7-9.

43. The multiple lines of evidence analysis in the Baldwin ASD, discussed in detail above, provided the "factual and evidentiary basis" for the ASD's conclusions that the BAP did not cause or contribute to the fluoride exceedance at MW-392, as required by Section 845.650(e). **Exhibit B** at 10; **Exhibit H** at 5-6, 8-9. Following this approach, DMG provided sampling and analysis of rock cores from the identified alternative source demonstrating the presence of fluoride as a naturally occurring mineral with the alternative source. This evidence provides the "environmental data" necessary for IEPA's decision. *Id.* As noted above, this "environmental data" was the same as that relied upon in previous ASDs approved by IEPA. **Exhibit H** at 8-9.

44. Thus, the facts and evidence provided with the Baldwin ASD are supportive of the conclusion that the "alternative source of fluoride is the shale bedrock lithology" and "the BAP CCR unit did not contribute to the GWPS exceedance for fluoride at MW-392." **Exhibit B** at 10. IEPA's "Data Gaps" request information that is not required under § 845.650(e) and that would not change the conclusions reached through the multiple lines of evidence presented in the Baldwin ASD. **Exhibit H** at 8-9. Accordingly, IEPA's "Data Gaps" are factually and legally insufficient to form the basis for its Denial.

III. MOTION FOR PARTIAL STAY

45. Because Part 845 does not authorize an automatic stay, DMG asks the Board to stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 for the fluoride exceedance at issue in this Petition until the later of (a) the Board's final resolution of this Petition, or (b) if this Petition is granted, IEPA's issuance of a concurrence.

A. The Board has authority to issue a stay.

46. The Board has long recognized its authority under Illinois law to issue discretionary stays. *See Community Landfill Co. and City of Morris v. IEPA*, PCB 01-48, PCB 01-49 (consol.), slip op. at 4 (Oct. 19, 2000); *see also, e.g.*, *Ill. Power Generating Co. v. IEPA*, PCB 24-43, slip op. at 2 (Jan. 18, 2024). Section 845.650(e)(7), which authorizes a petition for review of an IEPA nonconcurrence with an ASD, "would be rendered moot if a petitioner was required to comply with the contested sections during the pendency of the appeal." PCB 24-43, slip op. at 3 (Jan. 18, 2024). An IEPA nonconcurrence with an ASD triggers corrective measure requirements that must be initiated within a short timeframe, likely far before the Board reaches a final resolution of this petition.[7]

B. A partial stay is appropriate under Illinois law.

47. The Board considers four factors[8] when determining whether to grant a discretionary stay of a final Agency decision:

- **a.** a certain and clearly ascertainable right needs protection;
- **b.** irreparable injury will occur without injunction;
- **c.** no adequate remedy at law exists; and
- **d.** a probability of success on the merits.

PCB 24-43, slip op. at 2 (Jan. 18, 2024), citing *Community Landfill Co. and City of Morris v. IEPA*, PCB 01-48, PCB 01-49 (consol.), slip op. at 4 (Oct. 19, 2000). The Board need not find that

[7] Section 845.660(a) requires: "The assessment of corrective measures must be initiated within 90 days after finding [of any GWPS exceedance]" and the "assessment of corrective measures must be completed and submitted to the Agency within 90 days after initiation of assessment of corrective measures . . ."

[8] When reviewing a request for a discretionary stay in the context of a permit appeal or appeal of final agency decision, the Board has held that "although there are no specific standards set by the Board for issuing stays, Illinois law provides for standards under which such equitable relief is appropriate." *Motor Oils Refining Co. v. IEPA*, PCB 89-116, slip op. at 1 (Aug. 31, 1989), *citing Junkunc v. S.J. Advanced Technology & Mfg.*, 101 Ill. Dec. 671, 498 N.E.2d 1179 (Ill. App. 1 Dist. 1986).

all of these factors exist in order to grant a discretionary stay. *Id.* The Board will also consider the likelihood of environmental harm should a stay be granted. *Id.*, citing *Motor Oils Refining Co. v. IEPA*, PCB 89-116, slip op. at 2 (Aug. 31, 1989).

48. For the reasons stated in this Petition, a stay is necessary to protect DMG's right to appeal the IEPA Denial and to prevent DMG from being unlawfully and unreasonably required to comply with costly and potentially unnecessary corrective measure requirements before it is able to exercise its right to appeal and be heard by the Board. Accordingly, DMG has an ascertainable right that needs protection.

49. DMG will suffer irreparable injury if it is subject to the corrective measure requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 for the fluoride exceedance at issue in this Petition. Compliance with these requirements would require DMG to expend resources to complete assessments of corrective measures, prepare corrective action plans and take other steps under Part 845 for alleged discharges that, as explained in detail in the Baldwin ASD and this Petition, likely never occurred. The assessments of corrective measures alone would likely cost approximately $200,000. Declaration of Cynthia Vodopivec (November 26, 2024) (attached as **Exhibit I**). Selecting an appropriate remedy and developing a corrective action plan could cost approximately an additional $500,000. *Id.* If DMG complied with the corrective measure requirements for the fluoride exceedance at well MW-392 and then succeeded on the merits of this Petition, costs, as well as time and other resources, would be lost. *Id.* Thus, DMG would suffer irreparable injury.

50. DMG has no other adequate remedy at law to prevent these injuries or to contest the IEPA Denial.

51. It is also likely that DMG will succeed on the merits of this Petition. DMG has demonstrated by a preponderance of the evidence that the BAP is not the source of the fluoride exceedance at well MW-392 and that the exceedance is due to groundwater interactions with bedrock as evidenced through the thorough analysis of a qualified professional engineer, and DMG is prepared to demonstrate that IEPA's nonconcurrence was factually and legally insufficient. *See, e.g.,* **Exhibit B**; **Exhibit H**.

52. Finally, no harm to human health or the environment will result from a stay of these requirements. As demonstrated in the Baldwin ASD and this Petition, the BAP is not the source of or contributing to the fluoride. Notably, the IEPA Denial does not suggest that IEPA believes the BAP is the cause of or is contributing to the GWPS exceedances – rather, the IEPA Denial is based on alleged "data gaps." **Exhibit A**. Moreover, the corrective measure requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 include an assumption that the impoundment under assessment is at least a partial cause of the exceedance.[9] It is impossible to complete a corrective action assessment or to determine the optimal corrective action for a source that is not the cause of the exceedance, and to do so would provide no benefit to human health and the environment.

53. Further, DMG has prepared a Risk Mitigation Plan for the BAP as part of an Alternative Closure Demonstration submitted to USEPA. *See* Burns & McDonnel, CCR Surface Impoundment, Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline, Attachment 1 – Risk Mitigation Plan (Sept. 29, 2020) (available at https://www.luminant.com/documents/ccr/Illinois/Baldwin/2020/2020-Baldwin-Alternative%20Closure%20Demonstration-Bottom%20Ash%20Pond.pdf). The Risk Mitigation

[9] *See, e.g.*, Section 845.660(a) ("...the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases, and to restore the affected area.").

Plan evaluated potential receptors that might be impacted by a release from the BAP, and concluded that "[t]here are no industrial, commercial, or domestic use water wells located in a downgradient or cross-gradient groundwater flow direction relative to the Bottom Ash pond that are at risk of impacts form a release to groundwater." *Id.* at 3. Lastly, DMG has been and will continue to be subject to the groundwater monitoring requirements of Section 845.650, which ensures that any changes in circumstances during the stay that could pose a risk to human health or the environment will be quickly identified and responded to in accordance with Part 845.

IV. CONCLUSION

54. For the above reasons, DMG respectfully requests that the Board stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 relating to the GWPS exceedance at issue in this Petition until the later of (a) the Board's final resolution of this Petition, or (b) if this Petition is granted, IEPA's issuance of a concurrence. Moreover, DMG respectfully requests that the Board grant this Petition for Review and remand to IEPA to issue a new final written response concurring with the Baldwin ASD.

Respectfully submitted,

/s/ Joshua R. More
Joshua R. More

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Attorneys for Dynegy Midwest Generation, LLC.

BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

DYNEGY MIDWEST GENERATING, LLC	
Petitioner	**PCB 2025-________**
v.	
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	
Respondent.	

INDEX OF EXHIBITS

EXHIBIT A	Letter from Darin E. LeCrone to Phil Morris (October 3, 2024).
EXHIBIT B	Geosyntec, Alternative Source Demonstration, Baldwin Power Plant Bottom Ash Pond (Unit ID #601), IEPA ID: W1578510001-06, 35 IAC 845.650 (September 12, 2024).
EXHIBIT C	Geosyntec, Alternative Source Demonstration, Baldwin Power Plant Bottom Ash Pond (Unit ID #601), IEPA ID: W1578510001-06, 35 IAC 845.650 (October 27, 2023).
EXHIBIT D	Letter from Geosyntec to Heather Mullenax Re: Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration Addendum (November 10, 2023) (attachments omitted).
EXHIBIT E	Letter from Michael Summers to Phil Morris (November 28, 2023).
EXHIBIT F	Geosyntec, Alternative Source Demonstration, Baldwin Power Plant Bottom Ash Pond (Unit ID #601), IEPA ID: W1578510001-06, 35 IAC 845.650 (July 8, 2024).
EXHIBIT G	Letter from Darin E. LeCrone to Phil Morris (August 8, 2024).
EXHIBIT H	Declaration of Melida W. Hahn (December 2, 2024).
EXHIBIT I	Declaration of Cynthia Vodopivec (November 26, 2024).

Exhibit A

217-782-1020

October 3, 2024

Phil Morris
Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Re: Baldwin Power Plant Bottom Ash Pond; W1578510001-06
Alternative Source Demonstration Submittal

Dear Mr. Morris:

The purpose of this correspondence is to notify you that the Illinois Environmental Protection Agency (Illinois EPA) does not concur with the Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration (ASD) for arsenic on September 17, 2024. The Illinois EPA does not concur due to the following data gaps:

- Characterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD.
  - 35 IAC 845.640(a) requires evidence of field collection methods and field and laboratory quality control and quality assurance.
  - 35 IAC 845.650(e) requires alternative source data as evidence of the alternative source, see item 1(a)(i) above. SW846 chapter 1, incorporated by reference in 35 IAC 845, states that regulatory decisions must be made with environmental data.

If you have any questions, please contact: **Heather Mullenax** Illinois EPA, Bureau of Water, WPC #15, P.O. Box 19276, Springfield, Illinois 62794-9276. If you have any questions concerning the investigation described above, please call 217-782-1020.

Sincerely,

Darin E. LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control
Illinois Environmental Protection Agency

Exhibit B

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.
500 W. Wilson Bridge Road, Suite 250
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

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

Prepared by

Geosyntec Consultants, Inc.
500 W. Wilson Bridge Road
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Allison Kreinberg
Senior Geochemist

John Seymour, P.E.
Senior Principal

License No.: 062.040562
Expires: 11/30/2025

JOHN P. SEYMOUR
062-040562
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Project Number: GLP8068

September 12, 2024

Geosyntec consultants

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Geosyntec consultants

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Attachment 8: X-ray Diffraction Laboratory Analytical Report

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

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[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 δ^7Li, 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 δ^7Li 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 δ^7Li values compared to expectations based on the depositional environment (Warner et al., 2014).

MW-370 groundwater also has a lithium isotope composition (δ^7Li = 20.7‰) consistent with upgradient groundwater from shale lithologies at MW-358 (δ^7Li = 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 (δ^7Li = 17.1‰) is somewhat similar to the bedrock lithium signature and is not consistent with the ranges of δ^7Li for other CCR material effluents (δ^7Li 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

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

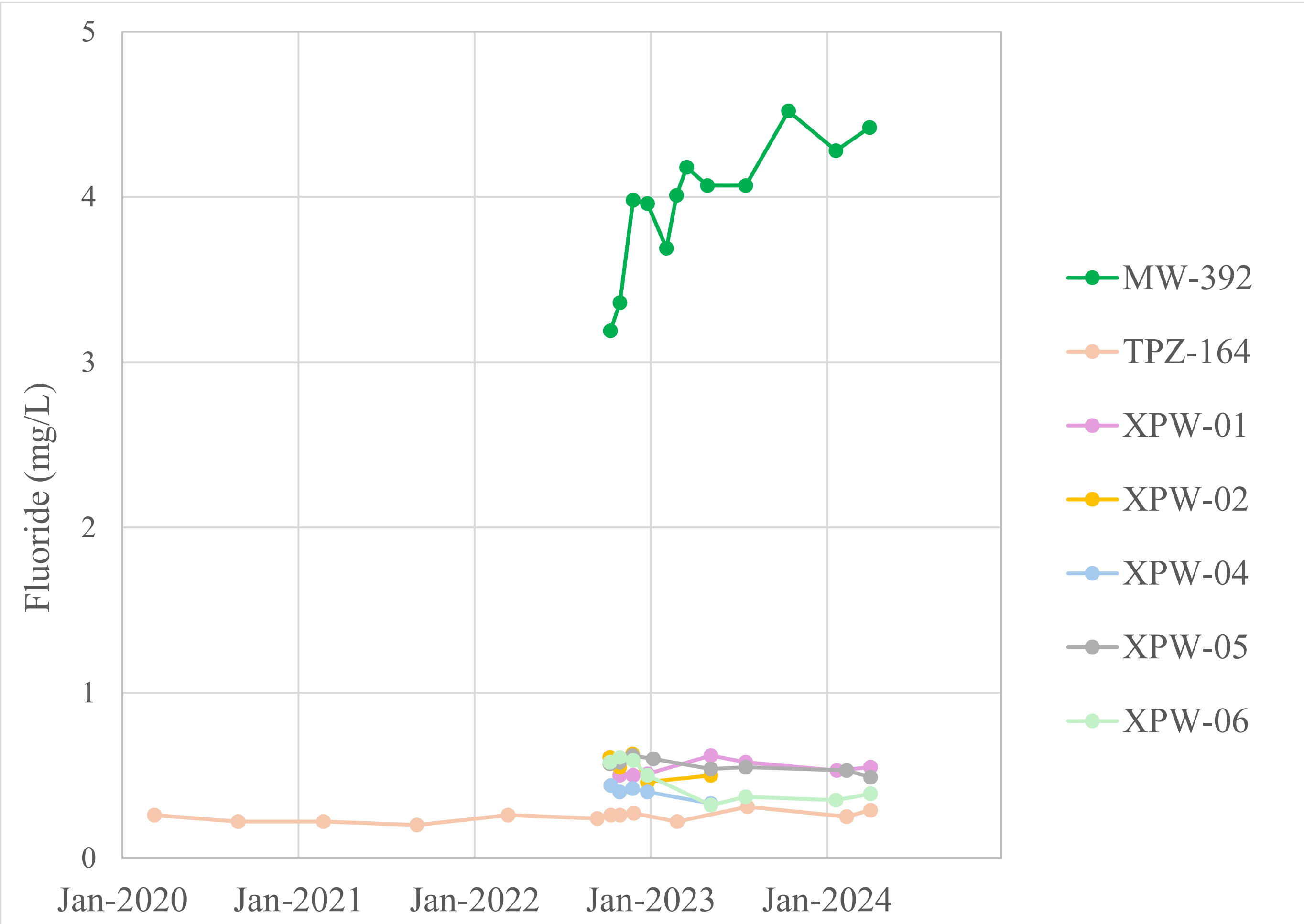
Table 2 - Summary of Rietveld Quantitative Analysis
X-Ray Diffraction Results
Baldwin Power Plant

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

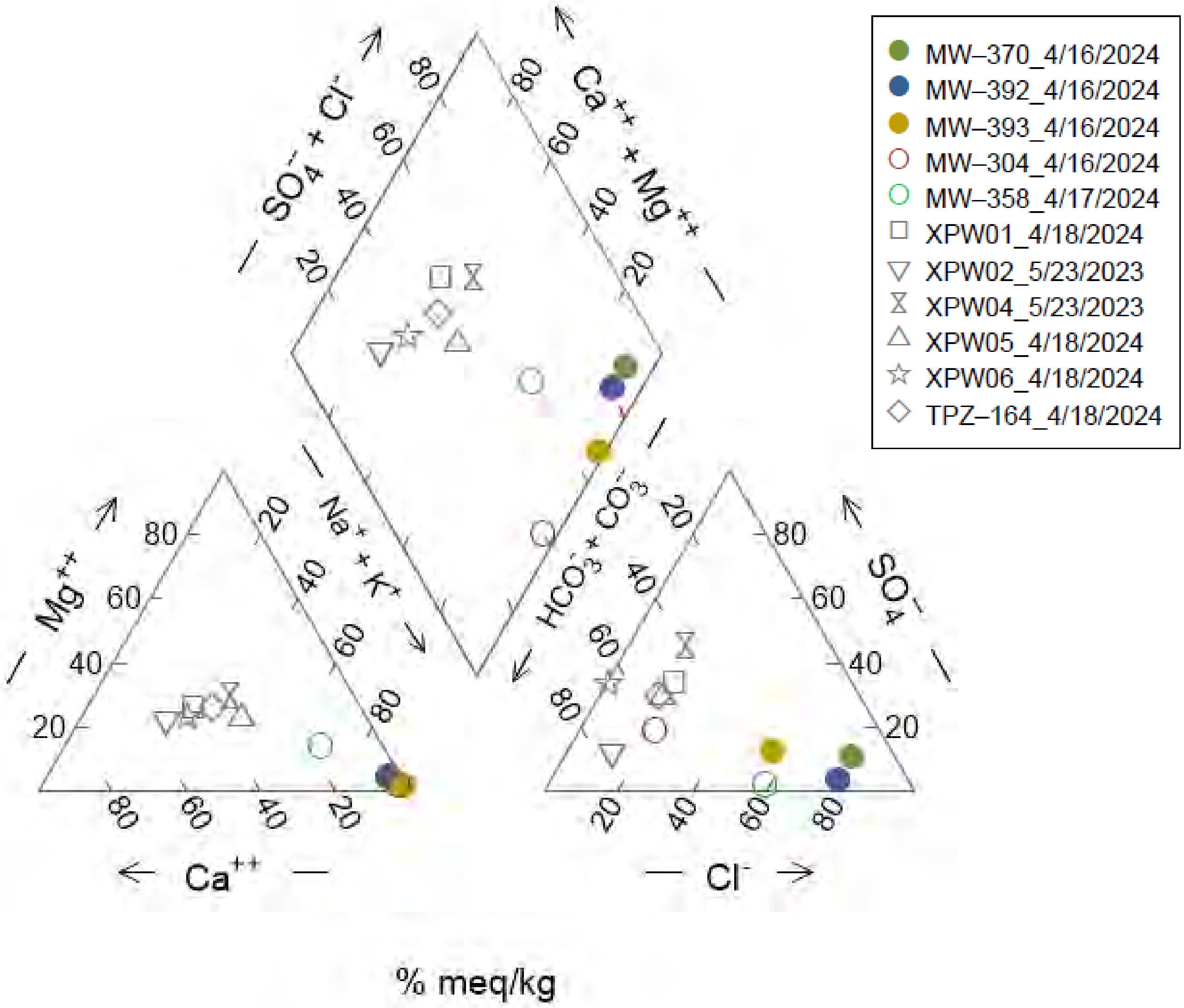
Baldwin Power Plant

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.

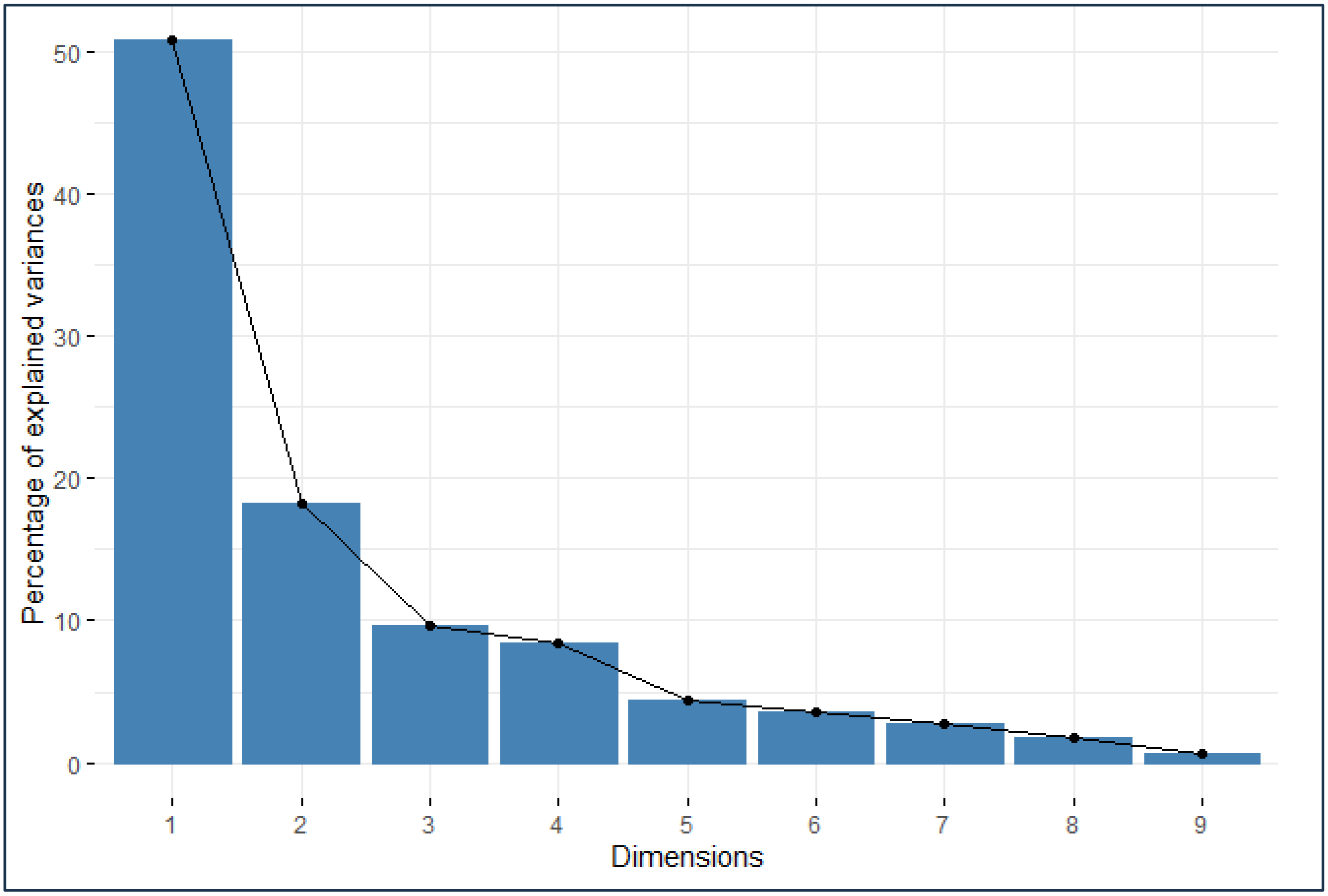
Piper Diagram

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure 2

Columbus, Ohio | August 2024



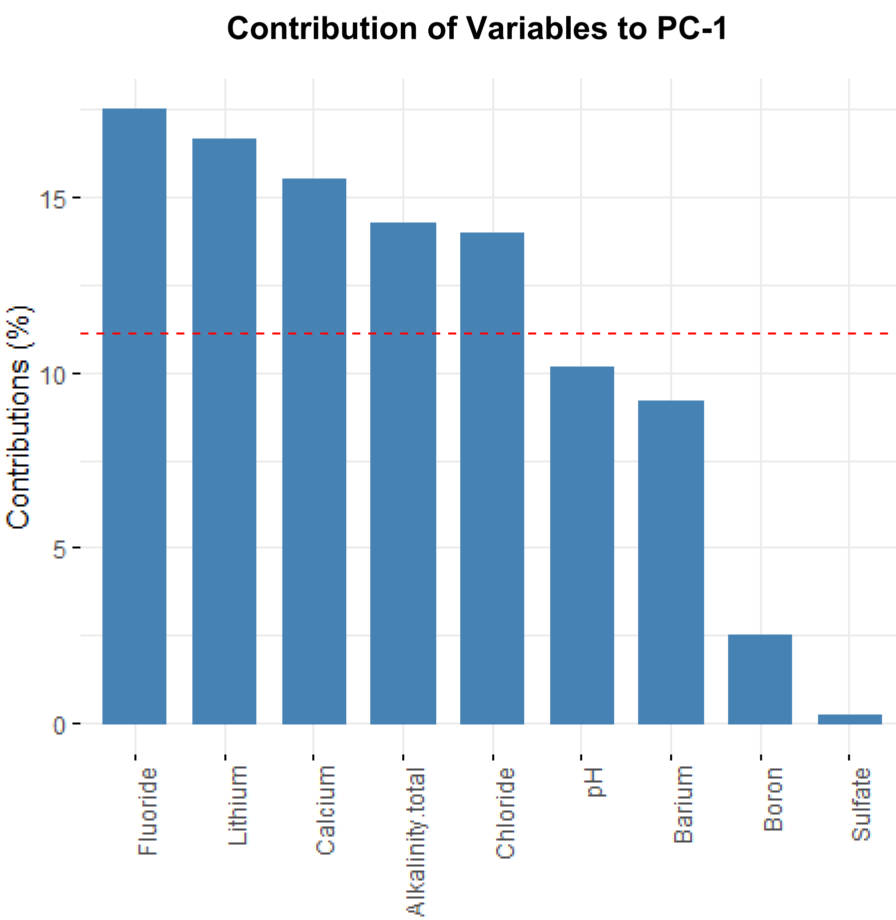
Notes:
1. Samples collected between 2022 and 2024 from background wells MW-304 and MW-358, downgradient wells MW-370, MW-392 and MW-393, and porewater wells TPZ-164, XPW-01, XPW-02, XPW-04, XPW-05, and XPW-06 were included in the evaluation.

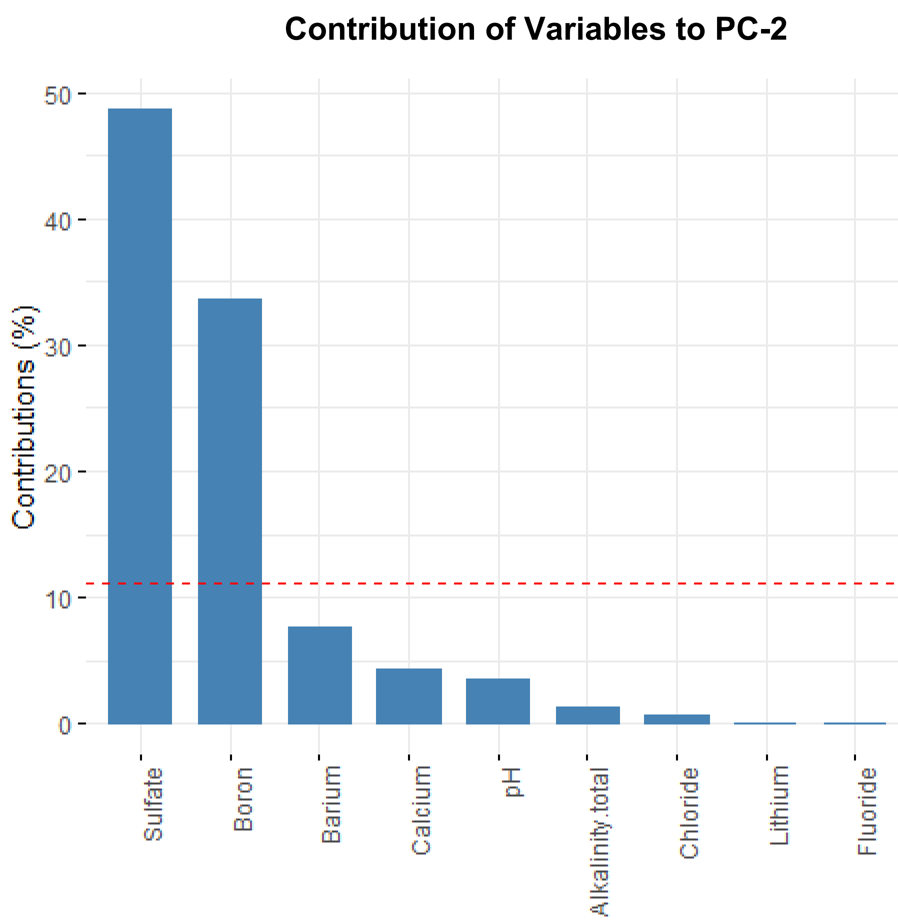
Principal Component Analysis - Quality of Representation of Principal Components
Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Columbus, Ohio | August 2024

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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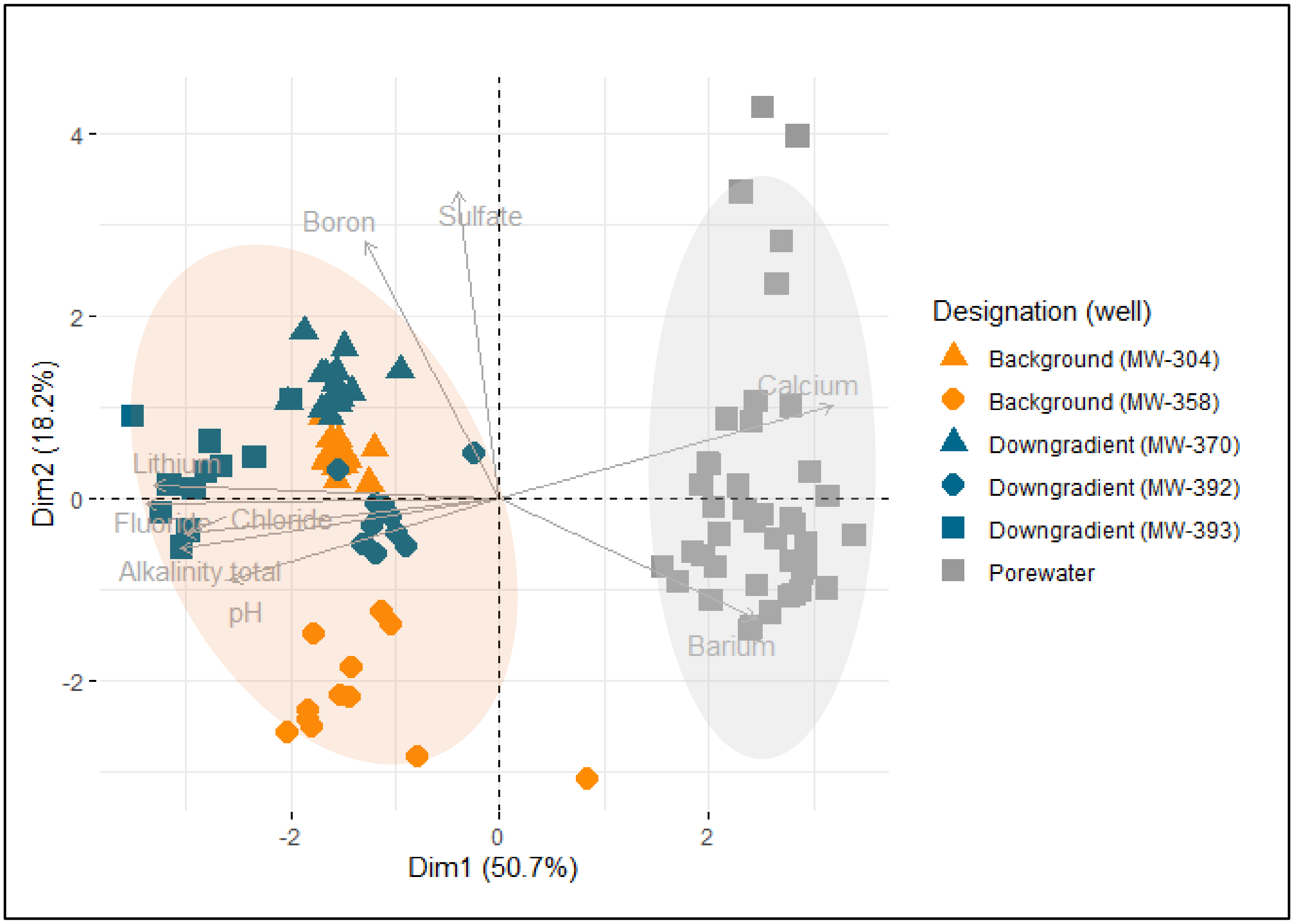
Figure **3b**

Columbus, Ohio | August 2024



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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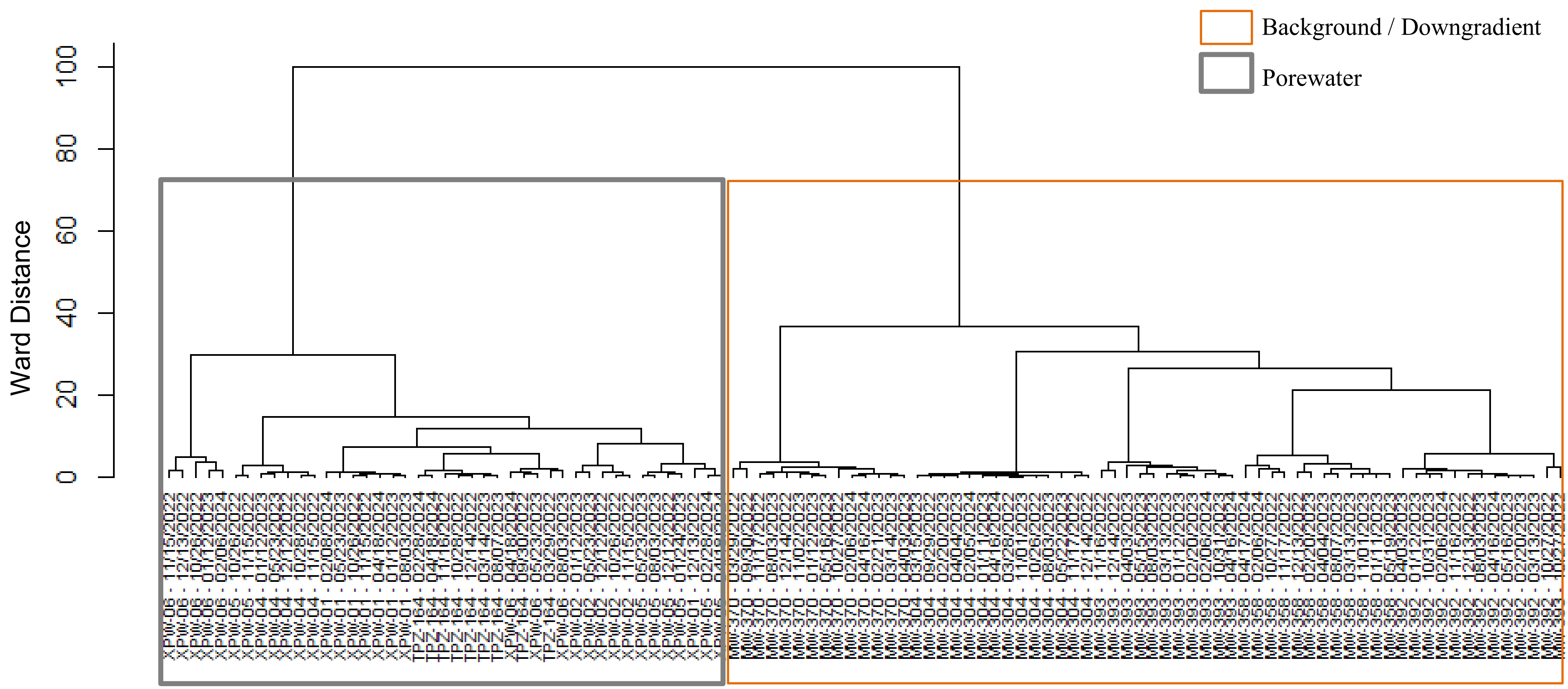
Columbus, Ohio | August 2024

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.

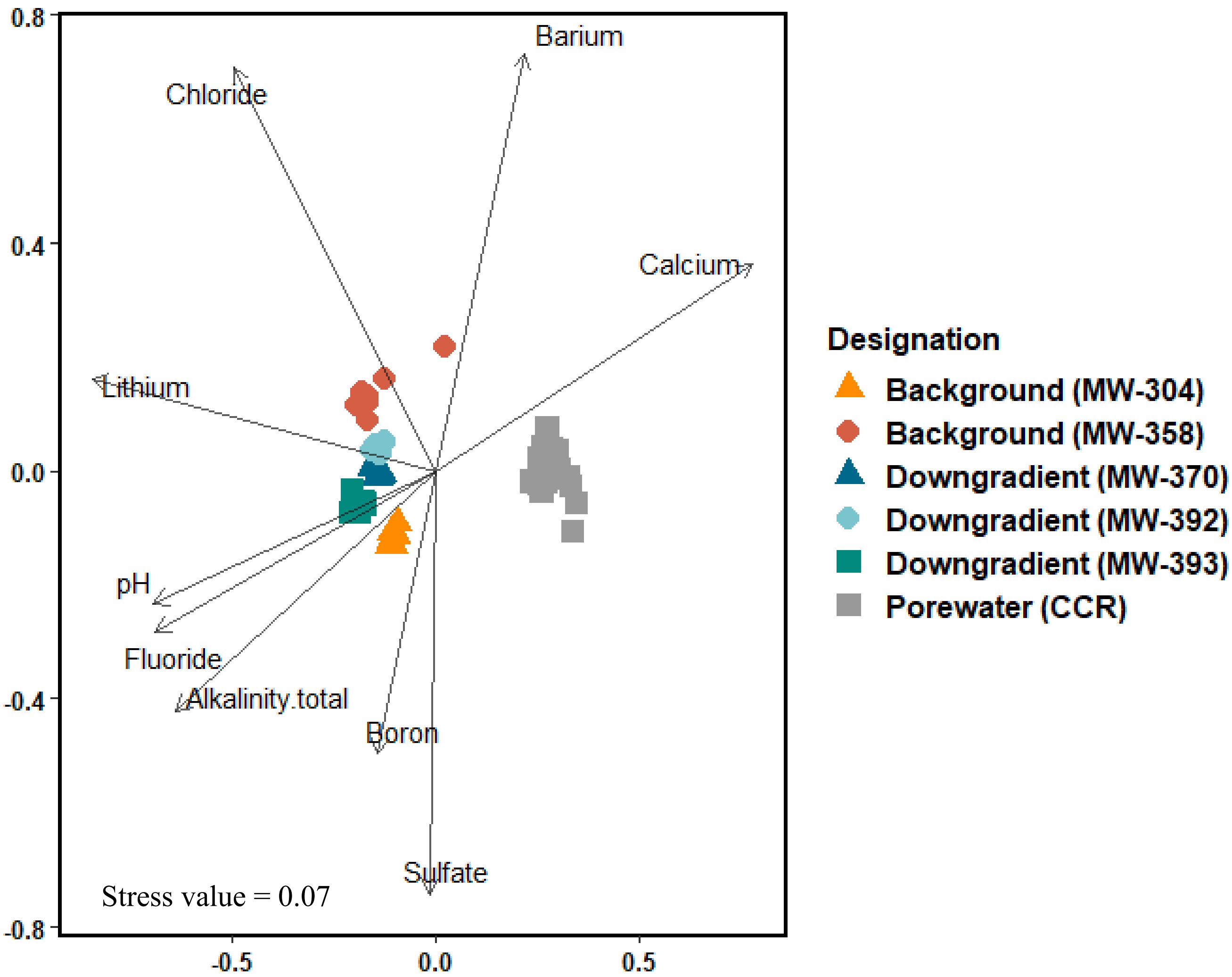
Dendrogram Graph from Cluster Analysis

Baldwin Power Plant

Geosyntec consultants

Figure **5**

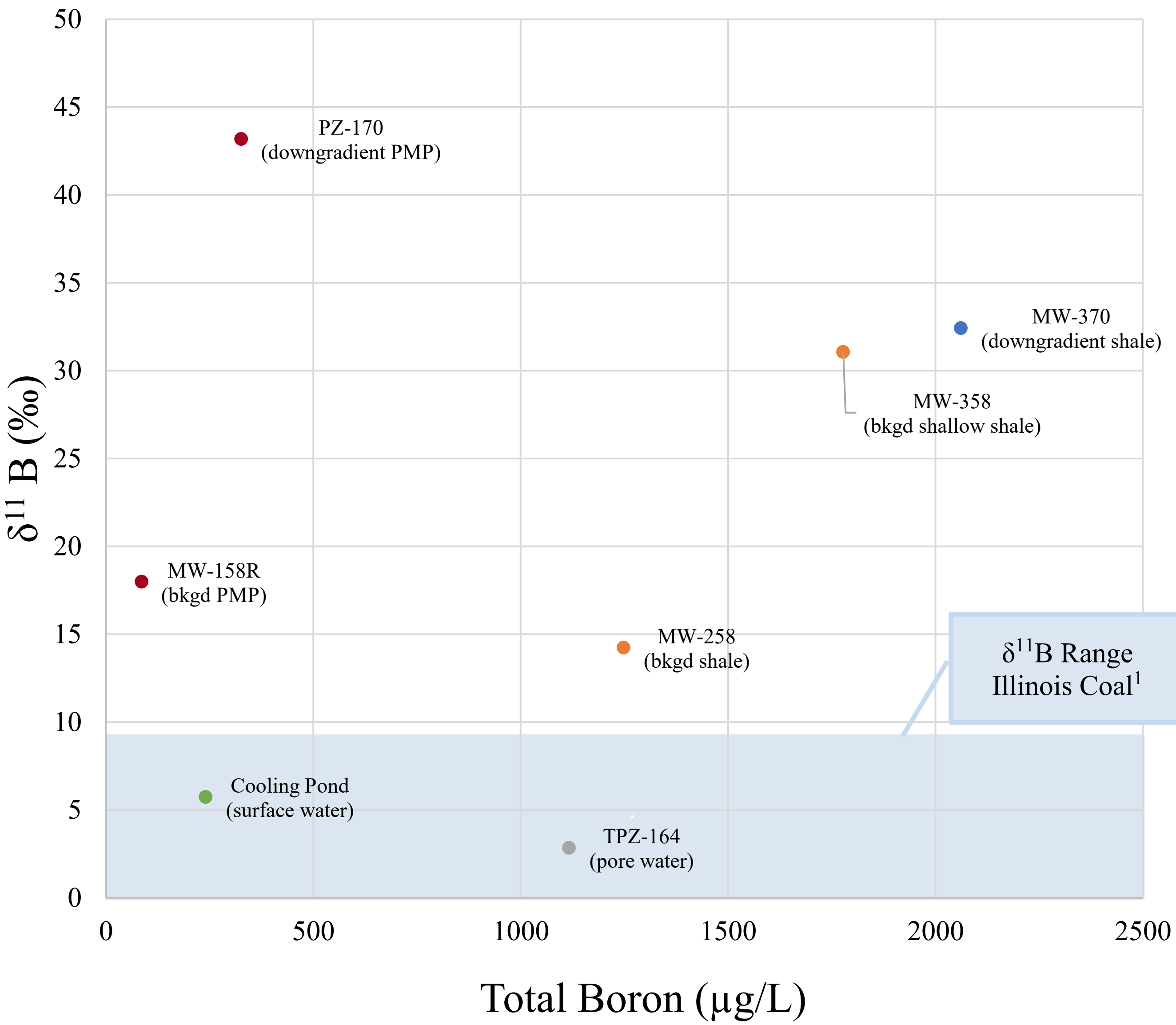
Columbus, Ohio | August 2024



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		
Geosyntec consultants		Figure **6**
Columbus, Ohio	August 2024	



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

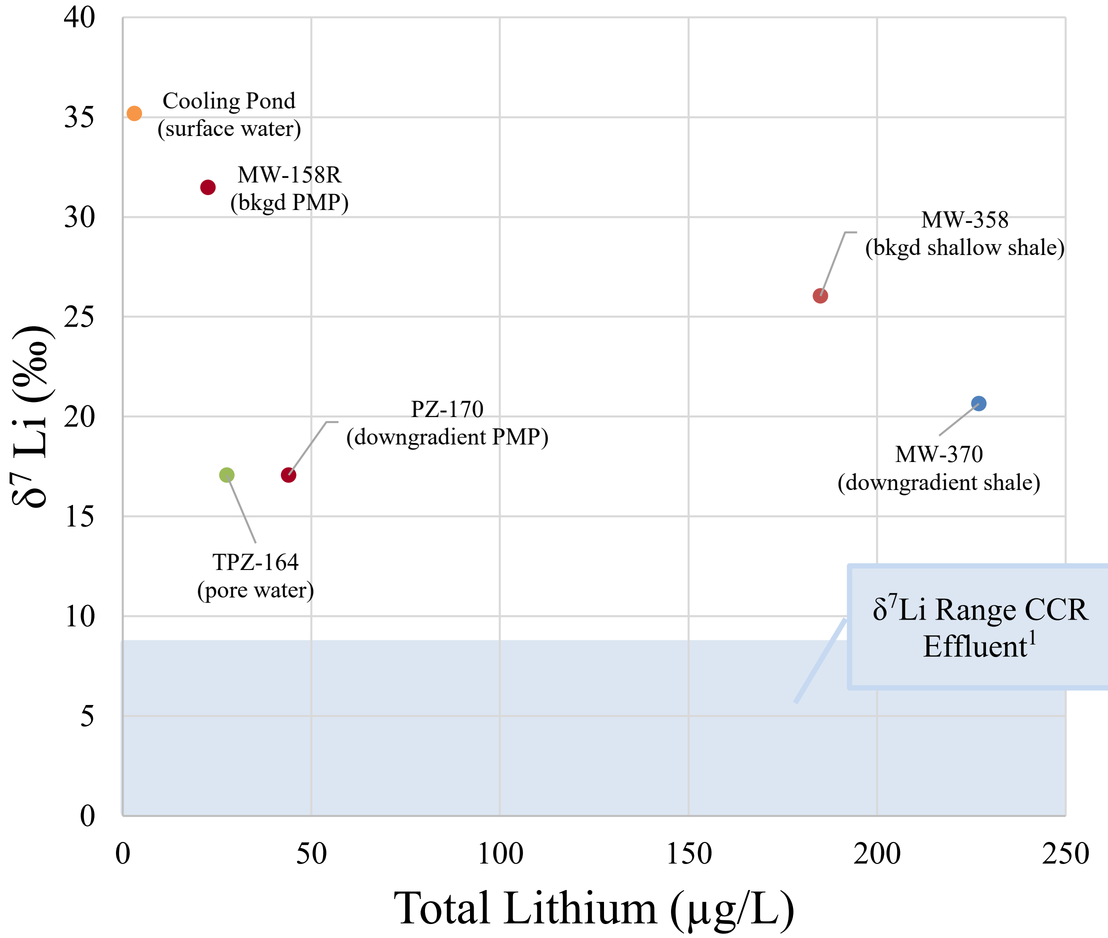
Boron Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure 7

Columbus, Ohio | August 2024



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

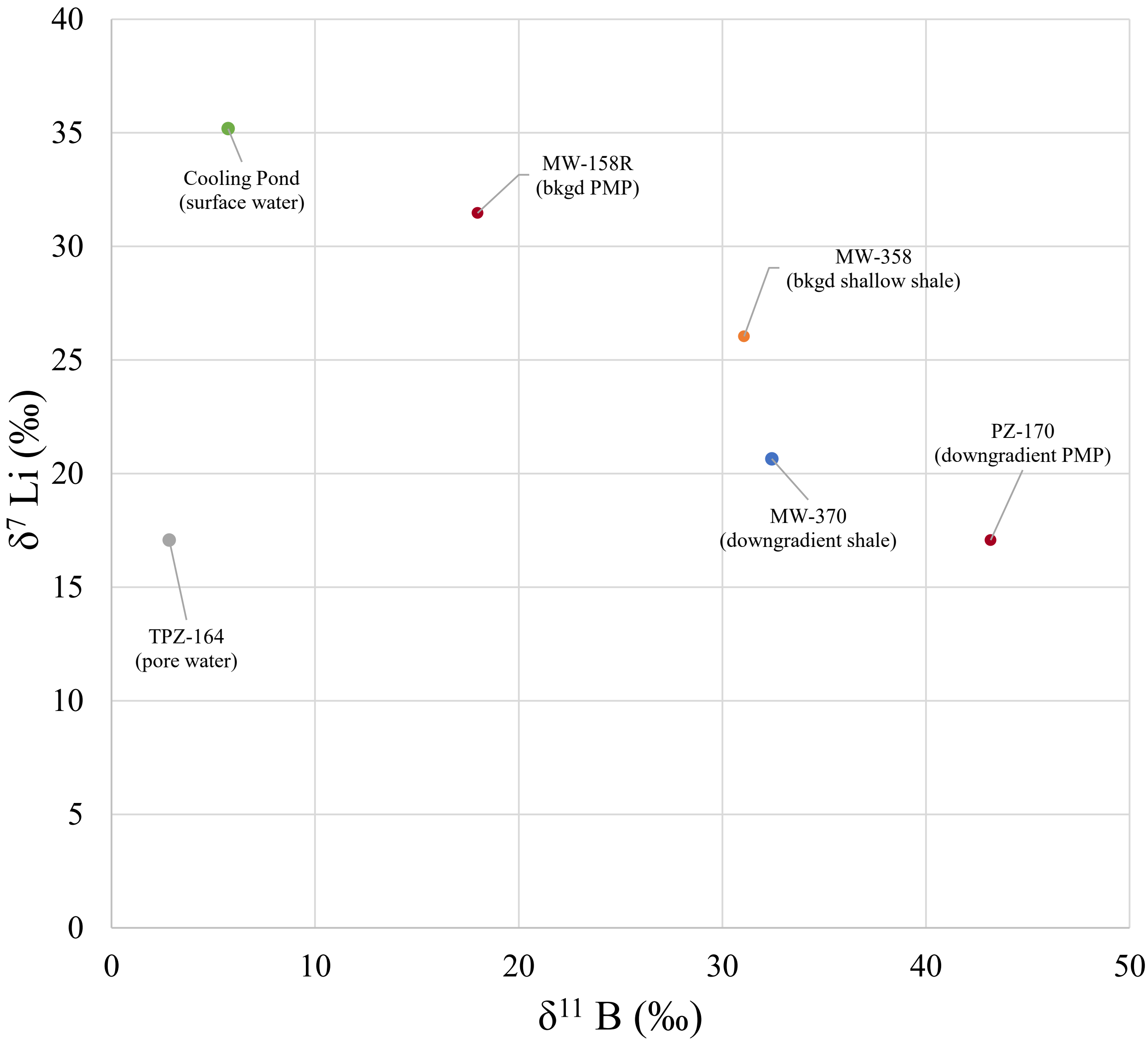
Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure **8**

Columbus, Ohio

August 2024



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

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Figure 9

Columbus, Ohio | August 2024

ATTACHMENT 1

Part 845 Groundwater Monitoring Network

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Baldwin_AP\E003\Figure 2-1_BAL BAP Monitoring Well Network.mxd

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

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

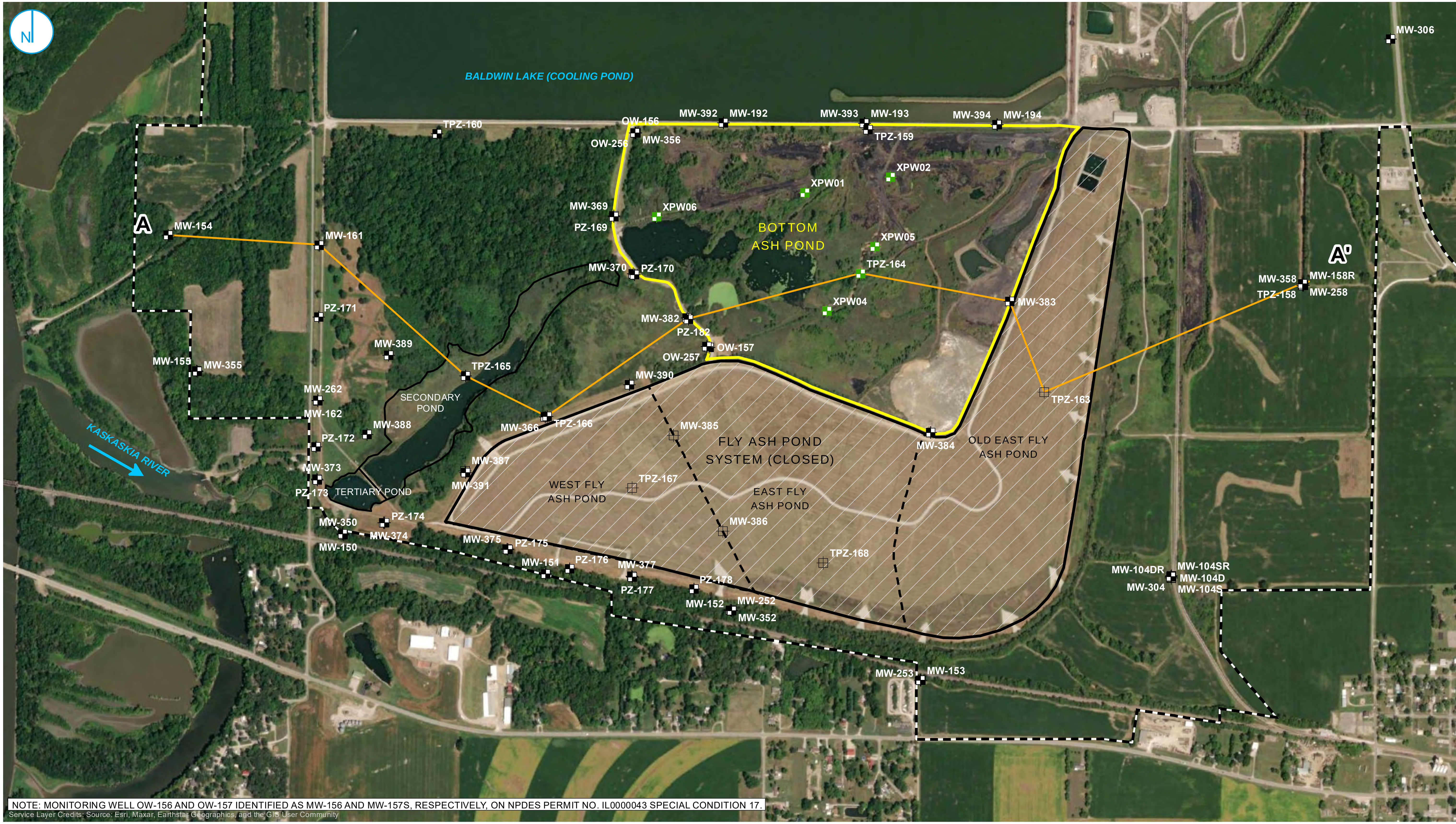
35 IAC § 845.600 GROUNDWATER MONITORING SYSTEM

BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

ATTACHMENT 2
Geologic Cross Section

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Demo\Baldwin_AP\2023\Figure 3_Cross Section Locations.mxd



PROJECT: 169000XXXX | DATED: 4/24/2023 | DESIGNER: GALARNMC

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

CROSS SECTION TRANSECT

A to A'

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

0 400 800 Feet

CROSS SECTION LOCATION MAP

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

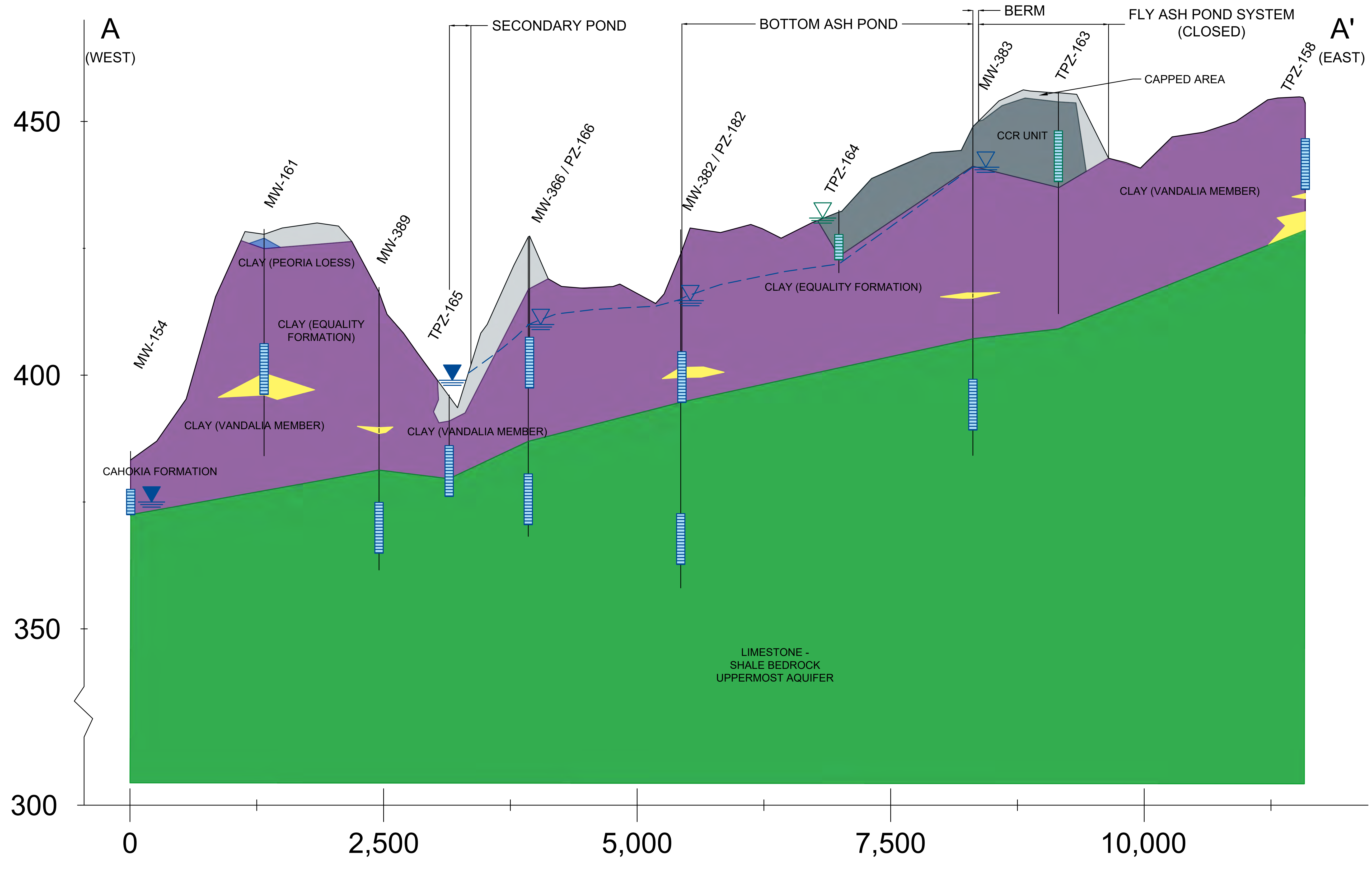
FIGURE 3

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)

CROSS SECTIONS A-A'

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT BOTTOM ASH POND

BALDWIN POWER PLANT
BALDWIN, ILINOIS

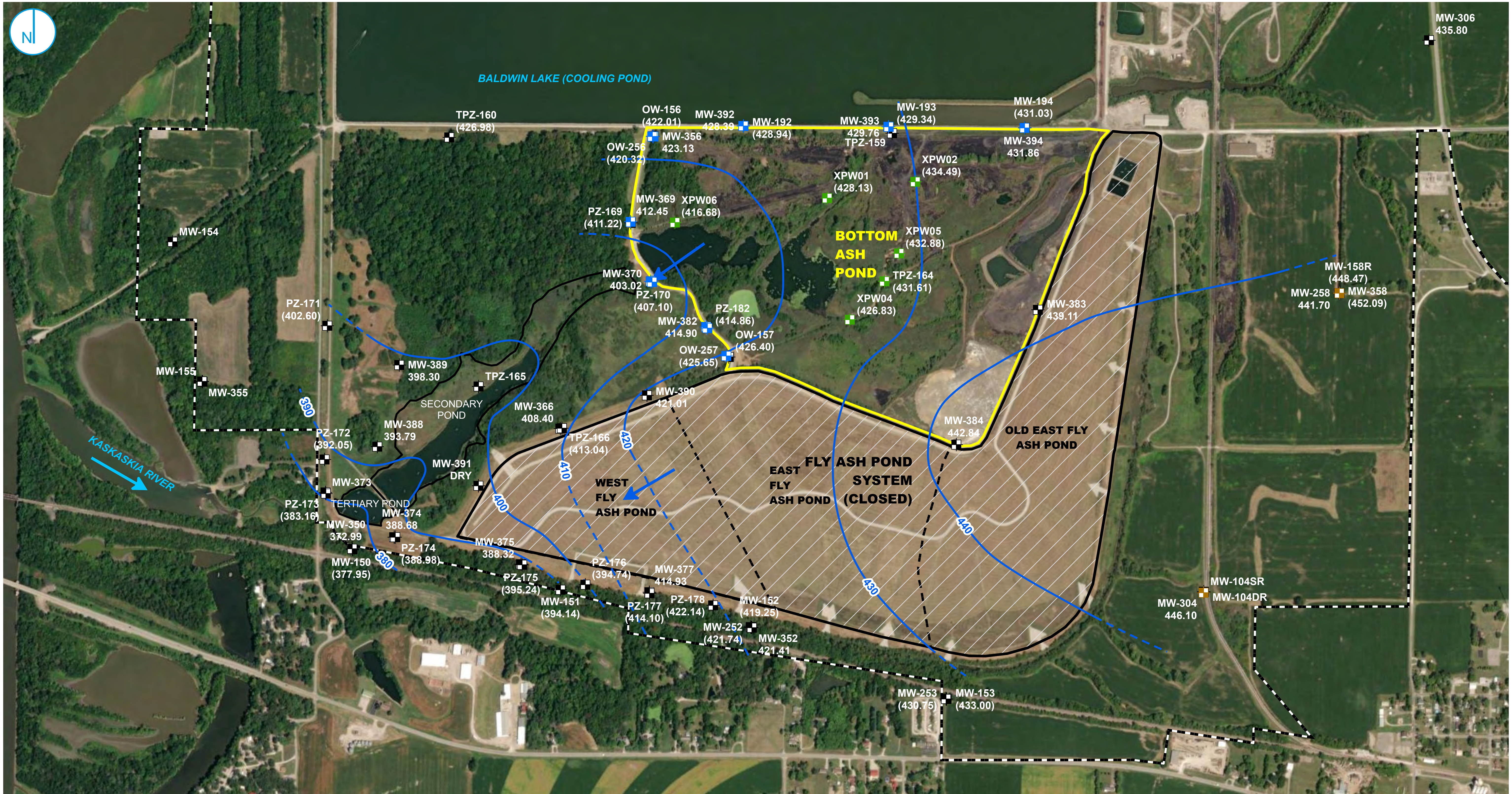
FIGURE 2-7

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

PROJECT: 1940100806 DATED: ... Shared Documents\-CCR GW\Deliverables\Part 845 Operating Permits\Sites\Baldwin BAP\Hydrogeo\Figures\EVS\CAD\Baldwin Cross Sections.dwg

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

PROJECT: 169000XXXX | DATED: 7/31/2024 | DESIGNER: GALARNMC

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2024\Baldwin\BAP_601\BAL_601_BAP_2024.aprx\BAL 601 BAP Pot Surface 20240415

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	U S C S	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		0–3.8	0 - 3.8' **SILT:** ML, very dark grayish brown (10YR 3/2), organic material (0-10%), moist to wet. 2.1' dry.	ML									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.
			3.8–8.9	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.	ML/CL									
			8.9–12	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.	(CL/ML)S									

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 MW358

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
					(CL/ML)S									
2 CS	60 60		13–17.8	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. 16.1' mottling discontinues.	CL/ML									
3 CS	48 36		17.8–21	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									
4 CORE	36 32		21–26.5	21 - 26.5' **SHALE:** BDX (SH), dark gray (GLEY 1 4/N), weathered, thin bedding, moderately fractured. 24' -25.2' wet.	BDX (SH)									RUN #4: Modified RQD = (21/32) = 66%
5 CORE	36 29		26.5–27.5	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%
6 CORE	72 60		27.5–31.3	27.5 - 31.3' **SHALE:** BDX (SH), grayish black (N2), weathered, highly decomposed to residual soil, wet to moist. 29.3' thinly bedded, moderately decomposed. 30' slightly decomposed to competent, moderately fractured.	BDX (SH)									RUN #6: Modified RQD = (45/60) = 75%
			31.3–32	31.3 - 32' **COAL:** COAL, black (N1).	COAL									

Boring Number MW358

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				32 - 33' **SHALE:** BDX (SH), grayish black (N2), slightly decomposed to competent, moderately fractured, wet to moist.	BDX (SH)									
			33–35	33 - 36' **SHALEY LIMESTONE:** BDX (LS/SH), medium gray (N5), weathered, shaley, higly decomposed, slightly fractured.	BDX (LS/SH)									
7 CORE	72 71		36–40	36 - 40.8' **SHALEY LIMESTONE:** to **SHALE:** BDX (LS/SH), interbedded shale.	BDX (LS/SH)									RUN #7: Modified RQD = (67/71) = 94%
			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		42–49	42 - 58.9' **SHALE:** BDX (SH), medium gray (N5) to medium dark gray (N4), weathered, weak, thinly bedded, moderately to highly fractured. 47.5' dark grayish brown (10YR 4/2), pale olive (5Y 6/4) discoloration, more competent.	BDX (SH)									RUN #8: Modified RQD = (81/85) = 94%
9 CORE	60 60		50–52	50.2' weak to moderate. 50.8' olive gray (5Y 5/2).										RUN #9: Modified RQD = (52/60) = 87%

Boring Number MW358

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

Boring Number MW358

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73–75	64 - 75.3' **SHALE:** BDX (SH), medium dark gray (N4) to medium gray (N5), strong, thinly bedded to laminated, moderately fractured. *(continued)*	BDX (SH)									
15 CORE	60 56		75–77	75.3 - 77.1' **LIMESTONE:** BDX (LS), gray (5Y 6/1), fossiliferous, very strong.	BDX (LS)									RUN #15: Modified RQD = Not Recorded
			77–78	77.1 - 78.2' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak to moderate strength, moderately decomposed.	BDX (SH)									
16 CORE	60 51		78–84	78.2 - 84.8' **LIMESTONE:** BDX (LS), medium dark gray (N4) to medium gray (N5), shaley, fossiliferous, very strong, moderately fractured, laminations (0-5%).	BDX (LS)									RUN #16: Modified RQD = (23/51) = 45%
17 CORE	60 60		85–90	84.8 - 90' **SHALE:** BDX (SH), dark gray (N3), weathered, weak to moderate strength, moderately decomposed, moderately fractured, thin bedding.	BDX (SH)									RUN #17: Modified RQD = (28/60) = 47%
			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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 46		0–1	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
			1.2–10	1.2 - 16' **FILL, LEAN CLAY:** CL, light 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 CS	120 62		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
Tel: (414)837-3607
Fax: (414)837-3608

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
			13–16	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									
			16–20	16 - 20' **LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.	CL									
3 CS	120 33		20–32	20 - 33' **LEAN CLAY:** CL, pinkish gray (7.5YR 6/2), sand (0-5%), medium to high plasticity, stiff, moist.	CL									
4 CS	120 104		30	30' increasing sand and gravel content.										

Boring Number MW392

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

Boring Number MW392

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				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											
7 CORE	60 4		57	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	66.3' - 67.2' highly fractured, very soft, wet.										
			67											
			68											
			69											
9 CORE	120 62		70	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures.										RUN #9: Modified RQD = (28/78) = 36%
			71		BDX (LS)									
			72											

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

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	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	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 CS	120 120		10	10' sand (0-5%), iron concretions (0-5%).										

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 MW393

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12-20	1 - 20' **FILL, LEAN CLAY:** CL, brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist. *(continued)* 18' medium to high plasticity.	(FILL) CL									
3 CS	120 120		20-24	20 - 24' **LEAN CLAY:** CL, light brown (7.5YR 6/4), mottling, sand (0-5%), medium to high plasticity, cohesive, moist.	CL									
			24-27	24 - 27' **CLAYEY SAND:** SC, gray (10YR 6/1), fine to medium sand, wet.	SC									
			27-31	27 - 31' **SILT WITH SAND:** (ML)s, dark gray (7.5YR 4/1), sand (0-5%), moist.	(ML)s									
4 CS	120 105		30	30' coal fragments (0-5%).										
			31-32	31 - 40' **SILTY CLAY:** CL/ML, dark gray (7.5Y 4/1), organic material (0-5%), gravel (0-5%), stiff to very stiff, moist.	CL/ML									

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			33–39	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									
5 CS	120 120		40–49	40 - 50' **SILT:** ML, grayish brown (2.5Y 5/2), very stiff to hard, platy, dry.	ML									
6 CS	120 92		50–52	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry.	ML									

Boring Number MW393

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, 54	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry. *(continued)*	ML									
			55, 56	55 - 57' **CLAYEY SILT:** ML/CL, gray (10YR 6/1), sand (0-5%), gravel (0-5%), medium plasticity, moist.	ML/CL									
			57, 58, 59	57 - 60' **LIMESTONE:** BDX (LS), gray (10YR 6/1), rock flour and angular chips (<2").	BDX (LS)									
7 CORE	120 60		60, 61, 62, 63, 64, 65, 66, 67, 68, 69	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, 71, 72	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%

Boring Number MW393

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)	Moisture Content	Liquid Limit	Plasticity Index	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 75 76 77 78 79	73.5 - 85' **SHALE:** BDX (SH), medium gray (N5), weathered, moderately to slightly fractured, thinly laminated.	BDX (SH)									RUN #9: Modified RQD = (30/40) = 75%
10 CORE	60 45		80 81 82 83 84	83.5' more competent.										RUN #10: Modified RQD = (34/45) = 76%
			85	85' End of Boring.										

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/Ⓦ
1/4 of 1/4 of Section , T N, R
Lat 38° 11' 56.8911"
Long -89° 51' 31.1756"
Local Grid Location ☐ N ☐ S Feet ☐ E ☐ W Feet

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	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.
			2.6	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.	CL				4					
			5						4					
2 CS	120 120		6											
			6.5						2.5					
			7.5						3.5					
			8.5						2					
			9.2	9.2' brown (7.5YR 5/3), medium to high plasticity.										
			9.5						2					
			10.5						3					
			11.5						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

RAMBOLL

Boring Number MW394

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				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)*										
			13						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.										
			23						4.5					
			24						4.5					
			25						4.5					
4 CS	120 112		26						4.5					
			27		CL				4.5					
			28						4.5					
			29						4.5					
			30						4.5					
			31						4.5					
			32											

Boring Number MW394

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											
			43		BDX (SH)									
			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											

SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number MW394

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	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		54–57	53.7' - 53.9' limestone, very strong. 54' - 55.6' dark gray (10YR 4/1) to gray (10YR 5/1), more competent. 55.6' gray (10YR 6/1) to dark gray (10YR 4/1), more competent.	BDX (LS)									
8 CORE	18 14		58–59	58 - 59.7' **LIMESTONE:** BDX (LS), medium gray (N5), shaley, laminated, moderately fractured.	BDX (LS)									RUN #8: Modified RQD = (4/14) = 29%
9 CORE	60 60		60–64	59.7 - 68' **SHALE:** BDX (SH), medium dark gray (N4), weathered, very weak to weak, thinly bedded, moderately fractured.	BDX (SH)									RUN #9: Modified RQD = (48/60) = 80%
10 CORE	57 56		65–67	64.5 - 67.2' highly decomposed, weathered, wet.										RUN #10: Modified RQD = Not Recorded
			68	68 - 68.4' **LIMESTONE:** BDX (LS), light olive gray (5Y 6/2) to olive gray (5/2).	BDX (LS)									
11 CORE	68 68		69–70	68.4 - 70.8' **SHALE:** BDX (SH), medium dark gray (N4), weathered, very weak to weak, thinly bedded, moderately fractured.	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

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				strong, thinly bedded, moderately fractured. 71 - 77.6' **SHALE:** BDX (SH), dark gray (N3), strong, thinly bedded, moderately fractured. *(continued)*	BDX (SH)									
12 CORE	60 59		73–77											RUN #12: Modified RQD = (44/59) = 75%
			78–79	77.6 - 80' **LIMESTONE:** BDX (LS), medium gray (N5), shaley, weak, moderately fractured.	BDX (LS)									
13 CORE	60 48		80–85	80 - 85' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak, thinly bedded, moderately fractured, moist to wet.	BDX (SH)									RUN #13: Modified RQD = (40/48) = 83%
			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	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0-2	0 - 2' **SILTY CLAY** CL/ML.	CL/ML								0-28' Blind Drilled. See log PZ-170 for soil description.
			2-4	2 - 4' Shelby Tube Sample.									
			4-8	4 - 8' **SILTY CLAY** CL/ML.	CL/ML								
			8-10	8 - 10' **SILTY CLAY** to **LEAN CLAY:** CL/ML.	CL/ML								
			10-12	10 - 12' **LEAN CLAY:** CL.	CL								

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	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12 - 14	12 - 14' Shelby Tube Sample.										
			14 - 24	14 - 24' **SILTY CLAY** CL/ML.	CL/ML									
			24 - 26	24 - 26' Shelby Tube Sample.										
			26 - 28	26 - 28' **SILTY CLAY** CL/ML.	CL/ML									
1 SS	10 10	23 50/4"	28 - 28.4	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		28.4 - 28.9	28.4 - 28.9' **SHALE:** BDX (SH), gray, highly decomposed, very weak.	BDX (SH)									Core 1, RQD=51%
			28.9 - 38.1	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)									

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	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: 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.	BDX (LS/SH)								Core 2, RQD=0%
			36	36' - 37.9' vertical fracture.									
3 CORE	24 25		38	38.1 - 44' **SHALE:** BDX (SH), bluish gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 3, RQD=40%
4 CORE	24 11		40										Core 4, RQD=0%
5 CORE	36 32		41	40.6' - 40.8 shaley limestone layer, light gray to gray, microcrystalline, moderately decomposed, very strong. 41.1' - 43.2 gray, moderately to highly decomposed.	BDX (SH)								Core 5, RQD=78%
6 CORE	12 28		44	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		45	45' shale layer, bluish gray, moderately fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 7, RQD=65%
			46	45.7 - 52.2' **SHALE:** BDX (SH), bluish gray, moderately fractured (tight to narrow), highly decomposed, weak.									
8 CORE	24 30		49		BDX (SH)								Core 8, RQD=78%
9 CORE	24 24		51										Core 9, RQD=0%
			52										

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	U S C S	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 54 55	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. 52.7' - 53' clayey sand in aperture. 53' - 53.1 shale bed, bluish gray, fossiliferous, moderately fractured (very narrow to narrow), highly decomposed, weak. 53.1' white to bluish gray, gray in the fractures (extremely narrow to moderately narrow apertures), thinly to medium bedded, slightly to moderately disintegrated. 55.7' moderately disintegrated.	BDX (LS/SH)									Core 10, RQD=0%
11 CORE	24 30		56 57											Core 11, RQD=18%
12 CORE	30 27		58 59 60	58.1' highly decomposed.										Core 12, RQD=39%
13 CORE	36 53		61											Core 13, RQD=89%
			62 63 64 65	61.7 - 65.3' **LIMESTONE:** BDX (LS).	BDX (LS)									
			66	65.3 - 66' Overdrilled for Well Installation.										
				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: PZ-170	Final Static Water Level: Feet (NAVD88)	Surface Elevation: 418.58 Feet (NAVD88)	Borehole Diameter: 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: Feet ☐N ☐S Feet ☐E ☐W

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	U S C S	Graphic Log	Well Diagram	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 8	4 5 6 9	0–2	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		2–4	2 - 4' Shelby Tube Sample.									ST2: 24" push at 500lbs of pressure.
3 SS	24 15	2 3 5 7	4–6	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.	CL/ML								
4 SS	24 17	3 5 8 8	6–8	6' - 7.4' trace gray (10YR 5/1) mottling.									
5 SS	24 17	3 4 6 6	8–10	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	10–12	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								
7 ST	24 24		12–13	12 - 14' Shelby Tube Sample.									ST7: 24" push at 250lbs of pressure.

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

Signature: [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	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		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				12 - 14' Shelby Tube Sample. *(continued)*										
8 SS	24 21	3 5 7 8	14 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.	CL/ML									
9 SS	24 24	2 4 4 6	16 17	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	18 19	18' - 20' silt (15-25%), very fine sand (0-10%), trace fine gravel, medium plasticity, moist. 19' layer of gravel (2" thick, subangular to subrounded).										
11 SS	24 20	1 2 5 7	20 21	19.8' very soft (0.25 tsf). 20' - 24' subangular to subrounded gravel, low plasticity, dry to moist. 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 25	24 - 26' Shelby Tube Sample.										ST13: 24" push at 650lbs of pressure.
14 SS	24 22	3 6 12 14	26 27	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	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 31	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). 31.1' End of Boring.	BDX (SH)									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
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 44.170" Long. -89° 52' 10.808" or	MW-370
Facility ID	St. Plane 556,826.50 ft. N, 2,381,936.14 ft. E. E / (W)	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.

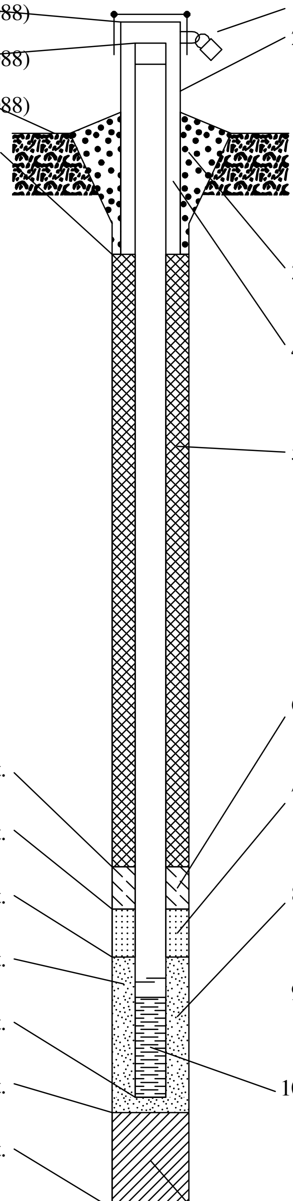
J. Filter pack, bottom 355.2 ft. (NAVD88) or 63.5 ft.

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 ☐ Other ☒
   2.1' of bentonite chips, 0.4' of bedrock drill cuttings

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 Rodes

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

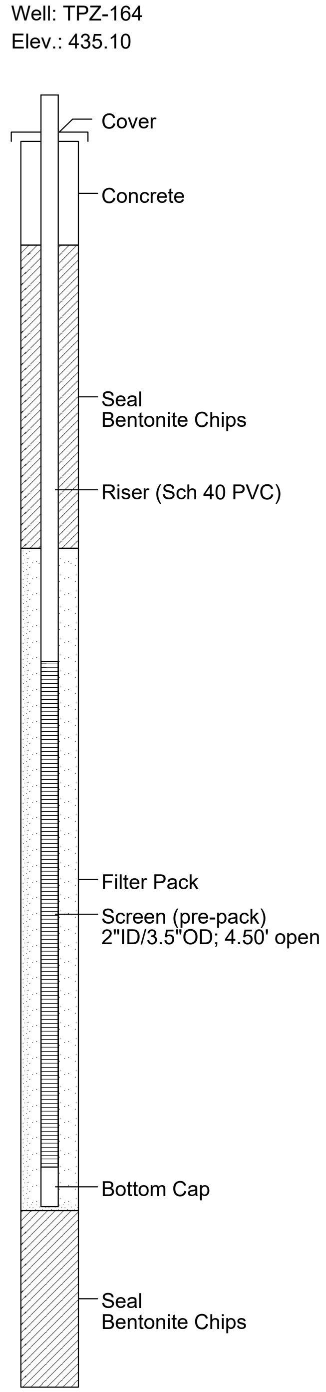
KELRON ENVIRONMENTAL
Incorporated

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
0–8.75	FILL - Bottom Ash, coarse, black (10YR 2/1), dry - moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay - wet	430, 429, 428, 427, 426, 425, 424	1		17/24		AR
8.75–10.3	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)	423	2	3 3 5	18/18		CL
10.3–12	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	422, 421	3		23/24		CL



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KELRON
ENVIRONMENTAL
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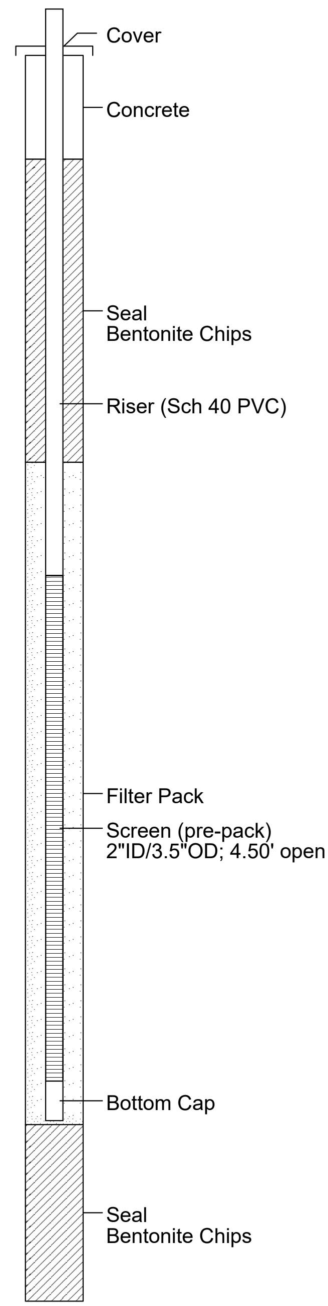
LOG OF PROBEHOLE TPZ-164

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, 1, 2, 3, 4, 5, 6, 7, 8	FILL - Bottom Ash, coarse, black (10YR 2/1), dry - moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay - wet	430, 429, 428, 427, 426, 425, 424	1		17/24		AR	
9, 10	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)	423	2	3 3 5	18/18		CL	
11, 12	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	422, 421	3		23/24		CL	

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/Ⓦ
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	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	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. 5.4' very dark gray.	(FILL) SM									
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
Tel: (414)837-3607
Fax: (414)837-3608

RAMBOLL

Boring Number XPW01

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)	Moisture Content	Liquid Limit	Plasticity Index	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					
									3					
			14	14' End of Boring.										

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 ☒		Local Grid Location
State Plane 557,667.96 N, 2,384,171.76 E E/Ⓦ	Lat 38° 11' 52.4167"	☐ N ☐ S Feet
1/4 of 1/4 of Section , T N, R	Long -89° 51' 42.7697"	☐ E ☐ W Feet

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	U S C S	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		0–9.5	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
2 CS	48 48		9.5–11	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									
			11–14	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					

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

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				11 - 14' **SILTY CLAY:** CL/ML, dark greenish gray (GLEY 1 4/1), medium to high plasticity, stiff to very stiff, moist. *(continued)*					2.5					
			13	13' yellowish brown (10YR 5/4).	CL/ML				2					
			14	14' End of Boring.										

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(circled 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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 85		0–6	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
2 CS (at 10)	60 60		6–12	6 - 16.5' **FILL, ASH (Coal):** SW, black (10YR 2/1), sand-sized ash, silt (10-20%), clay (0-5%), loose, wet.	(FILL) SW									

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

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

Boring Number XPW04

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)*										
			14		(FILL) SW									
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.					2.75					
			18		CL/ML				3.25					
			19						3.5					
			20	20' End of Boring.										

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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 55		0–10	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									
2 CS	120 88		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	Tel: (414)837-3607 Fax: (414)837-3608

Boring Number XPW05

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
3 CS	120 120		12–21.9	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)* 15' saturated.	(SW)g									
			21.9–24.5	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.	ML									
			24.5–28.2	24.5 - 28.2' **ASH (Coal):** (SW)g, black (10YR 2/1), sand-sized ash, silt (5-15%), loose, wet.	(SW)g									
			28.2–30	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 4.5					
			30	30' End of Boring.										

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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	72 72		0–5	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
			5–5.4	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		5.4–9.9	5.4 - 9.9' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, clay (5-15%), loose, moist. 7 - 9.9' interbedded silty clay.	(FILL) SM									
			9.9–12	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	
[signature]	Ramboll 234 W Florida Street, 5th Floor, Milwaukee, WI 53204	Tel: (414)837-3607 Fax: (414)837-3608

Boring Number XPW06

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13 14 15 16	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)* 13.7' dark greenish gray (GLEY 1 4/1), reddish brown mottling (10%).	CL/ML									
				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, 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 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.

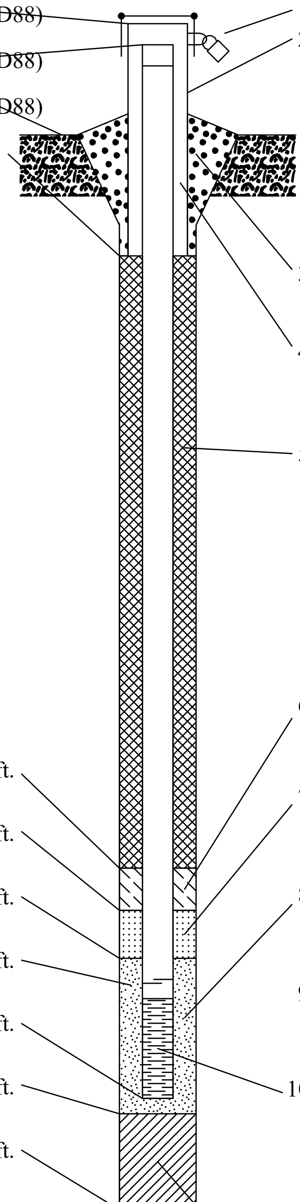
J. Filter pack, bottom 421.1 ft. (NAVD88) or 14.0 ft.

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
[signature]	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	Local Grid Location of Well	Well Name
Baldwin Power Plant	____ft. ☐ N. ☐ S. ____ft. ☐ E. ☐ W.	
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 52.4" Long. -89° 51' 42.8" or	XPW02
Facility ID	St. Plane 557,668 ft. N, 2,384,172 ft. E. E/Ⓦ	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 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.

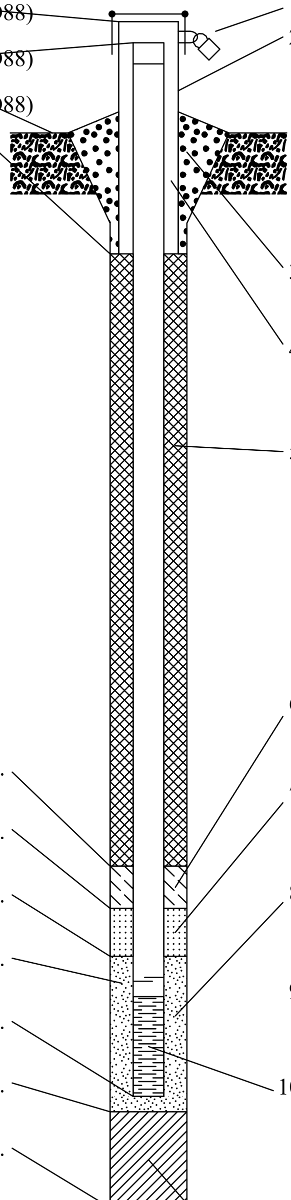
J. Filter pack, bottom 422.9 ft. (NAVD88) or 12.0 ft.

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
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 40.9" Long. -89° 51' 49.7" or	XPW04
Facility ID	St. Plane 556,503 ft. N, 2,383,618 ft. E. E/(W)	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 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 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.

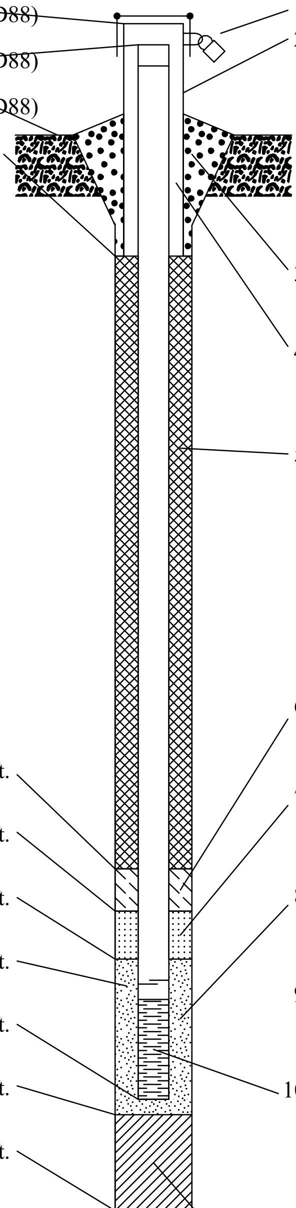
J. Filter pack, bottom 413.1 ft. (NAVD88) or 17.5 ft.

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	Local Grid Location of Well	Well Name
Baldwin Power Plant	____ft. ☐ N. ☐ S. ____ft. ☐ E. ☐ W.	
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 46.4" Long. -89° 51' 44.5" or	XPW05
Facility ID	St. Plane 557,063 ft. N, 2,384,034 ft. E. E /W (W circled)	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.

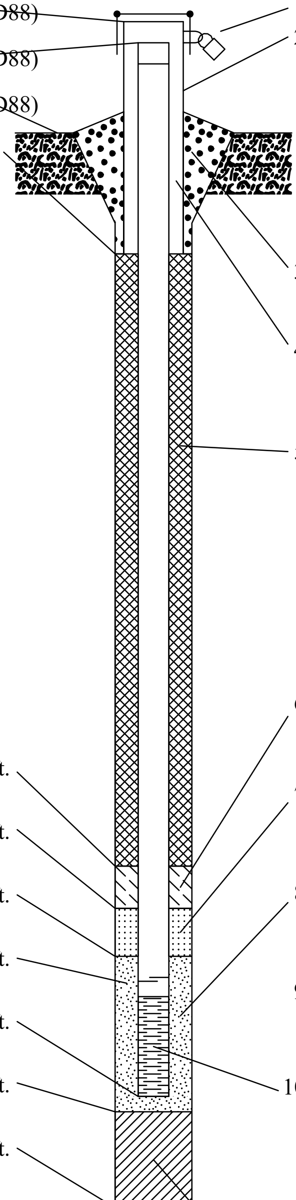
J. Filter pack, bottom 405.1 ft. (NAVD88) or 29.0 ft.

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

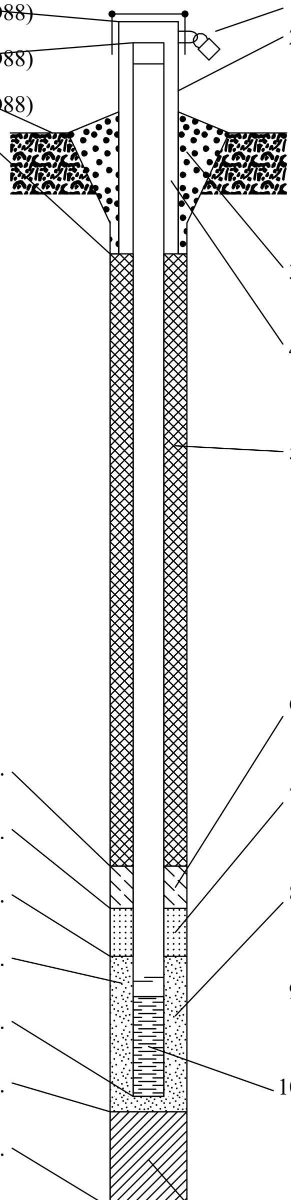
Signature

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
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 49.1" Long. -89° 52' 8.2" or	XPW06
Facility ID	St. Plane 557,324 ft. N, 2,382,140 ft. E. E /Ⓦ	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 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 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

SiREM
Leading Science · Lasting Solutions

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

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 ✓✓		Total & Stable Li Isotopes		S-9990
MW158R-20230822	8/22/2023	13:50	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
PZ170-20230821	8/21/2023	11:25	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
TPZ164-20230821	8/21/2023	10:45	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
MW370-20230821	8/21/2023	12:10	Water		~~2~~ 1 Sr	2x500mL ✓		Total & Stable Li Isotopes		S-9990
MW358-20230822	8/22/2023	12:15	Water		2	2x500mL ✓✓		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:		Signature:	
Name:	Susan Thomas	Name:	Vazquez Ramos José	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

CHARTERED
CATHARINE ARNOLD
CHEMIST

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

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

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

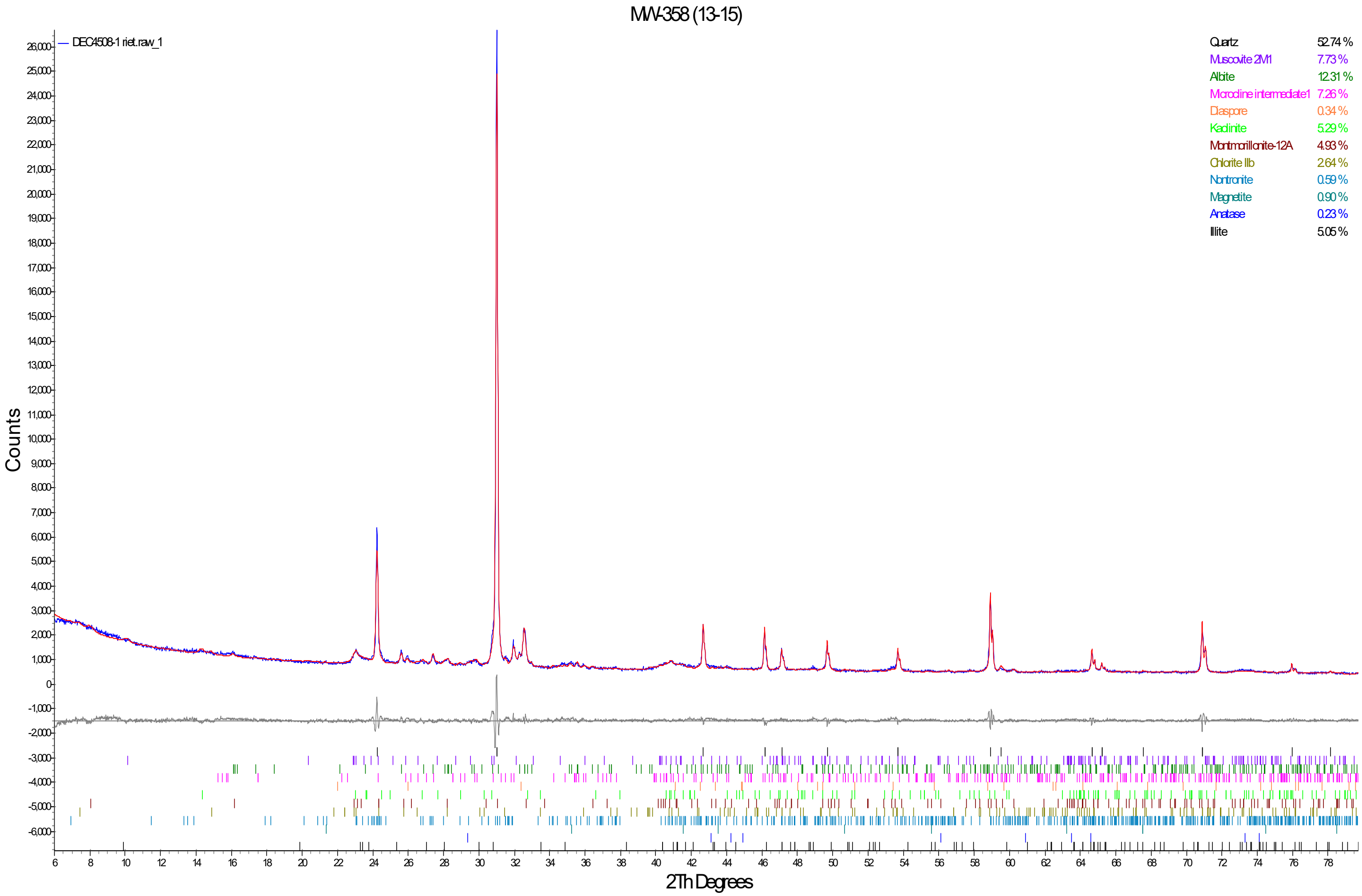
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

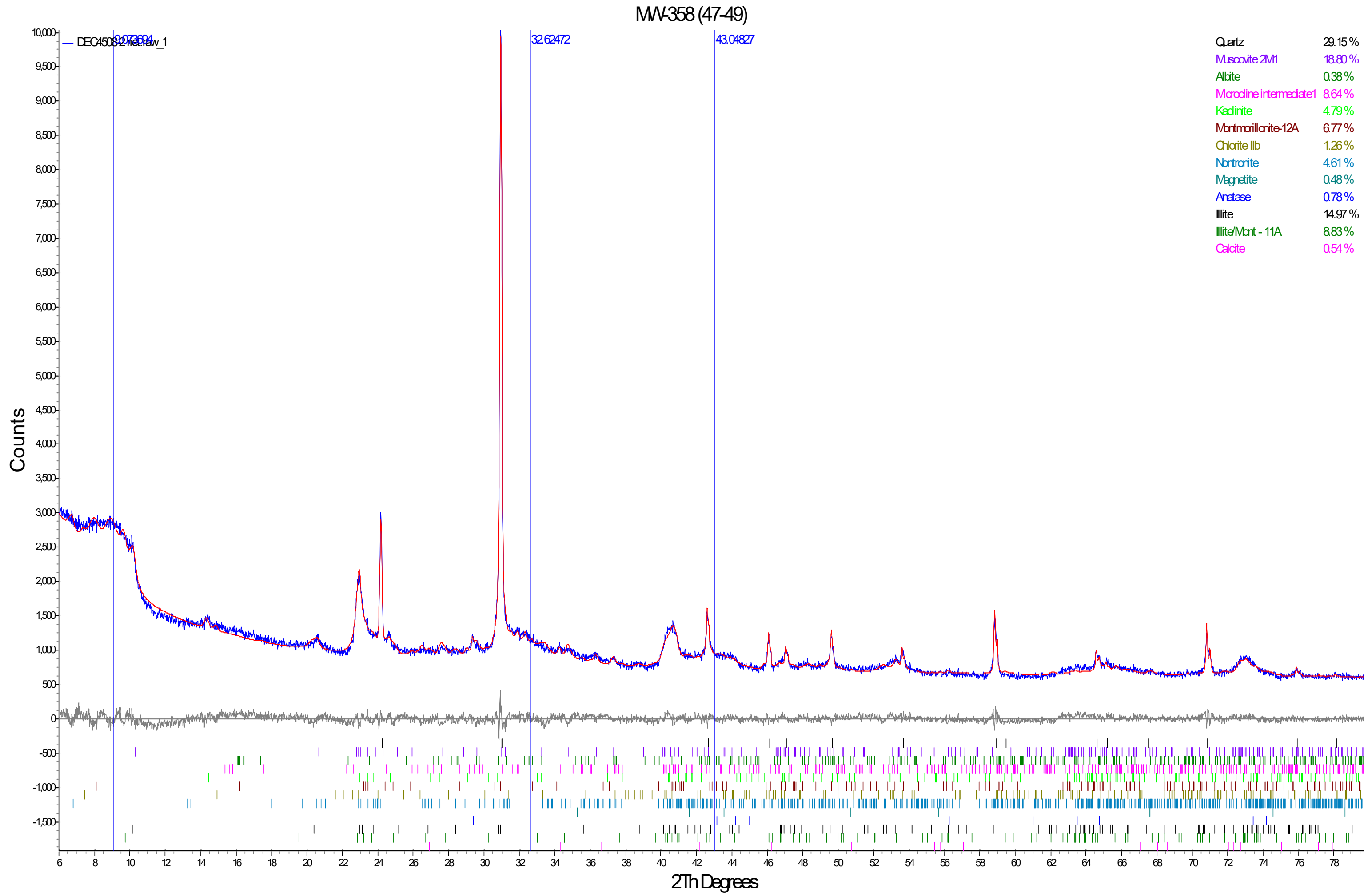
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

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	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$

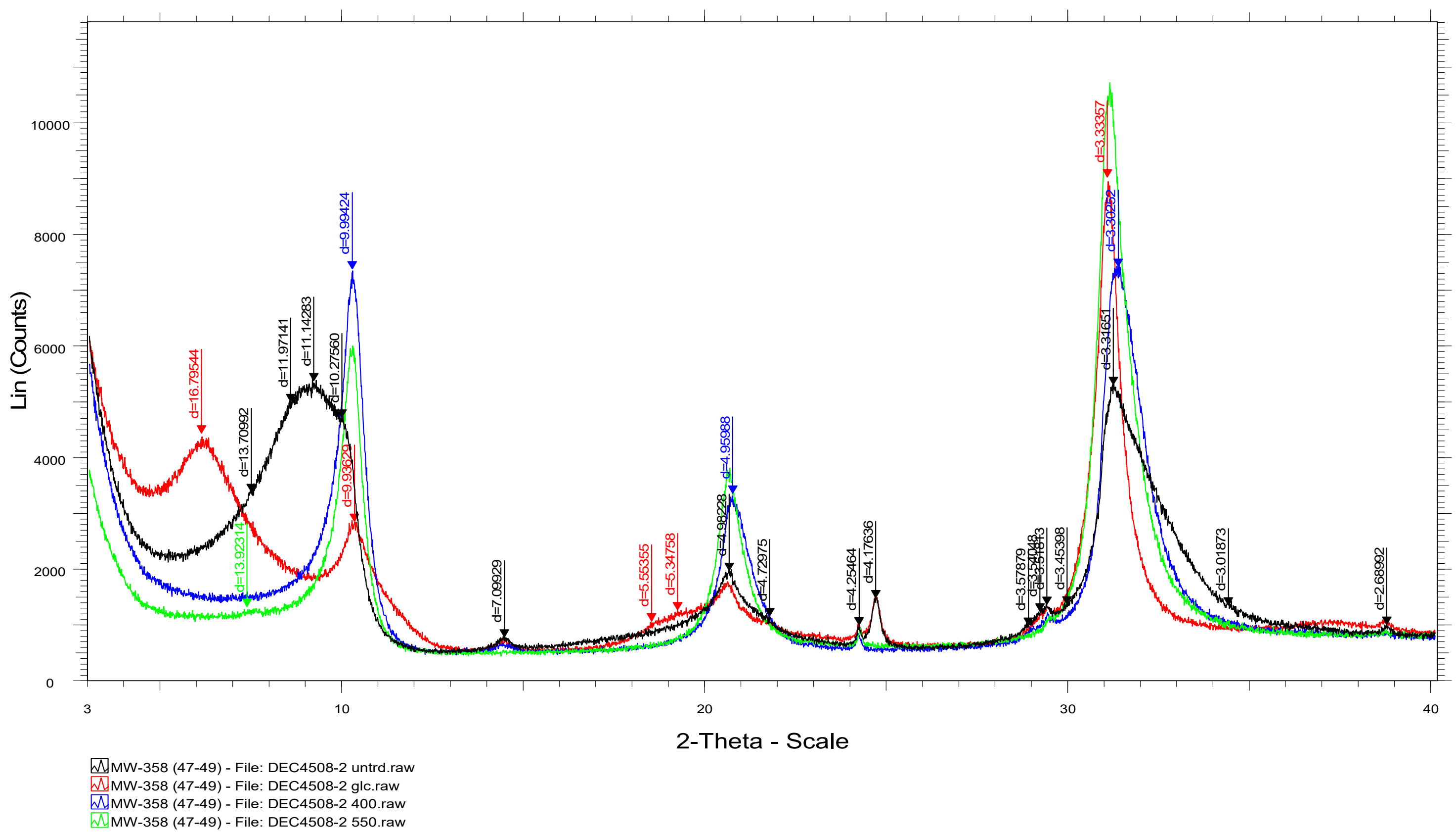
Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



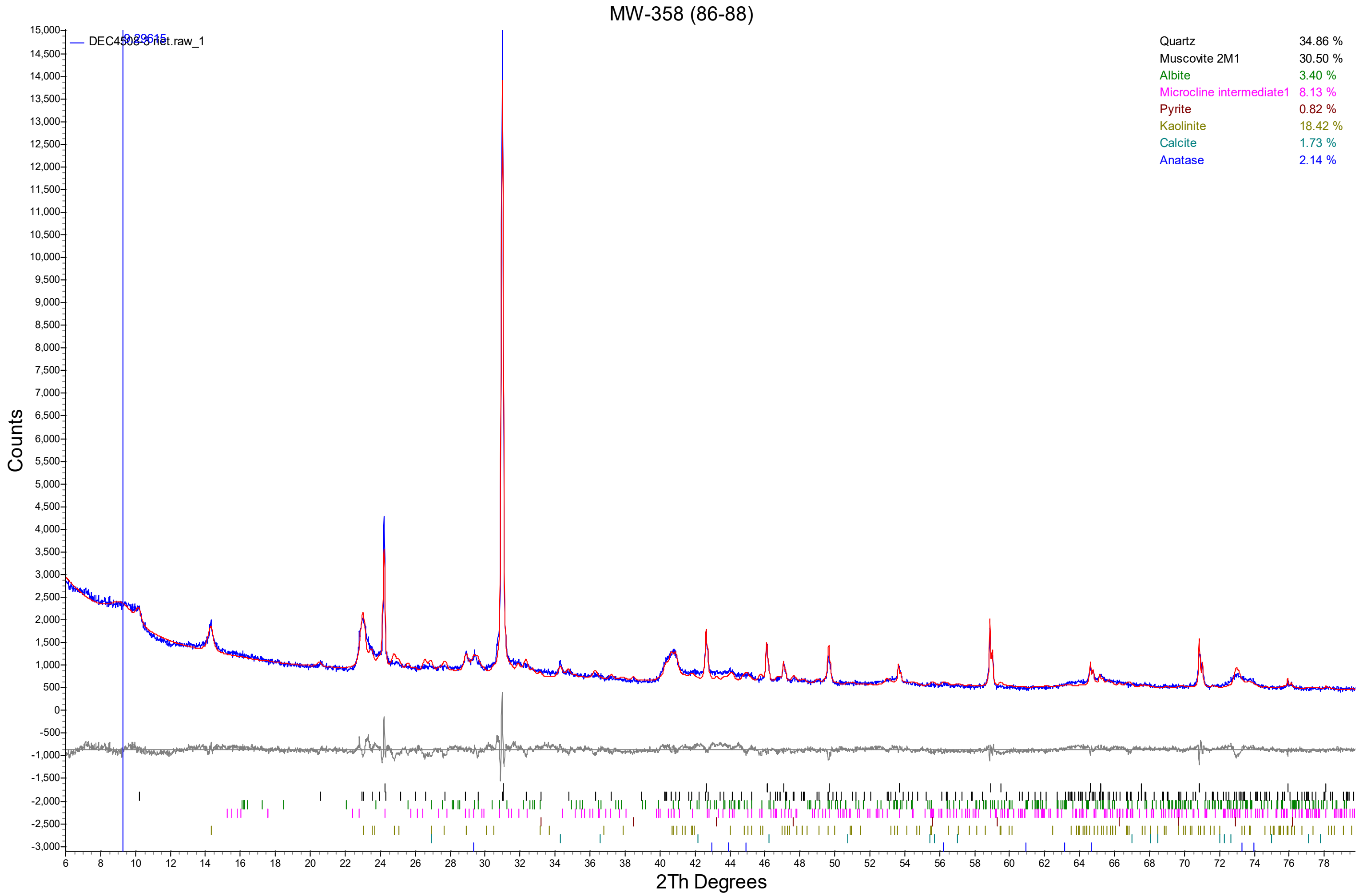

MW-358 (47-49)
DEC4508-2-rietraw_1
9.073694
32.62472
43.04827
Counts
2Th Degrees
Quartz 29.15 %
Muscovite 2M1 18.80 %
Albite 0.38 %
Microcline intermediate1 8.64 %
Kaolinite 4.79 %
Montmorillonite-12A 6.77 %
Chlorite IIb 1.26 %
Nontronite 4.61 %
Magnetite 0.48 %
Anatase 0.78 %
Illite 14.97 %
Illite/Mont - 11A 8.83 %
Calcite 0.54 %

Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

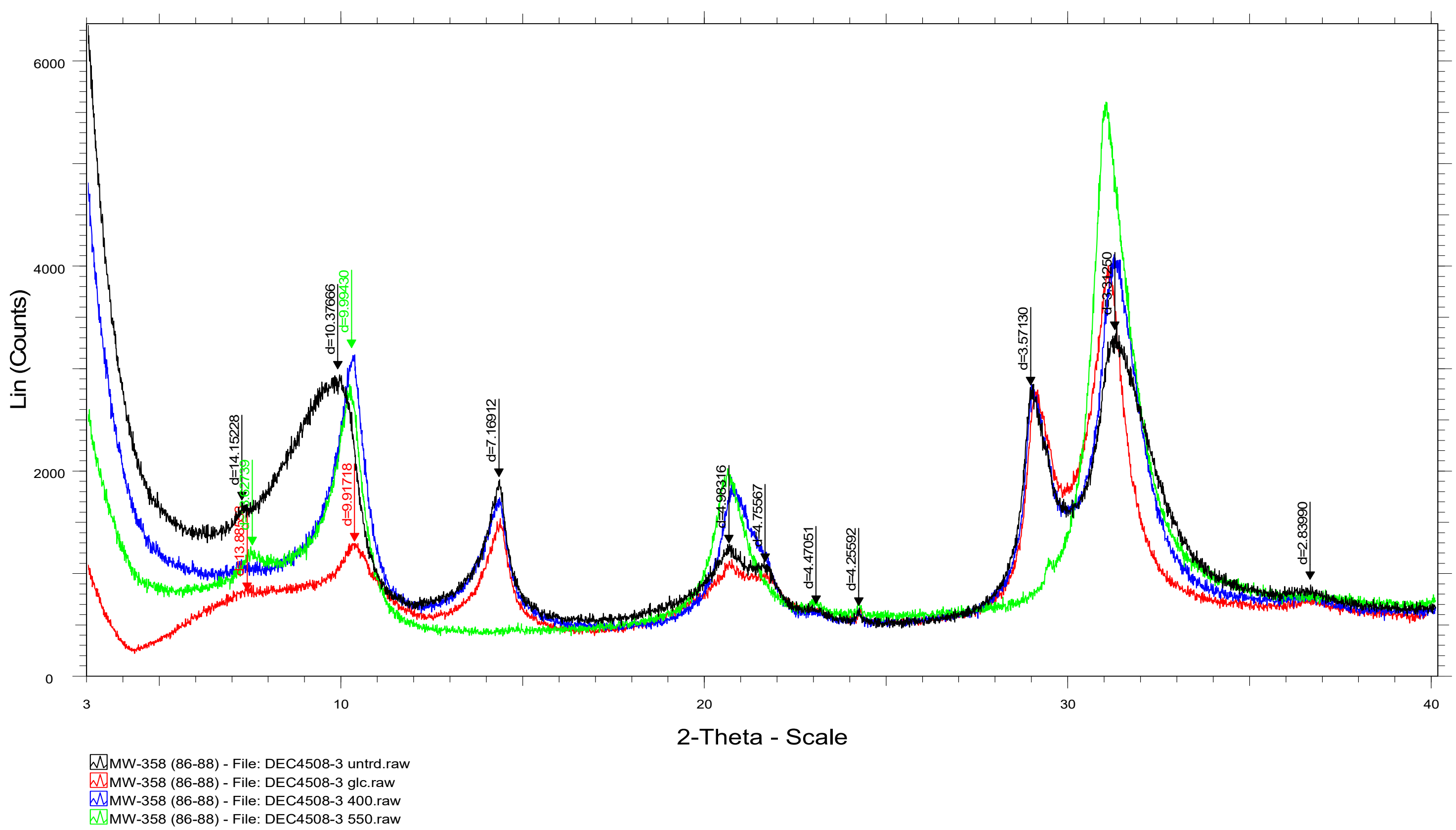
MW-358 (47-49)

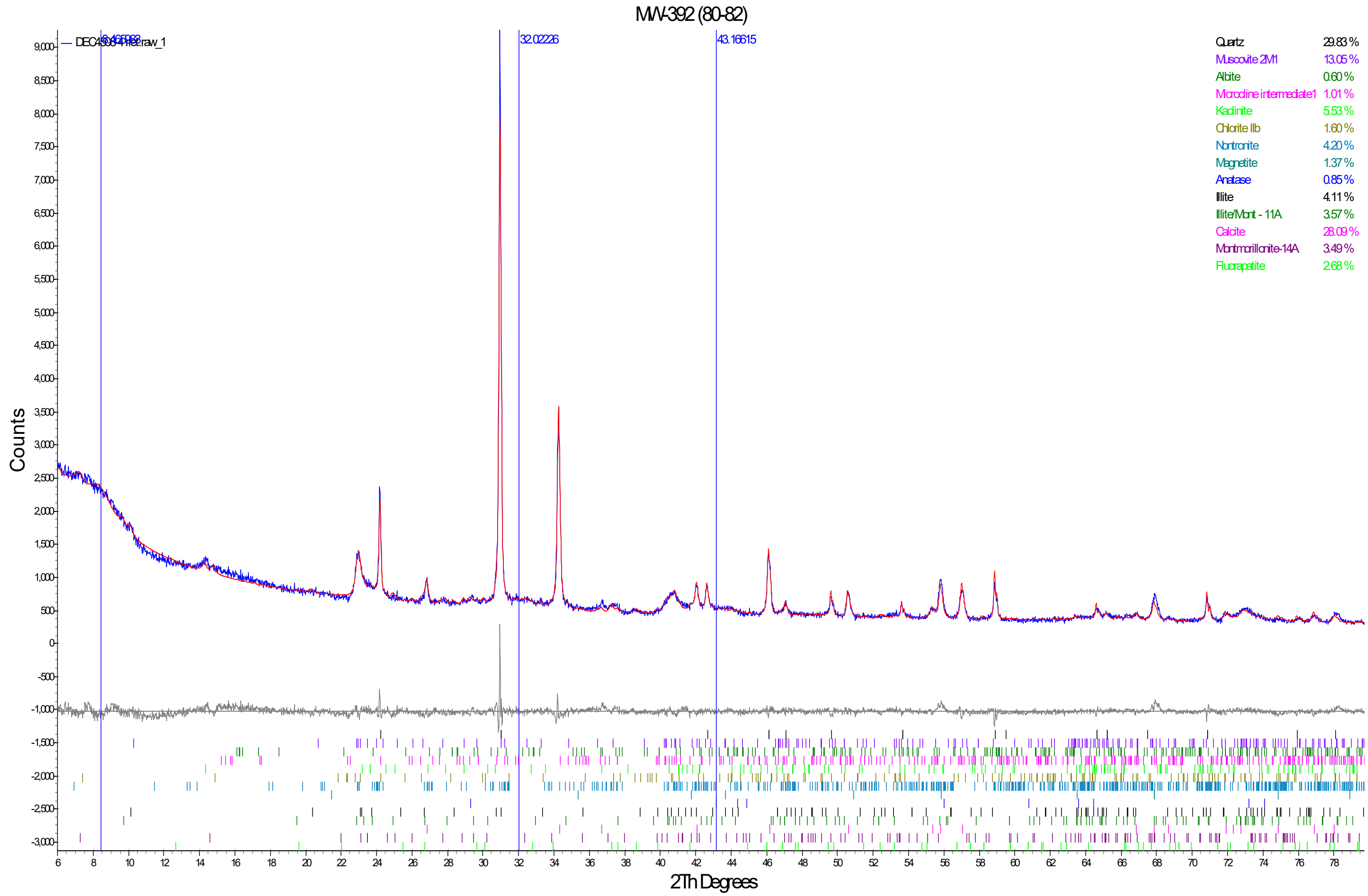


Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



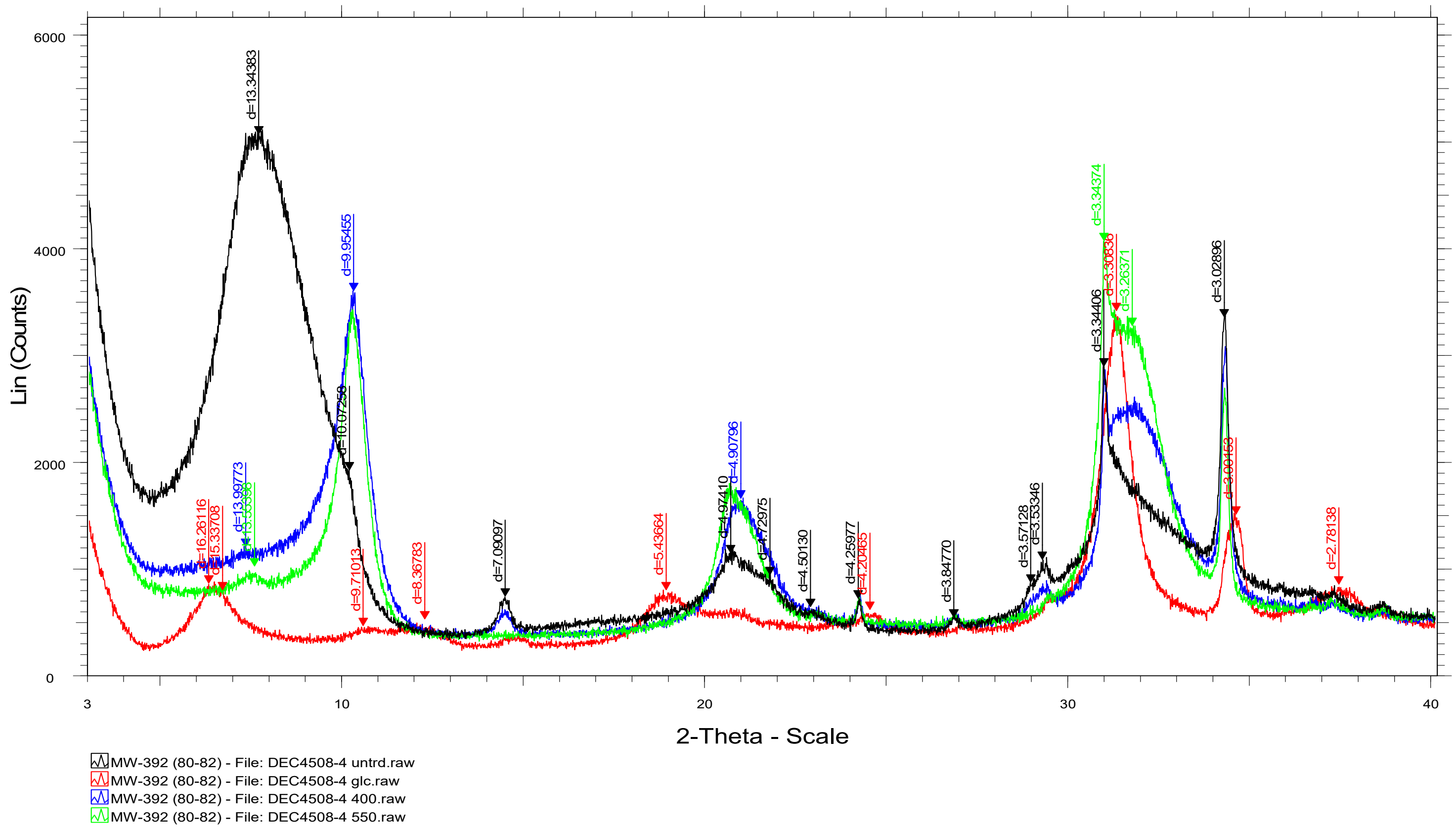
MW-358 (86-88)

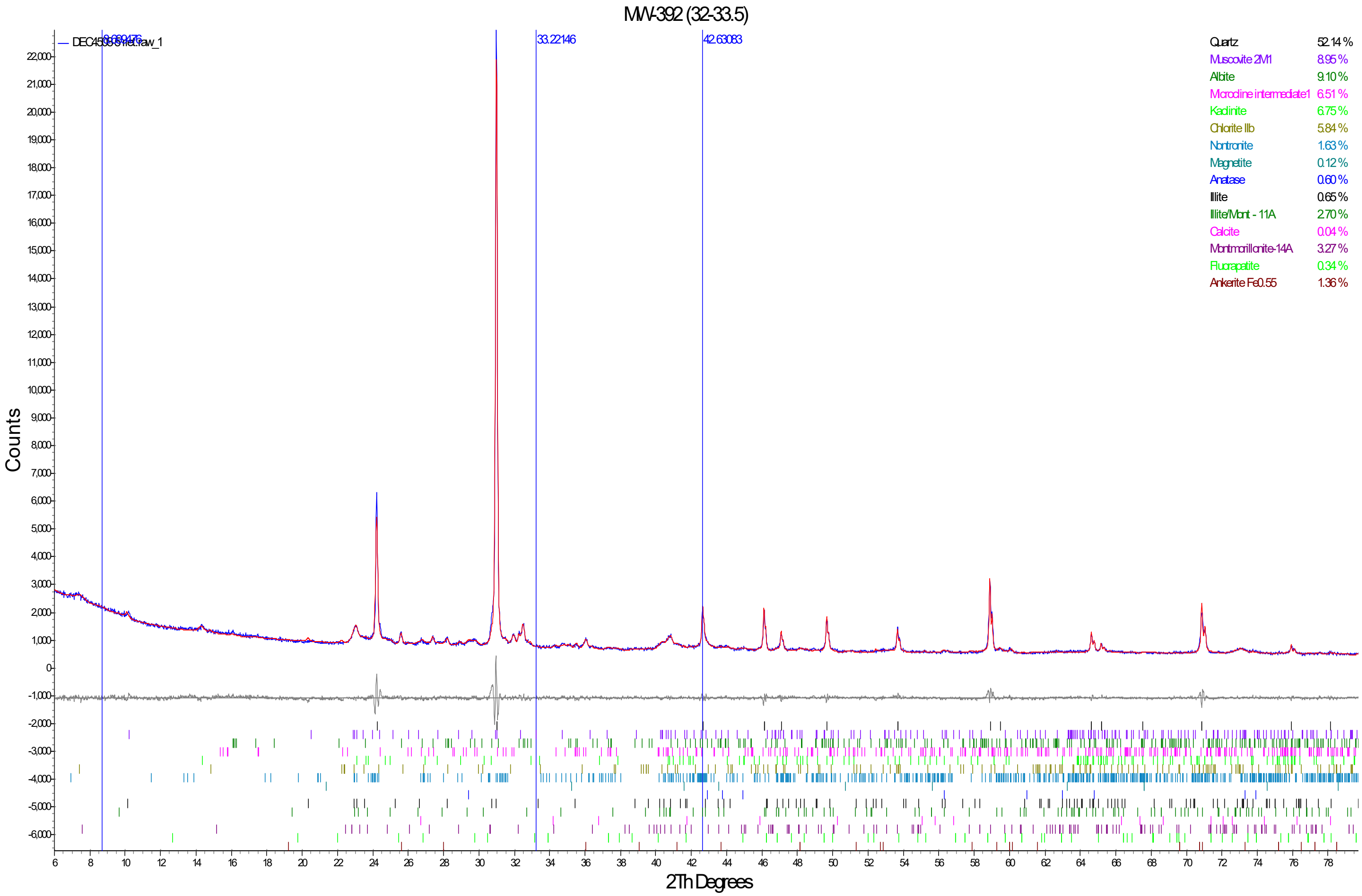

Lin (Counts)
6000
4000
2000
0
3
10
20
30
40
2-Theta - Scale
d=14.15228
d=10.37666
d=9.99430
d=9.91718
d=7.16912
d=4.98316
d=4.75567
d=4.47051
d=4.25592
d=3.57130
d=2.83990
MW-358 (86-88) - File: DEC4508-3 untrd.raw
MW-358 (86-88) - File: DEC4508-3 glc.raw
MW-358 (86-88) - File: DEC4508-3 400.raw
MW-358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


MW-392 (80-82)
DEC4508-44.raw_1
32.02226
43.16615
Counts
2Th Degrees
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 %

Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

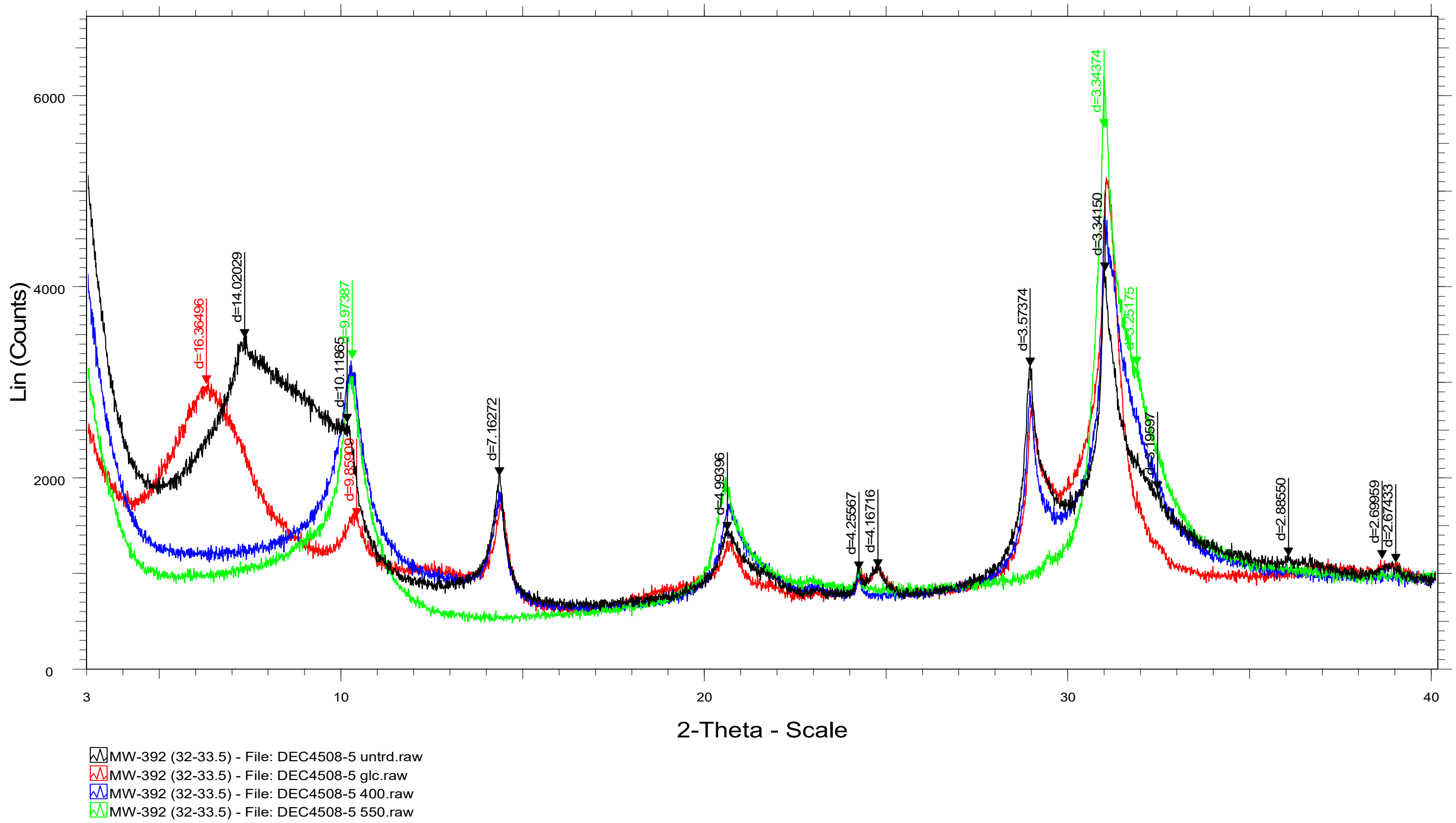
MW-392 (80-82)

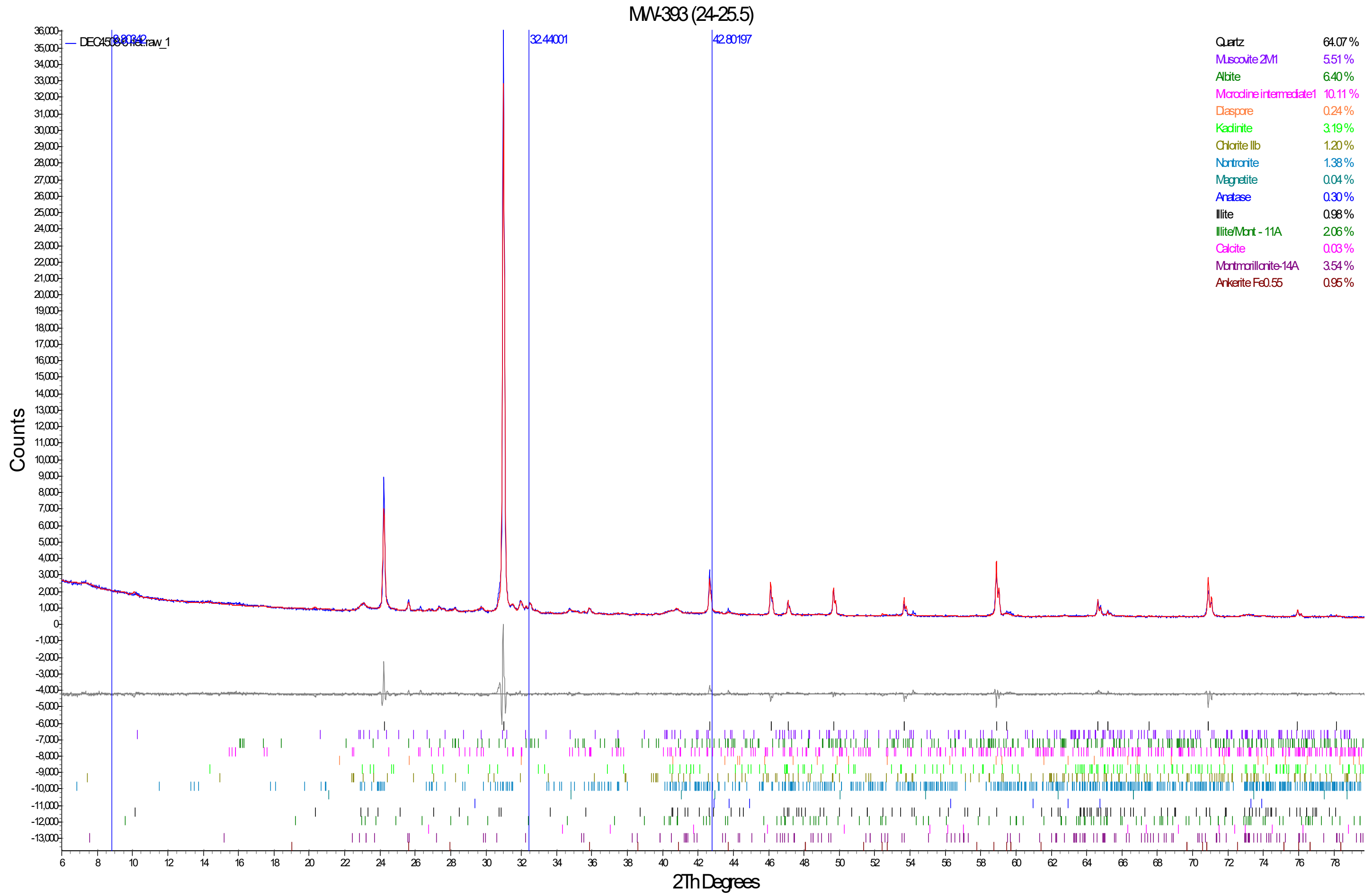



MW-392 (32-33.5)
DEC4508-9.rd.raw_1
8.699476
33.22146
42.63083
Quartz 52.14 %
Muscovite 2M1 8.95 %
Albite 9.10 %
Microcline intermediate1 6.51 %
Kaolinite 6.75 %
Chlorite IIb 5.84 %
Nontronite 1.63 %
Magnetite 0.12 %
Anatase 0.60 %
Illite 0.65 %
Illite/Mont - 11A 2.70 %
Calcite 0.04 %
Montmorillonite-14A 3.27 %
Fluorapatite 0.34 %
Ankerite Fe0.55 1.36 %
Counts
2Th Degrees

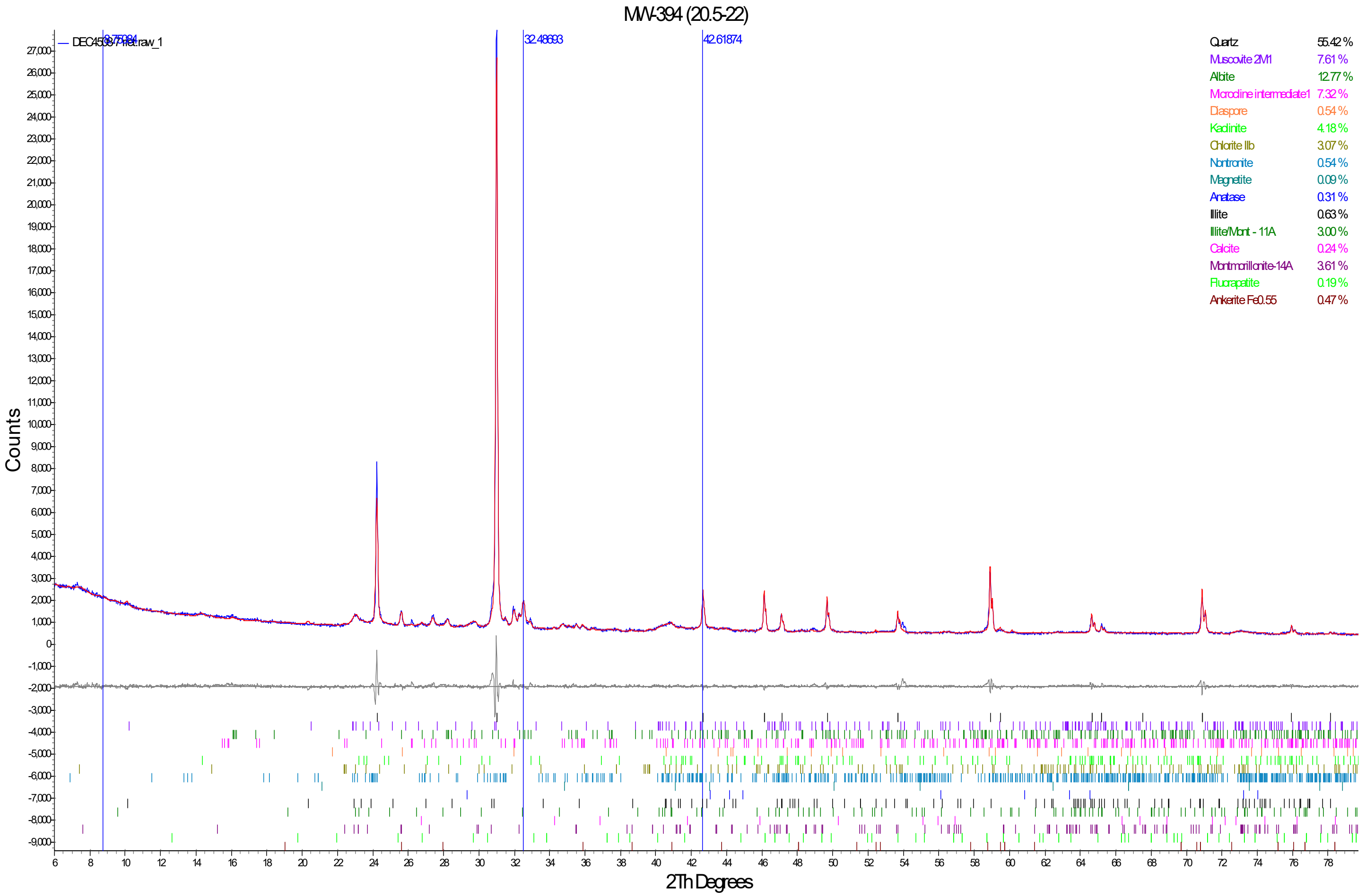
Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-392 (32-33.5)

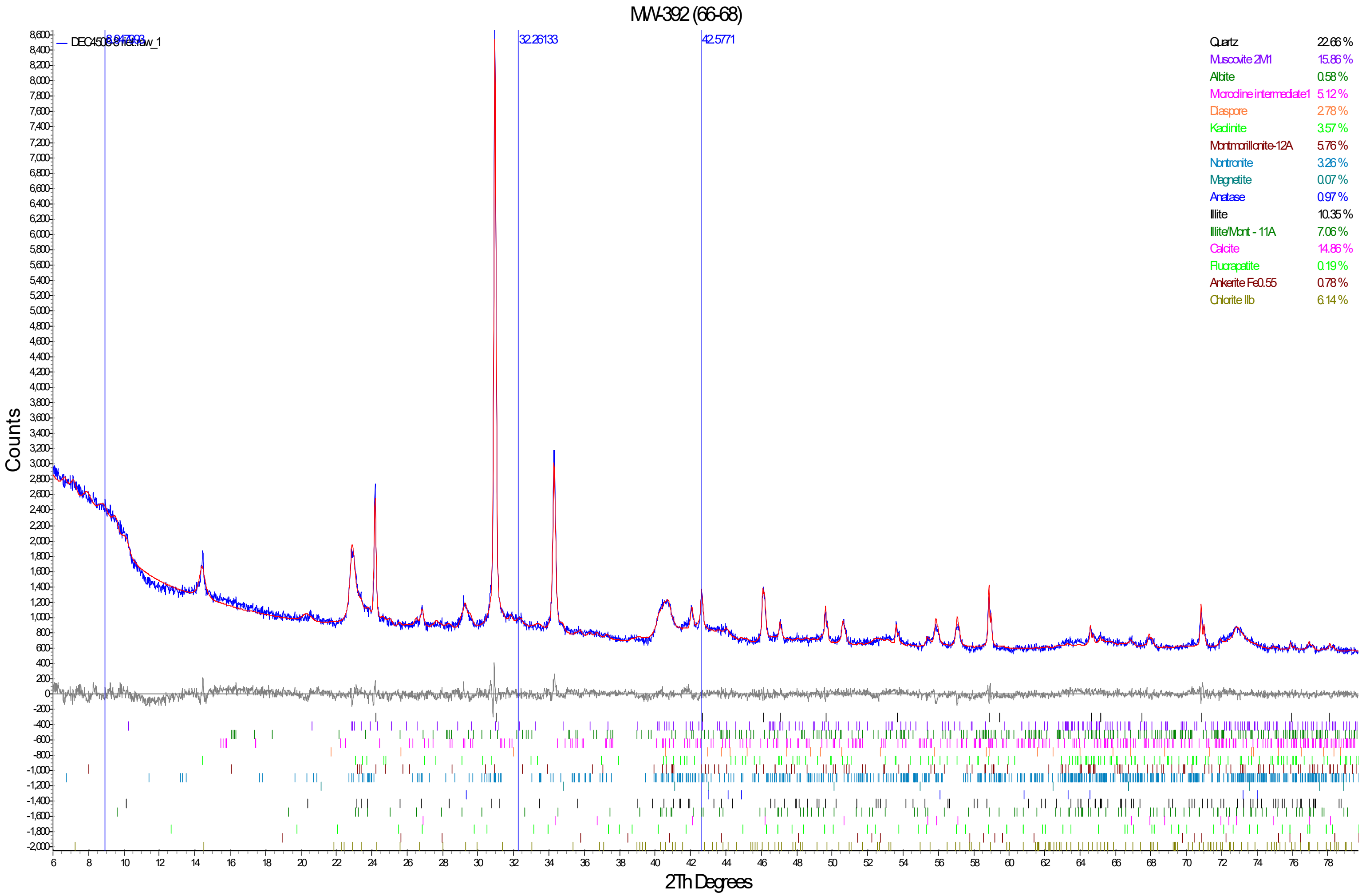



MW-393 (24-25.5)
Counts
2Th Degrees
32.44001
42.80197
Quartz 64.07 %
Muscovite 2M1 5.51 %
Albite 6.40 %
Microcline intermediate1 10.11 %
Diaspore 0.24 %
Kaolinite 3.19 %
Chlorite IIb 1.20 %
Nontronite 1.38 %
Magnetite 0.04 %
Anatase 0.30 %
Illite 0.98 %
Illite/Mont - 11A 2.06 %
Calcite 0.03 %
Montmorillonite-14A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

Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-392 (66-68)

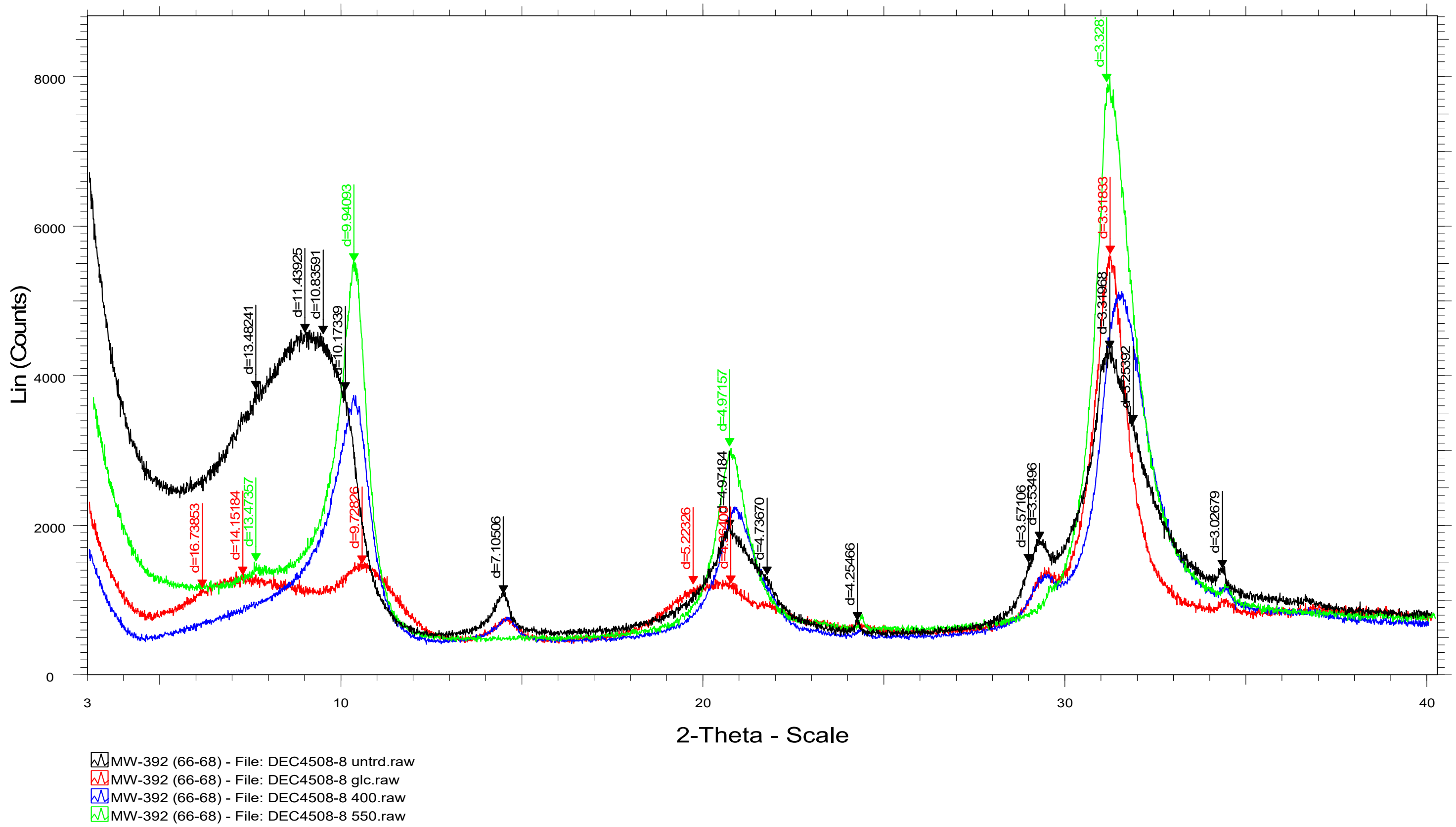


Exhibit C

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.
150 E Wilson Bridge Road
Worthington, Ohio 43085

Project Number: GLP8068

October 27, 2023

Geosyntec consultants

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, Illinois 62234

Prepared by

Geosyntec Consultants, Inc.
500 W. Wilson Bridge Road
Worthington, OH 43085

License No.: 062.040562
Expires: 11/30/2023

John Seymour, P.E.
Senior Principal

JOHN P. SEYMOUR
062-040562
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Project Number: GLP8068

October 27, 2023

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ACRONYMS AND ABBREVIATIONS

%	percent
‰	per mill
ANOSIM	analysis of similarities
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
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
USGS	United States Geological Survey

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 the Illinois Administrative Code (IAC) Title 35, Part 845 ("Standards for the Disposal of CCR in Surface Impoundments") and was completed by October 27, 2023, within 60 days of determination of the exceedances (August 28, 2023), as required by 35 I.A.C.§ 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 (NID) ID No. IL50721.

An exceedance of chloride was identified above the site-specific groundwater protection standard (GWPS) of 1,370 milligrams per liter (mg/L) at downgradient monitoring well MW-370 following the Second Quarter 2023 sampling event. An exceedance of fluoride was identified above the site-specific GWPS of 4.0 mg/L at downgradient monitoring well MW393 following the Second Quarter 2023 sampling event.

Under 35 IAC 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, or that the exceedance of the groundwater protection standard resulted from error in sampling, analysis, or statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction.

Pursuant to 35 IAC 845.650(e), the lines of evidence (LOEs) documented in this ASD demonstrate that a source other than the BPP BAP CCR unit was the cause of the GWPS exceedance for chloride at downgradient monitoring well MW-370 and the GWPS exceedance for fluoride at downgradient monitoring well MW-393. Natural variability associated with the lithology of the aquifer was identified as the alternative source for the elevated chloride and fluoride concentrations at MW-370 and MW-393, respectively.

2. BACKGROUND

2.1 Site Location and Description

The BPP is located 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 location 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, 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 is 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 (AECOM 2016).

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 also 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 (Ramboll 2023b).
- Upper 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

(PMPs) 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 2023a). 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.

A geologic cross-section originally included in the Hydrogeologic 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 IAC 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}) (NRT 2014).

The groundwater monitoring network for the BAP consists of 16 monitoring wells: thirteen 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 three background monitoring wells (MW-304, MW-306, 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.

3. ALTERNATIVE SOURCE DEMONSTRATION LINES OF EVIDENCE

This ASD for the chloride GWPS exceedance at MW-370 and the fluoride GWPS exceedance at MW-393 is based on four lines of evidence (LOEs). These LOEs are described and supported below.

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

Porewater (*i.e.*, water within the CCR) samples have been collected from piezometer TPZ-164 since September 2018 and at five new porewater wells (XPW-01, -02, -04, -05, and -06) since October 2022. The chloride and fluoride concentrations reported for these porewater sampling locations are consistently below the concentrations observed for chloride at MW-370 and for fluoride at MW-393, as shown in **Figure 1** and **Figure 2**, respectively. The highest observed chloride concentration in the porewater is consistently more than 10 times lower than the maximum concentration observed at MW-370. Likewise, the highest observed fluoride concentration in the porewater is consistently more than 10 times lower than the maximum fluoride concentration observed at MW-393. The chloride concentrations detected in the porewater samples are less than the lower confidence limits of chloride concentrations observed at downgradient well MW-370 (1,370 mg/L calculated using a confidence band around a linear regression) and fluoride concentrations observed at downgradient well MW-393 (7.49 mg/L calculated using a confidence band around a linear regression) (Ramboll 2023a).

If the BAP were the source of chloride or fluoride in groundwater, BAP porewater concentrations are expected to be greater than the GWPS exceedance concentrations. Given the conservative (non-reactive) nature of both chloride and fluoride, their concentrations are expected to remain stable or decrease along the flow path from the source due to dispersion and dilution. Because the concentrations in the BAP are lower than the concentrations of chloride above the GWPS at monitoring well MW-370 and the concentrations of fluoride above the GWPS at monitoring well MW-393, these exceedances are not attributed to impacts from the BAP unit.

3.2 LOE #2: The Wells of Concern Have a Similar Ionic Composition to Upgradient Monitoring Well MW-358.

The groundwater at both MW-370 and MW-393 has a similar ionic composition to the groundwater from recently installed background monitoring well MW-358, suggesting that these locations are not affected by the BAP. Ramboll (2023b) previously evaluated Stiff diagrams and found that both MW-358 and MW-370 contain groundwater dominated by chloride and monovalent cations. Furthermore, a Piper diagram — an alternative to Stiff diagrams for illustrating the relative concentration of major cations and anions in groundwater samples — shows that groundwater at MW-393 appears to be predominantly composed of chloride and monovalent cations, consistent with the composition of MW-358 and MW-370 (**Figure 3**). 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 3**).

Piper and Stiff diagrams (Ramboll 2023b) typically show the relative proportions and individual concentrations (respectively) of major cations and anions. Advanced statistical approaches such as principal component analysis (PCA) or non-metric multi-dimensional 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.

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 plot.

In this study the dataset used for PCA included 65 samples collected between 2017 and 2023 from background MW-358, downgradient wells MW-370 and MW-393, and porewater wells. 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 4a**, with the first two PCs accounting for approximately 70 percent [%] of the total variation in the datasets. Additionally, the quality of representation of each variable is presented in **Figure 4b,** 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 result from this study is shown on **Figure 5**, where the background samples are highlighted in orange, the downgradient samples in shades of blue, and the porewater samples in gray. The factor loadings, represented as vectors on the biplot, suggest that constituents such as calcium, magnesium, potassium, and barium are responsible for shifting the chemical signature of samples from within the BAP towards the porewater cluster. In contrast, constituents such as lithium, fluoride, and chloride are drivers for shifting chemical compositions in the direction of the downgradient and background sample clusters. These results are generally consistent with the findings of the Piper Diagram (**Figure 3**).

The 95% bivariate confidence ellipses for each of the three groups of water (porewater from within the BAP, downgradient bedrock groundwater, and background bedrock groundwater) are also depicted on the biplot graph (**Figure 5**). As illustrated on the biplot, the porewater samples cluster relatively separately from the downgradient and background wells, with no overlap in their confidence ellipses. Furthermore, the PCA suggests that the composition of downgradient samples from MW-370 and MW-393 are similar to the composition of background samples from MW-358.

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 6**), this analysis supported the distinction between porewater samples from the combined group of downgradient and background wells.

The different groups of samples were further compared and contrasted using Analysis of Similarities (ANOSIM). ANOSIM is a nonparametric, rank-based test used to evaluate if differences in water quality data between groups are statistically significant. **Table 1** presents the ANOSIM results for three subsets of data.

The first subset compares porewater samples with background samples, and the second subset compares porewater samples with downgradient samples. The third subset compares the background and downgradient samples. The p-values for the first two comparisons are less than 0.05, indicating a significant difference between the porewater samples and both the downgradient and background water samples[1]. However, the high p-value (0.14) for the third dataset comparing background and downgradient wells indicates no statistically significant difference between the background and downgradient clusters.

NMDS analysis of the available dataset from 2023 was conducted to evaluate more recent site conditions and to further compare the combined chemical composition of porewater, background, and key downgradient samples. As some wells were installed in 2022, the 2023 samples are likely to be more representative of equilibrium conditions in the aquifer. While both PCA and NMDS aim to reduce dimensionality and visualize patterns among samples, their methods are distinct. PCA relies on linear transformations and captures maximum variance through orthogonal components, whereas NMDS utilizes rank orders to achieve a non-linear representation of the original distances between samples. Therefore, NMDS is more flexible in relation to input requirement and given the limited number of sampling results available for 2023, NMDS was chosen over PCA when looking at only the most recent samples. Additionally, the results of NMDS analysis can be used for independent validation of previous findings from PCA. The results are displayed in a biplot in **Figure 7**.

Qualitatively, the NMDS findings align closely with those from the PCA (**Figure 5**) and indicate that: (i) the porewater sample cluster is separate from the downgradient and background samples; and (ii) the chemical compositions of the background and downgradient wells appear more similar to each other than to the composition of porewater. These results support the conclusion that

[1] P-values are a measure indicating the differences between two groups relative to random variations. Generally, p-values <0.05 are assumed to represent statistically significant differences between groups.

downgradient locations MW-370 and MW-393 are not affected by the BAP and their geochemistry is instead influenced by the native lithology.

3.3 LOE #3: Stable Boron Isotopes Provide Further Evidence That the Wells of Concern Have a Geochemical Signature Distinct from the BAP's.

Boron isotopes (^{11}B and ^{10}B) can be useful tracers in groundwater systems in sedimentary environments (United States Geological Survey [USGS] 2004). Depleted (lower) 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 impacts to 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 $\delta^{11}B$ 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 2**. These locations included TPZ-164 to represent porewater conditions and compliance well MW-370 to represent wells screened within the downgradient shale. The samples were submitted to SmartGas Sciences, LLC (Columbus, Ohio) for analysis of total boron and stable boron isotopes. A review of the boron stable isotopic signatures for the BAP porewater and groundwater at MW-370, which is representative of conditions within the downgradient shale, are markedly different, providing further evidence that the groundwater chemistry at the wells of concern is not affected by the BAP.

Of the samples with more than 1 mg/L of total boron detected, porewater from TPZ-164 was the most depleted in $\delta^{11}B$, with a reported $\delta^{11}B$ of 2.8 per mill (‰). This is 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 8**). Upgradient well MW-358 and compliance well MW-370 both had enriched $\delta^{11}B$ values, with reported results of +31.1‰ and +32.4‰, respectively (**Table 2**). The enrichment of $\delta^{11}B$ is inconsistent with influences from CCR. Instead, these results are consistent with elevated $\delta^{11}B$ in shale formations due to their deposition from marine environments (Spivack et al. 1987; Warner et al. 2013). Typical ranges for $\delta^{11}B$ in groundwater unimpacted by CCR are +4.0‰ to +33.0‰ (Warner et al. 2013) and +8.7‰ to 34.0‰ (Buszka et al. 2007). MW-258, which is also an upgradient well screened within the interbedded limestone and shale formation although at a higher elevation (403-413 feet NAVD88) in comparison with approximately 356-366 feet NAVD88 at downgradient well MW-370) was less enriched in $\delta^{11}B$. This variability in $\delta^{11}B$ enrichment with depth within the shale may be attributed to differences in mineralogy or depositional environment over time.

These results provide further evidence that wells screened within the shale lithology, including at downgradient locations such as MW-370, are not influenced by the BAP and instead are more strongly influenced by the bedrock lithology where they are screened.

3.4 LOE #4: Chloride and Fluoride Occur Naturally in the Shale Bedrock of the Uppermost Aquifer.

Solid phase analysis identified chloride and fluoride within the bedrock of the uppermost aquifer at the Site – i.e., these are naturally occurring inorganics within the mineral matrix of the bedrock. The presence of these constituents within the solid phase of the uppermost aquifer (bedrock) likely contributes to elevated and naturally occurring chloride and fluoride in the groundwater. Studies have found that chloride and fluoride concentrations in groundwater are comparable to or higher than those observed at MW-370 and MW-393, respectively, and are often found within the Pennsylvanian and Mississippian-aged interbedded shale and limestone of the uppermost aquifer.

Solid phase analysis of bedrock from background boring location MW-358 identified both chloride and fluoride in the solid phase materials (**Attachment 4**). The boring logs for these locations are provided in **Attachment 5**. Solid phase samples were also submitted for analysis of mineralogy via x-ray diffraction (XRD). 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 3**; **Attachment 6**). 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, which is the same depth interval as the well screen of MW-393. The presence of chloride and 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 these constituents in groundwater other than the BAP.

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). Concentrations of chloride as high as 1,400 mg/L, which is consistent with the concentrations at MW-370, were reported in Pennsylvanian-aged aquifers (Cable et al, 1971).

Furthermore, seeps with high salinity (i.e., brines) are known to occur in southern Illinois. Samples of seeps and shallow wells affected by brine in Illinois had highly variable chloride concentrations ranging from ~100 mg/L up to more than 15,000 mg/L (Panno, et al. 2005). 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 chloride and fluoride concentrations in groundwater at ranges consistent with those observed at the site.

4. CONCLUSIONS

It has been demonstrated that the chloride GWPS exceedance at MW-370 and the fluoride GWPS exceedance at MW-393 are not caused by a release from the BAP CCR unit, but instead are attributed to a source other than the BAP. The following summarizes the four LOEs used to support this demonstration:

1. Chloride and fluoride concentrations in the BAP porewater are historically more than 10 times lower than the chloride concentrations observed at MW-370 and the fluoride concentrations observed at MW-393.

2. Compliance monitoring locations MW-370 and MW-393 have similar geochemical signatures as upgradient monitoring well MW-358. Moreover, a statistical evaluation has shown that their groundwater compositions are distinct from the porewater geochemical signature.

3. The stable boron isotopic ratio in groundwater at MW-370 is similar to the same ratio in groundwater at upgradient monitoring well MW-358 and dissimilar from the BAP porewater, providing further evidence that groundwater geochemistry at MW-370 is not influenced by the BAP.

4. Solid phase analysis of rock cores from the uppermost aquifer (i.e., bedrock) identified chloride and fluoride within the naturally occurring minerals of the bedrock, thereby providing an alternative source of these constituents in groundwater. Based on a review of literature, elevated concentrations of chloride and 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.

The alternative source of both chloride and fluoride is the influence of the shale bedrock lithology on the groundwater composition. This demonstration meets the expectations in both 35 IAC 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.

The information serves as the written ASD prepared in accordance with 35 IAC 845.650(e) demonstrating that the GWPS exceedances for chloride at MW-370 and for fluoride at MW-393 are not due to the BAP CCR unit. Therefore, implementation of corrective measures is not required for chloride or fluoride at the BAP CCR unit.

5. REFERENCES

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TABLES

Table 1 - ANOSIM Hypothesis Test Results
Baldwin Power Plant

Data	R	p-Value	Conclusion
Comparing porewater and background well	1	< 0.001	Water quality of porewater and background wells is different.
Comparing porewater and downgradient wells	1	< 0.001	Water quality of porewater and downgradient wells is different.
Comparing background and downgradient wells	0.09	0.14	Water quality of background and downgradient wells is similar.

Notes:

ANOSIM- Analysis of Similarities

R: ANOSIM test statistics; an R value close to "1.0" suggests a high dissimilarity between groups, while an R value close to "0" indicates an even distribution of high and low ranks both within and between groups.

p-Value: A measure indicating the differences between two groups relative to random variations. Generally, p-values < 0.05 are assumed to represent statistically significant differences between groups.

Table 2 - Boron Isotope Analytical Results
Baldwin Power Plant

Sample ID	Sample Location	Sample Description	δ11B (‰)	Total Boron (µg/L)
20230206 TPZ-164	TPZ-164	Porewater	2.8	1116
20230206 Cooling Pond	Cooling Pond	Surface Water	5.7	240
20230206 MW-370	MW-370	Downgradient Shale	32.4	2061
20230206 PZ-170	PZ-170	Downgradient PMP	43.2	326
20230206 MW-158R	MW-158R	Background PMP	18.0	86
20230207 MW-358	MW-358	Background Deep Shale	31.1	1778
20230207 MW-258	MW-258	Background Shale	14.2	1248

Notes:

1. The standard error for all boron isotope samples was 1.2 ‰

‰: parts per thousand (per mill)

µg/L: micrograms per liter

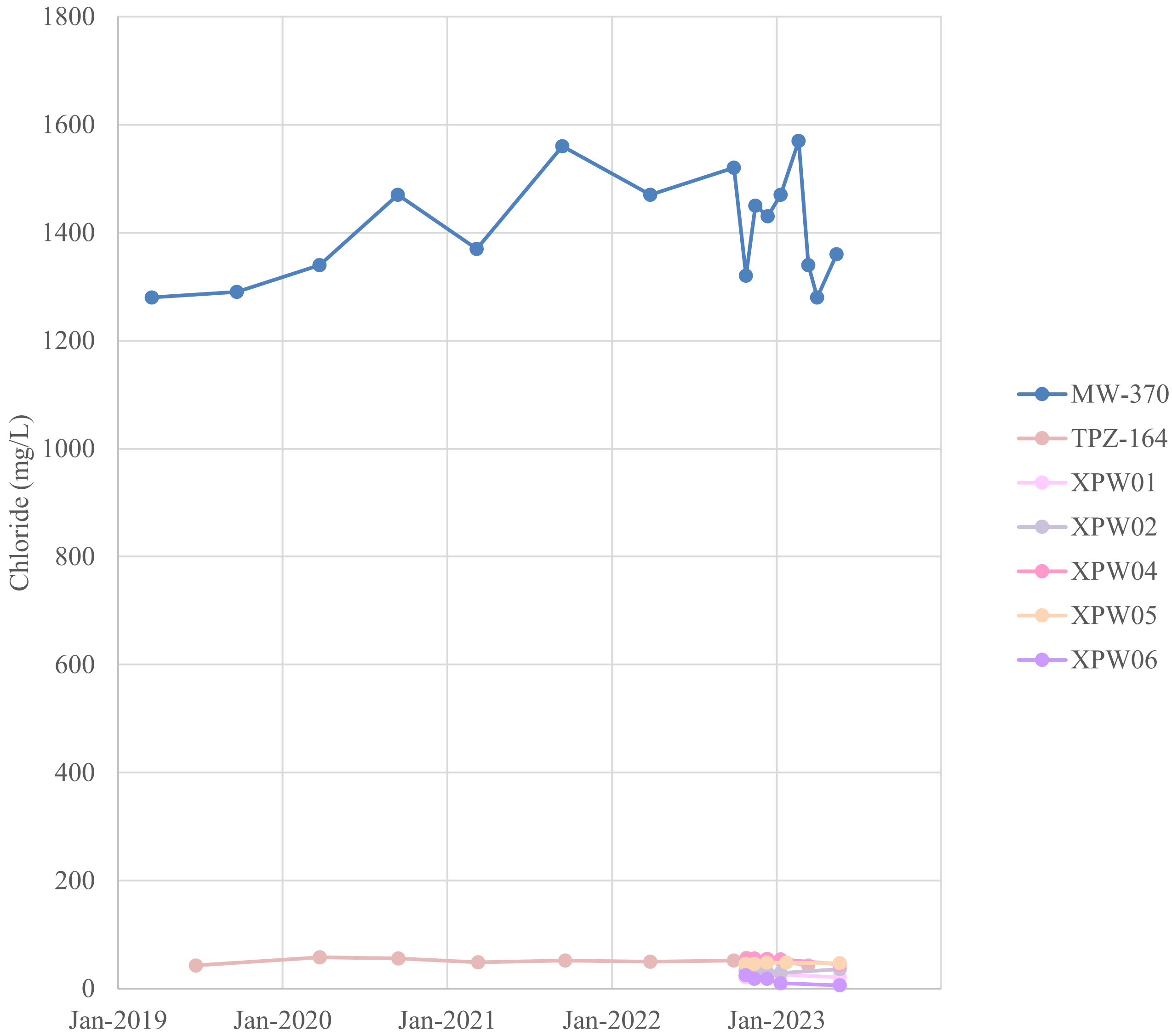
PMP: potential migration pathway

Table 3 - Summary of Rietveld Quantitative Analysis
X-Ray Diffraction Results
Baldwin Power Plant

Well ID			**MW-358**	**MW-358**	**MW-392**	**MW-392**
Depth (ft bgs)			**(47-49)**	**(86-88)**	**(66-68)**	**(80-82)**
Location			**Upgradient**	**Upgradient**	**Downgradient**	**Downgradient**
Boring Log Description			**Shallow Shale**	**Deeper Shale Body**	**Shale**	**Shale transitioning to limestone**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	29.2	30.7	22.7	29.8
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	Mica	18.8	19.7	15.9	13.1
Albite	$NaAlSi_3O_8$	Feldspar	0.4	2.5	0.6	0.6
Microcline	$KAlSi_3O_8$	Feldspar	8.6	5.9	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	3.6	5.5
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot 10H_2O$	Smectite	6.8	4.8	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	$KAl_4(Si,Al)_8O_{10}(OH)_4 \cdot 4H_2O$	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	6.1	1.6
Clay Minerals Total			41	38	36	23
Clays + Muscovite Total			60	58	52	36

Notes
Only samples collected within the shale bedrock are shown. Additional sample data is provided in Attachment 5.
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:
1. Chloride data at MW-370 are available back to 12/29/15. Historically, results have been consistent, and the dataset is truncated for ease of view here.
mg/L: milligrams per liter

Chloride Time Series Graph

Baldwin Power Plant

Geosyntec consultants

Columbus, Ohio | October 2023

Figure 1

Vistra - Groundwater Compliance - Documents\General\2023_Data_Gap_Assessment\Baldwin\2023-09 Cl and F ASD Report

Notes:
mg/L: milligrams per liter

Fluoride Time Series Graph

Baldwin Power Plant

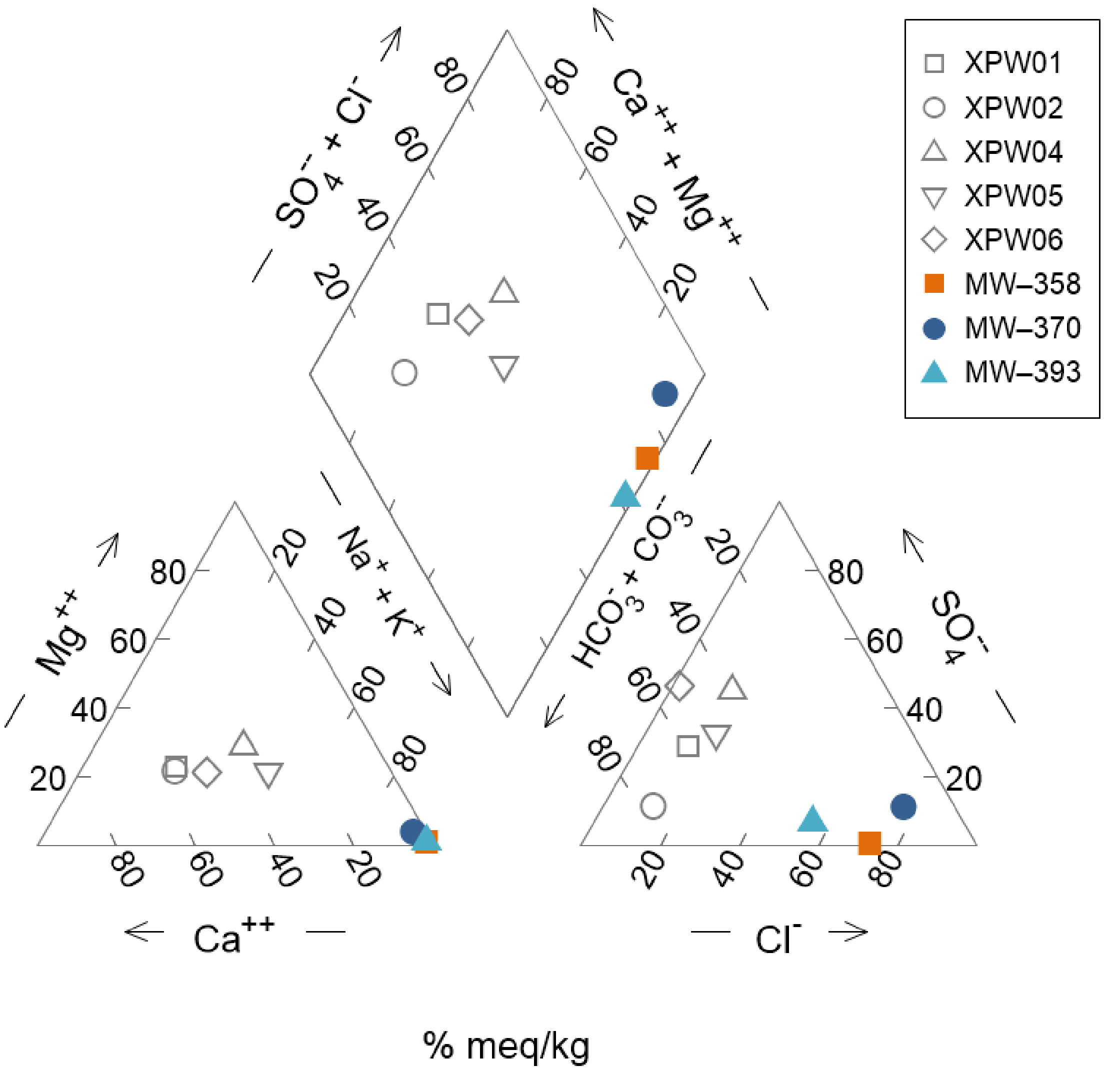
Geosyntec consultants

Figure

2

Columbus, Ohio

October 2023



Notes:
1. Data from May 2023 are shown.
% meq/kg: percent milliequivalents per kilogram

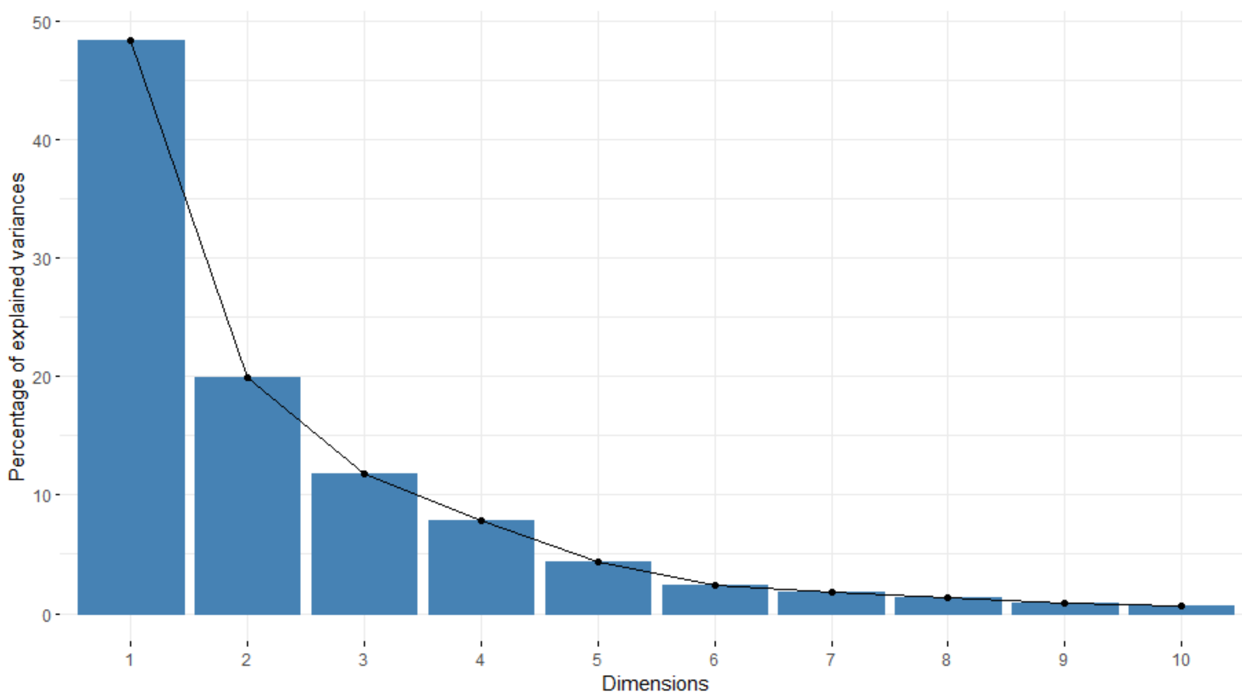
Piper Diagram

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure 3

Columbus, Ohio | October 2023



Notes:
Samples collected from background well MW-358, downgradient wells MW-370 and MW-393, and porewater wells TPZ-164, XPW-1, XPW-2, XPW-3, XPW-5, and XPW-6 were included in the evaluation.

PCA Analysis - Quality of Representation of PCs
Baldwin Power Plant – Bottom Ash Pond

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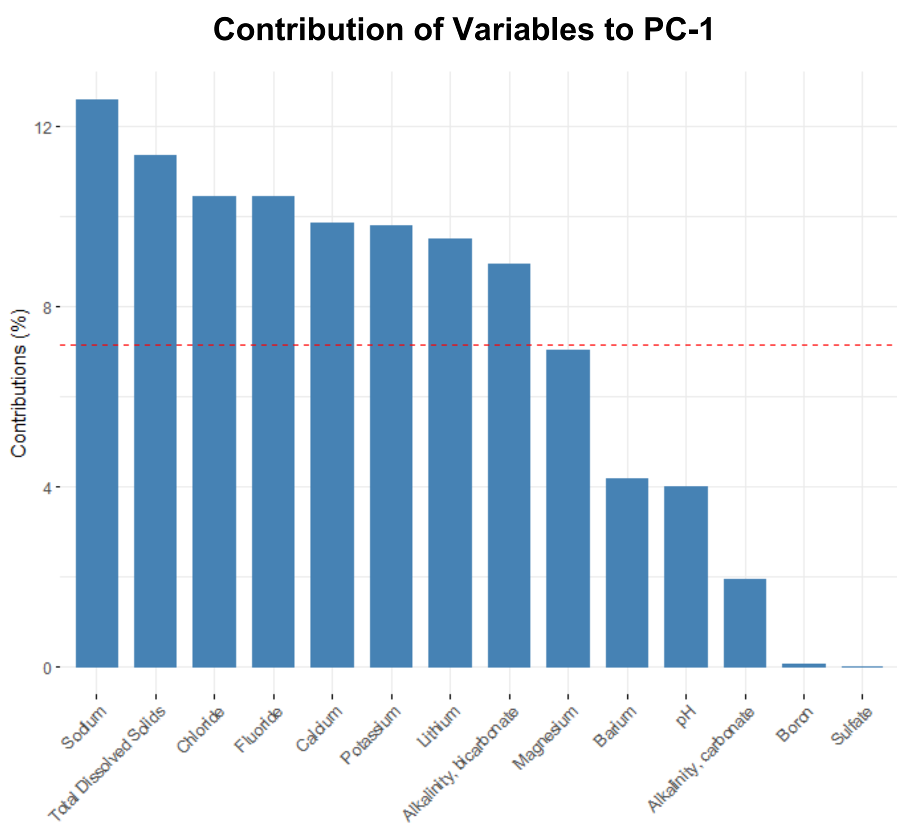
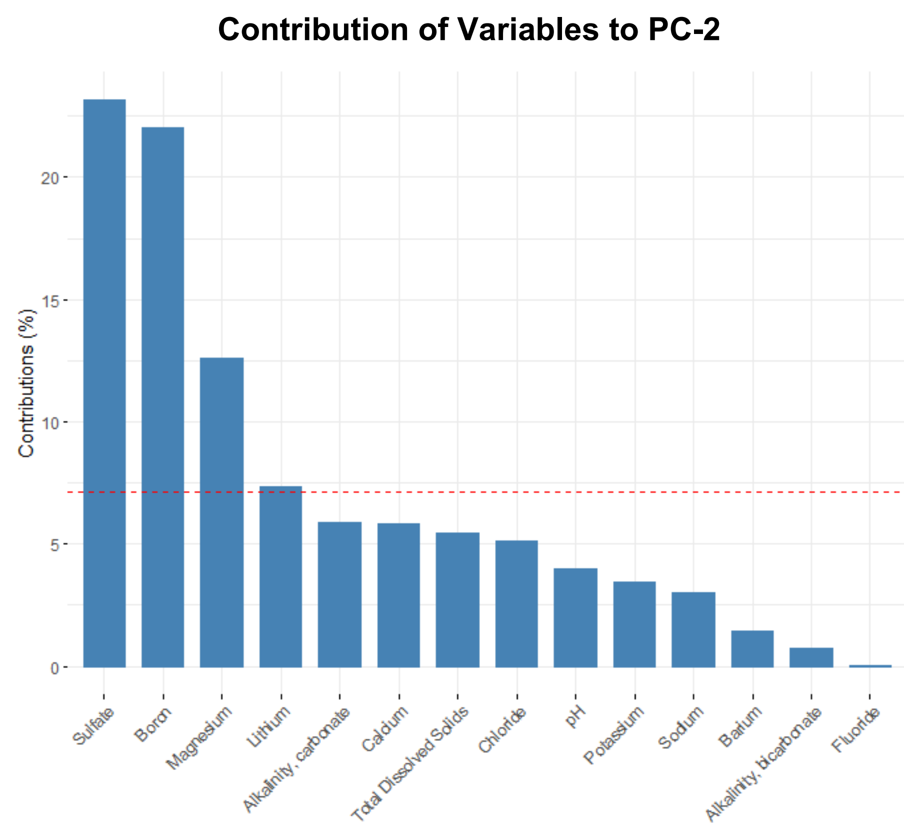
Figure **4a**

Columbus, Ohio | October 2023





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 PCs

Baldwin Power Plant

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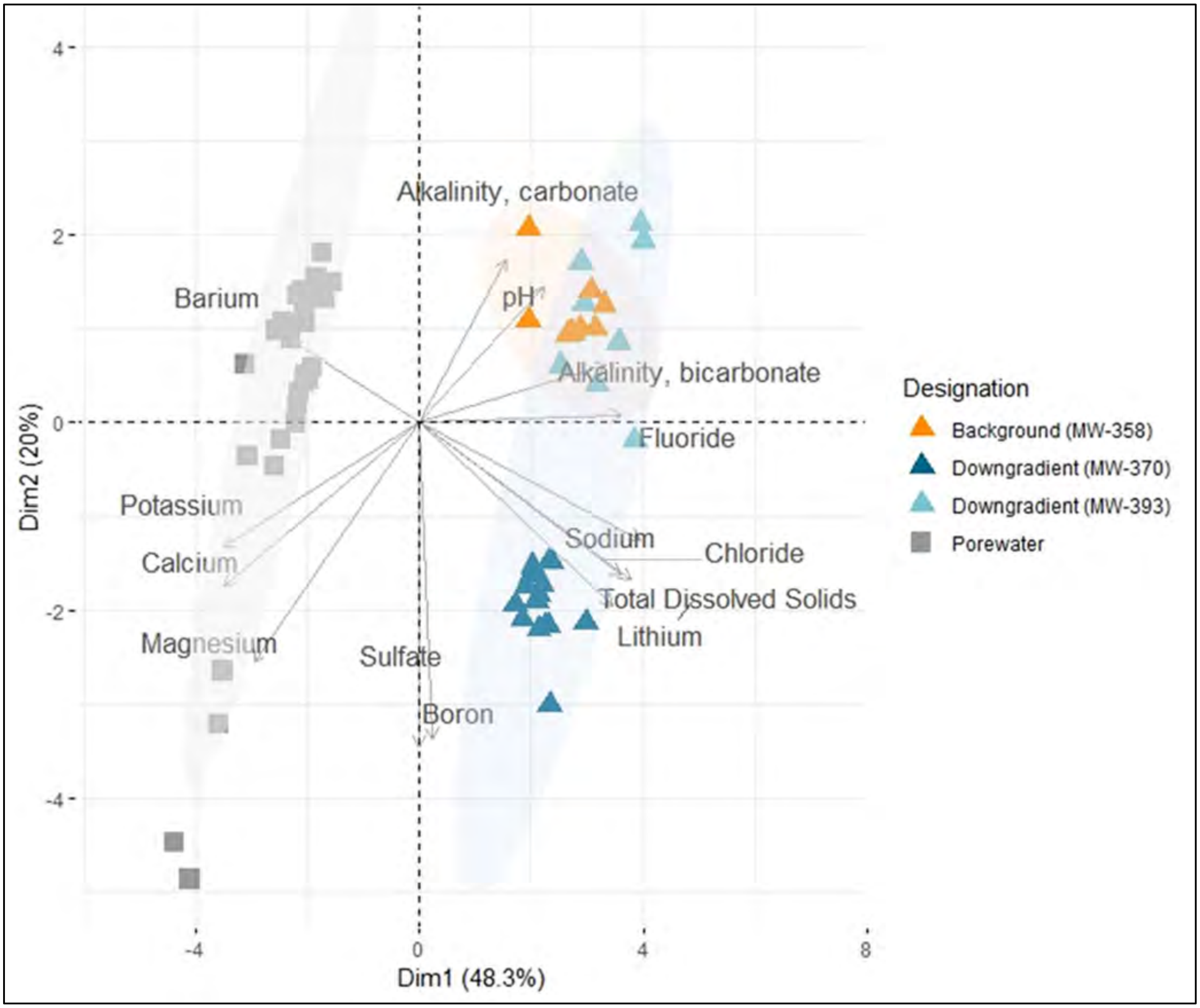
Columbus, Ohio | October 2023

Figure **4b**



Notes:

1. The ellipse containing data points within the 95% confidence interwall for each group is outlined and shaded in gray, orange, and blue for porewater, background and downgradient groups.
2. The arrows signify the correlations between the constituents and the principal components.

PCA Biplot

Baldwin Power Plant – Bottom Ash Pond

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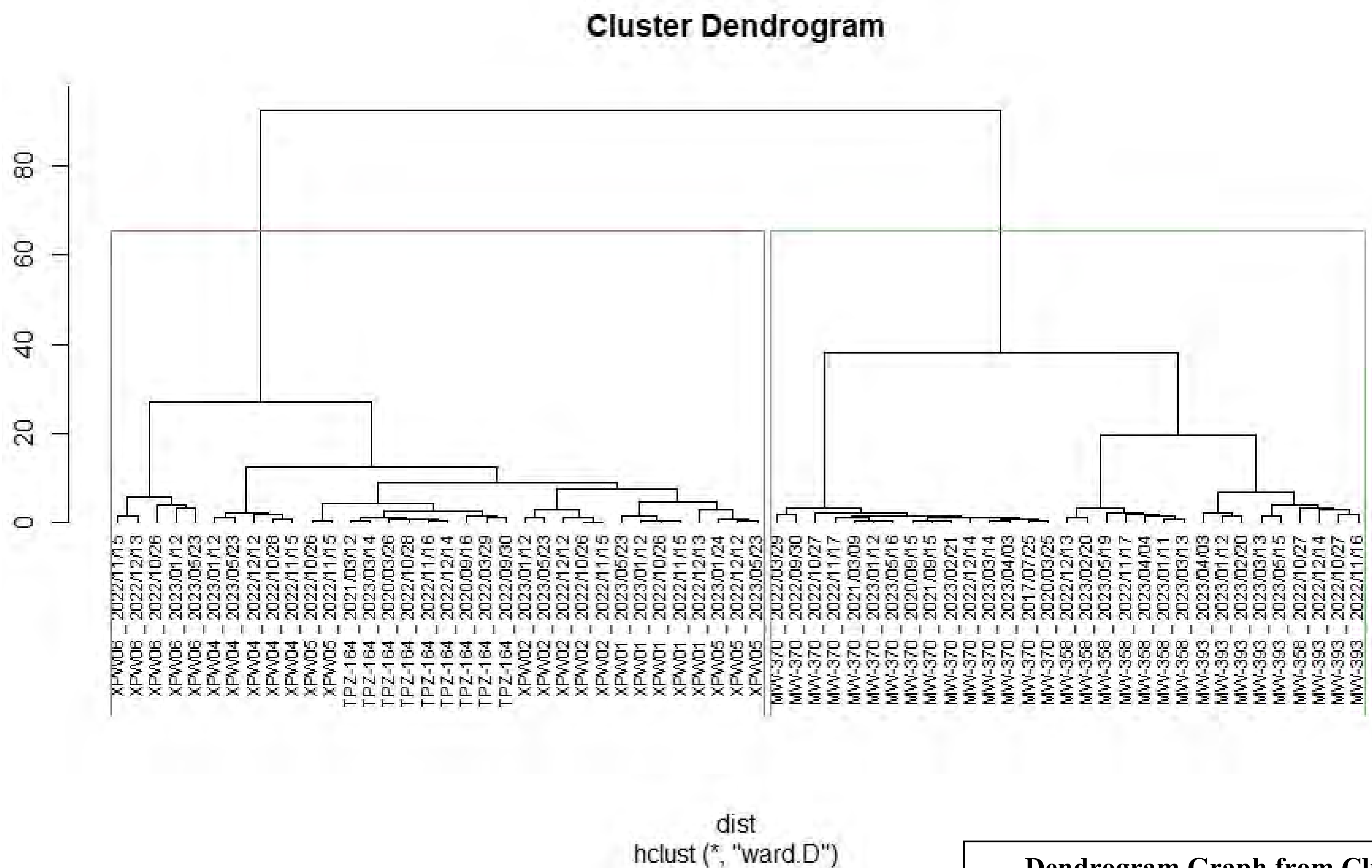
Figure 5

Columbus, Ohio | October 2023



Dendrogram Graph from Cluster Analysis

Baldwin Power Plant

Notes:
1. The cluster analysis used Euclidean distances as the similarity measure and Ward's method as the clustering algorithm.

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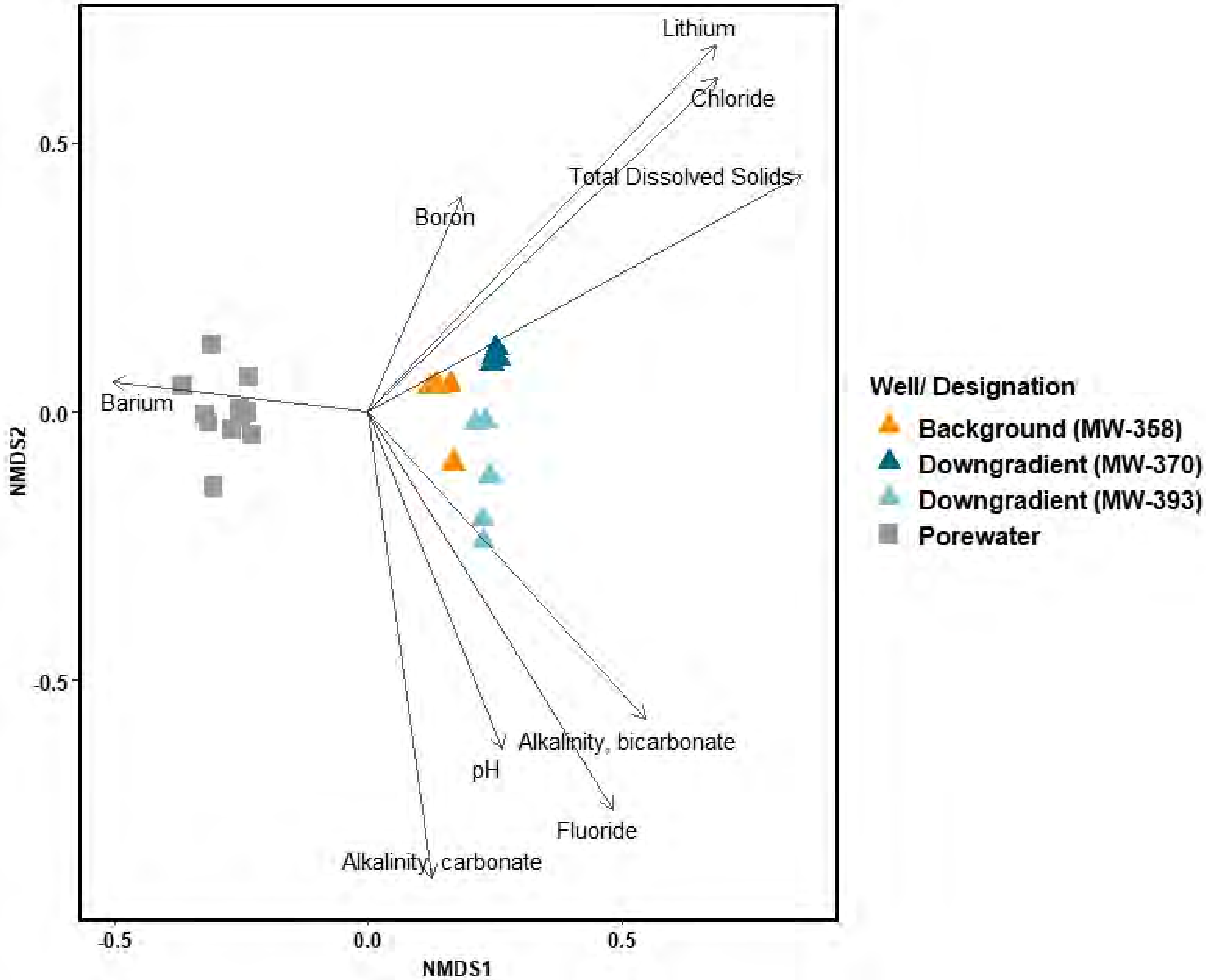
Figure **6**

Columbus, Ohio | October 2023



Notes:

1. The arrows represent the correlations between the constituents and the NMDS axes.
2. NMDS: Non-metric Multidimensional Scaling

NMDS Biplot

Baldwin Power Plant – Bottom Ash Pond

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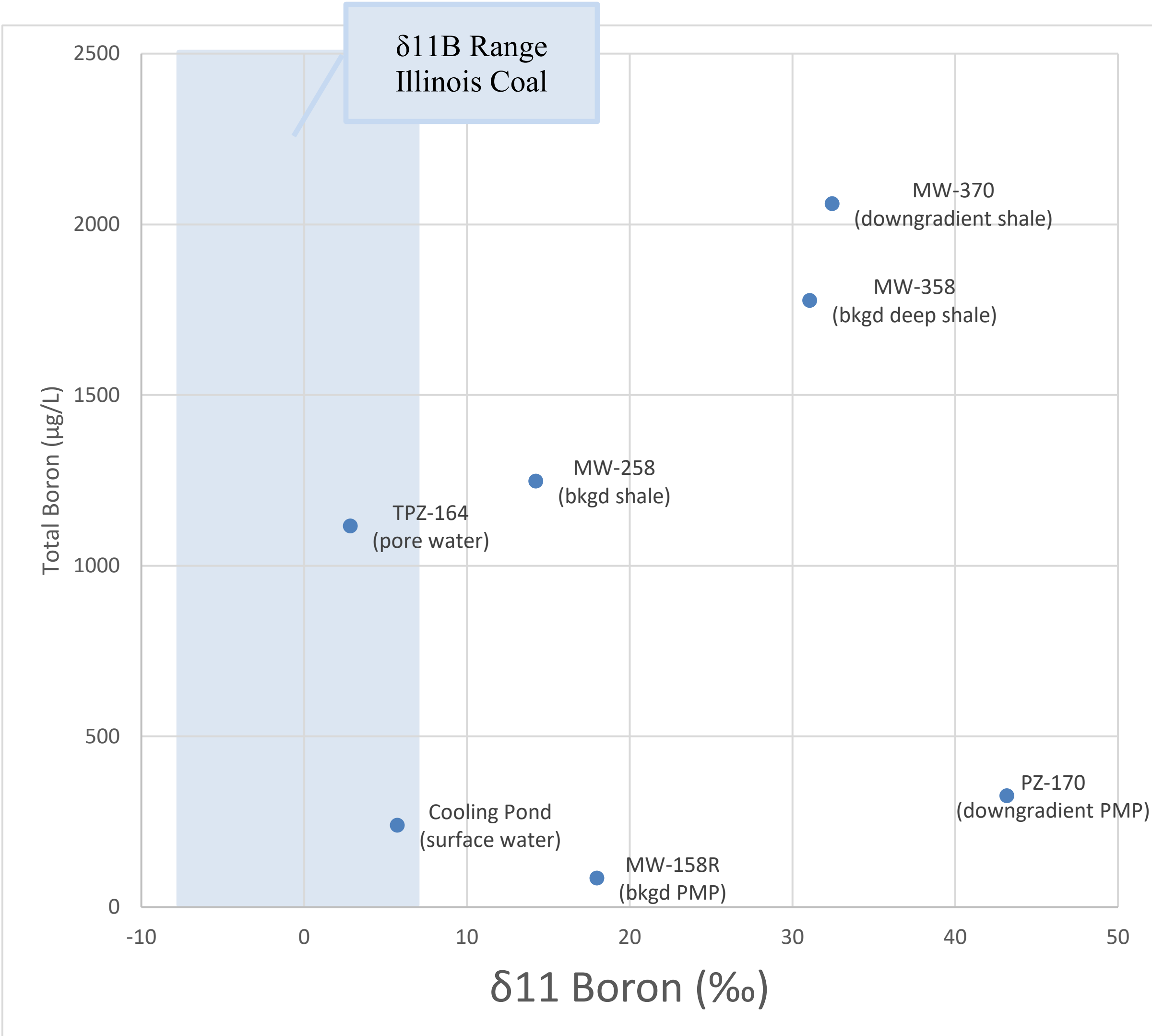
Figure

7

Columbus, Ohio | October 2023



Notes:
1. δ11B range from Ruhl et al 2014.
µg/L: micrograms per liter
‰: parts per thousand
PMP: potential migration pathway

Boron Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

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Figure 8

Columbus, Ohio | October 2023

ATTACHMENT 1
Part 845 Groundwater Monitoring Network

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Baldwin\BAP\2023_Update\GMP\Figure 2-1_BAL BAP Proposed Monitoring Well Network.mxd

PROJECT: 169000XXXX | DATED: 6/20/2023 | DESIGNER: GALARNMC

BACKGROUND WELL
COMPLIANCE WELL
PORE WATER WELL
REGULATED UNIT (SUBJECT UNIT)
FLY ASH POND SYSTEM (CLOSED)
SITE FEATURE
CAPPED AREA
PROPERTY BOUNDARY

0 400 800 Feet

35 I.A.C. § 845 GROUNDWATER MONITORING WELL NETWORK

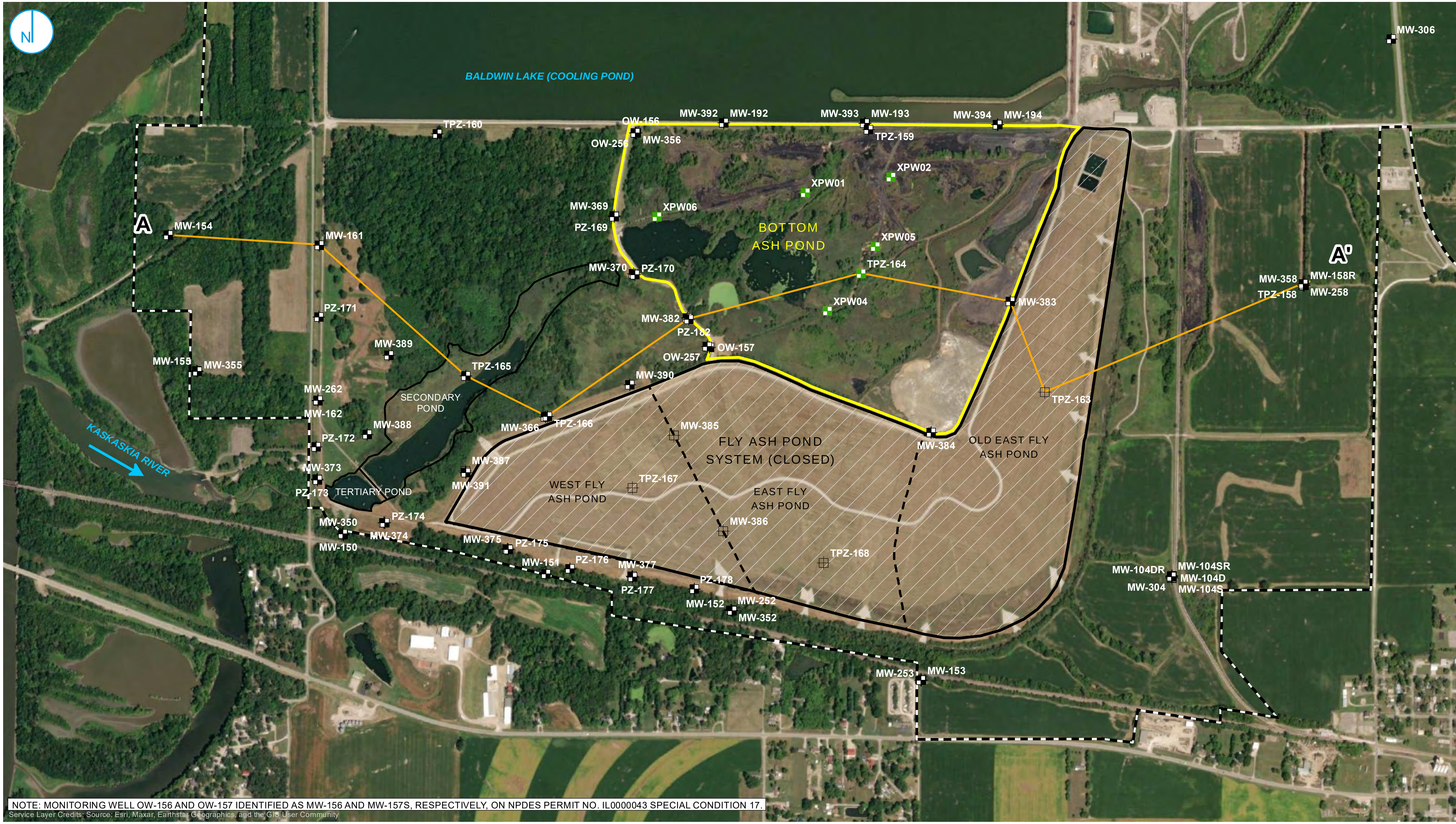
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 2
Geologic Cross Section



Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Demo\Baldwin_AP\2023\Figure 3_Cross Section Locations.mxd

PROJECT: 169000XXXX | DATED: 4/24/2023 | DESIGNER: GALARNMC

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

CROSS SECTION TRANSECT

A to A'

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

0 400 800 Feet

CROSS SECTION LOCATION MAP

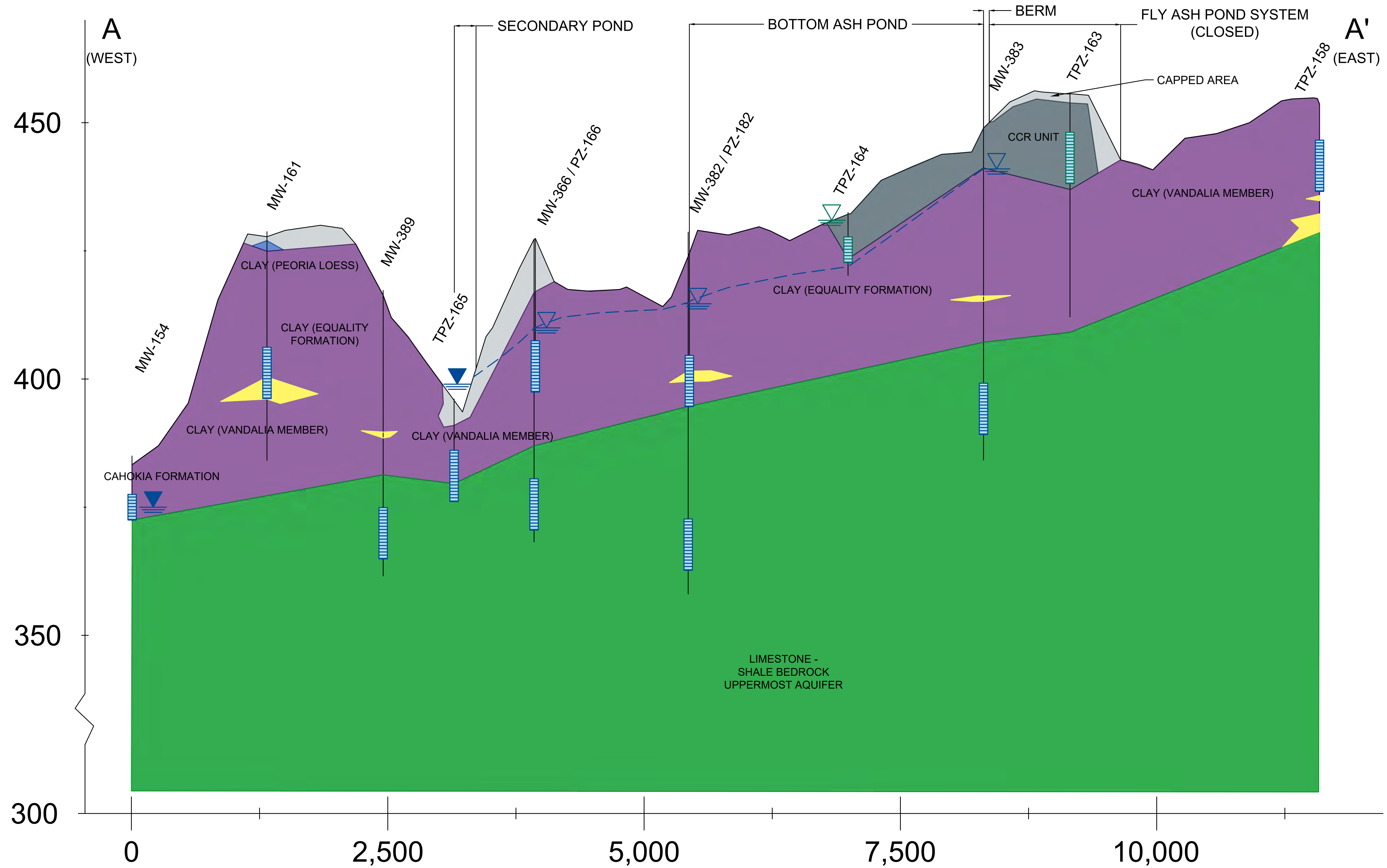
ALTERNATE SOURCE DEMONSTRATION
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

FIGURE 3

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 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'

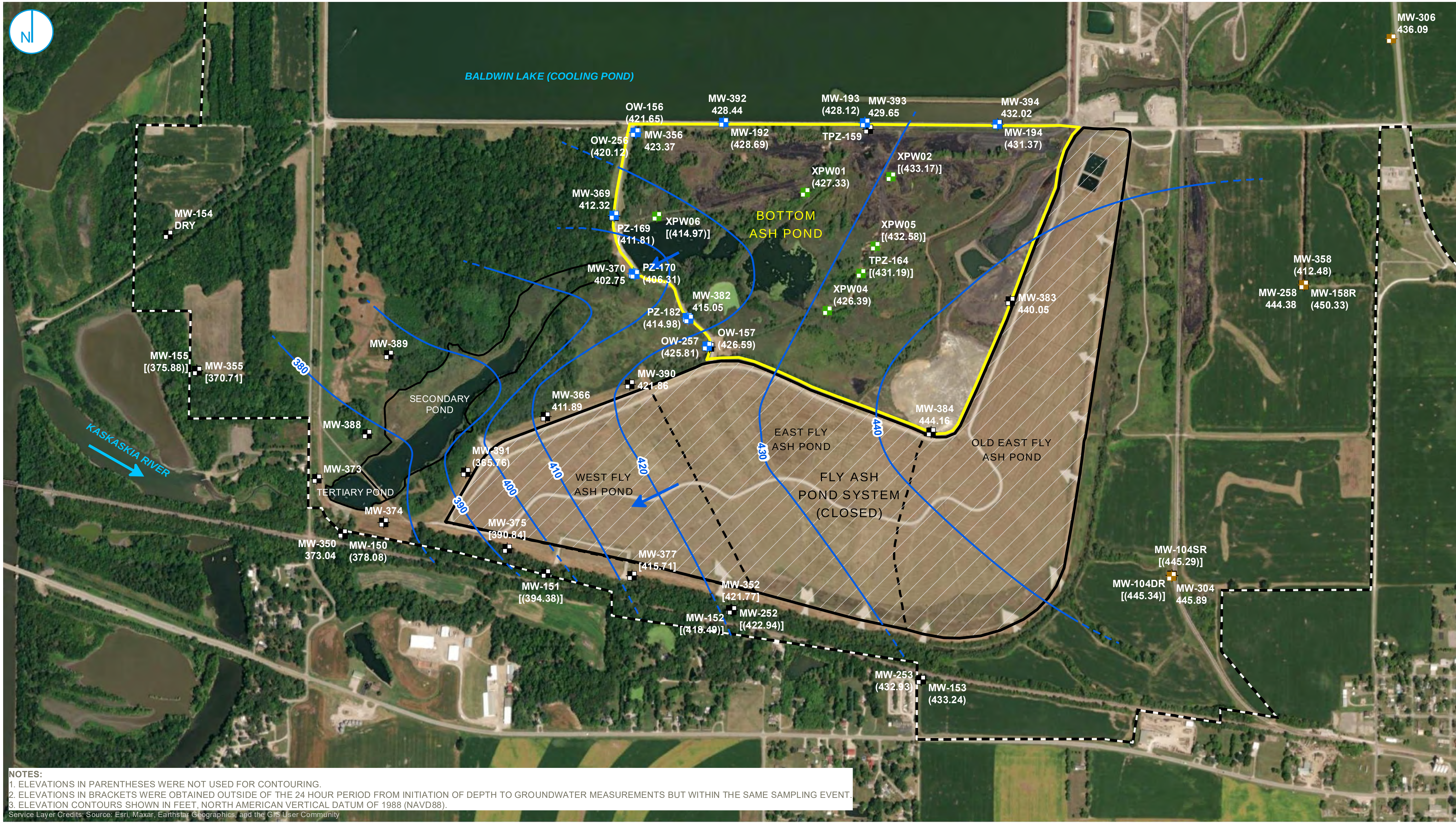
CROSS SECTIONS A-A'

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILINOIS

FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

ATTACHMENT 3
Uppermost Aquifer Potentiometric Surface Map – May 15-17, 2023



NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24 HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.
3. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECT: 169000XXXX | DATED: 10/25/2023 | DESIGNER: GALARNMC
Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Baldwin\BAP_601\BAL 601 BAP Pot Surface 20230516.mxd

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
SITE FEATURE
CAPPED AREA
PROPERTY BOUNDARY

0 400 800 Feet

POTENTIOMETRIC SURFACE MAP
MAY 15-17, 2023

2023 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 4
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

CHARTERED
CATHARINE ARNOLD
CHEMIST
ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO

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

ATTACHMENT 5
MW-358 and MW-392 Boring Logs

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 ☐ N ☐ S Feet ☐ E ☐ W Feet

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	180 97		0–3	0 - 3.8' **SILT:** ML, very dark grayish brown (10YR 3/2), organic material (0-10%), moist to wet. 2.1' dry.	ML									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.
			4–8	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.	ML/CL									
			9–12	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.	(CL/ML)S									

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 MW358

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13		(CL/ML)S									
2 CS	60 60		14 15 16 17	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. 16.1' mottling discontinues.	CL/ML									
3 CS	48 36		18 19 20	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									
4 CORE	36 32		21 22 23 24 25 26	21 - 26.5' **SHALE:** BDX (SH), dark gray (GLEY 1 4/N), weathered, thin bedding, moderately fractured. 24' -25.2' wet.	BDX (SH)									RUN #4: Modified RQD = (21/32) = 66%
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%
6 CORE	72 60		28 29 30 31	27.5 - 31.3' **SHALE:** BDX (SH), grayish black (N2), weathered, highly decomposed to residual soil, wet to moist. 29.3' thinly bedded, moderately decomposed. 30' slightly decomposed to competent, moderately fractured.	BDX (SH)									RUN #6: Modified RQD = (45/60) = 75%
			32	31.3 - 32' **COAL:** COAL, black (N1).	COAL									

RAMBOLL

Boring Number MW358

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

RAMBOLL

Boring Number MW358

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

Boring Number MW358

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				64 - 75.3' **SHALE:** BDX (SH), medium dark gray (N4) to medium gray (N5), strong, thinly bedded to laminated, moderately fractured. *(continued)*	BDX (SH)									
15 CORE	60 56		75	75.3 - 77.1' **LIMESTONE:** BDX (LS), gray (5Y 6/1), fossiliferous, very strong.	BDX (LS)									RUN #15: Modified RQD = Not Recorded
			77	77.1 - 78.2' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak to moderate strength, moderately decomposed.	BDX (SH)									
16 CORE	60 51		78	78.2 - 84.8' **LIMESTONE:** BDX (LS), medium dark gray (N4) to medium gray (N5), shaley, fossiliferous, very strong, moderately fractured, laminations (0-5%).	BDX (LS)									RUN #16: Modified RQD = (23/51) = 45%
17 CORE	60 60		85	84.8 - 90' **SHALE:** BDX (SH), dark gray (N3), weathered, weak to moderate strength, moderately decomposed, moderately fractured, thin bedding.	BDX (SH)									RUN #17: Modified RQD = (28/60) = 47%
			90	90' End of Boring.										

Depth scale: 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90

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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 46		0–1	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
			1.2–10	1.2 - 16' **FILL, LEAN CLAY:** CL, light 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 CS	120 62		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
Tel: (414)837-3607
Fax: (414)837-3608

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13–16	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									
			16–20	16 - 20' **LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.	CL									
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.	CL									
4 CS	120 104		30	30' increasing sand and gravel content.										

Boring Number MW392

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
				20 - 33' **LEAN CLAY:** CL, pinkish gray (7.5YR 6/2), sand (0-5%), medium to high plasticity, stiff, moist. *(continued)*	CL									
			33	33 - 35' **WELL-GRADED SAND WITH SILT AND GRAVEL:** (SW-SM)g, fine to medium sand, dry.	(SW-SM)g									
			34											
			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.	(ML)s									
			41											
			42											
			43											
			44	44' increasing clay content.										
			45	45' (2.5Y 6/2).										
			46											
			47											
			48	48 - 52' **SILT:** ML, gray (2.5Y 5/1), sand (0-5%), dry.	ML									
			49											
6 CS	84 81		50											
			51											
			52											

Boring Number MW392

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
				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											
7 CORE	60 4		57	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	66.3' - 67.2' highly fractured, very soft, wet.										
			67											
			68											
			69											
9 CORE	120 62		70	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures.										RUN #9: Modified RQD = (28/78) = 36%
			71		BDX (LS)									
			72											

Boring Number MW392

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73, 74	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures. *(continued)*	BDX (LS)									
10 CORE	48 48		75, 76, 77, 78, 79, 80, 81	74.4 - 81.8' **SHALE:** BDX (SH), medium dark gray (N4) to dark gray (N3), slightly weathered, moderately fractured, thinly bedded.	BDX (SH)									RUN #10: Modified RQD = (28/48) = 58%
			82, 83, 84	81.8 - 84' **LIMESTONE:** BDX (LS), medium light gray (N6), shaley, fossiliferous, moderately fractured, thinly bedded. 83.2' medium gray (N5).	BDX (LS)									
				84' End of Boring.										

ATTACHMENT 6
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:

1) Method Summary
2) Quantitative XRD Results
3) XRD Pattern(s)

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

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

SGS Natural Resources
a division of SGS Canada Inc.
P.O. Box 4300, 185 Concession Street, Lakefield, Ontario, Canada K0L 2H0
Tel: (705) 652-2000 Fax: (705) 652-6365 www.sgs.com www.sgs.com/met
Member of the SGS Group (SGS SA)

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

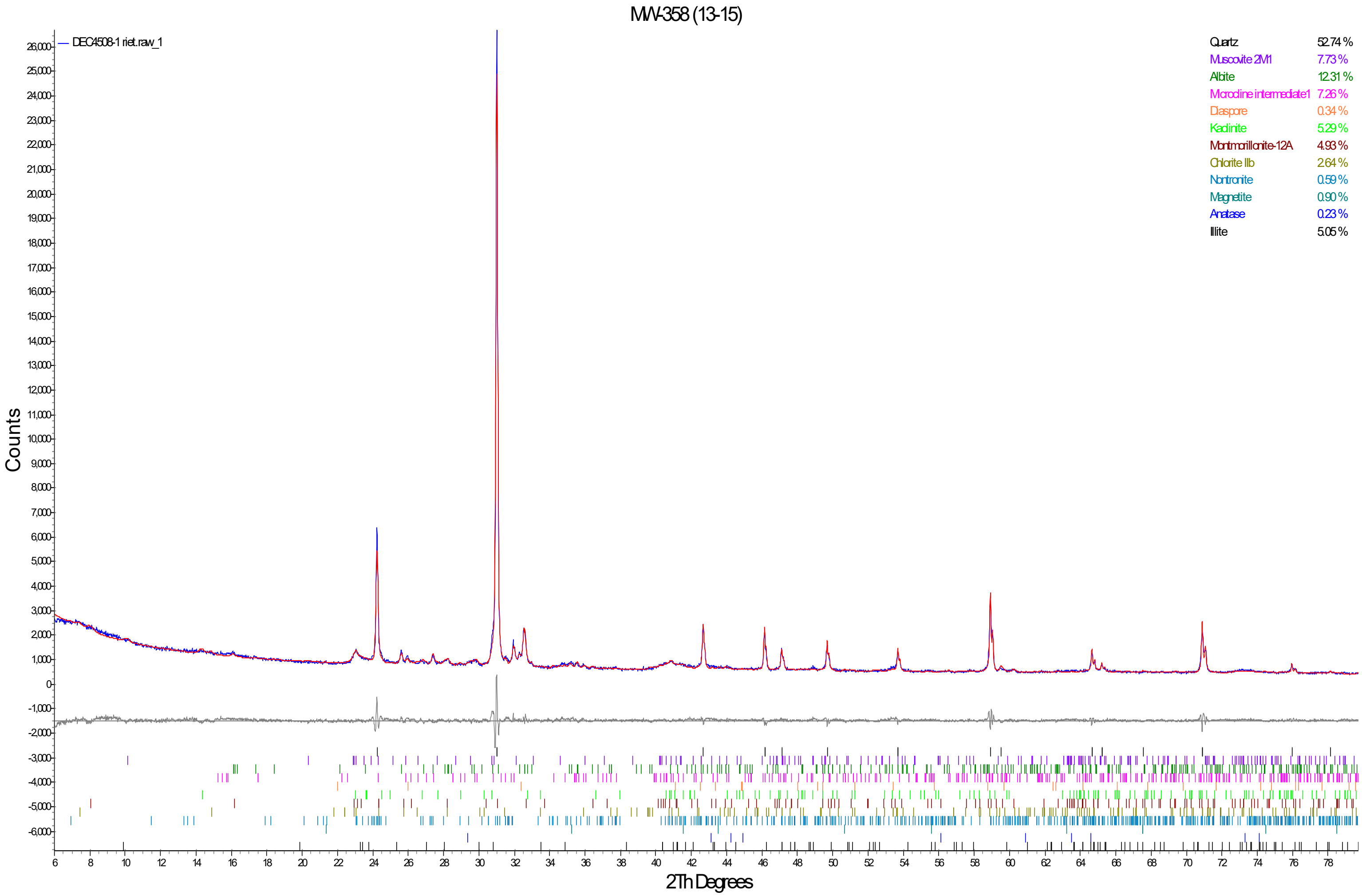
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

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

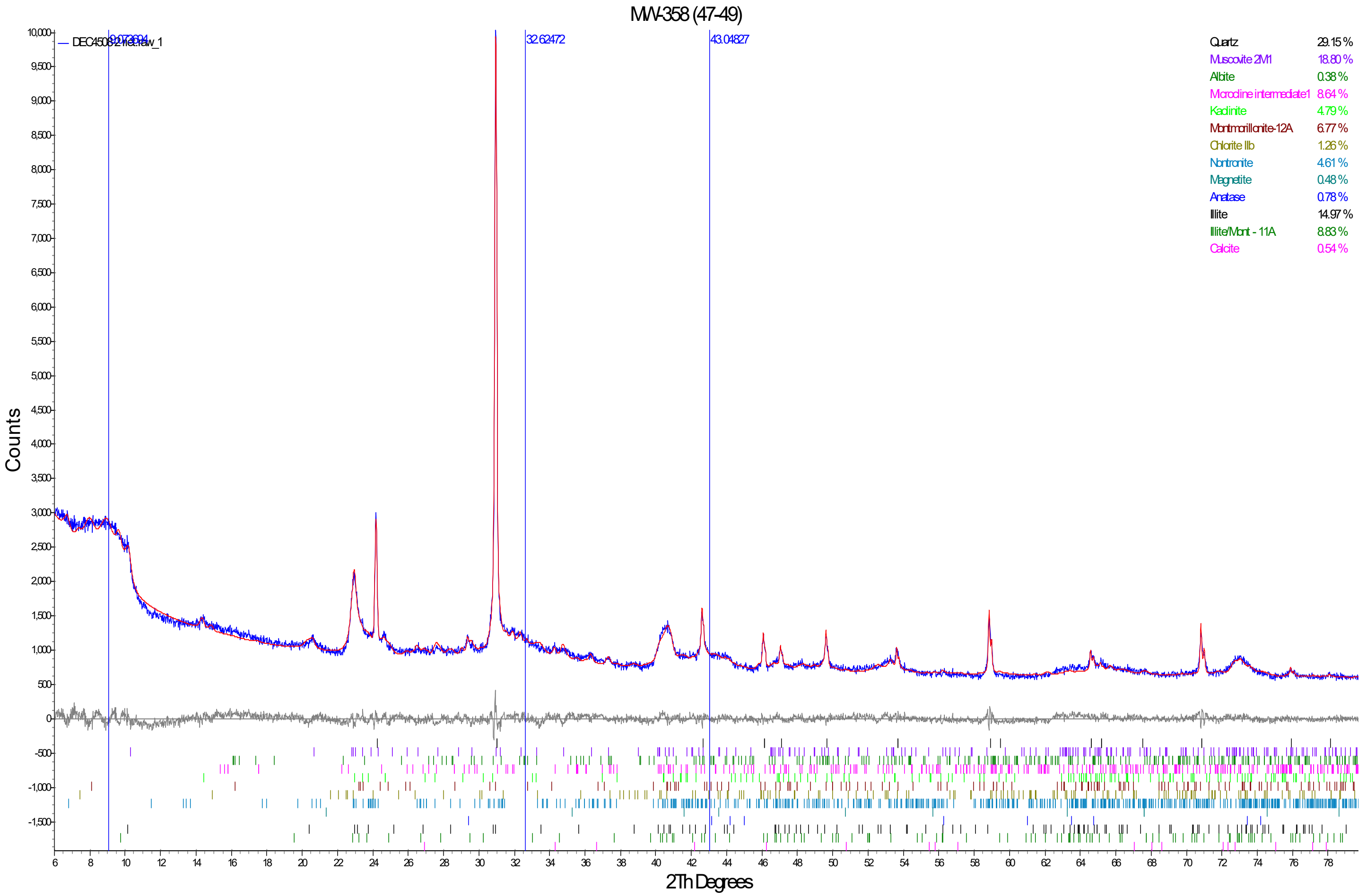
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

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	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$

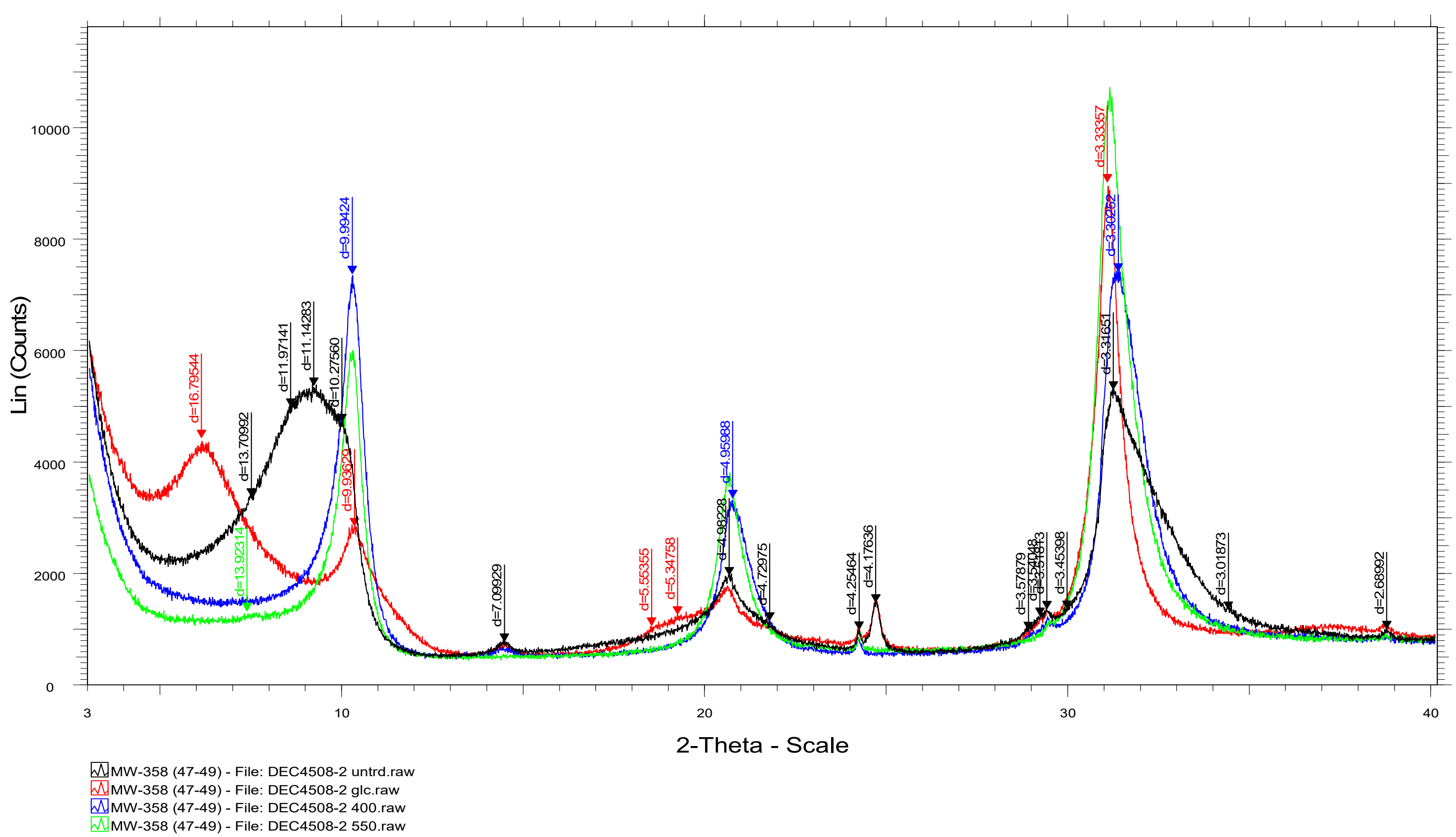
Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



MW-358 (47-49)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10000
8000
6000
4000
2000
0
3
10
20
30
40
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d=13.70992
d=11.97141
d=11.14283
d=10.27560
d=9.99424
d=13.92314
d=7.09929
d=5.53355
d=5.34758
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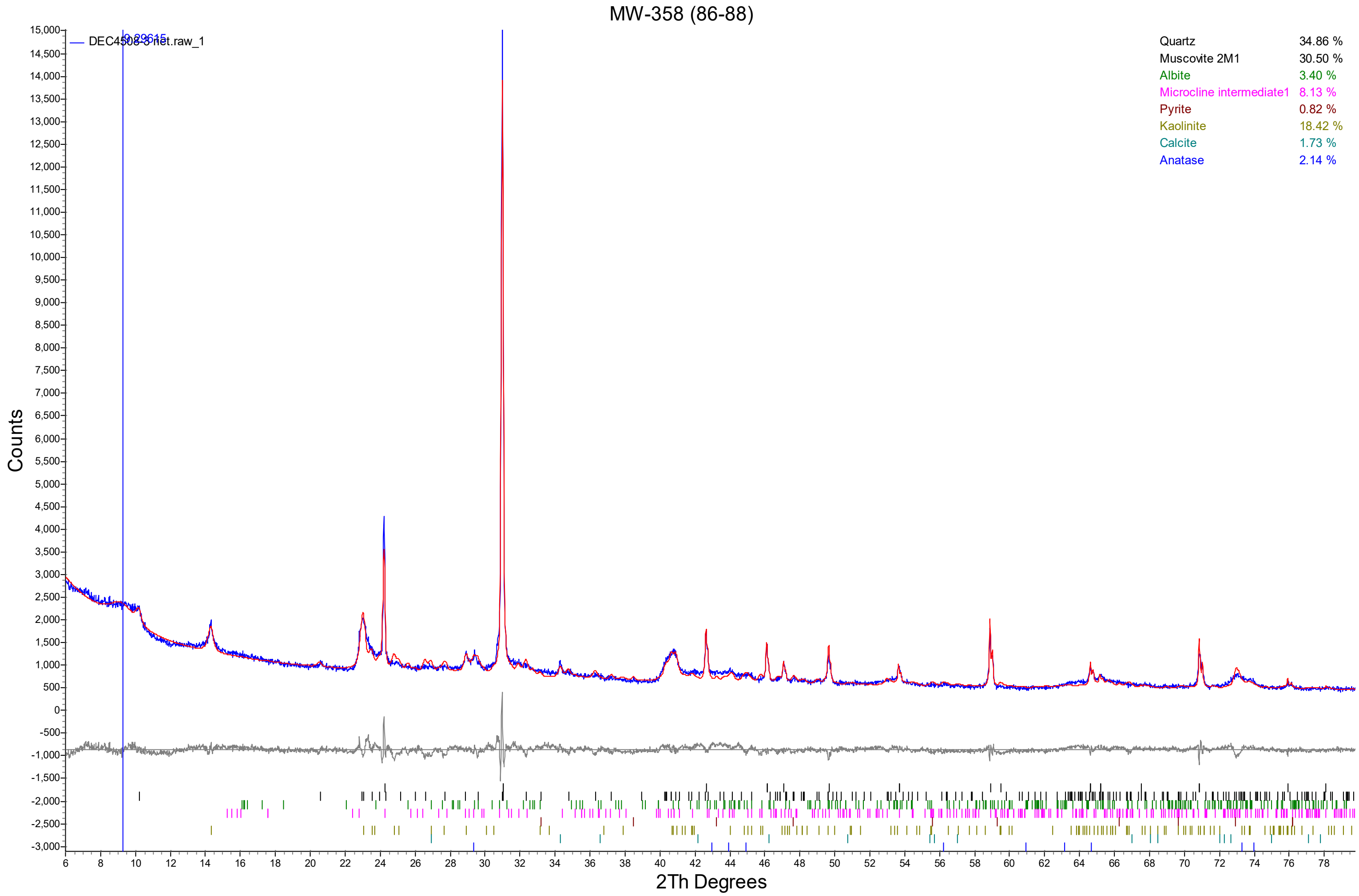
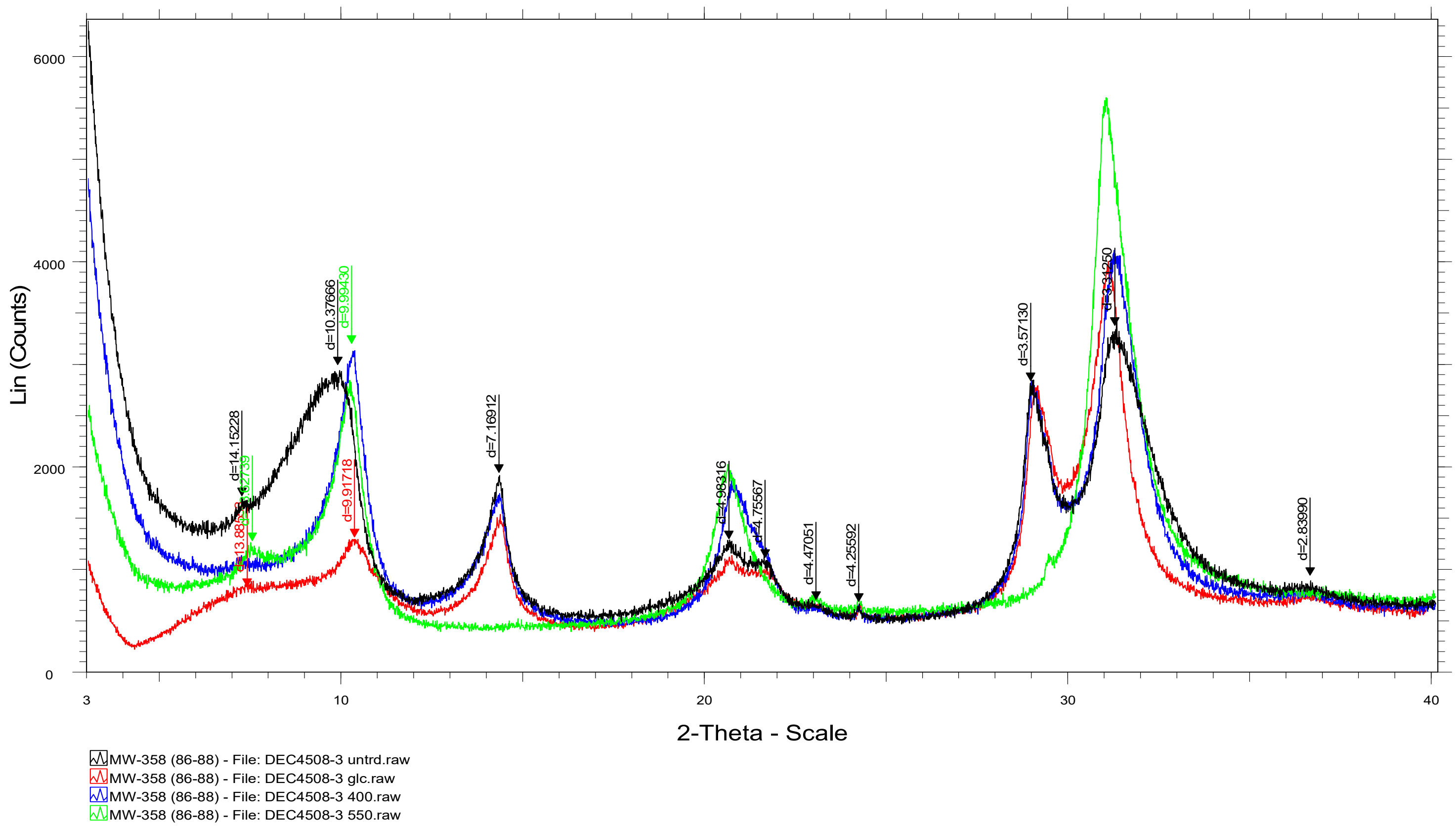
d=4.95988
d=4.72975
d=4.25464
d=4.17636
d=3.57879
d=3.45398
d=3.33357
d=3.34651
d=3.01873
d=2.68992
MW-358 (47-49) - File: DEC4508-2 untrd.raw
MW-358 (47-49) - File: DEC4508-2 glc.raw
MW-358 (47-49) - File: DEC4508-2 400.raw
MW-358 (47-49) - File: DEC4508-2 550.raw

Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



MW-358 (86-88)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4000
2000
0
3
10
20
30
40
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d=4.47051
d=4.25592
d=3.57130
d=3.34250
d=2.83990
MW-358 (86-88) - File: DEC4508-3 untrd.raw
MW-358 (86-88) - File: DEC4508-3 glc.raw
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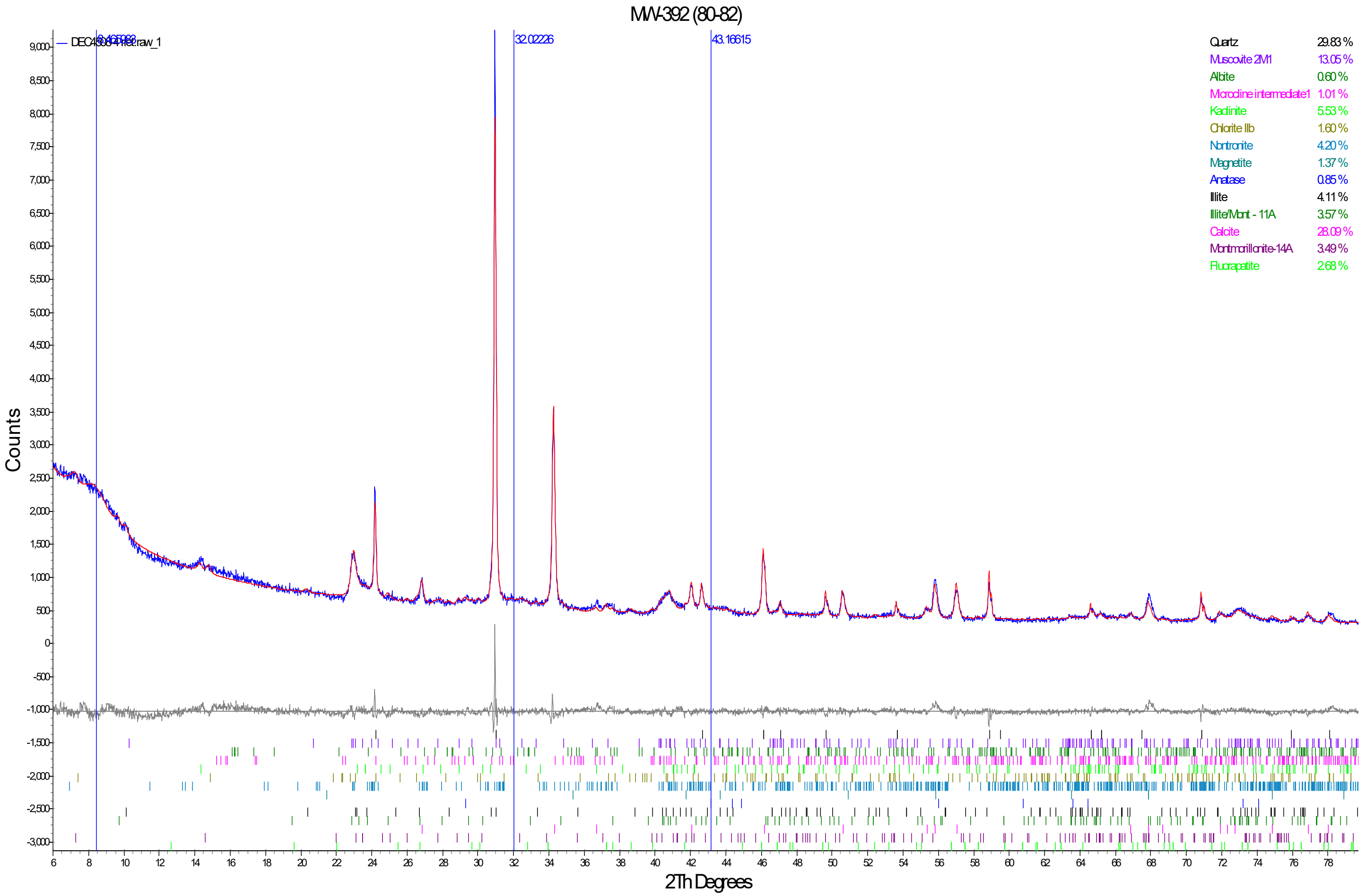
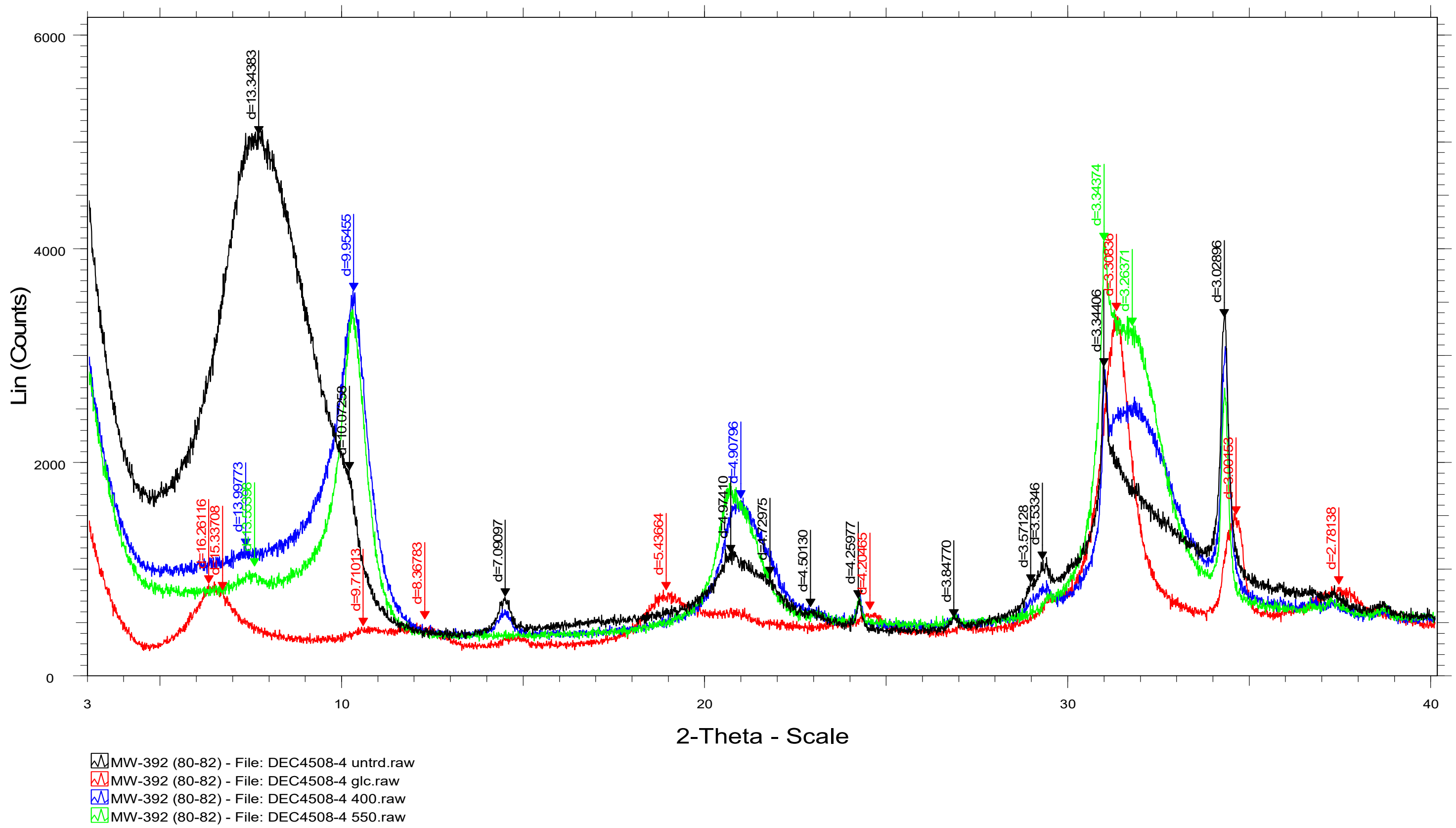
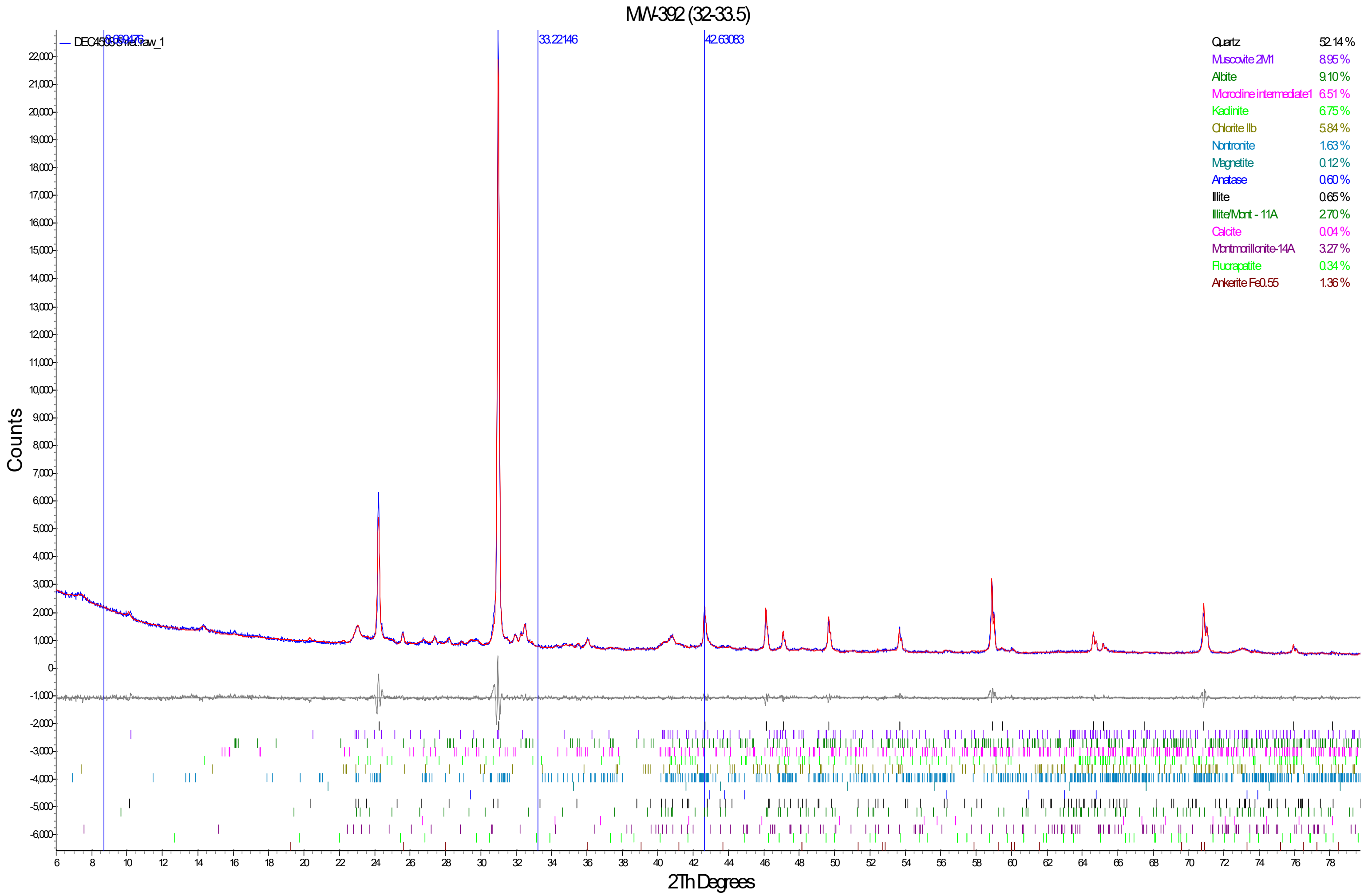

MW-392 (80-82)
DEC4508-4-file.raw_1
8.465983
32.02226
43.16615
Counts
2Th Degrees
Quartz 29.83 %
Muscovite 2M1 13.05 %
Albite 0.60 %
Microcline intermediate1 1.01 %
Kaolinite 5.53 %
Chlorite IIb 1.60 %
Nontronite 4.20 %
Magnetite 1.37 %
Anatase 0.85 %
Illite 4.11 %
Illite/Mont - 11A 3.57 %
Calcite 28.09 %
Montmorillonite-14A 3.49 %
Fluorapatite 2.68 %

Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

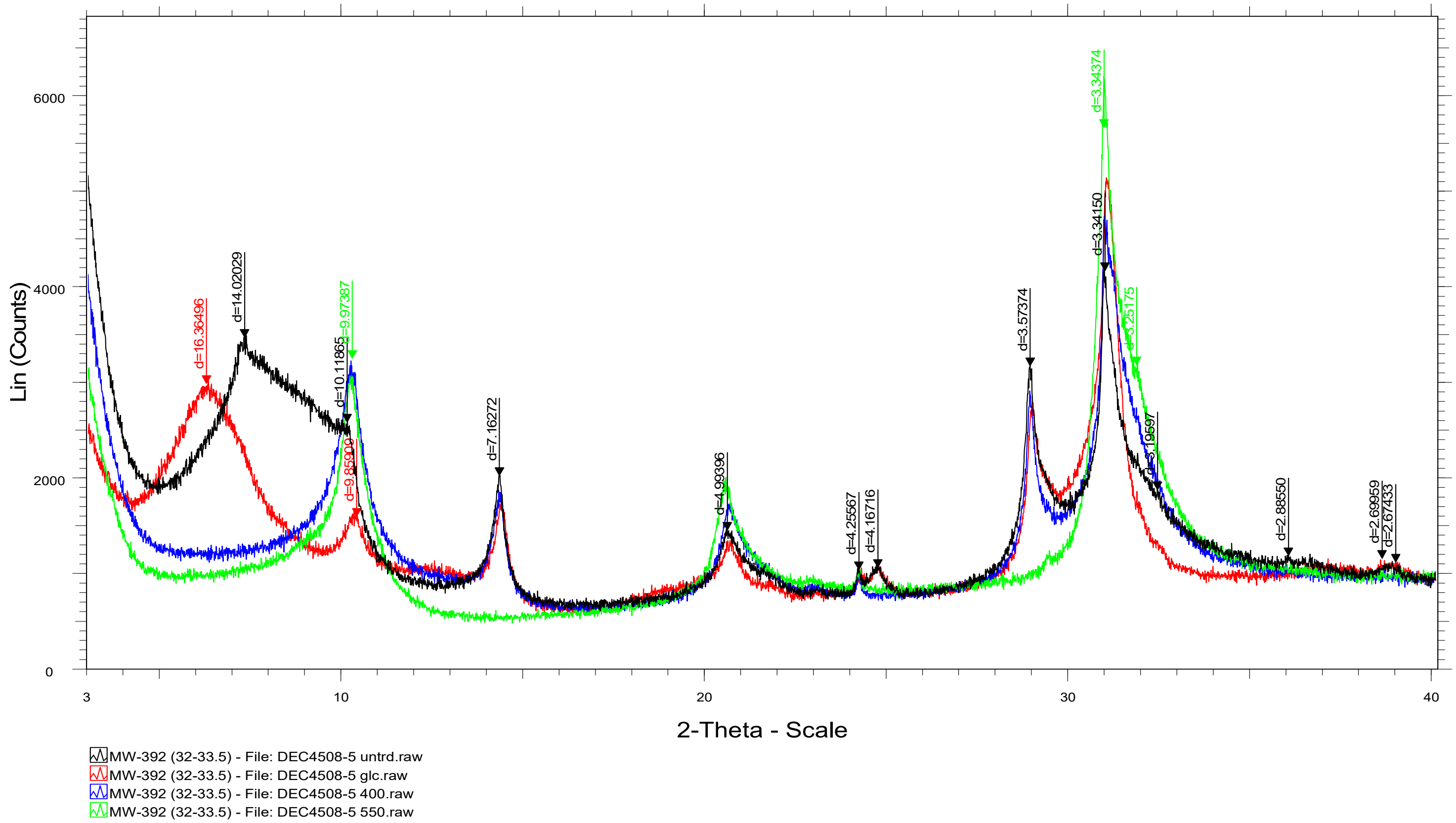
MW-392 (80-82)

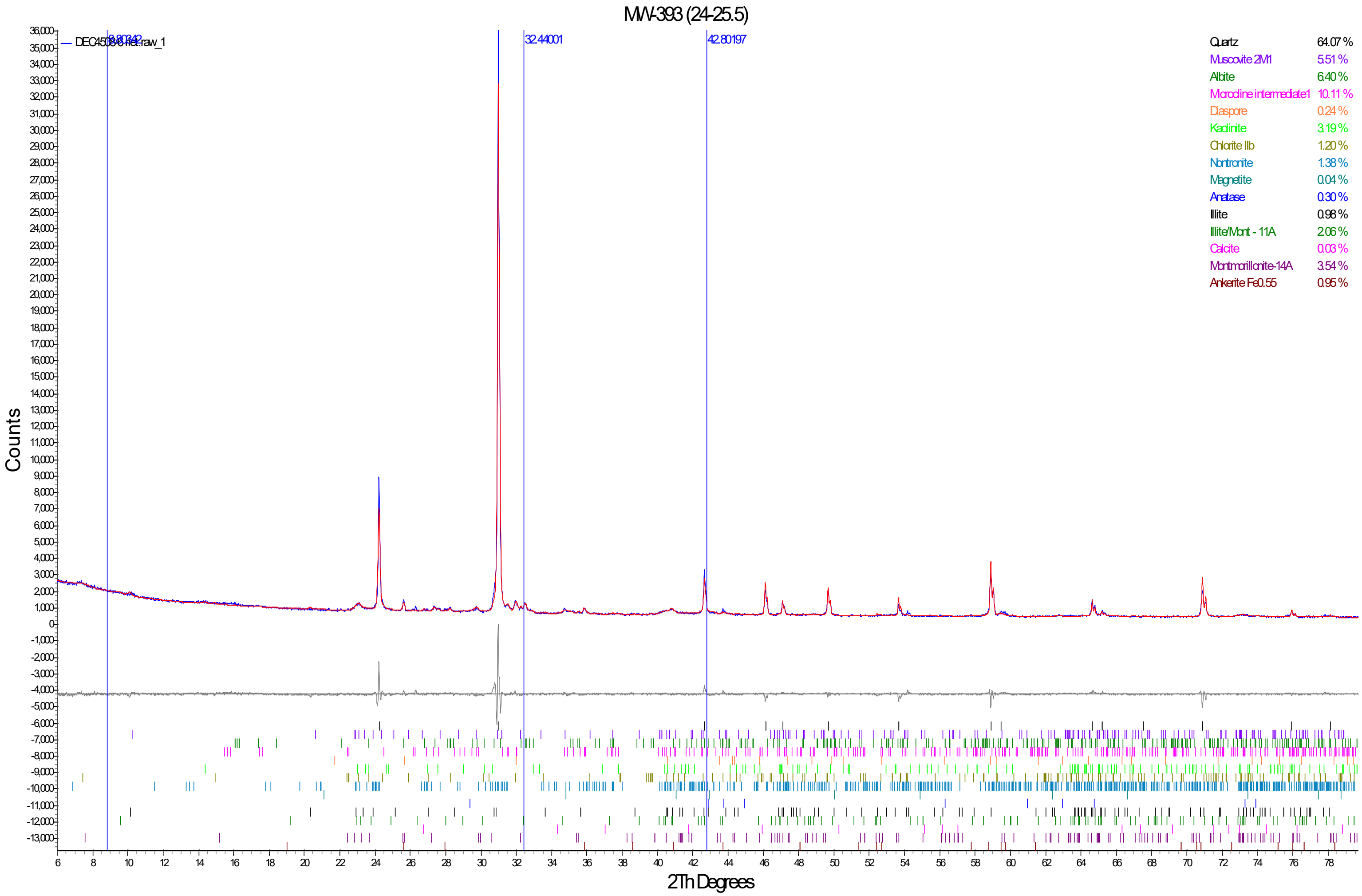



MW-392 (32-33.5)
DEC4508-9-Ref.raw_1
8.690476
33.22146
42.63083
Counts
2Th Degrees
Quartz 52.14 %
Muscovite 2M1 8.95 %
Albite 9.10 %
Microcline intermediate1 6.51 %
Kaolinite 6.75 %
Chlorite IIb 5.84 %
Nontronite 1.63 %
Magnetite 0.12 %
Anatase 0.60 %
Illite 0.65 %
Illite/Mont - 11A 2.70 %
Calcite 0.04 %
Montmorillonite-14A 3.27 %
Fluorapatite 0.34 %
Ankerite Fe0.55 1.36 %

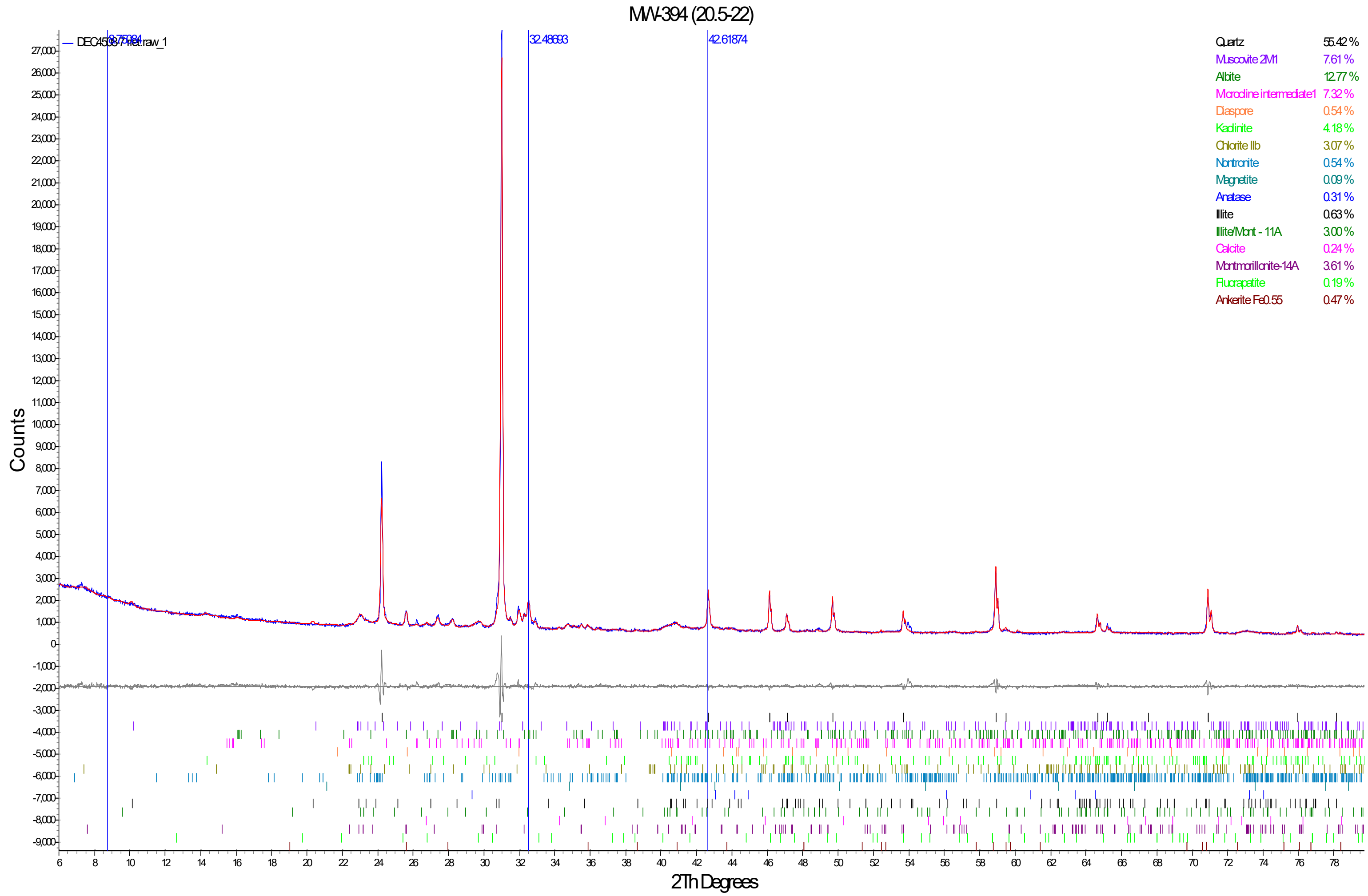
Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-392 (32-33.5)

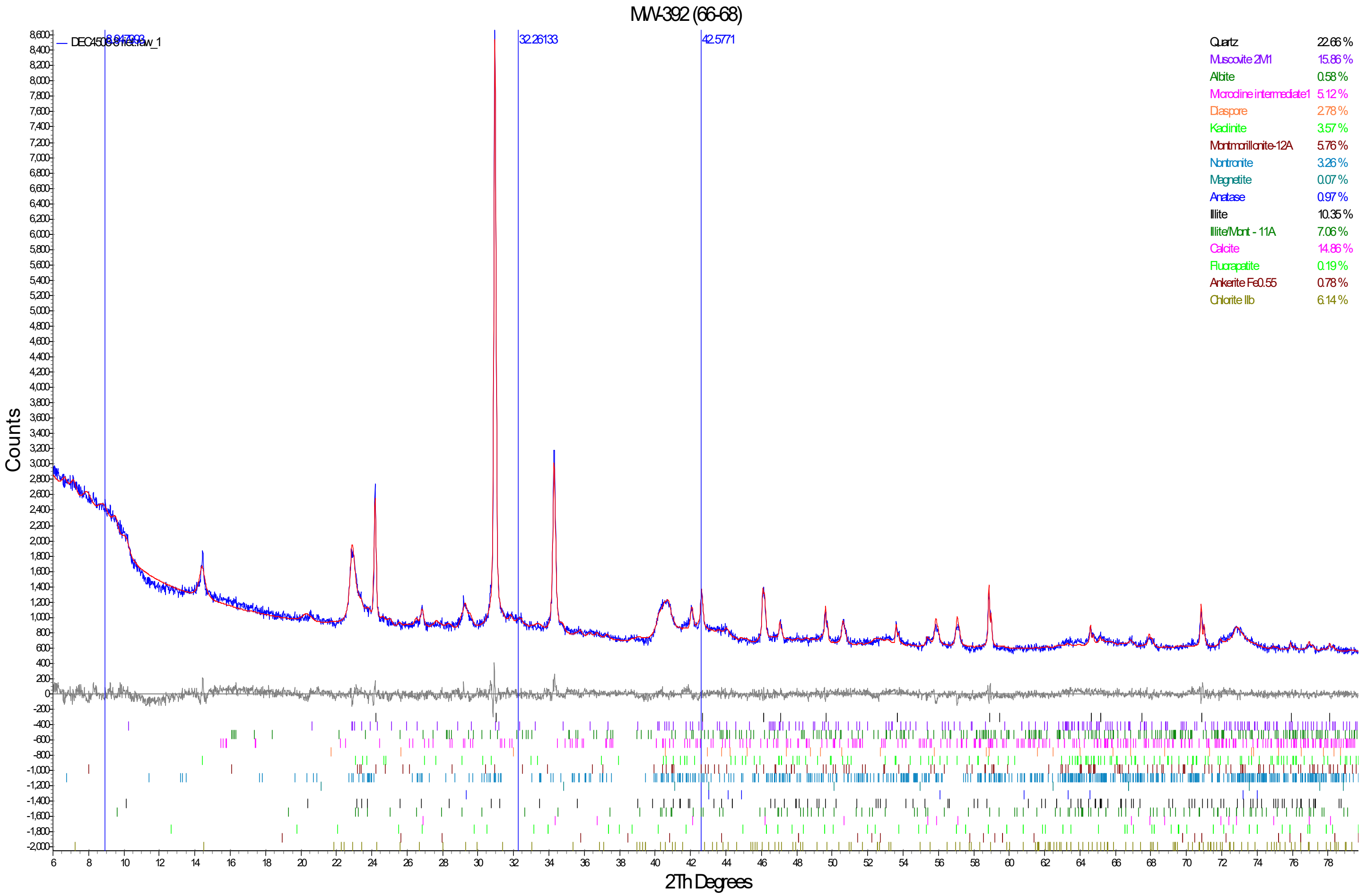



MW-393 (24-25.5)
DEC4508-6 file.raw_1
8.87342
32.44001
42.80197
Counts
2Th Degrees
Quartz 64.07 %
Muscovite 2M1 5.51 %
Albite 6.40 %
Microcline intermediate1 10.11 %
Diaspore 0.24 %
Kaolinite 3.19 %
Chlorite IIb 1.20 %
Nontronite 1.38 %
Magnetite 0.04 %
Anatase 0.30 %
Illite 0.98 %
Illite/Mont - 11A 2.06 %
Calcite 0.03 %
Montmorillonite-14A 3.54 %
Ankerite Fe0.55 0.95 %

Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



MW-392 (66-68)

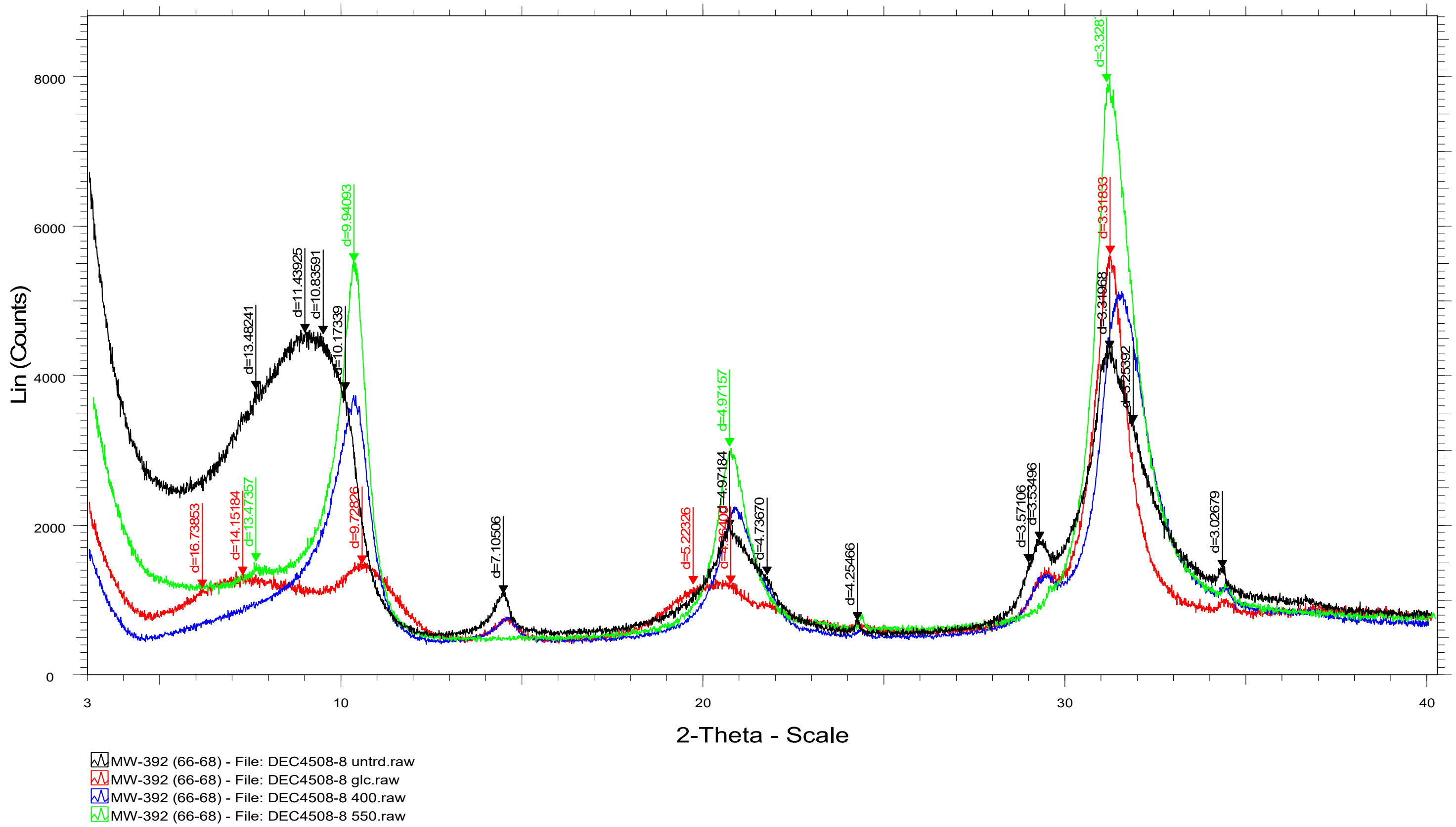

Lin (Counts)
2-Theta - Scale
MW-392 (66-68) - File: DEC4508-8 untrd.raw
MW-392 (66-68) - File: DEC4508-8 glc.raw
MW-392 (66-68) - File: DEC4508-8 400.raw
MW-392 (66-68) - File: DEC4508-8 550.raw

Exhibit D

Geosyntec consultants

134 North La Salle, Suite 300
Chicago, Illinois 60602
PH 312.658.0500
www.geosyntec.com

November 10, 2023

VIA EMAIL
heather.mullenax@illinois.gov
EPA.CCR.PART845.COORDINATOR@ILLINOIS.GOV
EPA.CCR.Part845.Notify@Illinois.gov

Re: Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration Addendum

To Whom it May Concern:

This letter provides additional information to support the Baldwin Power Plant Bottom Ash Pond (BAP) alternative source demonstration (ASD) submitted by Dynegy Midwest Generation, LLC (DMG) on October 27, 2023. Pursuant to 35 I.A.C. § 845.650(e), the lines of evidence (LOEs) presented in the Baldwin Power Plant BAP ASD demonstrated that sources other than the BAP were the cause of the chloride and fluoride GWPS exceedances identified in the ASD and the BAP has not contributed to the exceedances. This ASD was completed in conformance with guidance provided in the Electric Power Research Institute (EPRI) guidance for development of ASDs at CCR sites (EPRI 2017) and the United States Environmental Agency (USEPA)'s Solid Waste Disposal Facility Criteria: Technical Manual (USEPA 1993).

While DMG has not yet received any feedback from the Illinois Environmental Protection Agency (IEPA) on the Baldwin Power Plant ASD submittal, this additional information is being provided consistent with the following requests from IEPA for previously submitted ASDs:

1. Source characterization of the CCR at the Bottom Ash Pond must include total solids sampling, analysis and reporting in accordance with SW846.
2. Supporting documentation for groundwater monitoring wells or analytical data used to support the ASD.
3. Characterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD.

BACKGROUND

Alternative source demonstrations use multiple lines of evidence approach to support the conclusions that 1) the coal combustion residuals (CCR) unit is not the source of an exceedance, and 2) there is an alternative source of the exceedance. The multiple lines of evidence approach is consistent with the approach used in many areas of environmental analysis such as ecological risk assessment, monitored natural attenuation (MNA), and vapor intrusion (USEPA 2016; USEPA 1999; ITRC 2007). The goal of a multiple lines of evidence approach is to provide robust support for a causal relationship based on many smaller individual qualitative or quantitative pieces of evidence (USEPA 2016). Critically, no individual line of evidence will be completely conclusive, and each will have varying degrees of certainty. The final determination of a conclusion is based on the totality of the evidence provided.

ASDs based on a multiple lines of evidence approach are routinely prepared by environmental consultants to comply with federal CCR rules (Title 40 of the Code of Federal Regulations [40 C.F.R.] § 257) and State CCR rules (Title 35 of the Illinois Administrative Code [35 I.A.C.] § 845). In Georgia, where the CCR permitting authority has been delegated to the State, the Georgia Environmental Protection Division has approved ASDs using multiple lines of evidence to satisfy the requirements of the federal CCR rule. An example of such approval is documented in the summary section (page 3) of the 2023 Annual Groundwater Monitoring and Corrective Action Report found in the publicly accessible files linked here: https://www.georgiapower.com/content/dam/georgia-power/pdfs/company-pdfs/plant-mcmanus/20230731_2023agwmcar_mcm_ap-1.pdf.

The BAP ASD was completed in conformance with the EPRI guidance for development of ASDs at CCR sites (EPRI 2017). The EPRI document presents an approach for developing ASD lines of evidence that relies, where possible, on leachate samples collected from leachate wells, lysimeters, and/or leachate collection systems to provide samples that are representative of interstitial porewater. This direct approach for evaluating the potential for the BAP to impact groundwater is in contrast to the indirect approach implied by the IEPA request to characterize the CCR at the BAP using methods in accordance with SW-846 (specifically those used for waste characterization [*e.g.*, EP, TCLP, SPLP, LEAF[1]]), as discussed below.

Additionally, the lines of evidence as presented as section headings in the BAP ASD commonly contain multiple qualitative and quantitative pieces of information that contribute to the body of evidence that support the conclusion that the CCR surface impoundment (SI) is not the source of an exceedance.

RESPONSE TO REQUEST NUMBER 1: SW-846 CHARACTERIZATION OF CCR MATERIAL

The CCR porewater most accurately represents the mobile constituents associated with the waste management activity within the CCR SI (EPRI 2017). The composition of CCR porewater accumulated at the base of the CCR unit, which is derived from, and represents contact with, CCR

[1] Extraction Procedure, Toxic Characteristic Leaching Procedure, Synthetic Precipitation Leaching Procedure, Leaching Environmental Assessment Framework

material above and around the well screen, is the truest representation of mobile constituents throughout the CCR SI. Leach tests presented in SW-846 (*e.g.*, TCLP, SPLP, LEAF 1313 - 1316) are inconsistent predictors or surrogates of *in situ* porewater chemical concentrations (EPRI 2020; EPRI 2021; and EPRI 2022). Indeed, laboratory leach test effectiveness is determined by comparing results to porewater data (USEPA 2014; EPRI 2020; EPRI 2021; and EPRI 2022). These laboratory leach tests most accurately predict porewater concentrations when conditions in the test closely reflect conditions present in the field (USEPA 2019). In many cases, the pH and/or redox potential of porewater is poorly represented by any laboratory leach test conditions. For these reasons, analysis of actual CCR porewater is more representative of potential contributions to groundwater observed in compliance monitoring wells than laboratory leach testing. The uncertainty in comparing the laboratory leach test results with the actual porewater concentrations means that the contribution of laboratory leach test data as a line of evidence to an ASD would be minimal.

Prior to performing hydrogeologic investigations in 2022, Ramboll completed a review of existing data to determine whether sufficient information existed to meet the requirements of 35 I.A.C. § 845. Based on review of the BAP, six porewater well locations were identified to provide representative spatial distribution of the pond and confirm the elevation of the base of ash in former topographic low areas (Figure 1; Ramboll 2021). Porewater wells were constructed with well screens at the base of the CCR material observed in the boring. Because the unit was bottom ash, operators utilized equipment to establish access to five locations, one of the locations was not completed due to its proximity to open water and health and safety considerations.

During installation of the porewater wells, the borings were logged, and solid samples were collected from fifteen intervals for geotechnical and/or chemical analysis. Samples were analyzed for total metal concentrations via EPA Method 6010B and 7471B (SW-846) and the results for the solid phase analyses are provided in Attachment 1 of this letter.

As established above, testing porewater is a direct source term for evaluating potential influence on groundwater. SW-846 provides analytical methods for evaluating solid waste using leach tests that are designed to replicate potential *in situ* conditions (either current or future). The goal of these laboratory leach tests is to predict the potential concentration of chemicals under laboratory controlled conditions (*e.g.*, landfill leachate, synthetic precipitation, variable pH) which may or may not represent conditions observed in the field. The use of leach test results performed under variable conditions collected from any number of locations within the CCR SI to estimate a total potential for chemical leaching from CCR into groundwater under a variety of different conditions is irrelevant to an ASD. ASDs are prepared to evaluate the potential for actual porewater leaking from a CCR SI to be the cause of a detected exceedance observed in a compliance well.

RESPONSE TO REQUEST NUMBER 2: ADDITIONAL SUPPORTING DOCUMENTATION

The BAP geologic and hydrogeologic setting was fully characterized and described in the October 25, 2021 operating permit application (Burns and McDonnell 2021), the revised Hydrogeological Characterization Report (Ramboll 2023), and July 31, 2023 closure construction permit application (Geosyntec 2023). Those materials are incorporated herein by reference. Select boring logs relevant to the ASD were provided in Attachment 5 of the original BAP ASD submittal. Additional boring logs and well construction diagrams, which were previously provided in the documents described above, are provided as Attachment 2 to this submittal for ease of reference.

Analytical laboratory data for samples collected in May 2023 from leachate well locations XPW-01, XPW-02, XPW-04, XPW-05, and XPW-06 were used to generate a Piper diagram and facilitate comparison between the porewater composition and groundwater composition within the bedrock (Figure 3 of the ASD), which is the uppermost aquifer. The analytical laboratory data for these leachate samples is provided as Attachment 3 to this submittal.

RESPONSE TO REQUEST NUMBER 3: ALTERNATIVE SOURCE CHARACTERIZATION

Geosyntec's investigation and analysis in the ASD submittal identified bedrock is likely the source of chloride in MW-370 and fluoride at MW-393. Although there is no requirement under 35 Ill Admin. Code 845.640, 35 Ill. Admin. Code 845.650 or elsewhere in Part 845 to identify, sample or analyze an alternative source, Geosyntec provided solid phase laboratory analytical data from bedrock samples collected at the site in Attachments 4 and 6 of the ASD submittal. These results identified the presence of chloride and fluoride and fluoride-bearing minerals (fluorapatite) in the bedrock at the site.

CONCLUSIONS

The combined strength of the lines of evidence in the Bottom Ash Pond ASD demonstrates that the Bottom Ash Pond is not the source of the chloride exceedance at MW-370 or the fluoride exceedance at MW-393 (and did not contribute to these exceedances) and that the likely source is native bedrock. Geosyntec does not believe that additional lines of evidence based on leach test data or further testing of the alternative source would change the conclusion of the full body of evidence presented in the ASD that the Bottom Ash Pond is not the source or a contributing source of the chloride exceedance at MW-370 or the fluoride exceedance at MW-393.

REFERENCES

Burns and McDonnell. 2021. Initial Operating Permit – Baldwin Power Plant Bottom Ash Pond. October 25.

ITRC. 2007. Technical and Regulatory Guidance Vapor Intrusion Pathway: A Practical Guide. Interstate Technology Regulatory Council. January.

EPRI. 2022. Evaluation and Comparison of Leach Test and Porewater Variability for Multiple Coal Combustion Product Management Units. Electric Power Research Institute. Palo Alto, CA: 2022. 3002024214.

EPRI. 2021. Leaching, Geotechnical, and Hydrologic Characterization of Coal Combustion Products from an Active Coal Ash Management Unit: Plant 42197. Electric Power Research Institute. Palo Alto, CA: 2021. 3002018780.

EPRI. 2020. Leaching, Geotechnical, and Hydrologic Characterization of Coal Combustion Products from a Closed Coal Ash Impoundment: Capped Unit. Electric Power Research Institute. Palo Alto, CA: 2020. 3002017363.

EPRI. 2017. Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Sites. Electric Power Research Institute. Palo Alto, CA: 2017. 3002010920.

Geosyntec Consultants, Inc. 2023. Construction Permit Application. Baldwin Power Plant Bottom Ash Pond. July.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2023. Hydrogeologic Site Characterization Report Revision 1. Baldwin Bottom Ash Pond. Baldwin Power Plant. Baldwin, Illinois. August 1, 2023.

Ramboll. 2021. Hydrogeologic Site Characterization Report. Bottom Ash Pond – Baldwin Power Plant. Ramboll Americas Engineering Services. October 25.

USEPA. 2019. Leaching Environmental Assessment Framework (LEAF) How-To Guide. SW-846 Update VII. Revision 1. United States Environmental Protection Agency. May.

United States Environmental Protection Agency (USEPA), 2016. Weight of Evidence in Ecological Assessment. EPA/100/R-16/001. December.

United States Environmental Protection Agency (USEPA), 2014. Leaching Test Relationships, Laboratory-to-Field Comparisons and Recommendations for Leaching Evaluation using the Leaching Environmental Assessment Framework. EPA 600/R-14/061 September.

United States Environmental Protection Agency (USEPA), 1999. Use of Monitoring Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive Number 9200.4-17P.

USEPA. 1993. Solid Waste Disposal Facility Criteria: Technical Manual. Solid Waste and Emergency Response. EPA530-R-93-017. November.

ATTACHMENTS

Figure 1: CCR Characterization

Attachment 1: Ash Analytical Results

Attachment 2: Additional Boring Logs and Well Construction Information

Attachment 3: May 2023 Laboratory Analytical Data

CLOSING

If you have any questions about this letter, please do not hesitate to contact John Seymour, as referenced below.

Sincerely,

John Seymour, P.E.
Senior Principal Engineer
jseymour@geosyntec.com
312-416-3919

Exhibit E

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397

JB PRITZKER, GOVERNOR

JOHN J. KIM, DIRECTOR

217-782-1020

November 28, 2023

Phil Morris
Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Re: Baldwin Power Plant Bottom Ash Pond; W1578510001-06
Alternative Source Demonstration (ASD) Submittal

Dear Mr. Morris:

The purpose of this correspondence is to notify you that the Illinois Environmental Protection Agency (Illinois EPA) concurs with the Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration dated October 27, 2023, and the additional evidence provided on November 10, 2023.

Based on the provided evidence, the Illinois EPA concurs that the chloride and fluoride exceedances found in MW-370 and MW-393, respectively, do not come from the Baldwin Power Plant Bottom Ash Pond. The Illinois EPA also concurs that the likely source of the exceedances come from native bedrock. Therefore, the groundwater monitoring may continue in accordance with Section 845.650(e)(5). The ASD provided must be included in the annual groundwater monitoring report and the corrective action report as required by Section 845.610(e).

If you have any questions, please contact: **Heather Mullenax** Illinois EPA, Bureau of Water, Groundwater Section DPWS #13, P.O. Box 19276, Springfield, Illinois 62794-9276. If you have any questions concerning the investigation described above, please call 217-782-1020.

Sincerely,

Michael Summers, P.G.
Manager, Groundwater Section
Division of Public Water Supplies
Bureau of Water

Exhibit F

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

July 8, 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 1 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 1 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
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Collinsville, Ilinois 62234

Prepared by

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Project Number: GLP8068

July 8, 2024

Geosyntec consultants

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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

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 July 9, 2024, within 60 days of determination of the exceedances (May 10, 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 lithium above the site-specific groundwater protection standard (GWPS) of 0.123 milligrams per liter (mg/L) was determined at downgradient monitoring well MW-370 following the First Quarter 2024 sampling event (Ramboll 2024). An ASD for Li at MW-370 was previously submitted under Title 40 of the Code of Federal Regulation Section 257.95(g)(3)(ii) on 30 April 2023 (Ramboll 2023). Statistical exceedances of chloride at MW-370 and fluoride at downgradient monitoring well MW-393 were also determined following the First Quarter 2024 sampling event. However, 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); therefore, these exceedances are not addressed in this ASD.

Under 35 IAC 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, or statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction.

Pursuant to 35 IAC Section 845.650(e), the lines of evidence (LOEs) documented in this ASD demonstrate that a source other than the BPP BAP CCR unit is the cause of the GWPS exceedance for lithium at downgradient monitoring well MW-370. Natural variability associated with the lithology of the aquifer is identified as the alternative source for the elevated lithium concentrations at MW-370.

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 is 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 (AECOM 2016).

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 2023). 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 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 IAC 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}) (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 events.

3. ALTERNATIVE SOURCE DEMONSTRATION LINES OF EVIDENCE

This ASD for the lithium GWPS exceedance at MW-370 is based on four LOEs. These LOEs are described and supported below.

3.1 LOE #1: BAP Porewater Concentrations of Lithium 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. Three samples of CCR effluent were collected during May 2020 from sumps at the FAPS in lieu of porewater which is unavailable due to unit closure. These samples were also included in the subsequent evaluation to assess the potential influence of the FAPS on lithium concentrations at MW-370, even though MW-370 is not anticipated to be directly downgradient of the FAPS.

The lithium concentrations reported for the both the BAP porewater sampling locations and the FAPS sump samples are consistently below the concentrations detected for lithium at MW-370 as shown in **Figure 1.** If the BAP or FAPS were the source of lithium in groundwater, porewater concentrations are expected to be greater than the GWPS exceedance concentrations. The median lithium concentrations detected in BAP porewater and FAPS sump water (0.011 mg/L and 0.010 mg/L, respectively) are below the median lithium concentrations detected in both background (0.062 mg/L) and compliance groundwater monitoring wells (0.057 mg/L), indicating that lithium concentrations at compliance well locations are not related to the BAP or to the FAPS. Furthermore, the highest detected lithium concentration in the porewater is consistently more than three times lower than the minimum concentration detected at MW-370. The lithium concentrations detected in the porewater samples are also less than the lower confidence limits of lithium concentrations detected at downgradient well MW-370 (0.131 mg/L calculated using a confidence interval around the mean) (Ramboll 2024). Similarly, lithium concentrations in FAPS sump water are less than the lower confidence limit for lithium at MW-370, with a maximum reported concentration of 0.012 mg/L (**Figure 1**). BAP CCR solids were also analyzed for total lithium, as discussed in Section 3.4.

3.2 LOE #2: MW-370 Has a Similar Ionic Composition to Upgradient Monitoring Well MW-358.

The groundwater at MW-370 has a similar ionic composition to the groundwater from recently installed background monitoring well MW-358, further indicating that MW-370 is not affected by the BAP. Ramboll (2023) previously evaluated Stiff diagrams and found that MW-370 contains groundwater dominated by chloride and monovalent cations. A Piper diagram — an alternative to Stiff diagrams for illustrating the relative concentration of major cations and anions in groundwater samples — shows that groundwater composition at MW-370 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**). The groundwater composition at MW-370 is similar to background monitoring wells MW-358 and MW-304, with cation contributions dominated by monovalent cations such as sodium and potassium, although MW-304 has a greater contribution of alkalinity to its anion composition than MW-358 and MW-370, both of which have greater relative contributions from chloride.

Piper and Stiff diagrams (Ramboll 2023) typically show the relative proportions and individual concentrations (respectively) of 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 plot.

In this ASD, the dataset used for PCA included 76 samples collected between 2022 and 2024 from background wells MW-304 and MW-358, downgradient well MW-370, and the BAP CCR porewater wells.[1] 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 accounting for approximately 70 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.

[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**. The FAPS sump samples were excluded from analysis given the limited lithium detections in the FAPS.

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 highlighted in shades of orange, the downgradient sample in blue, and the porewater samples in gray. The factor loadings, represented as vectors on the biplot, suggest 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, alkalinity, fluoride, and chloride are main drivers for shifting chemical compositions in the direction of the downgradient and background sample clusters. These 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.

The 95% bivariate confidence ellipses for each of the three groups of water (porewater from within the BAP, downgradient bedrock groundwater, and background bedrock groundwater) are also depicted on the biplot graph (**Figure 4**). As illustrated on the biplot, the porewater samples cluster separately from the downgradient and background wells, with no overlap in their confidence ellipses. Furthermore, the PCA demonstrates that the composition of the downgradient sample from MW-370 is similar to the composition of background samples from MW-358 and MW-304 - as evident by the overlap of their confidence ellipses.

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 from the combined group of downgradient and background wells.

Non-metric multidimensional scaling (NMDS) analysis of the dataset from 2023 and Q1 2024 was conducted to evaluate more recent site conditions and to further compare the combined chemical composition of porewater, background, and key downgradient samples. 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 patterns among samples to interpret patterns that represent the underlying data distribution, 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 is typically presented in two-dimensional space with arbitrary dimensions, where the distance between two samples is representative of their relative similarity. Given the limited number of sampling results available for 2023 and Q1 2024, NMDS was chosen over PCA when considering the dataset that only included the most recent samples. Additionally, the results of NMDS analysis can be used for validation of previous findings from PCA.

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 is separate from the downgradient and background samples; and (ii) the chemical compositions of the background and downgradient wells appear more similar to each other than to the composition of porewater. These results support the conclusion that downgradient location MW-370 is not affected by the BAP and its geochemistry is instead influenced by the native lithology.

3.3 LOE #3: Stable Lithium and Boron Isotopes Provide Further Evidence that the MW-370 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 compliance well MW-370 to represent wells screened within the downgradient shale. 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.

The boron stable isotopic signatures for the BAP CCR porewater and groundwater at MW-370 are markedly different, providing further evidence that the groundwater at MW-370 is not affected by 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 (14.0‰) 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 (^7Li and ^6Li) 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 δ^7Li, which is calculated as the ratio of $^7Li/^6Li$ relative to an international standard) can be an indicator of CCR constituents, as coals have δ^7Li 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 ^6Li from exchangeable sites on clays within shale during burial and formation can significantly alter groundwater δ^7Li values compared to expectations based on the depositional environment (Warner et al., 2014).

MW-370 groundwater also has a consistent lithium isotope composition (δ^7Li = 20.7‰) with upgradient groundwater from shale lithologies at MW-358 (δ^7Li = 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 (δ^7Li = 17.1‰) is somewhat similar to the bedrock lithium signature and is not consistent with the ranges of δ^7Li for other CCR material effluents (δ^7Li 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 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-370, are not influenced by the BAP and instead are more strongly influenced by the bedrock lithology where they are screened.

3.4 LOE #4: Lithium 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 lithium GWPS at MW-370 are associated with the limestone and shale bedrock formation.

Samples were collected from soil borings advanced in September and October 2022 at one location upgradient of the BAP (MW-358) and three locations downgradient of the BAP (MW-392, MW-393, and MW-394). These boring logs, plus the boring log for monitoring well MW-370, are provided as **Attachment 4**. Three samples each were collected from various depth intervals/lithologies at MW-358 and MW-392, and one sample each was collected from the unconsolidated overburden at MW-393 and MW-394.[2] The samples were submitted for analysis of mineralogy via X-ray diffraction (XRD), total lithium, and lithium distribution within the aquifer solids using sequential extraction procedure (SEP). SEP uses progressively stronger reagents to solubilize metals from increasingly recalcitrant phases. Although these procedures do

[2] One additional sample each was collected from the unconsolidated overburden at MW-393 and MW-394. These results are excluded from subsequent results tables and discussion to emphasize findings associated with the bedrock lithologies.

not identify the specific metal phases in a soil/aquifer matrix, they do provide a means to evaluate the class of solids and relative stability in relation to oxidation/reduction (redox) potential and pH fluctuations (Tessier et al. 1979, Kuo et al. 1983, Sposito et al. 1984, Hickey and Kittrick 1984, Gruebel et al. 1988).

Results for total and SEP analyses of lithium in these samples are presented in **Table 2** and the analytical laboratory reports are provided as **Attachment 7**. As a first step to evaluate data quality in an SEP analysis, the sum of individual extraction steps from the SEP was compared to the total lithium concentration. The sum of the SEP procedure is not expected to be exactly equal to the total metals analysis but should generally be consistent with the total metals analysis. As can be seen in **Table 2**, the total lithium concentrations ranged from 6.0 micrograms per gram (µg/g) of material to 20 µg/g in the shale samples. The summed concentrations of lithium from the SEP analyses ranged from 7 to 73 µg/g. The results were generally consistent between the total metals analyses and the summed SEP steps, indicating good metals recovery and data quality. One notable exception is the sample collected from 86-88 feet bgs at upgradient location MW-358, which had a total lithium concentration of 20.0 µg/g and a summed SEP total of 73 µg/g. Although a difference was detected, both results indicate lithium is present within shale materials upgradient of the BAP.

SEP and total lithium results from these locations indicate that lithium is present in both upgradient and downgradient shale bedrock samples at the Site, with the greatest concentrations detected in upgradient samples. Most lithium in these samples was found to be associated with the residual metals fraction, which is typically considered to be immobile and not readily soluble (**Table 2**). The abundance of lithium within the residual fraction indicates association with inseparable primary mineral phases such as clay minerals (Tessier et al., 1979). Lithium was also found to be associated with iron/manganese oxides in multiple samples (maximum of 25% associated with iron/manganese oxides in the sample collected from the 47-49 feet bgs samples from MW-358), and a small component of lithium was found to be associated with organic material in the 86-88 feet bgs sample collected from MW-358. These results indicate that natural lithium occurrence in aquifer material from the Site is associated with multiple phases and therefore groundwater interactions with lithium could occur through differing mechanisms at different locations and depths.

Clay minerals are known to be common geosorbents for naturally occurring lithium (Starkey 1982). Lithium is known to leach from lithium-hosting igneous rocks and micas through weathering processes. Mineral alteration reactions occurring in micas may result in lithium-rich micas transforming directly to illitic clays, and then to mixed-layer and smectite clays. The lithium within these primary minerals either becomes incorporated directly into the crystal structures of these clay minerals or is transported in solution and later concentrated in brines through evaporation (Ronov et al., 1970). Lithium-enriched brines constitute a common source of lithium in clay minerals, as eroded fine-grained materials deposited in these brines are capable of housing aqueous lithium within vacant sites in octahedral layers comprising their crystal structures (Schultz 1969). Field lithologic descriptions of samples indicate that nearly all of the samples collected and analyzed consist of clay or shale, both of which are comprised primarily of mica and clay minerals which are known to be hosts of natural lithium. Based on SEP results and lithologic observations, the data suggests that lithium in BAP solids is naturally occurring and primarily associated with micas and clays, with a smaller component associated with leachable oxides and organic material.

Mineralogical analyses were completed using XRD to evaluate whole rock mineralogy and evaluate the abundance of clays and micas within the aquifer solids (**Attachment 8**). Whole rock mineralogy results are provided in **Table 3**. Sample mineralogy consists predominantly of quartz, mica (muscovite), feldspars (albite and microcline), and clay minerals (chlorite, kaolinite) (**Table 3**). Of these minerals, muscovite and clays are known hosts of natural lithium within their crystal structures (Zawidzki 1976; Starkey 1982). The combined abundances of muscovite or clay minerals account for between 30 to 49% of the crystalline portion of samples within the bedrock shale samples, with an average value of 43%. As indicated on **Table 3**, these minerals are present at sizeable abundances both upgradient and downgradient of the BAP, indicating that these lithium-host minerals occur in the uppermost bedrock aquifer throughout the Site and constitute natural sources of lithium. Moreover, lithium concentrations within the solids of shale lithologies at background monitoring well MW-358 are on average (13 milligrams per kilogram [mg/kg]) greater than those detected for BAP CCR materials at XPW-04, -05, and -06 (5.2 mg/kg) (**Table 4;** analytical laboratory data provided in **Attachment 9**).

MW-370 is screened from 53-63 feet bgs within an interval of shaley limestone, with additional shale and clay directly overlying this material, as indicated by the boring log included in **Attachment 4**. Solids samples submitted for XRD analysis from other locations had similar boring log descriptions, so it is likely that lithium-hosting micas and clay minerals are present within the screened interval of MW-370, and the leachable component of lithium within these minerals could act as a geogenic source to groundwater.

4. CONCLUSIONS

It has been demonstrated that the lithium GWPS exceedance at MW-370 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. Lithium concentrations in the BAP porewater are historically more than three times lower than the minimum lithium concentrations detected at MW-370. Lithium concentrations in FAPS sump water were also lower than those reported at MW-370. Lithium concentrations in bedrock solids were also higher than those reported in CCR solids from the BAP.

2. Compliance monitoring location MW-370 has a similar geochemical signature as upgradient monitoring well MW-358. Moreover, a statistical evaluation 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 are similar to the same ratio in groundwater at upgradient monitoring well MW-358 and dissimilar from the BAP porewater, providing further evidence that groundwater geochemistry at MW-370 is not influenced by the BAP.

4. Solid phase analysis of rock cores from the uppermost aquifer (i.e., bedrock) identified lithium associated with mobile phases within the naturally occurring minerals of the shale bedrock, thereby providing an alternative geogenic source of lithium in groundwater.

The alternative source of lithium is the shale bedrock, whose geochemistry influences the groundwater composition. This demonstration meets the expectations in both 35 IAC 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.

The information serves as the written ASD prepared in accordance with 35 IAC 845.650(e) demonstrating that the GWPS exceedance for lithium at MW-370 is not due to the BAP CCR unit. Therefore, implementation of corrective measures is not required for lithium at the BAP CCR unit.

5. REFERENCES

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TABLES

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

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 - Lithium SEP Results Summary
Baldwin Power Plant - Bottom Ash Pond

Well ID	MW-358		MW-358		MW-392		MW-392	
Depth (ft bgs)	(47-49)		(86-88)		(66-68)		(80-82)	
Location	Upgradient		Upgradient		Downgradient		Downgradient	
Boring Log Description	Shallow Shale		Deeper Shale Body		Shale		Shale transitioning to limestone	
Total Lithium	6.0		20.0		15.0		8.0	
SEP Results								
	Concentration	% of Total	Concentration	% of Total	Concentration	% of Total	Concentration	% of Total
Water Soluble Fraction	<2	--	<2	--	<2	--	<2	--
Exchangeable Metals Fraction	<2	--	<2	--	<2	--	<2	--
Metals Bound to Carbonates Fraction	<2	--	<2	--	<2	--	<2	--
Metals Bound to Fe/Mn Oxides Fraction	3.0	25%	5.0	7%	2.0	10%	<2	--
Bound to Organic Material Fraction	<2	--	3.0	4%	<2	--	<2	--
Residual Metals Fraction	9.0	75%	65.0	89%	19.0	90%	7.0	100%
SEP Total	12.0	100%	73.0	100%	21.0	100%	7.0	100%

Notes:
SEP - sequential extraction procedure
All results shown in microgram of lithium per gram of soil (µg/g).
Total lithium was analyzed using aqua regia digest, ICP-MS
Non-detect values are shown as less than the detection limit.
The lithium fraction associated with each SEP phase is shown.
% of total lithium is calculated from the sum of the SEP fractions.

Table 3 - Summary of Rietveld Quantitative Analysis
X-Ray Diffraction Results
Baldwin Power Plant - Bottom Ash Pond

Well ID			**MW-358**	**MW-358**	**MW-392**	**MW-392**
Depth (ft bgs)			**(47-49)**	**(86-88)**	**(66-68)**	**(80-82)**
Location			**Upgradient**	**Upgradient**	**Downgradient**	**Downgradient**
Boring Log Description			**Shallow Shale**	**Deeper Shale Body**	**Shale**	**Shale transitioning to limestone**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	33.0	34.9	27.2	29.1
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	Mica	37.6	30.5	29.7	14.5
Albite	$NaAlSi_3O_8$	Feldspar	8.2	3.4	4.5	1.0
Microcline	$KAlSi_3O_8$	Feldspar	9.4	8.1	6.9	2.9
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	Clay	-	-	16.3	6.8
Pyrite	FeS_2	Sulfide	1.0	0.8	-	1.2
Kaolinite	$Al_2Si_2O_5(OH)_4$	Clay	9.0	18.4	-	8.2
Calcite	$CaCO_3$	Carbonate	1.8	1.7	14.8	31.5
Anatase	TiO_2	Oxide	-	2.1	0.7	0.4
Leucite	$KAlSi_2O_6$	Zeolite	-	-	-	2.4
Siderite	$FeCO_3$	Carbonate	-	-	-	1.9
Clay Minerals Total			9	18	16	15
Clays + Muscovite Total			47	49	46	30

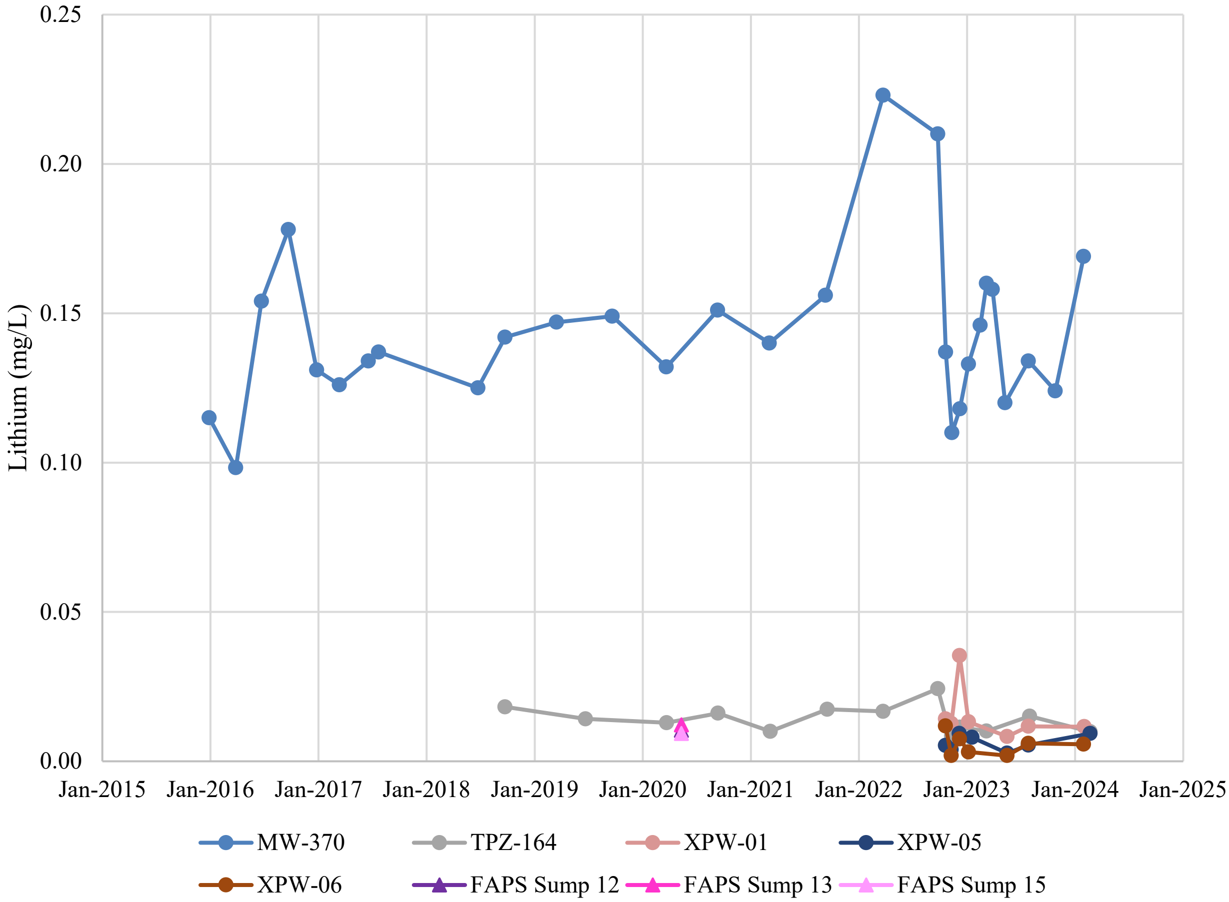
Notes
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.
Sample depths are shown in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

Table 4 - Lithium Concentration of Site Solids
Baldwin Power Plant - Bottom Ash Pond

Well ID	Depth (ft bgs)	Well Characterization	Sampled Aquifer Unit	Field Boring Log Description	Lithium (mg/kg)
MW-358	(47-49)	Background	UA	Shallow shale	6
	(86-88)	Background	UA	Deeper shale body	20
MW-392	(66-68)	BAP Compliance	UA	Shale	15
	(80-82)	BAP Compliance	UA	Shale transitioning to limestone	8
XPW-04	(8-10)	CCR Material	--	Ash	2.27
	(14.5-16.5)	CCR Material	--	Ash	0.46
XPW-05	(5-7)	CCR Material	--	Ash	10.9
	(12-13)	CCR Material	--	Ash	3.72
	(22-24)	CCR Material	--	Ash	12.1
	(26.2-28.2)	CCR Material	--	Ash	4.03
XPW-06	(5-7)	CCR Material	--	Ash	3.69
	(7-9)	CCR Material	--	Ash	4.11

Notes:
Sample depth is shown in feet below ground surface (ft bgs)
Non-detect values are shown as less than the reporting limit
BAP: Bottom Ash Pond
mg/kg: milligrams per kilogram
UA: uppermost aquifer

FIGURES



Notes:

mg/L: milligrams per liter
FAPS Sump: CCR effluent samples from the Baldwin Fly Ash Pond System

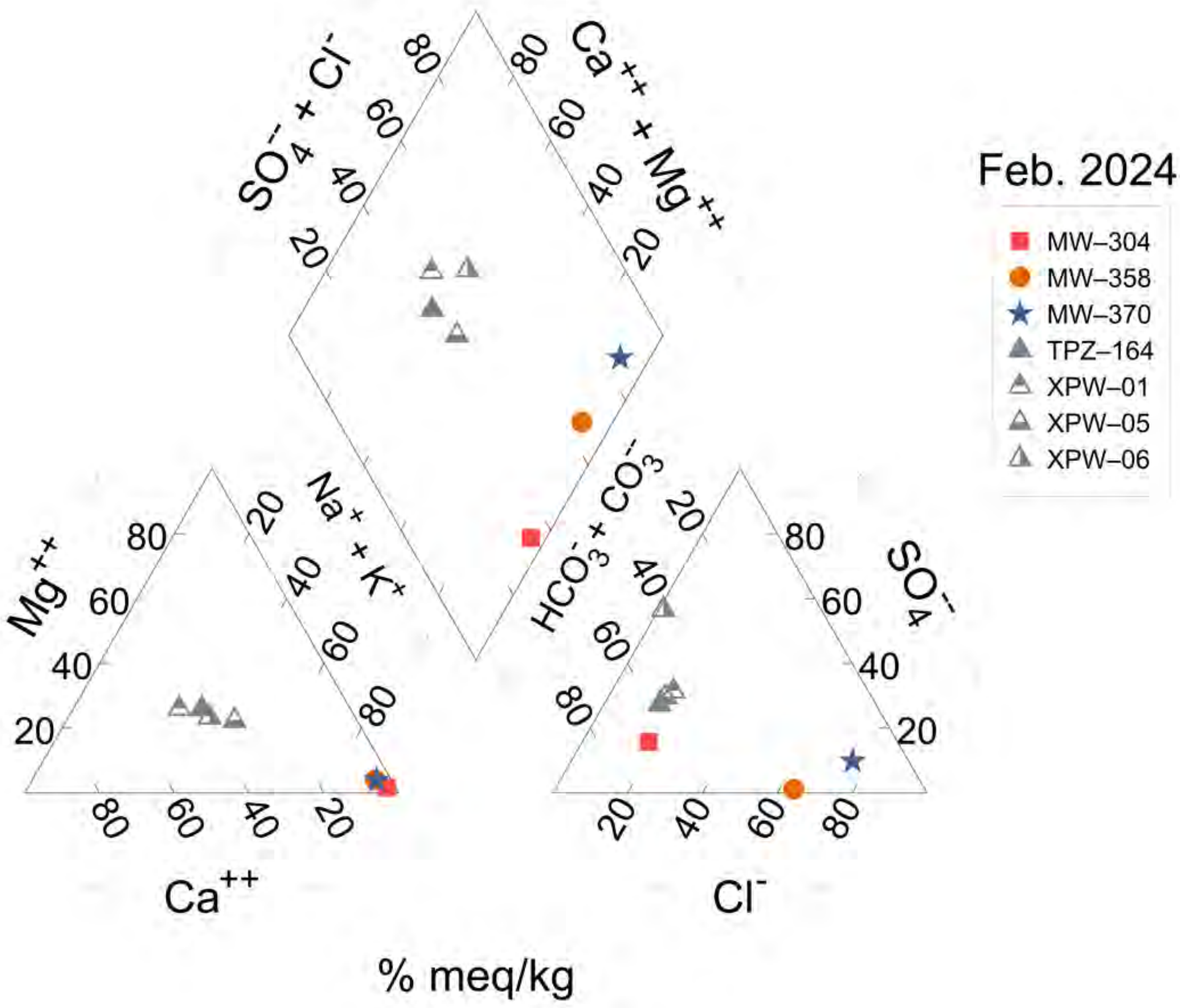
Lithium Time Series Graph
Baldwin Bottom Ash Pond

Geosyntec consultants

Figure
1

Columbus, Ohio | June 2024

internal info: path, date revised, author.



Notes:
% meq/kg: percent milliequivalents per kilogram

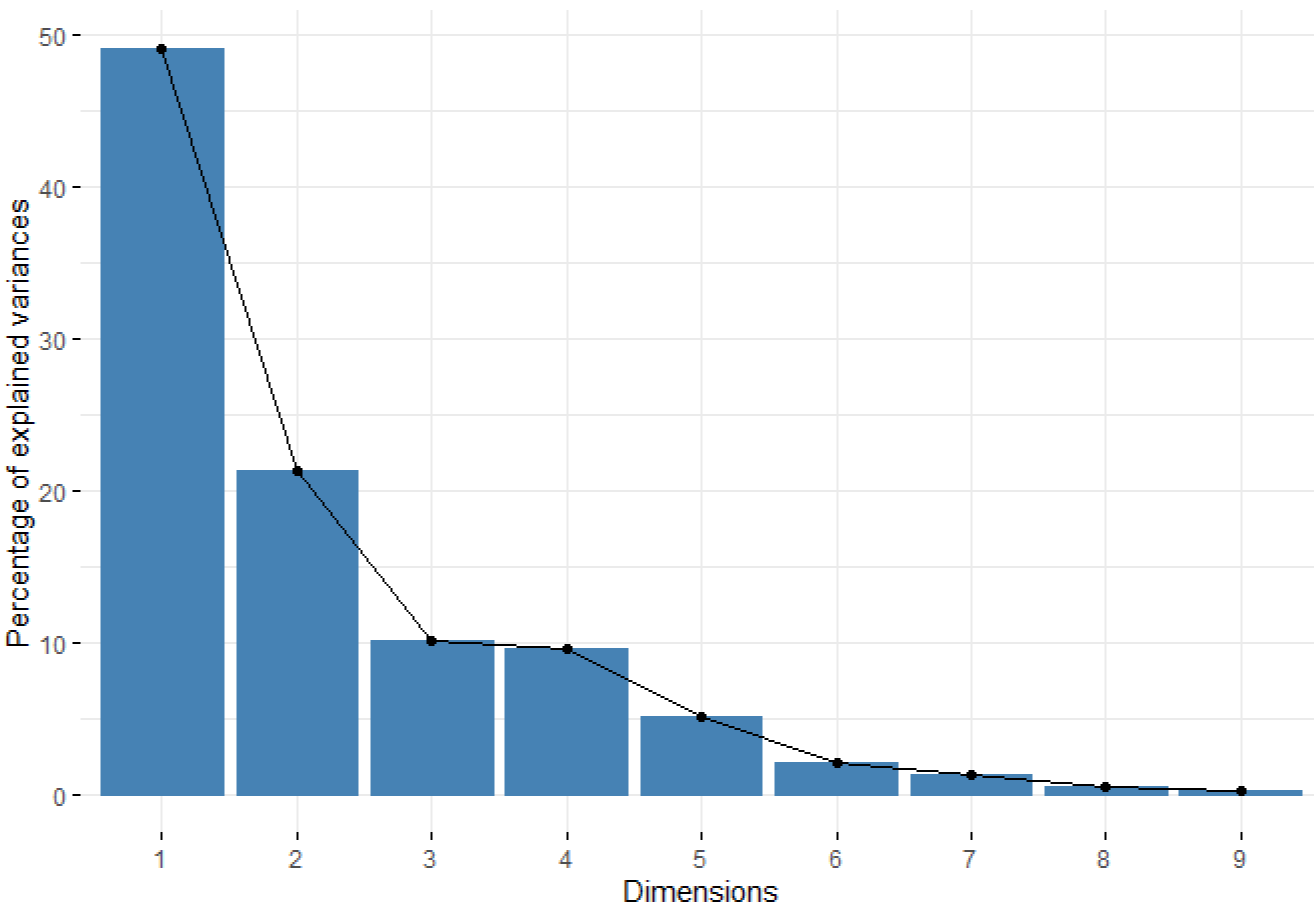
Piper Diagram

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure **2**

Columbus, Ohio | June 2024



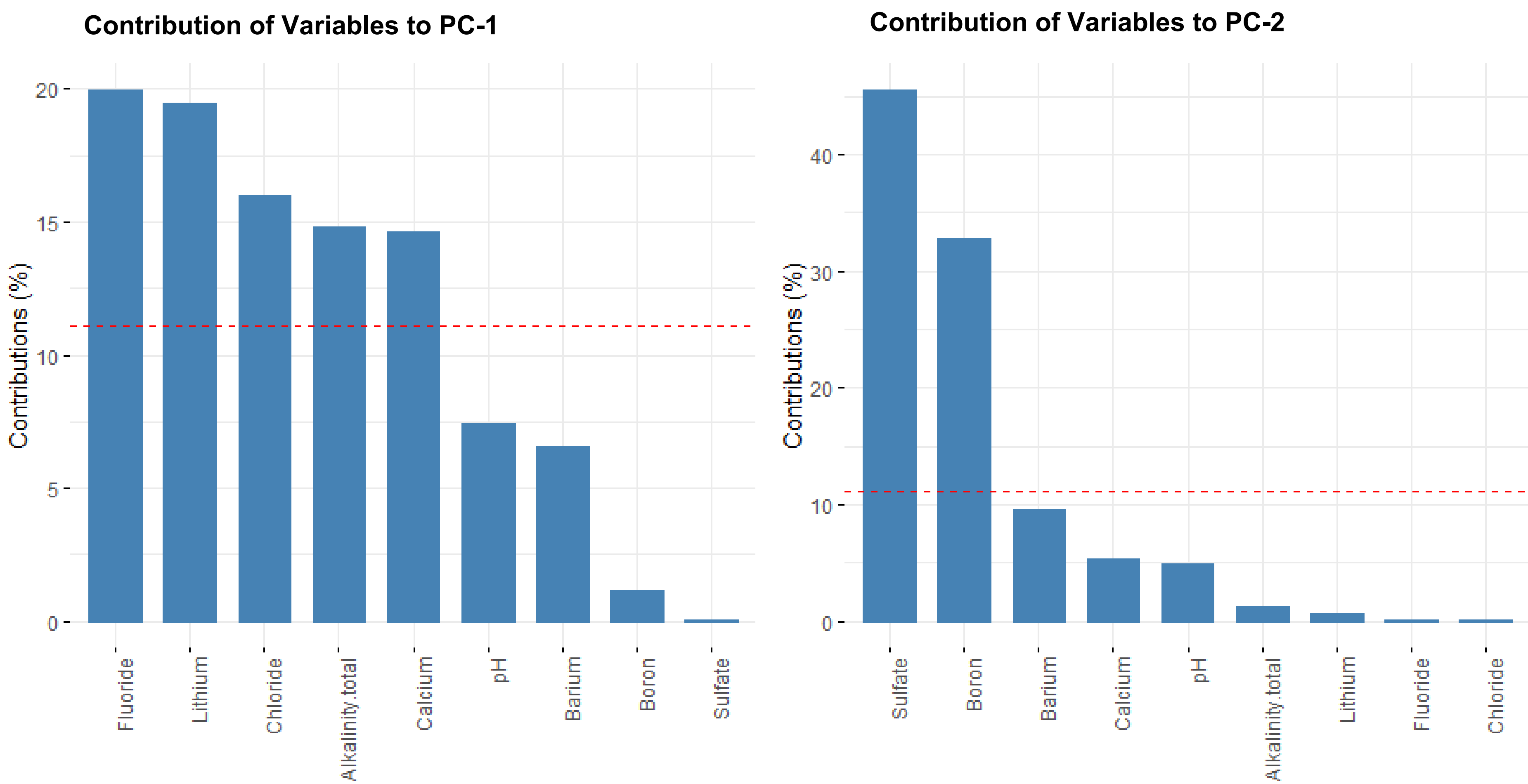
Notes:
1. Samples collected between 2022 and 2024 from background wells MW-304 and MW-358, downgradient well MW-370, and porewater wells TPZ-164, XPW-01, XPW-02, XPW-04, XPW-05, and XPW-06 were included in the evaluation.

Principal Component Analysis - Quality of Representation of Principal Components
Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure **3a**

Columbus, Ohio | June 2024



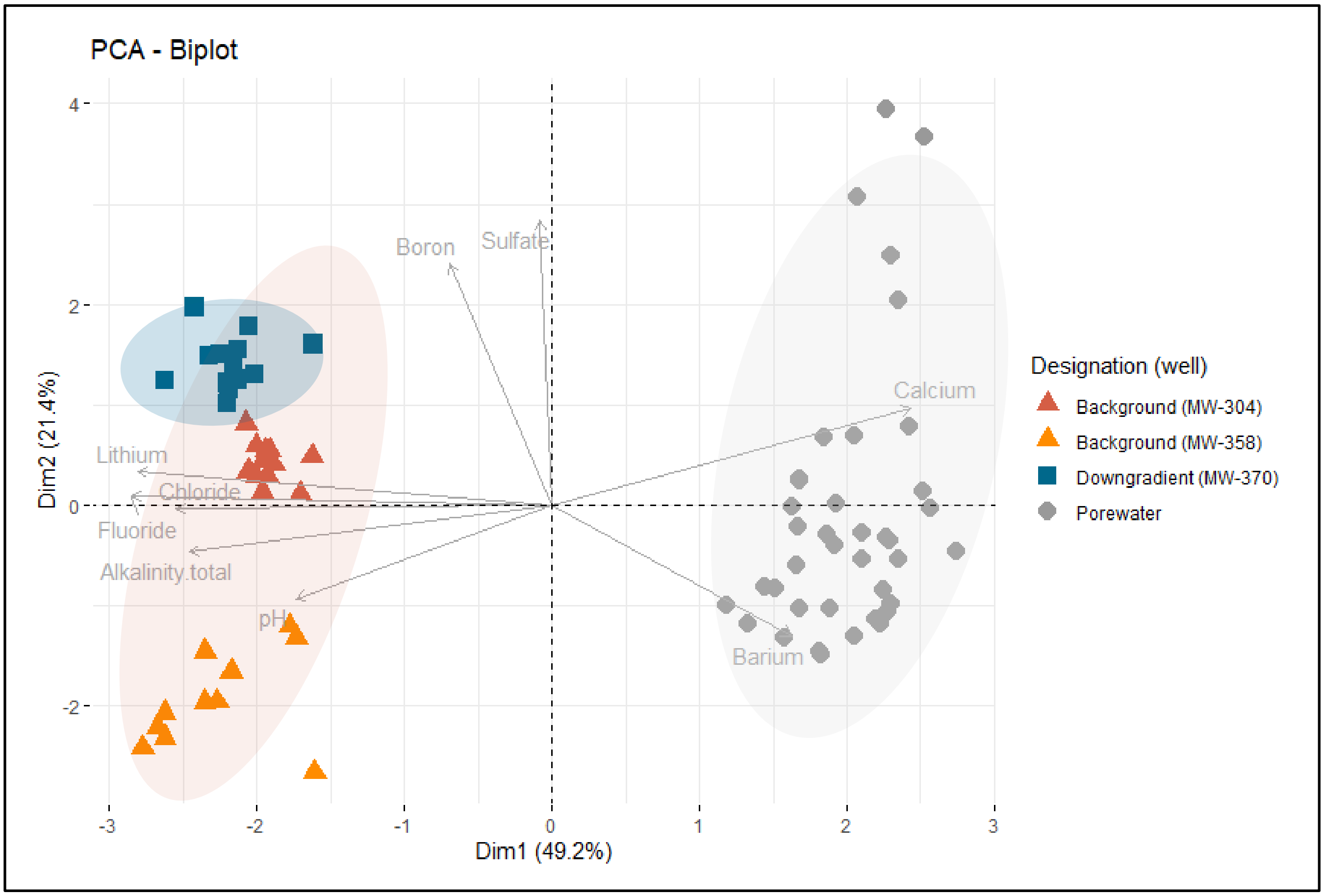
Notes:
1. The dashed red line represents the anticipated value for uniform contribution. The constituents with a contribution exceeding the reference line are considered significant in its contribution to each PC (principal component).

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

Geosyntec consultants

Figure **3b**

Columbus, Ohio | June 2024



Notes:

1. The ellipse containing data points within the 95% confidence interval for each group is outlined and shaded in gray, orange, and blue for porewater, background and downgradient groups respectively.
2. The arrows signify the correlations between the constituents and the principal components.

PCA – Principal Component Analysis
Dim - Dimension

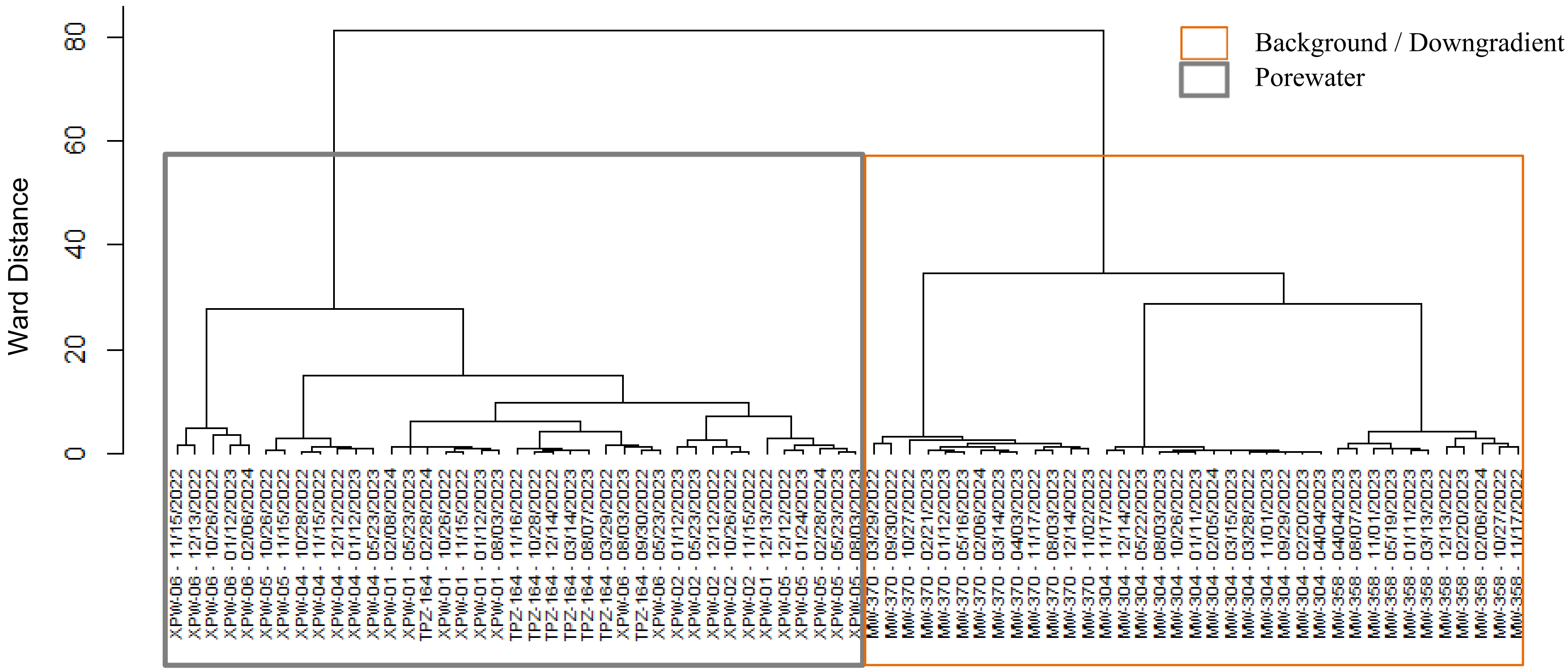
Principal Component Analysis Biplot

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure 4

Columbus, Ohio | June 2024



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

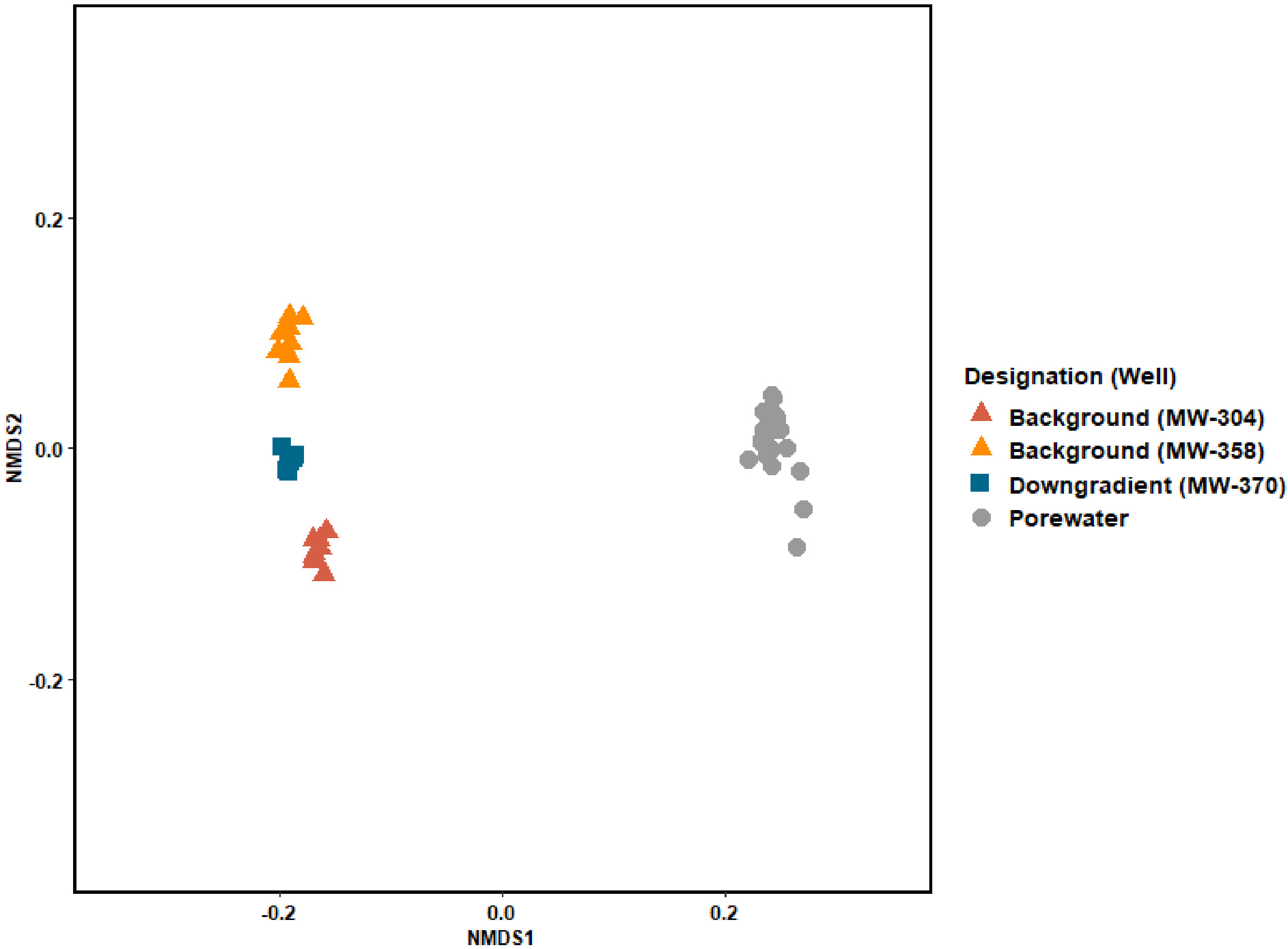
Baldwin Power Plant

Geosyntec consultants

Figure **5**

Columbus, Ohio

June 2024



Notes:
1. NMDS: Non-metric Multidimensional Scaling

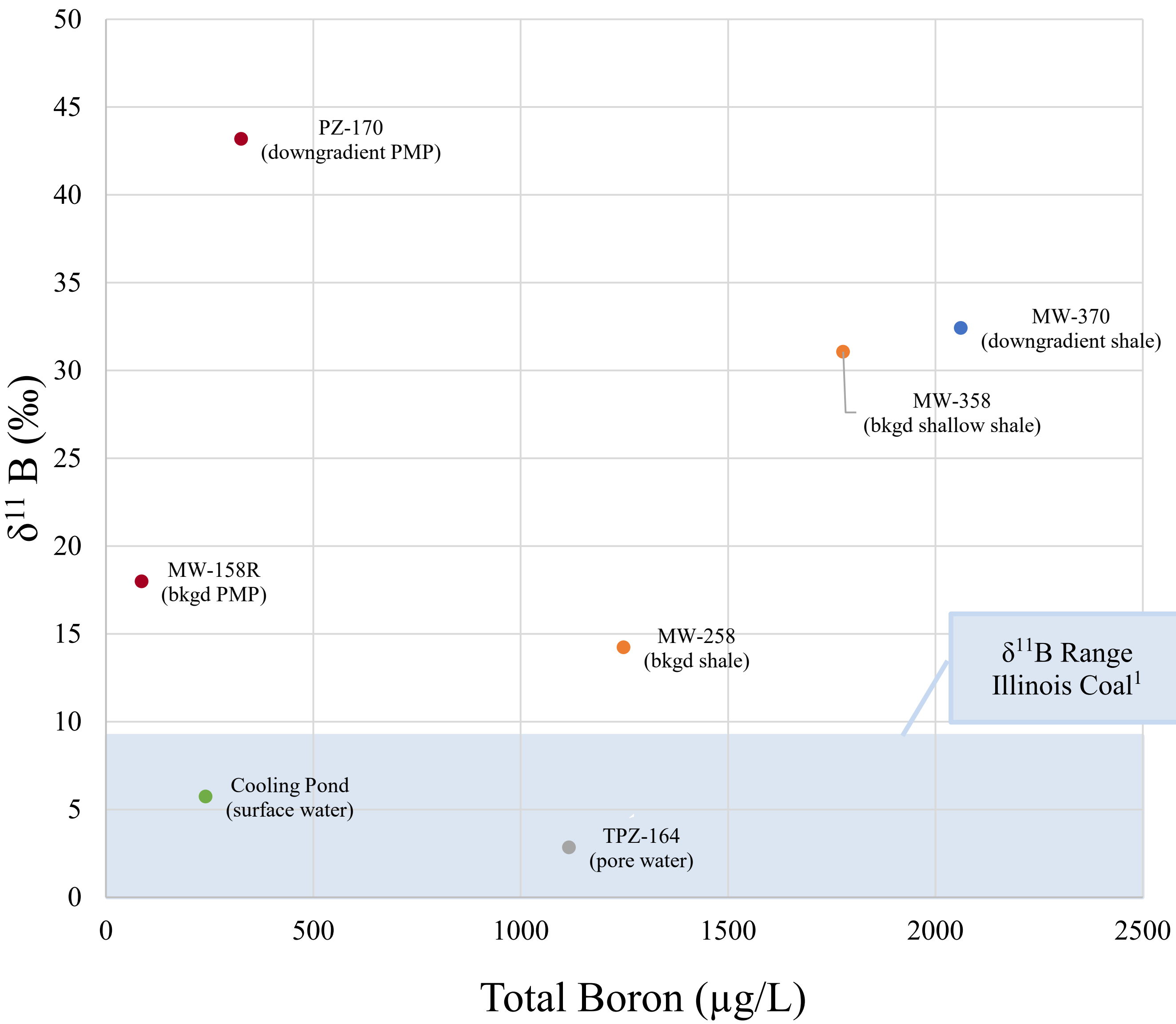
Non-Metric Multidimensional Scaling Plot

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Columbus, Ohio | October 2023

Figure **6**



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

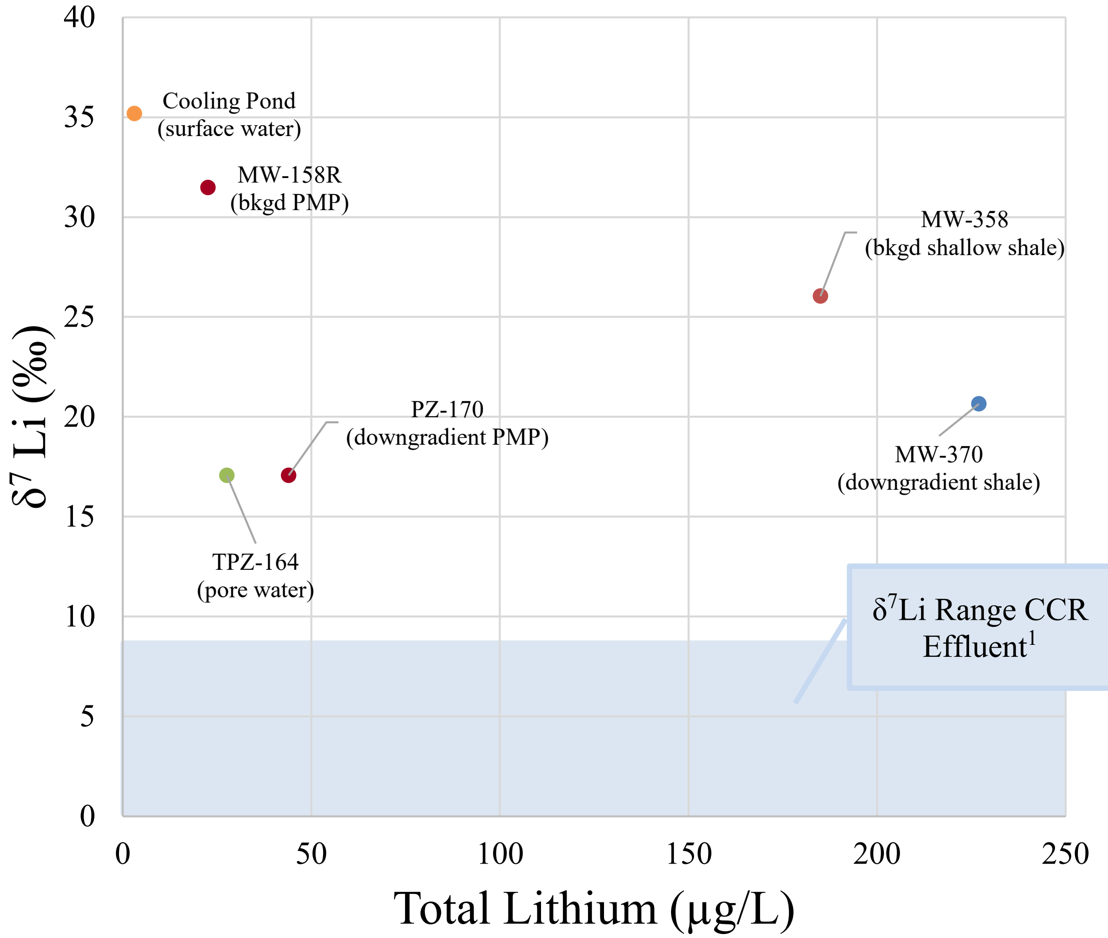
Boron Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure **7**

Columbus, Ohio | June 2024



Notes:

1. δ^7Li range from Ruhl et al 2015.

µg/L: micrograms per liter

‰: per mille

Bkgd: background

PMP: potential migration pathway

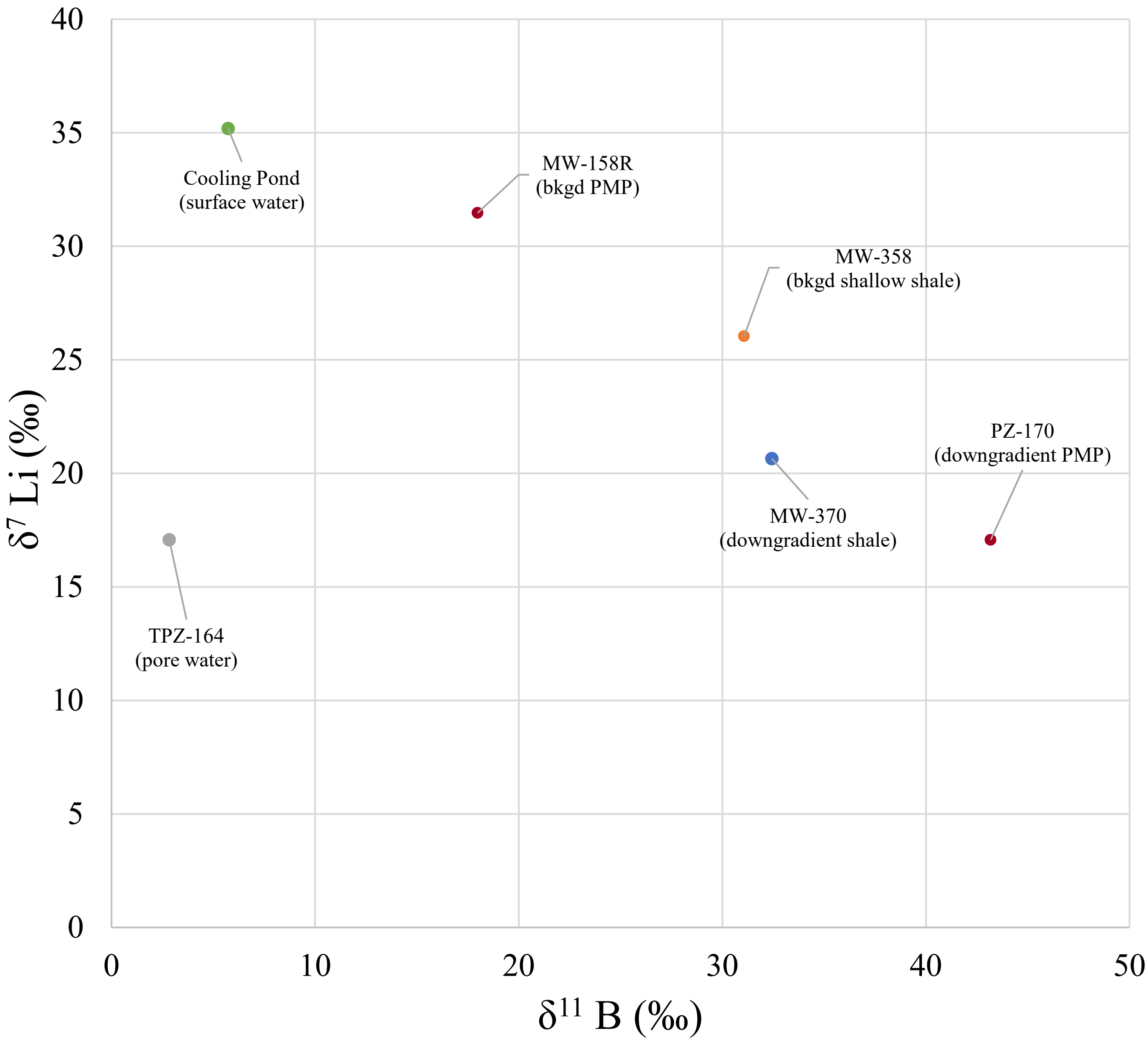
Lithium Isotope Distribution

Baldwin Power Plant – Bottom Ash Pond

Geosyntec consultants

Figure **8**

Columbus, Ohio | June 2024



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

Figure

9

Columbus, Ohio

June 2024

ATTACHMENT 1

Part 845 Groundwater Monitoring Network

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Baldwin_AP\E003\Figure 2-1_BAL BAP Monitoring Well Network.mxd

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

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

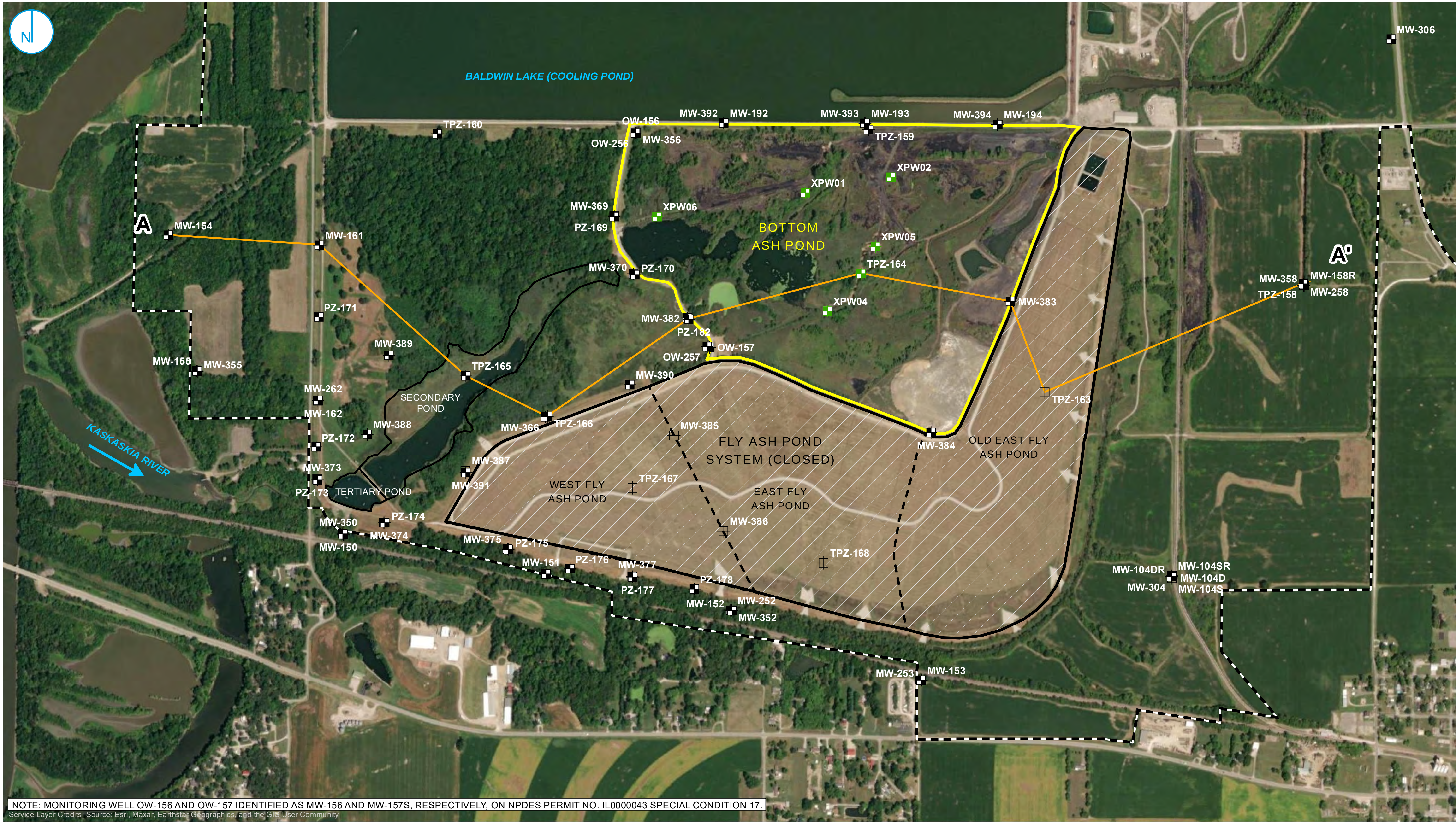
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 2

Geologic Cross Section



Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Demo\Baldwin_AP\2023\Figure 3_Cross Section Locations.mxd

PROJECT: 169000XXXX | DATED: 4/24/2023 | DESIGNER: GALARNMC

- 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

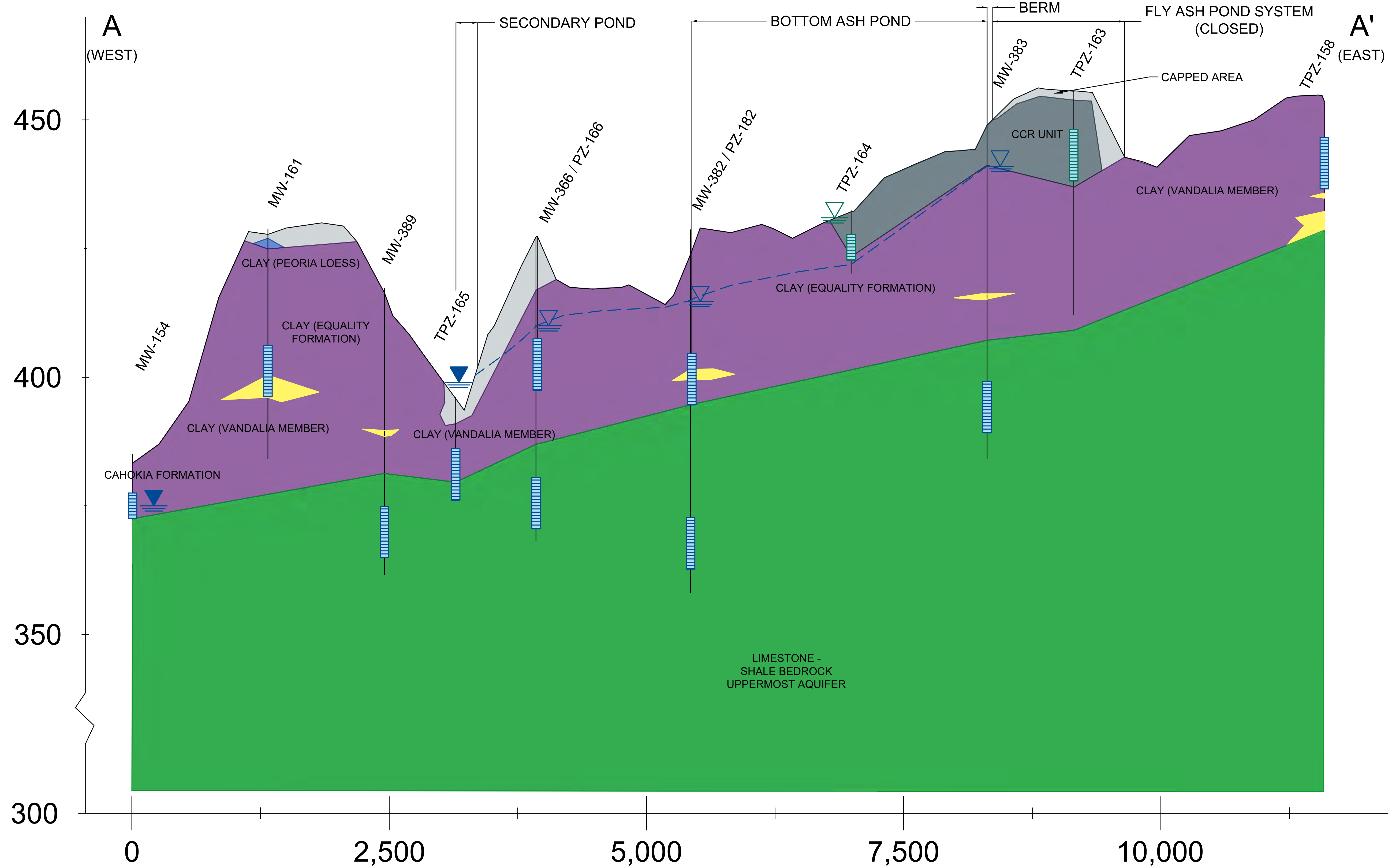
FIGURE 3

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

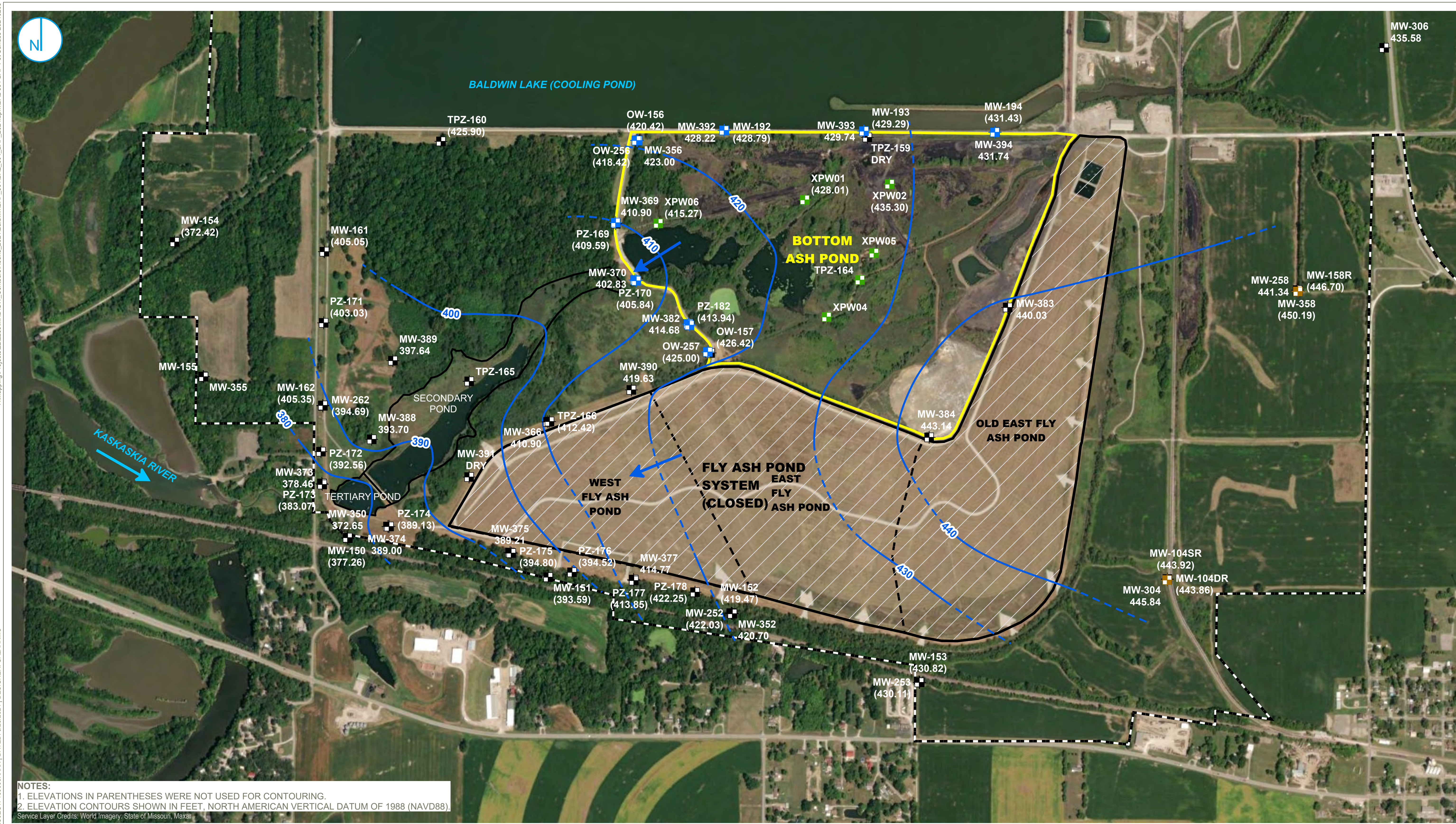
FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 3

Uppermost Aquifer Potentiometric Surface Map – May 15-17, 2023



Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2024\Baldwin\BAP_601\BAL_601_BAP_2024.aprx\BAL 601 BAP Pot Surface 20240205

PROJECT: 169000XXXX | DATED: 5/28/2024 | DESIGNER: GALARNMC

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
FEBRUARY 5, 2024

PRIVILEGED AND CONFIDENTIAL
PREPARED AT THE REQUEST OF COUNSEL

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

DRAFT

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 4
Boring Logs

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 ☐ N ☐ S Feet ☐ E ☐ W Feet

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	180 97		0–3.8	0 - 3.8' **SILT:** ML, very dark grayish brown (10YR 3/2), organic material (0-10%), moist to wet. 2.1' dry.	ML									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.
			3.8–8.9	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.	ML/CL									
			8.9–12	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.	(CL/ML)S									

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
					(CL/ML)S									
2 CS	60 60		13–17.8	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. 16.1' mottling discontinues.	CL/ML									
3 CS	48 36		17.8–21	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									
4 CORE	36 32		21–26.5	21 - 26.5' **SHALE:** BDX (SH), dark gray (GLEY 1 4/N), weathered, thin bedding, moderately fractured. 24' -25.2' wet.	BDX (SH)									RUN #4: Modified RQD = (21/32) = 66%
5 CORE	36 29		26.5–27.5	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%
			27.5–31.3	27.5 - 31.3' **SHALE:** BDX (SH), grayish black (N2), weathered, highly decomposed to residual soil, wet to moist. 29.3' thinly bedded, moderately decomposed. 30' slightly decomposed to competent, moderately fractured.	BDX (SH)									
6 CORE	72 60		31.3–32	31.3 - 32' **COAL:** COAL, black (N1).	COAL									RUN #6: Modified RQD = (45/60) = 75%

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			32–33	32 - 33' **SHALE:** BDX (SH), grayish black (N2), slightly decomposed to competent, moderately fractured, wet to moist.	BDX (SH)									
			33–36	33 - 36' **SHALEY LIMESTONE:** BDX (LS/SH), medium gray (N5), weathered, shaley, higly decomposed, slightly fractured.	BDX (LS/SH)									
7 CORE	72 71		36–40.8	36 - 40.8' **SHALEY LIMESTONE:** to **SHALE:** BDX (LS/SH), interbedded shale.	BDX (LS/SH)									RUN #7: Modified RQD = (67/71) = 94%
			40.8–42	40.8 - 42' **LIMESTONE:** BDX (LS), medium light gray (N6), strong to moderately fractured, slightly decomposed, narrow apertures.	BDX (LS)									
8 CORE	96 85		42–58.9	42 - 58.9' **SHALE:** BDX (SH), medium gray (N5) to medium dark gray (N4), weathered, weak, thinly bedded, moderately to highly fractured. 47.5' dark grayish brown (10YR 4/2), pale olive (5Y 6/4) discoloration, more competent.	BDX (SH)									RUN #8: Modified RQD = (81/85) = 94%
9 CORE	60 60		50–52	50.2' weak to moderate. 50.8' olive gray (5Y 5/2).										RUN #9: Modified RQD = (52/60) = 87%

Boring Number MW358

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

Boring Number MW358

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73, 74, 75	64 - 75.3' **SHALE:** BDX (SH), medium dark gray (N4) to medium gray (N5), strong, thinly bedded to laminated, moderately fractured. *(continued)*	BDX (SH)									
15 CORE	60 56													RUN #15: Modified RQD = Not Recorded
			76, 77	75.3 - 77.1' **LIMESTONE:** BDX (LS), gray (5Y 6/1), fossiliferous, very strong.	BDX (LS)									
			78	77.1 - 78.2' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak to moderate strength, moderately decomposed.	BDX (SH)									
			79, 80, 81, 82, 83, 84	78.2 - 84.8' **LIMESTONE:** BDX (LS), medium dark gray (N4) to medium gray (N5), shaley, fossiliferous, very strong, moderately fractured, laminations (0-5%).	BDX (LS)									
16 CORE	60 51													RUN #16: Modified RQD = (23/51) = 45%
17 CORE	60 60		85, 86, 87, 88, 89, 90	84.8 - 90' **SHALE:** BDX (SH), dark gray (N3), weathered, weak to moderate strength, moderately decomposed, moderately fractured, thin bedding.	BDX (SH)									RUN #17: Modified RQD = (28/60) = 47%
				90' End of Boring.										

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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 46		0–1	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
			1.2–10	1.2 - 16' **FILL, LEAN CLAY:** CL, light 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 CS	120 62		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
Tel: (414)837-3607
Fax: (414)837-3608

Template: RAMBOLL_IL_BORING LOG - Project: 845_BALDWIN_2022.GPJ

Boring Number MW392

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13–16	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									
			16–20	16 - 20' **LEAN CLAY:** CL, light brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist.	CL									
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.	CL									
4 CS	120 104		30	30' increasing sand and gravel content.										

Boring Number MW392

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
				20 - 33' **LEAN CLAY:** CL, pinkish gray (7.5YR 6/2), sand (0-5%), medium to high plasticity, stiff, moist. *(continued)*	CL									
			33	33 - 35' **WELL-GRADED SAND WITH SILT AND GRAVEL:** (SW-SM)g, fine to medium sand, dry.	(SW-SM)g									
			34											
			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.	(ML)s									
			41											
			42											
			43											
			44	44' increasing clay content.										
			45	45' (2.5Y 6/2).										
			46											
			47											
			48	48 - 52' **SILT:** ML, gray (2.5Y 5/1), sand (0-5%), dry.	ML									
			49											
6 CS	84 81		50											
			51											
			52											

Boring Number MW392

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			53, 54, 55, 56	52 - 57' **SHALE:** BDX (SH), dark gray (5Y 4/1), highly weathered, hard, dry. 53' very dark gray (7.5YR 3/1).	BDX (SH)									
7 CORE	60 4		57	57 - 57.5' **LIMESTONE:** BDX (LS), gray (5Y 6/1), slightly fractured.	BDX (LS)									RUN #7: Modified RQD = 0% (No Solid Recovery > 4")
8 CORE	96 78		58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69	57.5 - 70' **SHALE:** BDX (SH), dark gray (5Y 4/1), weathered, soft, moderately fractured to highly fractured limestone beds (0-5%). 66.3' - 67.2' highly fractured, very soft, wet.	BDX (SH)									RUN #8: Modified RQD = (28/78) = 36%
9 CORE	120 62		70, 71, 72	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%

Boring Number MW392

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73, 74	70 - 74.4' **LIMESTONE:** BDX (LS), gray (5Y 6/1), moderately to intensely fractured, moderately wide apertures. *(continued)*	BDX (LS)									
			75, 76, 77, 78, 79, 80, 81	74.4 - 81.8' **SHALE:** BDX (SH), medium dark gray (N4) to dark gray (N3), slightly weathered, moderately fractured, thinly bedded.	BDX (SH)									
10 CORE	48 48													RUN #10: Modified RQD = (28/48) = 58%
			82, 83, 84	81.8 - 84' **LIMESTONE:** BDX (LS), medium light gray (N6), shaley, fossiliferous, moderately fractured, thinly bedded. 83.2' medium gray (N5).	BDX (LS)									
				84' End of Boring.										

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/Ⓦ
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	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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 86			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 CS	120 120		10	10' sand (0-5%), iron concretions (0-5%).										

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 MW393

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13–19	1 - 20' **FILL, LEAN CLAY:** CL, brown (7.5YR 6/4), sand (0-5%), no dilatancy, low to medium plasticity, moist. *(continued)*	(FILL) CL									
			18	18' medium to high plasticity.										
3 CS	120 120		20–24	20 - 24' **LEAN CLAY:** CL, light brown (7.5YR 6/4), mottling, sand (0-5%), medium to high plasticity, cohesive, moist.	CL									
			24–27	24 - 27' **CLAYEY SAND:** SC, gray (10YR 6/1), fine to medium sand, wet.	SC									
			27–31	27 - 31' **SILT WITH SAND:** (ML)s, dark gray (7.5YR 4/1), sand (0-5%), moist.	(ML)s									
4 CS	120 105		30	30' coal fragments (0-5%).										
			31–32	31 - 40' **SILTY CLAY:** CL/ML, dark gray (7.5Y 4/1), organic material (0-5%), gravel (0-5%), stiff to very stiff, moist.	CL/ML									

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
			33–39	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									
5 CS	120 120		40–49	40 - 50' **SILT:** ML, grayish brown (2.5Y 5/2), very stiff to hard, platy, dry.	ML									
6 CS	120 92		50–52	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry.	ML									

Boring Number MW393

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			53, 54	50 - 55' **SILT:** ML, dark gray (7.5YR 4/1), sand (0-5%), very stiff to hard, dry. *(continued)*	ML									
			55, 56	55 - 57' **CLAYEY SILT:** ML/CL, gray (10YR 6/1), sand (0-5%), gravel (0-5%), medium plasticity, moist.	ML/CL									
			57, 58, 59	57 - 60' **LIMESTONE:** BDX (LS), gray (10YR 6/1), rock flour and angular chips (<2").	BDX (LS)									
7 CORE	120 60		60, 61, 62, 63, 64, 65, 66, 67, 68, 69	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, 71, 72	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%

Boring Number MW393

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 - 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.	BDX (SH)									RUN #9: Modified RQD = (30/40) = 75%
			75											
			76											
			77											
			78											
			79											
10 CORE	60 45		80											RUN #10: Modified RQD = (34/45) = 76%
			81											
			82											
			83	83.5' more competent.										
			84											
			85	85' End of Boring.										

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	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	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.
			2.6	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.	CL				4					
			5						4					
2 CS	120 120		6						2.5					
			7.5						3.5					
			8.5						2					
			9.2	9.2' brown (7.5YR 5/3), medium to high plasticity.					2					
			10.5						3					
			11.5						2.25					

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

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

Boring Number MW394

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)	Moisture Content	Liquid Limit	Plasticity Index	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.	SM									
			21											
			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.										
			23						4.5					
			24						4.5					
			25						4.5					
4 CS	120 112		26						4.5					
			27		CL				4.5					
			28						4.5					
			29						4.5					
			30						4.5					
			31						4.5					
			32											

Boring Number MW394

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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	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											
			43		BDX (SH)									
			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											

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	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.	BDX (LS)									RUN #8: Modified RQD = (4/14) = 29%
9 CORE	60 60		59											
			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.	BDX (SH)									
11 CORE	68 68		70											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

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)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
12 CORE	60 59		73–77	strong, thinly bedded, moderately fractured. 71 - 77.6' **SHALE:** BDX (SH), dark gray (N3), strong, thinly bedded, moderately fractured. *(continued)*	BDX (SH)									RUN #12: Modified RQD = (44/59) = 75%
			78–79	77.6 - 80' **LIMESTONE:** BDX (LS), medium gray (N5), shaley, weak, moderately fractured.	BDX (LS)									
13 CORE	60 48		80–85	80 - 85' **SHALE:** BDX (SH), medium dark gray (N4), weathered, weak, thinly bedded, moderately fractured, moist to wet.	BDX (SH)									RUN #13: Modified RQD = (40/48) = 83%
			85	85' End of Boring.										

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

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

Boring Drilled By: Name of crew chief (first, last) and Firm: Mark Baetje, Bulldog Drilling	Date Drilling Started: 11/20/2015	Date Drilling Completed: 11/24/2015	Drilling Method: 4 1/4 HSA and rotary
Common Well Name: MW-370	Final Static Water Level: Feet (NAVD88)	Surface Elevation: 418.67 Feet (NAVD88)	Borehole Diameter: 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: Feet ☐ N ☐ S, Feet ☐ E ☐ W

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	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–2	0 - 2' **SILTY CLAY** CL/ML.	CL/ML								0-28' Blind Drilled. See log PZ-170 for soil description.
			2–4	2 - 4' Shelby Tube Sample.									
			4–8	4 - 8' **SILTY CLAY** CL/ML.	CL/ML								
			8–10	8 - 10' **SILTY CLAY** to **LEAN CLAY:** CL/ML.	CL/ML								
			10–12	10 - 12' **LEAN CLAY:** CL.	CL								

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

Signature

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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	U S C S	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		28.4	28.4 - 28.9' **SHALE:** BDX (SH), gray, highly decomposed, very weak.	BDX (SH)									Core 1, RQD=51%
			28.9	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)									

SOIL BORING LOG INFORMATION SUPPLEMENT

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	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: 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											
3 CORE	24 25		38	38.1 - 44' **SHALE:** BDX (SH), bluish gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, weak.										Core 3, RQD=40%
			39											
4 CORE	24 11		40											Core 4, RQD=0%
5 CORE	36 32		41	40.6' - 40.8 shaley limestone layer, light gray to gray, microcrystalline, moderately decomposed, very strong. 41.1' - 43.2 gray, moderately to highly decomposed.	BDX (SH)									Core 5, RQD=78%
			42											
			43											
6 CORE	12 28		44	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.										Core 6, RQD=29%
7 CORE	45 27		45	45' shale layer, bluish gray, moderately fractured (extremely narrow to narrow apertures), highly decomposed, weak.	BDX (LS/SH)									Core 7, RQD=65%
			46	45.7 - 52.2' **SHALE:** BDX (SH), bluish gray, moderately fractured (tight to narrow), highly decomposed, weak.										
			47											
			48											
8 CORE	24 30		49		BDX (SH)									Core 8, RQD=78%
			50											
			51											
9 CORE	24 24		52											Core 9, RQD=0%

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				52' clay cement.										
			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.										
10 CORE	24 36		54	52.7' - 53' clayey sand in aperture.										Core 10, RQD=0%
			55	53' - 53.1 shale bed, bluish gray, fossiliferous, moderately fractured (very narrow to narrow), highly decomposed, weak.										
				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)									
12 CORE	30 27		58	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											
			64		BDX (LS)									
			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	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 8	4 5 6 9	0–2	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		2–4	2 - 4' Shelby Tube Sample.									ST2: 24" push at 500lbs of pressure.
3 SS	24 15	2 3 5 7	4–6	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.	CL/ML								
4 SS	24 17	3 5 8 8	6–8	6' - 7.4' trace gray (10YR 5/1) mottling.									
5 SS	24 17	3 4 6 6	8–10	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	10–12	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								
7 ST	24 24		12–13	12 - 14' Shelby Tube Sample.									ST7: 24" push at 250lbs of pressure.

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

Signature [signature]

Firm Natural Resource Technology
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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	U S C S	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13-14	12 - 14' Shelby Tube Sample. *(continued)*							
8 SS	24 21	3 5 7 8	14	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.	CL/ML						
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	18	18' - 20' silt (15-25%), very fine sand (0-10%), trace fine gravel, medium plasticity, moist. 19' layer of gravel (2" thick, subangular to subrounded).							
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. 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								
13 ST	24 24		24	24 - 26' Shelby Tube Sample.							ST13: 24" push at 650lbs of pressure.
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	28	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). 31.1' End of Boring.	BDX (SH)						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/W	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.

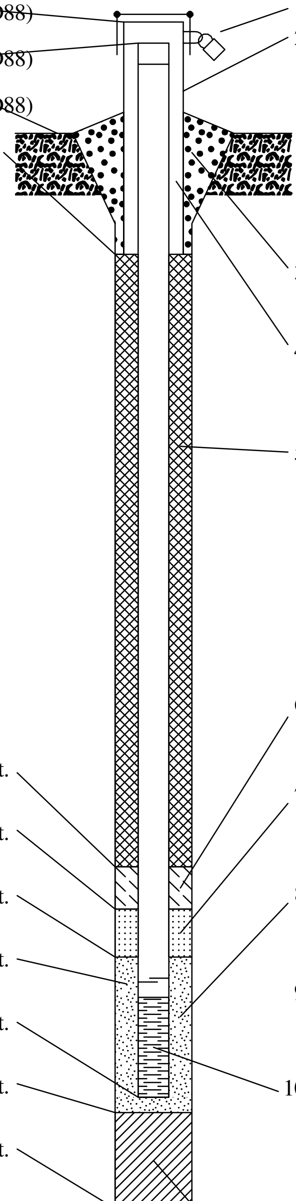
J. Filter pack, bottom 355.2 ft. (NAVD88) or 63.5 ft.

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 Roeder

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KELRON ENVIRONMENTAL
Incorporated

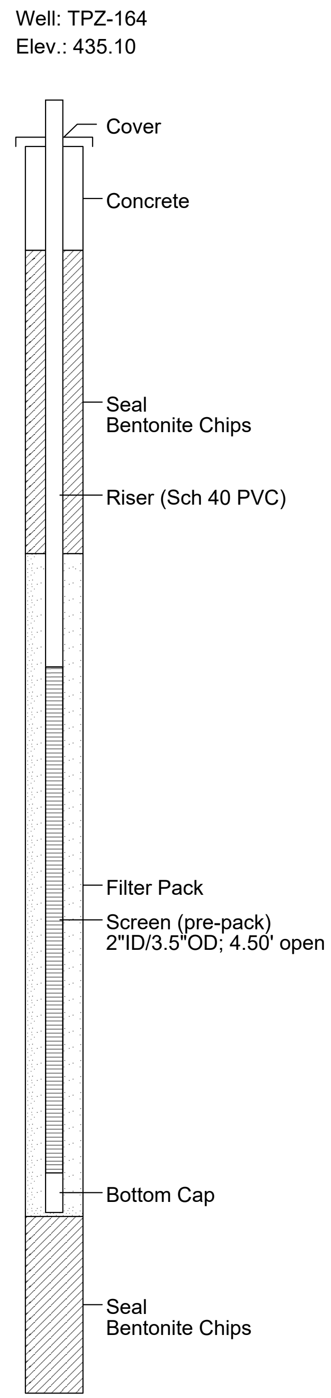
LOG OF PROBEHOLE TPZ-164

(Page 1 of 1)

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							
2.5		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	
4.5	- wet	428						
5.5		427						
6.5		426						
7.5		425						
8.5		424		3				
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)	423	2	3 5	18/18		CL	
10.5	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422	3		23/24		CL	
11.5	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	421						
12		420						
		419						



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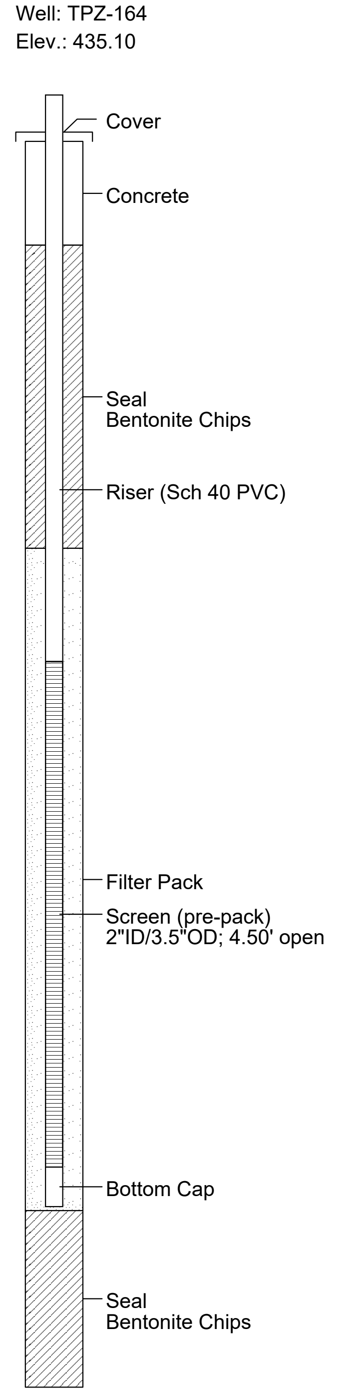
KELRON ENVIRONMENTAL Incorporated	LOG OF PROBEHOLE TPZ-164 (Page 1 of 1)

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
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry						
2.5		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
4.5	- wet	428					
5.5		427					
6.5		426					
7.5		425					
8.5		424		3			
8.9	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)	423	2	3 5	18/18		CL
10.3	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422 421	3		23/24		CL
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	420 419					



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/Ⓦ
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	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	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. 5.4' very dark gray.	(FILL) SM									
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
Tel: (414)837-3607
Fax: (414)837-3608

Boring Number XPW01

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)	Moisture Content	Liquid Limit	Plasticity Index	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						3					
				14' End of Boring.										

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 ☒		Local Grid Location
State Plane 557,667.96 N, 2,384,171.76 E E/W	Lat 38° 11' 52.4167"	☐N ☐E
1/4 of 1/4 of Section , T N, R	Long -89° 51' 42.7697"	Feet ☐S Feet ☐W

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 120		0–9.5	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
2 CS	48 48		9.5–11	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									
			11–12	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					

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

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
				11 - 14' **SILTY CLAY:** CL/ML, dark greenish gray (GLEY 1 4/1), medium to high plasticity, stiff to very stiff, moist. *(continued)*					2.5					
			13	13' yellowish brown (10YR 5/4).	CL/ML				2					
			14	14' End of Boring.										

SOIL BORING LOG INFORMATION

Facility/Project Name: Baldwin Power Plant	License/Permit/Monitoring Number:	Boring Number: XPW04	
Boring Drilled By: Name of crew chief (first, last) and Firm: Blake Weller, Cascade Drilling	Date Drilling Started: 9/24/2022	Date Drilling Completed: 9/24/2022	Drilling Method: Sonic
Common Well Name: XPW04	Final Static Water Level: Feet (NAVD88)	Surface Elevation: 430.59 Feet (NAVD88)	Borehole Diameter: 6.0 inches
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane 556,502.51 N, 2,383,618.45 E E/W(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: Randolph	State: IL	Civil Town/City/ or Village: Baldwin

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 85		0 - 6	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 - 12	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											

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

Signature: [signature]

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

Boring Number XPW04

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 14	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									
3 CS	60 50.4		15 16	15' interbedded silty clay.										
			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.										

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 ☐N ☐S Feet ☐E ☐W Feet

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 55		0–10	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									
2 CS	120 88		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
Tel: (414)837-3607
Fax: (414)837-3608

Boring Number XPW05

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)*										
			15	15' saturated.										
			17		(SW)g									
3 CS	120 120		20											
			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.	ML									
			25	24.5 - 28.2' **ASH (Coal):** (SW)g, black (10YR 2/1), sand-sized ash, silt (5-15%), loose, wet.	(SW)g									
			28.5	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					
			29.5						4.5					
			30	30' End of Boring.										

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/Ⓦ
1/4 of 1/4 of Section , T N, R
Lat 38° 11' 49.0814"
Long -89° 52' 8.2353"
Local Grid Location ☐N ☐S Feet ☐E ☐W Feet

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	72 72		0–5	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
			5–5.4	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		5.4–9.9	5.4 - 9.9' **FILL, ASH (Coal):** SM, black (10YR 2/1), silt to sand-sized ash, clay (5-15%), loose, moist. 7 - 9.9' interbedded silty clay.	(FILL) SM									
			9.9–12	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

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	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 St. Plane 557,530 ft. N, 2,383,427 ft. E. E / (W)	
Facility ID		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 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 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.

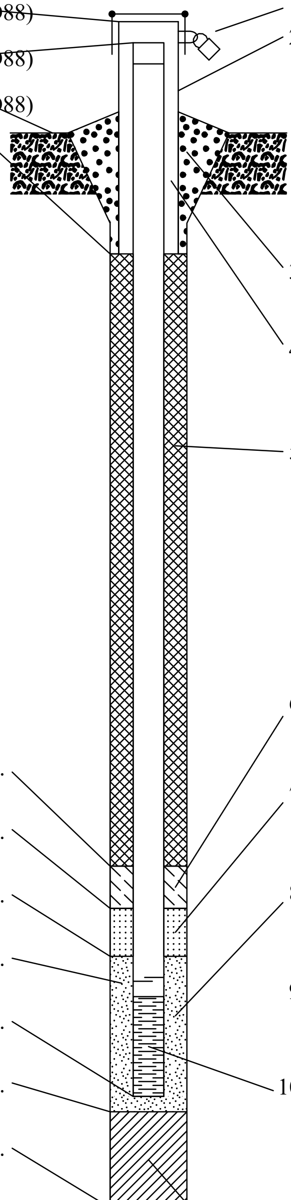
J. Filter pack, bottom 421.1 ft. (NAVD88) or 14.0 ft.

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 [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
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 52.4" Long. -89° 51' 42.8" or	XPW02
Facility ID	St. Plane 557,668 ft. N, 2,384,172 ft. E. E/Ⓦ	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 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.

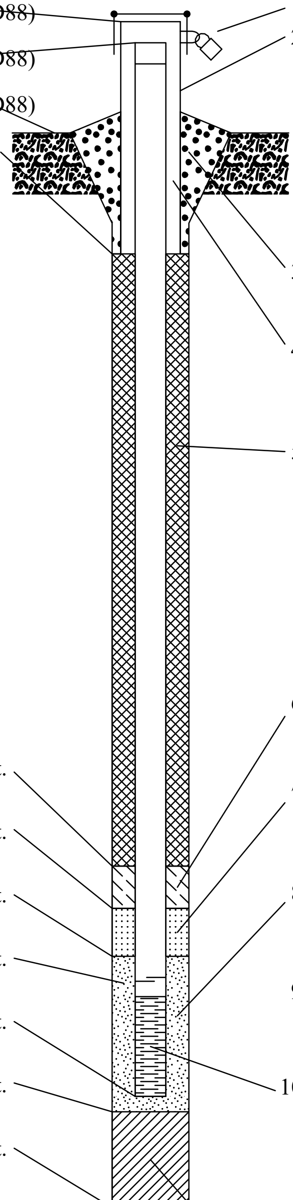
J. Filter pack, bottom 422.9 ft. (NAVD88) or 12.0 ft.

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
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RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name: Baldwin Power Plant	Local Grid Location of Well: ___ft. ☐ N. ☐ S. ___ft. ☐ E. ☐ W.	Well Name
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 40.9" Long. -89° 51' 49.7" or	XPW04
Facility ID	St. Plane 556,503 ft. N, 2,383,618 ft. E. E/W	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, 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 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.

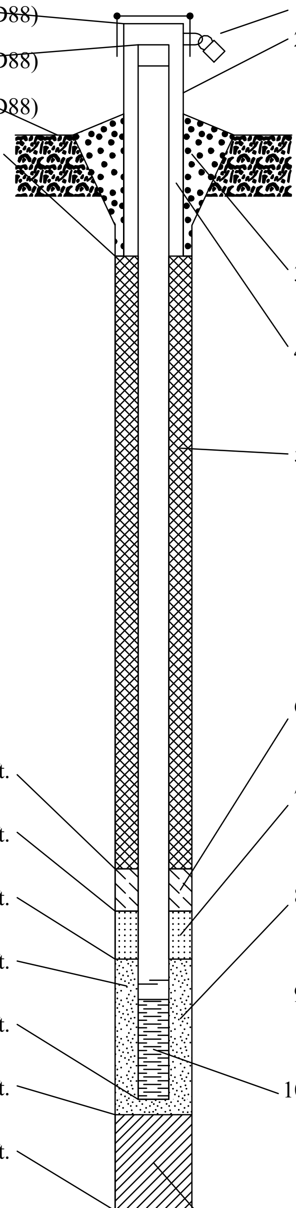
J. Filter pack, bottom 413.1 ft. (NAVD88) or 17.5 ft.

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 ☐ Other ☒ 3/8" bentonite chips

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
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 46.4" Long. -89° 51' 44.5" or	XPW05
Facility ID	St. Plane 557,063 ft. N, 2,384,034 ft. E. E /Ⓦ Section Location of Waste/Source	Date Well Installed 09/24/2022
Type of Well	____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 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.

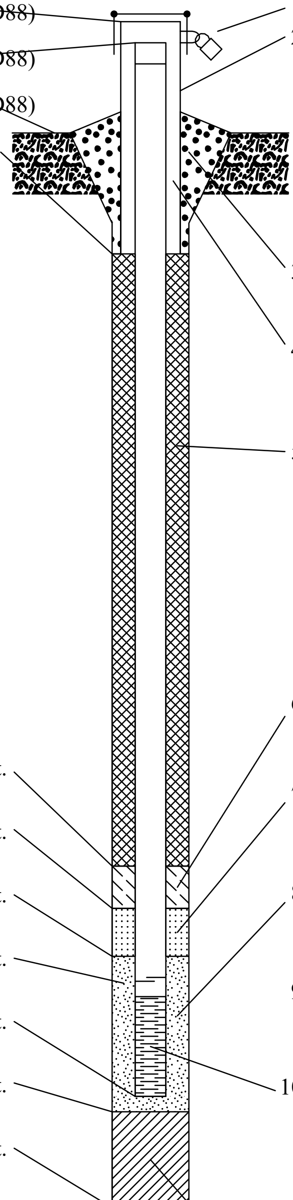
J. Filter pack, bottom 405.1 ft. (NAVD88) or 29.0 ft.

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
[signature]	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 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 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 ☒

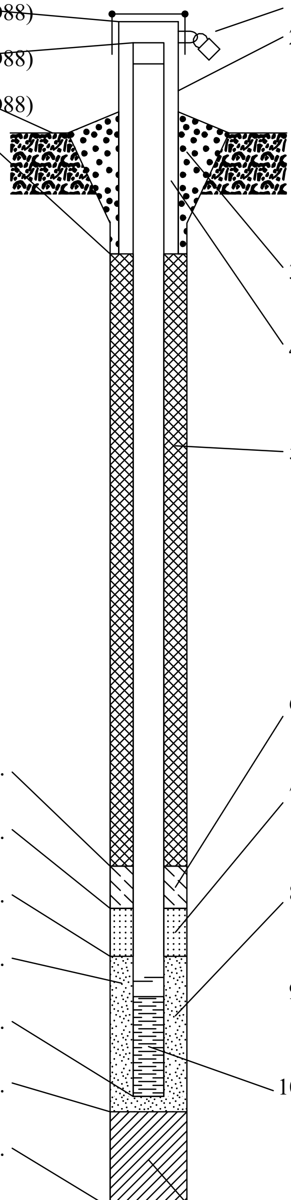
15. Drilling fluid used: Water ☐ 0 2 Air ☐
Drilling Mud ☐ 0 3 None ☒

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)	Sulfate (mg/L)	TDS (mg/L)
MW-304	BU	3/28/2022	Background	7.78	843	0.0194	1.71	14.5	161	1.76	198	1410
MW-304	BU	9/29/2022	Background	7.72	836	0.0183	1.75	10.2	174	1.70	199	1470
MW-304	BU	10/26/2022	Background	7.89	825	0.0186	1.76	10.8	175	1.72	193	1450
MW-304	BU	11/17/2022	Background	7.87	818	0.0209	1.91	9.48	175	1.7	218	1490
MW-304	BU	12/14/2022	Background	7.82	833	0.0191	2.16	10	181	1.82	216	1300
MW-304	BU	1/11/2023	Background	7.83	844	0.0173	1.68	8.5	185	1.68	209	1450
MW-304	BU	2/20/2023	Background	7.75	854	0.0216	1.75	10.7	186	1.67	228	1470
MW-304	BU	3/15/2023	Background	7.77	814	0.0206	1.89	10.6	173	1.67	208	1230
MW-304	BU	4/4/2023	Background	7.75	853	0.0324	1.69	8.9	168	1.81	210	1460
MW-304	BU	5/22/2023	Background	7.51	836	0.0199	1.7	9.63	162	1.72	208	1420
MW-304	BU	8/3/2023	Background	7.92	838	0.0201	1.6	11.4	160	1.70	188	1380
MW-304	BU	11/1/2023	Background	7.81	855	0.0199	1.7	12	166	1.91	191	1470
MW-304	BU	2/5/2024	Background	7.70	818	0.0295	1.5	12.4	155	1.77	185	1440
MW-358	BU	10/27/2022	Background	7.93	633	0.0933	1.1	12.8	688	2.43	108	1990
MW-358	BU	11/17/2022	Background	7.83	758	0.1720	1.3	15.8	992	2.36	101	2620
MW-358	BU	12/13/2022	Background	8.45	859	0.1680	1.67	18.6	1120	2.10	71	3260
MW-358	BU	1/11/2023	Background	7.59	841	0.165	1.38	14	1200	2.73	34	2690
MW-358	BU	2/20/2023	Background	8.38	847	0.201	1.42	13.2	1330	2.87	16	3080
MW-358	BU	3/13/2023	Background	7.73	856	0.1660	1.51	10.9	1340	3.07	8	2880
MW-358	BU	4/4/2023	Background	7.71	851	0.261	1.45	11.4	1370	3.13	31	2990
MW-358	BU	5/19/2023	Background	7.62	835	0.192	1.6	12.5	1300	3.31	10	3040
MW-358	BU	8/7/2023	Background	8.00	843	0.235	1.6	9.9	1290	3.36	9	3160
MW-358	BU	11/1/2023	Background	7.89	840	0.162	1.38	11.3	1310	3.59	11	3140
MW-358	BU	2/6/2024	Background	7.91	712	0.215	0.771	30.3	917	2.40	20	2280
MW-370	BU	3/29/2022	Downgradient	7.55	391	0.024	1.61	34.2	1470	3.15	270	3240
MW-370	BU	9/30/2022	Downgradient	7.64	403	0.0589	2.67	51.4	1520	2.98	273	3320
MW-370	BU	10/27/2022	Downgradient	6.88	389	0.038	1.8	39.6	1320	3.11	250	2980
MW-370	BU	11/17/2022	Downgradient	7.79	388	0.0292	1.74	36.8	1450	3.06	278	3200
MW-370	BU	12/14/2022	Downgradient	7.52	394	0.0325	2.34	44.7	1430	3.12	263	2680
MW-370	BU	1/12/2023	Downgradient	7.50	393	0.0272	1.75	38.4	1470	3.07	253	3060
MW-370	BU	2/21/2023	Downgradient	7.46	389	0.0303	1.95	40.6	1570	2.86	273	3250
MW-370	BU	3/14/2023	Downgradient	7.45	402	0.0291	1.9	39.5	1340	2.96	251	2940
MW-370	BU	4/3/2023	Downgradient	7.53	386	0.0308	2.06	37.4	1280	3.16	253	2850
MW-370	BU	5/16/2023	Downgradient	7.47	399	0.032	1.85	37	1360	3.07	253	2940
MW-370	BU	8/3/2023	Downgradient	7.79	399	0.033	1.7	41.4	1310	3.06	243	2870
MW-370	BU	11/2/2023	Downgradient	7.61	413	0.0285	1.98	41.1	1420	3.70	273	3180
MW-370	BU	2/6/2024	Downgradient	7.39	410	0.0417	1.69	40.1	1460	3.28	257	3170
TPZ-164	CCR	3/29/2022	CCR	7.31	198	0.113	1.6	55.4	50	0.26	227	472
TPZ-164	CCR	9/30/2022	CCR	7.14	206	0.166	2.04	68.5	52	0.24	150	465
TPZ-164	CCR	10/28/2022	CCR	7.31	276	0.061	1.47	67.6	57	0.26	127	615
TPZ-164	CCR	11/16/2022	CCR	7.56	250	0.056	1.38	61.8	46	0.26	123	515
TPZ-164	CCR	12/14/2022	CCR	7.34	233	0.0548	1.54	60.9	55	0.27	120	310
TPZ-164	CCR	3/14/2023	CCR	7.21	283	0.064	1.3	70	43	0.22	113	550
TPZ-164	CCR	8/7/2023	CCR	7.38	293	0.073	1.23	69.9	51	0.31	109	515
TPZ-164	CCR	2/28/2024	CCR	7.13	285	0.0746	0.922	74.8	52	0.25	130	530
XPW-01	CCR	10/26/2022	CCR	7.03	203	0.104	0.93	65.4	21	0.61	98	406
XPW-01	CCR	11/15/2022	CCR	6.98	205	0.108	1.03	72.5	22	0.50	105	410
XPW-01	CCR	12/13/2022	CCR	6.57	204	0.272	0.942	81.5	25	0.50	120	385
XPW-01	CCR	1/12/2023	CCR	6.86	212	0.105	0.881	67.5	26	0.51	119	384
XPW-01	CCR	5/23/2023	CCR	7.00	163	0.0743	0.649	55.1	21	0.62	62	316
XPW-01	CCR	8/3/2023	CCR	6.75	218	0.103	0.893	71.5	28	0.58	82	382
XPW-01	CCR	2/8/2024	CCR	6.60	217	0.116	0.961	84.8	49	0.53	126	472
XPW-02	CCR	10/26/2022	CCR	7.57	427	0.21	1.18	121	33	0.61	22	500
XPW-02	CCR	11/15/2022	CCR	7.60	426	0.19	1.2	115	30	0.55	20	485
XPW-02	CCR	12/12/2022	CCR	7.53	374	0.257	1.52	110	32	0.63	37	390
XPW-02	CCR	1/12/2023	CCR	7.32	337	0.125	0.87	88.5	29	0.46	43	446
XPW-02	CCR	5/23/2023	CCR	7.05	359	0.185	1.08	101	36	0.50	41	525
XPW-04	CCR	10/28/2022	CCR	8.31	222	0.161	1.28	47.9	55	0.44	119	484
XPW-04	CCR	11/15/2022	CCR	8.40	226	0.171	1.15	53.2	56	0.40	124	472
XPW-04	CCR	12/12/2022	CCR	8.04	217	0.196	1.38	51.1	55	0.42	120	428
XPW-04	CCR	1/12/2023	CCR	7.96	226	0.156	0.835	49.6	54	0.40	119	438
XPW-04	CCR	5/23/2023	CCR	8.23	200	0.172	0.921	56.2	45	0.33	173	488
XPW-05	CCR	10/26/2022	CCR	7.82	180	0.10	1.02	43.9	46	0.57	123	458
XPW-05	CCR	11/15/2022	CCR	7.67	180	0.12	1.16	43.5	46	0.58	132	450
XPW-05	CCR	12/12/2022	CCR	7.18	212	0.19	1.25	43.6	48	0.62	137	432
XPW-05	CCR	1/24/2023	CCR	7.30	192	0.21	1.57	40.2	48	0.60	125	412
XPW-05	CCR	5/23/2023	CCR	7.16	218	0.21	1.08	45.8	47	0.54	110	428
XPW-05	CCR	8/3/2023	CCR	7.17	229	0.22	0.93	49.1	46	0.55	89	428
XPW-05	CCR	2/28/2024	CCR	7.19	238	0.28	0.98	56.2	47	0.53	123	485
XPW-06	CCR	10/26/2022	CCR	7.22	370	0.27	2.29	130	25	0.58	575	855
XPW-06	CCR	11/15/2022	CCR	7.27	372	0.20	4.64	164	18	0.61	475	1120
XPW-06	CCR	12/13/2022	CCR	7.04	371	0.25	3.86	174	18	0.59	508	975
XPW-06	CCR	1/12/2023	CCR	7.25	278	0.10	3.38	112	10	0.50	391	848
XPW-06	CCR	5/23/2023	CCR	7.23	247	0.16	2.11	75.9	6	0.32	171	525
XPW-06	CCR	8/3/2023	CCR	6.96	195	0.14	1.55	61.6	2	0.37	117	365
XPW-06	CCR	2/6/2024	CCR	7.28	244	0.20	2.91	90.6	5	0.35	315	688

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

SiREM
Leading Science · Lasting Solutions

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

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.

Isodetect Umweltmonitoring GmbH

Chain of Custody for CSIA of organic pollutants

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 ✓✓		Total & Stable Li Isotopes		S-9990
MW158R-20230822	8/22/2023	13:50	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
PZ170-20230821	8/21/2023	11:25	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
TPZ164-20230821	8/21/2023	10:45	Water		2	2x500mL ✓✓		Total & Stable Li Isotopes		S-9990
MW370-20230821	8/21/2023	12:10	Water		~~2~~ 1 Sr	2x500mL ✓		Total & Stable Li Isotopes		S-9990
MW358-20230822	8/22/2023	12:15	Water		2	2x500mL ✓✓		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:		Signature:	
Name:	Susan Thomas	Name:	Vazquez Ramos José	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

ATTACHMENT 7
Sequential Extraction Procedure 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

Tessier Leach Fraction 1 - Water Soluble

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: **CA19218-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	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)
Sample Date & Time					05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00
Ag [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	30	540	380	18
As [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	0.4	11	4.2	< 0.1
Be [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.02	0.06	0.05	< 0.02
B [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 1	8	10	3
Bi [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	21	300	140	75
Cd [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.01	0.04	0.86	0.02
Cr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.1	< 0.1	0.1	< 0.1
Fe [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	17	240	190	< 1
K [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	7	250	190	41
Li [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 2	< 2	< 2	< 2
Mg [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	9	210	150	19
Mn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	0.6	0.9	< 0.5
Mo [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	65	1800	1600	850
Ni [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	1.2	< 0.5
P [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 3	6	< 3	< 3
Pb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.1	< 0.1	0.2	< 0.1
Si [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	100	950	750	59
Sb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.7	< 0.7	< 0.7	< 0.7
Sr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	0.1	13	5.9	1.4
Sn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	< 0.5	< 0.5
Ti [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	1.1	0.6	0.5	0.6
Tl [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.002	0.006	0.029	< 0.002
V [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 3	< 3	< 3	< 3
Zn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.7	< 0.7	< 0.7	< 0.7

OnLine LIMS

0003245943

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

LR Report : **CA19218-NOV22**

Analysis	9: MW-392 (32-33.5)	10: MW-393 (24-25.5)	11: MW-394 (20.5-22)	12: MW-392 (66-68)
Sample Date & Time	27-Sep-22 09:00	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	33	26	24	59
As [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	0.5	0.3	0.3	0.3
Be [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
B [µg/g]	< 1	< 1	< 1	5
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	130	28	25	89
Cd [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	0.02	< 0.01	0.01	0.02
Cr [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Fe [µg/g]	27	14	20	28
K [µg/g]	16	9	12	92
Li [µg/g]	< 2	< 2	< 2	< 2
Mg [µg/g]	40	12	12	44
Mn [µg/g]	1.4	0.7	0.6	< 0.5
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	44	49	43	720
Ni [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
P [µg/g]	< 3	< 3	< 3	< 3
Pb [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Si [µg/g]	100	80	91	140
Sb [µg/g]	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7
Sr [µg/g]	0.3	< 0.1	< 0.1	1.8
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Ti [µg/g]	0.6	0.6	0.9	0.5
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	< 0.002	< 0.002	< 0.002	< 0.002
V [µg/g]	< 3	< 3	< 3	< 3
Zn [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7

Water Soluble Fraction

Catharine Arnold

CHARTERED CATHARINE ARNOLD CHEMIST ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO

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

OnLine LIMS

0003245943

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

Tessier Leach Fraction 2 - Exchangeable Metals

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: **CA19219-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	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)
Sample Date & Time					05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00
Ag [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	9	17	8	9
As [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	48	55	15	3.0
Be [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.02	< 0.02	< 0.02	< 0.02
B [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 1	< 1	1	< 1
Bi [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	2000	2500	1300	3500
Cd [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.01	< 0.01	0.58	0.24
Cr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 0.1	< 0.1	< 0.1	< 0.1
Fe [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	2	21	< 1	12
K [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	37	430	300	160
Li [µg/g]	19-Jan-23	23:42	31-Jan-23	09:43	< 2	< 2	< 2	< 2
Mn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	6.5	0.7	1.8	3.6
Mo [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	45	3200	2600	420
Ni [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.5	< 0.5	< 0.5	0.7
Pb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.1	< 0.1	< 0.1	< 0.1
P [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 3	4	< 3	43
Sb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	11	100	52	76
Ti [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	0.9	0.3	0.2	0.1
Tl [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.002	0.009	0.006	0.043
V [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 3	< 3	< 3	< 3
Zn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:44	< 0.7	< 0.7	< 0.7	< 0.7

OnLine LIMS

0003245960

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

Analysis	9: MW-392 (32-33.5)	10: MW-393 (24-25.5)	11: MW-394 (20.5-22)	12: MW-392 (66-68)
Sample Date & Time	27-Sep-22 09:00	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	10	12	12	10
As [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	16	16	10	4.3
Be [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
B [µg/g]	< 1	< 1	< 1	2
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	2500	1400	2100	3700
Cd [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	0.02	< 0.01	< 0.01	0.02
Cr [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Fe [µg/g]	8	9	8	10
K [µg/g]	44	35	60	360
Li [µg/g]	< 2	< 2	< 2	< 2
Mn [µg/g]	3.5	1.7	3.2	2.5
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	17	22	30	480
Ni [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Pb [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
P [µg/g]	< 3	< 3	4	< 3
Sb [µg/g]	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	6.5	4.3	7.4	75
Ti [µg/g]	0.1	0.6	0.3	< 0.1
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	< 0.002	< 0.002	< 0.002	0.004
V [µg/g]	< 3	< 3	< 3	< 3
Zn [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7

Fraction 2 Exchangeable Metals

Catharine Arnold

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
CATHARINE ARNOLD
CHEMIST

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

OnLine LIMS

0003245960

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

Tessier Leach Fraction 3 - Metals Bound to Carbonates

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: **CA19220-NOV22**
Reference: Ramboll 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	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)
Sample Date & Time					05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00
Ag [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	30	55	56	25
As [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	25	23	6.9	2.8
Be [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	0.09	0.10	0.07	0.03
B [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 1	2	3	4
Bi [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	110	1300	770	52000
Cd [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	0.04	0.02	2.3	1.0
Cr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	0.6	0.2	0.6	0.2
Fe [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	40	45	42	25
K [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	15	180	120	90
Li [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 2	< 2	< 2	< 2
Mn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	13	7.0	4.3	77
Mo [µg/g]	19-Jan-23	23:42	31-Jan-23	09:45	< 0.1	< 0.1	< 0.1	< 0.1
Ni [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.5	< 0.5	1.9	2.7
Pb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	0.2	0.1	0.9	1.9
P [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 3	13	< 3	100
Sb [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	96	160	150	33
Sn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	0.5	10	7.3	99
Ti [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	0.8	0.6	0.5	1.0
Tl [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	0.19	0.094	0.13	0.31
V [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 3	< 3	< 3	< 3
Zn [µg/g]	19-Jan-23	23:42	31-Jan-23	09:46	< 0.7	< 0.7	< 0.7	3.7

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SGS Canada Inc.
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Analysis	**9: MW-392 (32-33.5)**	**10: MW-393 (24-25.5)**	**11: MW-394 (20.5-22)**	**12: MW-392 (66-68)**
Sample Date & Time	27-Sep-22 09:00	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Al [µg/g]	30	28	23	28
As [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	19	15	12	5.0
Be [µg/g]	0.06	0.04	0.04	0.07
B [µg/g]	< 1	< 1	< 1	3
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	1500	56	140	35000
Cd [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05
Co [µg/g]	0.05	0.02	0.03	0.27
Cr [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Cu [µg/g]	0.8	0.2	0.2	0.6
Fe [µg/g]	9	14	10	300
K [µg/g]	16	10	15	130
Li [µg/g]	< 2	< 2	< 2	< 2
Mn [µg/g]	20	4.4	7.0	144
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Ni [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Pb [µg/g]	0.2	0.1	0.1	0.4
P [µg/g]	< 3	< 3	4	< 3
Sb [µg/g]	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	130	90	99	96
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	1.5	0.3	0.8	59
Ti [µg/g]	0.1	1.9	0.6	< 0.1
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.12	0.14	0.17	0.100
V [µg/g]	< 3	< 3	< 3	< 3
Zn [µg/g]	< 0.7	< 0.7	< 0.7	1.0

Fraction 3 Metals Bound to Carbonates

Catharine Arnold

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Tessier Leach Fraction 4 - Metals Bound to Fe and Mn Oxides

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: **CA19221-NOV22**
Reference: Baldwin Power Plant Drilling

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)	9: MW-392 (32-33.5)
Sample Date & Time			05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00	27-Sep-22 09:00
Ag [µg/g]	31-Jan-23	09:47	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Al [µg/g]	31-Jan-23	09:47	290	310	340	220	220
As [µg/g]	31-Jan-23	09:47	< 0.5	< 0.5	< 0.5	1.3	< 0.5
Ba [µg/g]	31-Jan-23	09:47	16	6.4	1.6	4.1	56
Be [µg/g]	31-Jan-23	09:47	0.26	0.16	0.15	0.15	0.21
B [µg/g]	31-Jan-23	09:47	< 1	5	6	6	< 1
Bi [µg/g]	31-Jan-23	09:47	< 0.09	< 0.09	< 0.09	0.14	< 0.09
Ca [µg/g]	31-Jan-23	09:47	71	320	250	130000	2300
Cd [µg/g]	31-Jan-23	09:47	< 0.05	< 0.05	< 0.05	0.13	0.18
Co [µg/g]	31-Jan-23	09:47	3.8	0.33	3.0	2.3	5.1
Cr [µg/g]	31-Jan-23	09:47	2.3	1.2	1.3	1.0	0.9
Cu [µg/g]	31-Jan-23	09:47	1.6	0.4	0.7	0.1	2.9
Fe [µg/g]	31-Jan-23	09:47	1600	1600	1200	1800	1100
K [µg/g]	31-Jan-23	09:47	16	140	110	43	19
Li [µg/g]	31-Jan-23	09:47	< 2	3	5	< 2	< 2
Mn [µg/g]	31-Jan-23	09:47	240	3.1	2.9	190	500
Mo [µg/g]	31-Jan-23	09:47	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ni [µg/g]	31-Jan-23	09:47	3.1	2.7	4.5	6.5	3.1
Pb [µg/g]	31-Jan-23	09:47	3.3	0.2	1.2	8.4	3.7
P [µg/g]	31-Jan-23	09:47	19	110	77	400	31
Sb [µg/g]	31-Jan-23	09:47	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	31-Jan-23	09:47	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	31-Jan-23	09:47	920	910	710	270	600
Sn [µg/g]	31-Jan-23	09:47	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	31-Jan-23	09:47	0.4	3.1	2.8	237	1.7
Ti [µg/g]	31-Jan-23	09:47	0.4	0.1	0.3	< 0.1	< 0.1
Tl [µg/g]	31-Jan-23	09:47	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	31-Jan-23	09:47	0.26	0.068	0.17	0.62	0.15
V [µg/g]	31-Jan-23	09:47	5	< 3	< 3	< 3	3
Zn [µg/g]	31-Jan-23	09:47	2.9	1.9	1.9	13	3.8

OnLine LIMS

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Tessier Leach Fraction 4 - Metals Bound to Fe and Mn Oxides

LR Report : CA19221-NOV22

Analysis	10: MW-393 (24-25.5)	11: MW-394 (20.5-22)	12: MW-392 (66-68)
Sample Date & Time	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.01	0.02	< 0.01
Al [µg/g]	290	270	490
As [µg/g]	< 0.5	< 0.5	< 0.5
Ba [µg/g]	45	35	1.5
Be [µg/g]	0.16	0.18	0.18
B [µg/g]	< 1	< 1	4
Bi [µg/g]	< 0.09	< 0.09	0.14
Ca [µg/g]	100	350	7600
Cd [µg/g]	0.06	0.14	< 0.05
Co [µg/g]	4.3	3.5	0.62
Cr [µg/g]	1.2	1.2	2.0
Cu [µg/g]	1.5	2.0	0.9
Fe [µg/g]	1500	1200	2700
K [µg/g]	15	22	120
Li [µg/g]	< 2	< 2	2
Mn [µg/g]	380	260	63
Mo [µg/g]	< 0.1	< 0.1	< 0.1
Ni [µg/g]	3.2	3.7	2.5
Pb [µg/g]	3.5	2.1	0.9
P [µg/g]	17	91	110
Sb [µg/g]	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7
Si [µg/g]	660	850	650
Sn [µg/g]	< 0.5	< 0.5	< 0.5
Sr [µg/g]	0.5	1.3	26
Ti [µg/g]	0.3	0.2	0.2
Tl [µg/g]	< 0.02	< 0.02	< 0.02
U [µg/g]	0.12	0.18	0.082
V [µg/g]	< 3	5	< 3
Zn [µg/g]	4.3	7.8	2.8

Fraction 4 Metals Bound to Fe and Mn Oxides

Catharine Arnold

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
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Tessier Leach Fraction 5 - Bound to Organic Material

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: **CA19222-NOV22**
Reference: Baldwin Power plant Drilling

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)	9: MW-392 (32-33.5)
Sample Date & Time			05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00	27-Sep-22 09:00
Ag [µg/g]	31-Jan-23	09:48	0.14	0.15	0.08	0.07	0.06
Al [µg/g]	31-Jan-23	09:48	980	1300	1100	130	610
As [µg/g]	31-Jan-23	09:48	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ba [µg/g]	31-Jan-23	09:48	15	11	1.8	3.6	36
Be [µg/g]	31-Jan-23	09:48	0.13	0.32	0.16	0.07	0.12
B [µg/g]	31-Jan-23	09:48	< 1	2	2	2	< 1
Bi [µg/g]	31-Jan-23	09:48	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	31-Jan-23	09:48	160	490	220	8600	840
Cd [µg/g]	31-Jan-23	09:48	< 0.05	< 0.05	< 0.05	0.20	< 0.05
Co [µg/g]	31-Jan-23	09:48	1.4	0.45	9.7	3.3	1.3
Cr [µg/g]	31-Jan-23	09:48	2.1	1.0	1.2	< 0.5	1.6
Cu [µg/g]	31-Jan-23	09:48	0.5	1.0	1.8	1.9	0.4
Fe [µg/g]	31-Jan-23	09:48	150	610	1800	220	83
K [µg/g]	31-Jan-23	09:48	15	104	79	25	15
Li [µg/g]	31-Jan-23	09:48	< 2	< 2	3	< 2	< 2
Mg [µg/g]	31-Jan-23	09:48	170	1100	870	200	500
Mn [µg/g]	31-Jan-23	09:48	85	3.6	15	16	92
Mo [µg/g]	31-Jan-23	09:48	< 0.1	< 0.1	< 0.1	0.2	0.4
Na [µg/g]	31-Jan-23	09:48	110	180	150	90	75
Ni [µg/g]	31-Jan-23	09:48	1.9	4.3	13	15	2.1
Pb [µg/g]	31-Jan-23	09:48	1.6	0.1	1.6	3.8	1.3
P [µg/g]	31-Jan-23	09:48	< 3	< 3	< 3	290	5
Sb [µg/g]	31-Jan-23	09:48	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	31-Jan-23	09:48	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	31-Jan-23	09:48	590	480	420	130	530
Sn [µg/g]	31-Jan-23	09:48	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	31-Jan-23	09:48	0.5	5.1	2.8	48	0.9
Ti [µg/g]	31-Jan-23	09:48	0.7	< 0.1	< 0.1	< 0.1	2.9
Tl [µg/g]	31-Jan-23	09:48	< 0.02	< 0.02	0.02	0.05	< 0.02
U [µg/g]	31-Jan-23	09:48	0.17	0.13	0.19	0.25	0.060
V [µg/g]	31-Jan-23	09:48	< 3	< 3	< 3	< 3	3
Zn [µg/g]	31-Jan-23	09:48	1.4	< 0.7	1.8	41	1.7

OnLine LIMS

0003245986

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LR Report : CA19222-NOV22

Analysis	10: MW-393 (24-25.5)	11: MW-394 (20.5-22)	12: MW-392 (66-68)
Sample Date & Time	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.05	< 0.05	< 0.05
Al [µg/g]	660	870	820
As [µg/g]	< 0.5	< 0.5	< 0.5
Ba [µg/g]	33	45	1.5
Be [µg/g]	0.08	0.15	0.18
B [µg/g]	< 1	< 1	2
Bi [µg/g]	< 0.09	< 0.09	< 0.09
Ca [µg/g]	88	300	2400
Cd [µg/g]	< 0.05	< 0.05	< 0.05
Co [µg/g]	1.2	2.3	0.68
Cr [µg/g]	1.2	1.5	1.1
Cu [µg/g]	0.3	0.8	1.4
Fe [µg/g]	93	120	680
K [µg/g]	14	21	70
Li [µg/g]	< 2	< 2	< 2
Mg [µg/g]	150	280	730
Mn [µg/g]	100	164	15
Mo [µg/g]	0.1	0.3	< 0.1
Na [µg/g]	48	170	95
Ni [µg/g]	1.6	3.5	2.9
Pb [µg/g]	1.7	1.3	0.9
P [µg/g]	4	8	< 3
Sb [µg/g]	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7
Si [µg/g]	470	650	470
Sn [µg/g]	< 0.5	< 0.5	< 0.5
Sr [µg/g]	0.3	1.2	9.8
Ti [µg/g]	2.1	2.5	< 0.1
Tl [µg/g]	< 0.02	< 0.02	< 0.02
U [µg/g]	0.065	0.16	0.080
V [µg/g]	< 3	4	< 3
Zn [µg/g]	1.6	4.0	0.9

Fraction 5 Bound to Organic Material

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28-February-2023

Ramboll Americas Engineering Solutions, Inc.
Attn : Evvan Plank

P.O# Box 4873
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Phone: 315-463-7554
Fax:

Date Rec. : 24 November 2022
LR Report: **CA19223-NOV22**
Reference: Baldwin Power Plant Drilling

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-358 (13-15)	6: MW-358 (47-49)	7: MW-358 (86-88)	8: MW-392 (80-82)	9: MW-392 (32-33.5)
Sample Date & Time			05-Oct-22 14:05	06-Oct-22 15:00	08-Oct-22 18:00	26-Sep-22 16:00	27-Sep-22 09:00
Ag [µg/g]	31-Jan-23	09:48	0.09	< 0.05	< 0.05	< 0.05	0.07
Al [µg/g]	31-Jan-23	09:48	44000	63000	71000	27000	45000
As [µg/g]	31-Jan-23	09:48	5.8	2.3	9.8	10	8.6
Ba [µg/g]	31-Jan-23	09:48	390	150	140	56	320
Be [µg/g]	31-Jan-23	09:48	0.65	1.4	1.5	0.68	0.87
B [µg/g]	31-Jan-23	09:48	13	60	62	26	21
Bi [µg/g]	31-Jan-23	09:48	0.25	0.26	0.18	0.14	0.25
Ca [µg/g]	31-Jan-23	09:48	2500	150	120	20000	1400
Cd [µg/g]	31-Jan-23	09:48	0.06	< 0.05	< 0.05	0.11	0.08
Co [µg/g]	31-Jan-23	09:48	3.3	7.2	6.4	2.0	6.4
Cr [µg/g]	31-Jan-23	09:48	34	69	75	37	40
Cu [µg/g]	31-Jan-23	09:48	10	9.9	5.7	7.2	15
Fe [µg/g]	31-Jan-23	09:48	22000	42000	22000	14000	28000
K [µg/g]	31-Jan-23	09:48	11000	18000	16000	5100	13000
Li [µg/g]	31-Jan-23	09:48	18	9	65	7	20
Mg [µg/g]	31-Jan-23	09:48	2700	7800	7600	4100	3300
Mn [µg/g]	31-Jan-23	09:48	110	70	51	50	130
Mo [µg/g]	31-Jan-23	09:48	0.9	0.3	0.1	0.1	0.9
Na [µg/g]	31-Jan-23	09:48	6700	560	830	550	5200
Ni [µg/g]	31-Jan-23	09:48	14	32	29	13	21
Pb [µg/g]	31-Jan-23	09:48	10	8.0	7.0	17	12
P [µg/g]	31-Jan-23	09:48	260	240	160	7200	300
Sb [µg/g]	31-Jan-23	09:48	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Se [µg/g]	31-Jan-23	09:48	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Si [µg/g]	31-Jan-23	09:48	160000	66000	51000	73000	65000
Sn [µg/g]	31-Jan-23	09:48	5.4	5.8	5.8	4.9	5.2
Sr [µg/g]	31-Jan-23	09:48	89	30	25	130	79
Ti [µg/g]	31-Jan-23	09:48	2400	670	570	520	980
Tl [µg/g]	31-Jan-23	09:48	0.47	0.42	0.42	0.17	0.51
U [µg/g]	31-Jan-23	09:48	1.3	0.30	0.99	2.7	1.1
V [µg/g]	31-Jan-23	09:48	54	73	86	95	57
Zn [µg/g]	31-Jan-23	09:48	37	47	32	43	53

OnLine LIMS

0003246014

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LR Report : **CA19223-NOV22**

Analysis	**10: MW-393 (24-25.5)**	**11: MW-394 (20.5-22)**	**12: MW-392 (66-68)**
Sample Date & Time	04-Oct-22 16:00	25-Sep-22 16:00	26-Sep-22 12:00
Ag [µg/g]	< 0.05	< 0.05	< 0.05
Al [µg/g]	33000	45000	59000
As [µg/g]	10	9.8	0.9
Ba [µg/g]	300	410	93
Be [µg/g]	0.56	0.83	1.2
B [µg/g]	15	16	53
Bi [µg/g]	0.18	0.27	0.20
Ca [µg/g]	1700	3000	170
Cd [µg/g]	< 0.05	0.11	< 0.05
Co [µg/g]	3.2	5.0	6.4
Cr [µg/g]	24	35	71
Cu [µg/g]	9.9	13	12
Fe [µg/g]	19000	27000	43000
K [µg/g]	12000	14000	17000
Li [µg/g]	13	16	19
Mg [µg/g]	2200	3400	9500
Mn [µg/g]	80	140	47
Mo [µg/g]	0.7	2.7	0.2
Na [µg/g]	5100	7700	490
Ni [µg/g]	13	18	31
Pb [µg/g]	9.1	13	4.1
P [µg/g]	230	460	170
Sb [µg/g]	< 0.8	< 0.8	< 0.8
Se [µg/g]	< 0.7	< 0.7	< 0.7
Si [µg/g]	61000	43000	62000
Sn [µg/g]	4.6	5.2	5.6
Sr [µg/g]	70	110	22
Ti [µg/g]	780	1100	560
Tl [µg/g]	0.35	0.50	0.36
U [µg/g]	0.61	1.1	0.097
V [µg/g]	35	57	70
Zn [µg/g]	37	54	48

Fraction 6 Residual metals

Catharine Arnold

OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
CATHARINE ARNOLD
CHEMIST

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

OnLine LIMS

0003246014

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

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

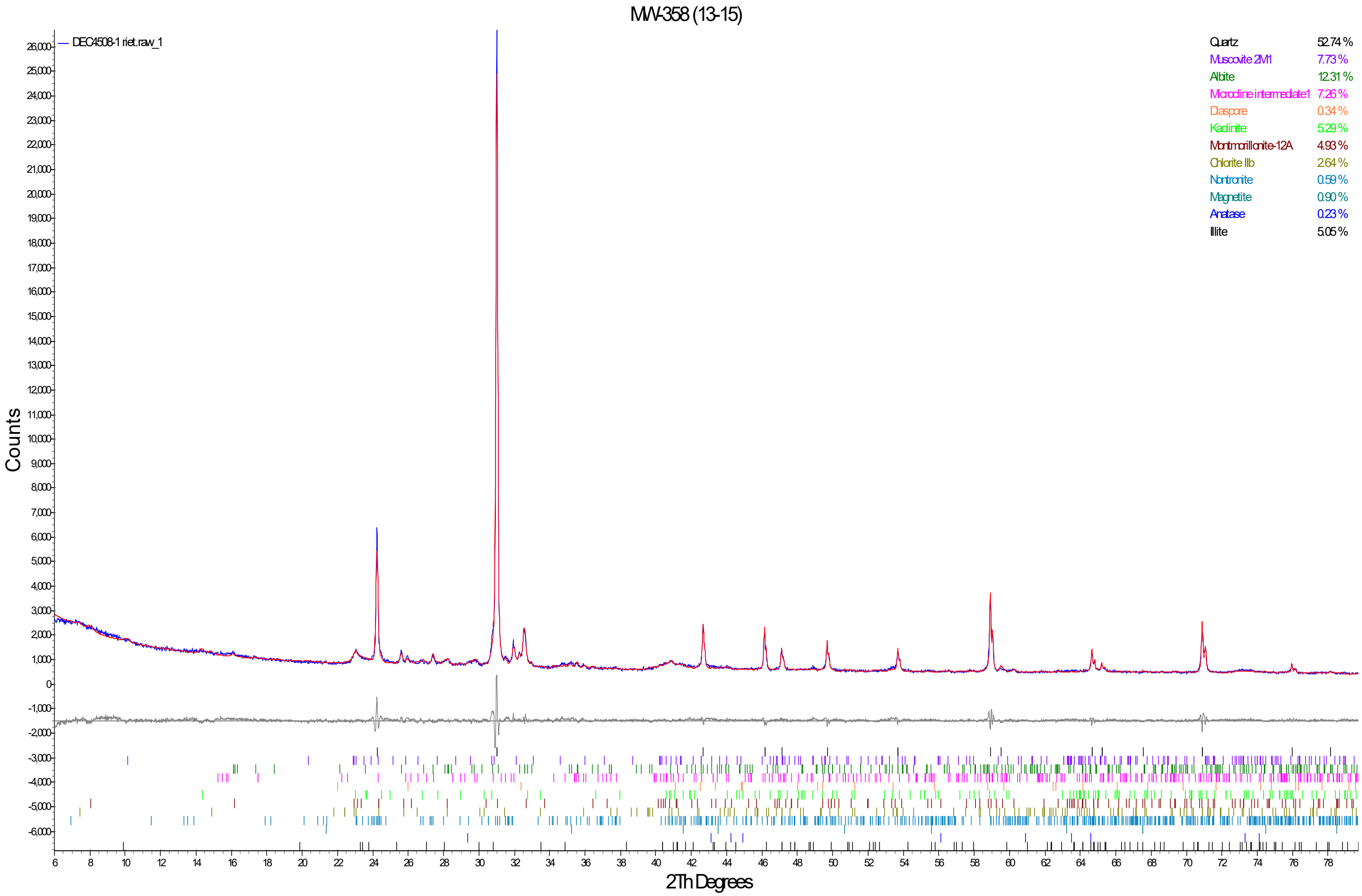
Mineral/Compound	MW-358 (13-15) DEC4508-1 (wt %)	MW-358 (47-49) DEC4508-2 (wt %)	MW-358 (86-88) DEC4508-3 (wt %)	MW-392 (80-82) DEC4508-4 (wt %)	MW-392 (32-33.5) DEC4508-5 (wt %)	MW-393 (24-25.5) DEC4508-6 (wt %)	MW-394 (20.5-22) DEC4508-7 (wt %)	MW-392 (66-68) DEC4508-8 (wt %)
Quartz	52.7	29.2	30.7	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

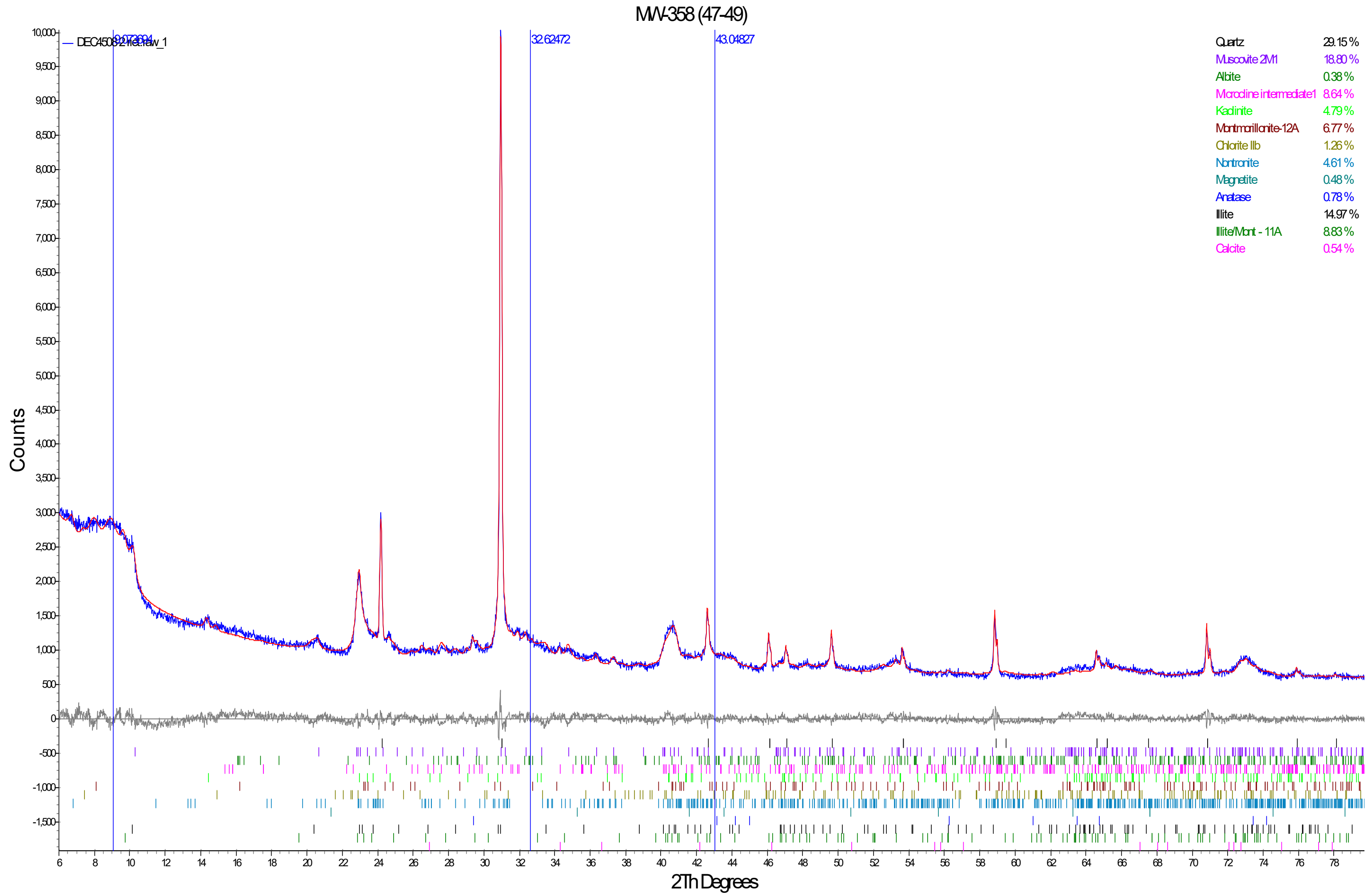
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

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.

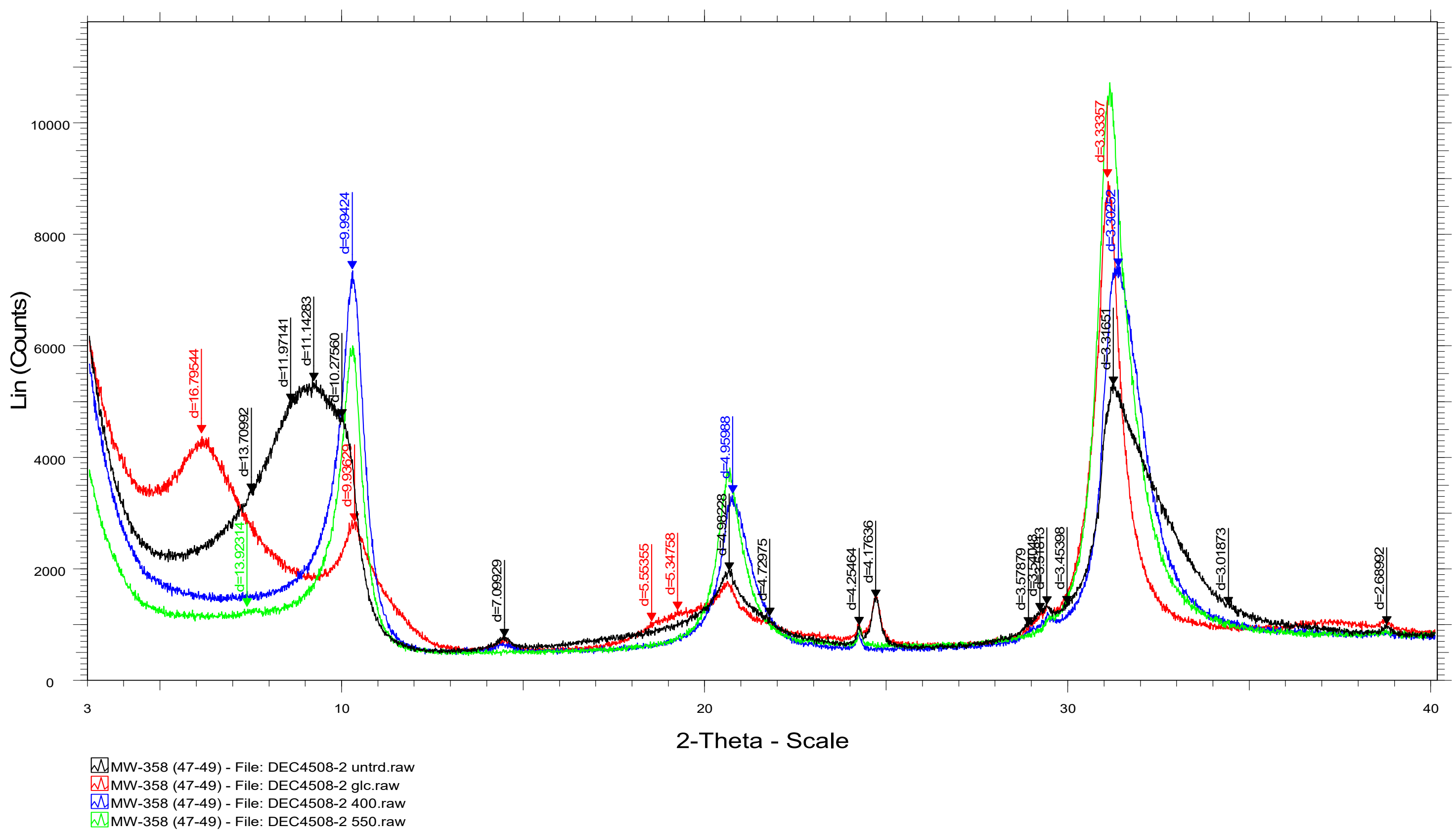
Mineral/Compound	Formula
Quartz	SiO_2
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Albite	$NaAlSi_3O_8$
Microcline	$KAlSi_3O_8$
Diaspore	aAlO.OH
Magnetite	Fe_3O_4
Anatase	TiO_2
Calcite	$CaCO_3$
Fluorapatite	$Ca_5(PO_4)_3F$
Ankerite	$CaFe(CO_3)_2$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot 10H_2O$
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
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 %
Counts
2Th Degrees

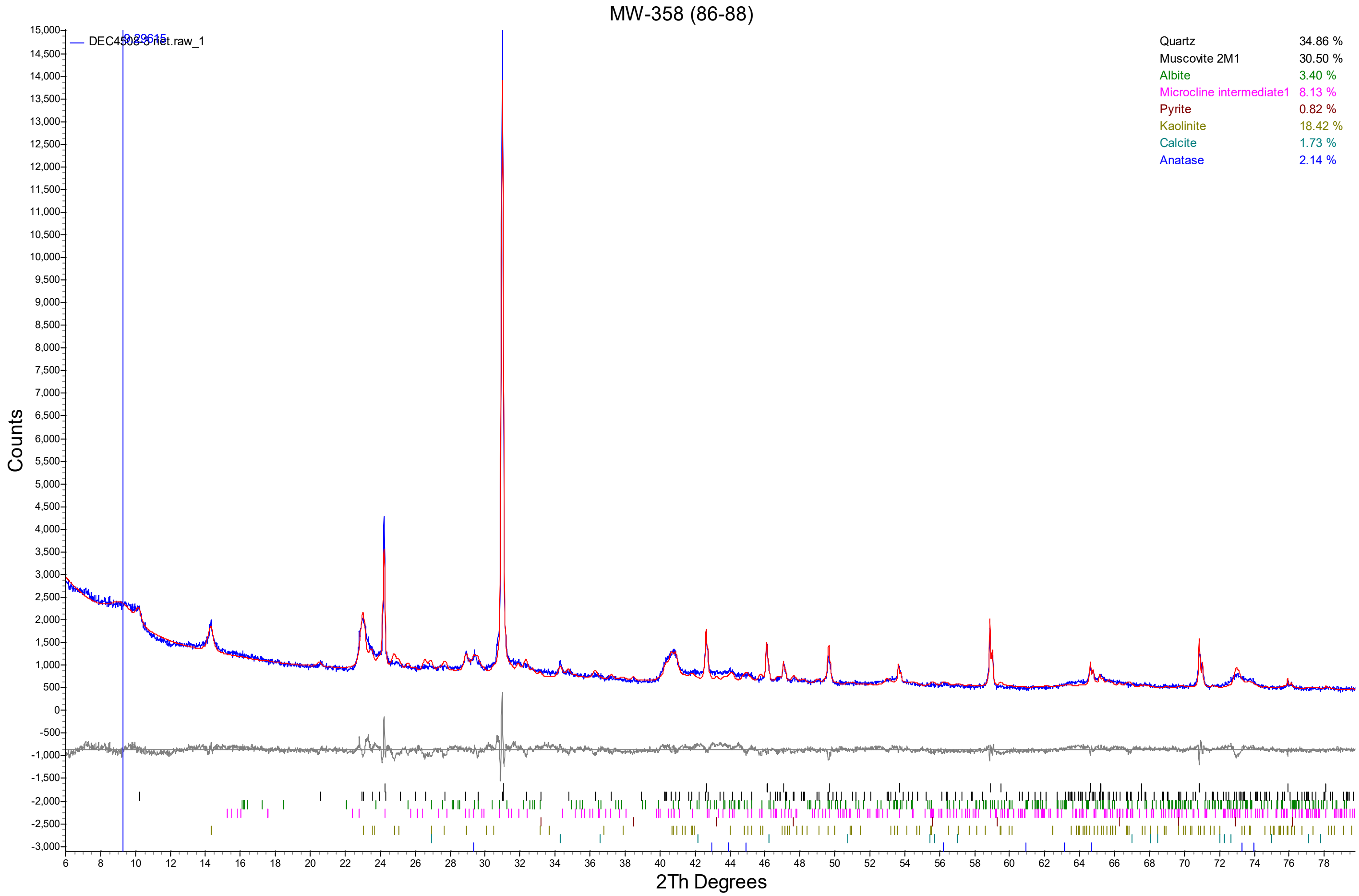

MW-358 (47-49)
DEC4508-2-fid.raw_1
32.62472
43.04827
Counts
2Th Degrees
Quartz 29.15 %
Muscovite 2M1 18.80 %
Albite 0.38 %
Microcline intermediate1 8.64 %
Kaolinite 4.79 %
Montmorillonite-12A 6.77 %
Chlorite IIb 1.26 %
Nontronite 4.61 %
Magnetite 0.48 %
Anatase 0.78 %
Illite 14.97 %
Illite/Mont - 11A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

Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-358 (47-49)

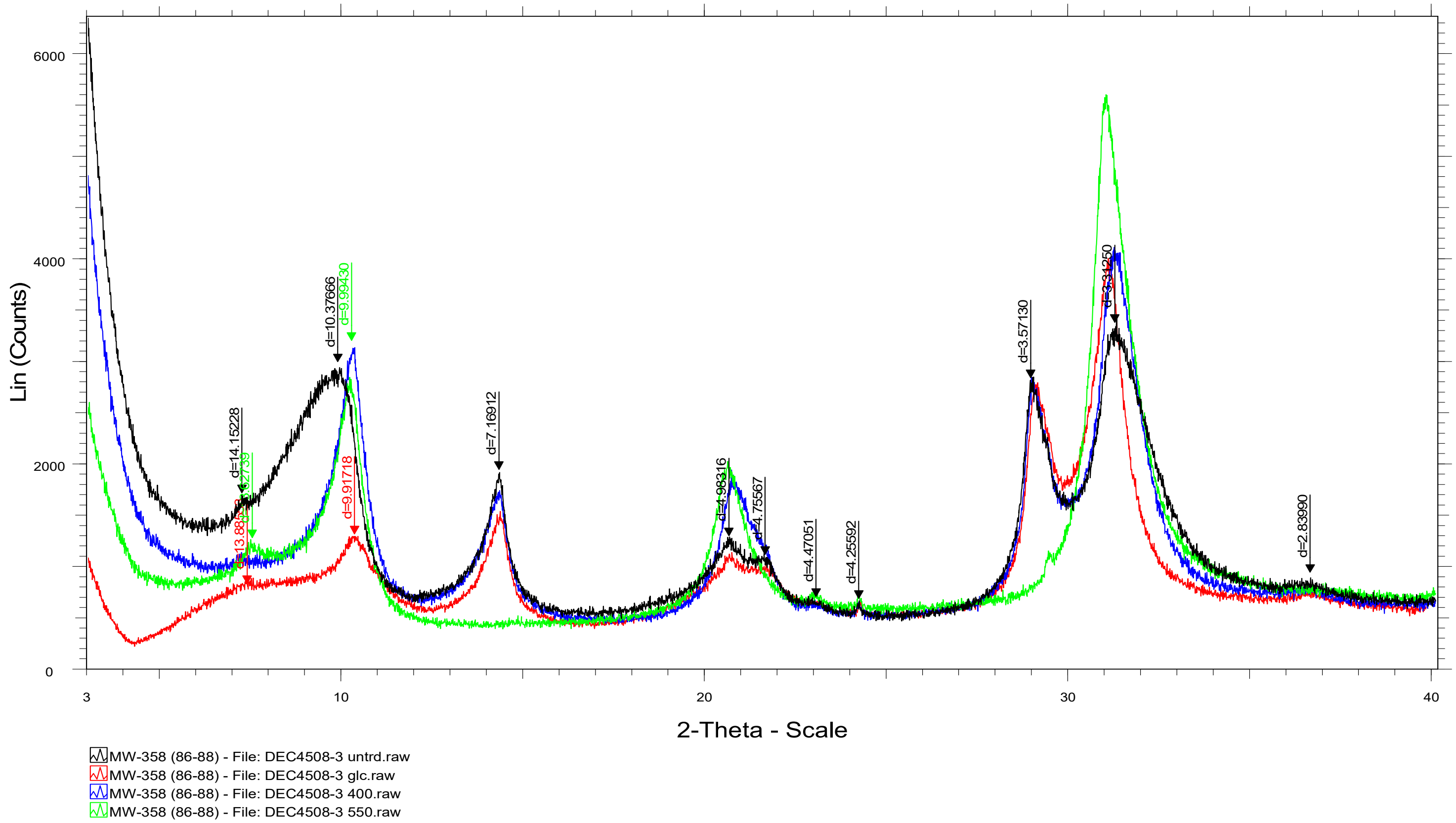


Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23



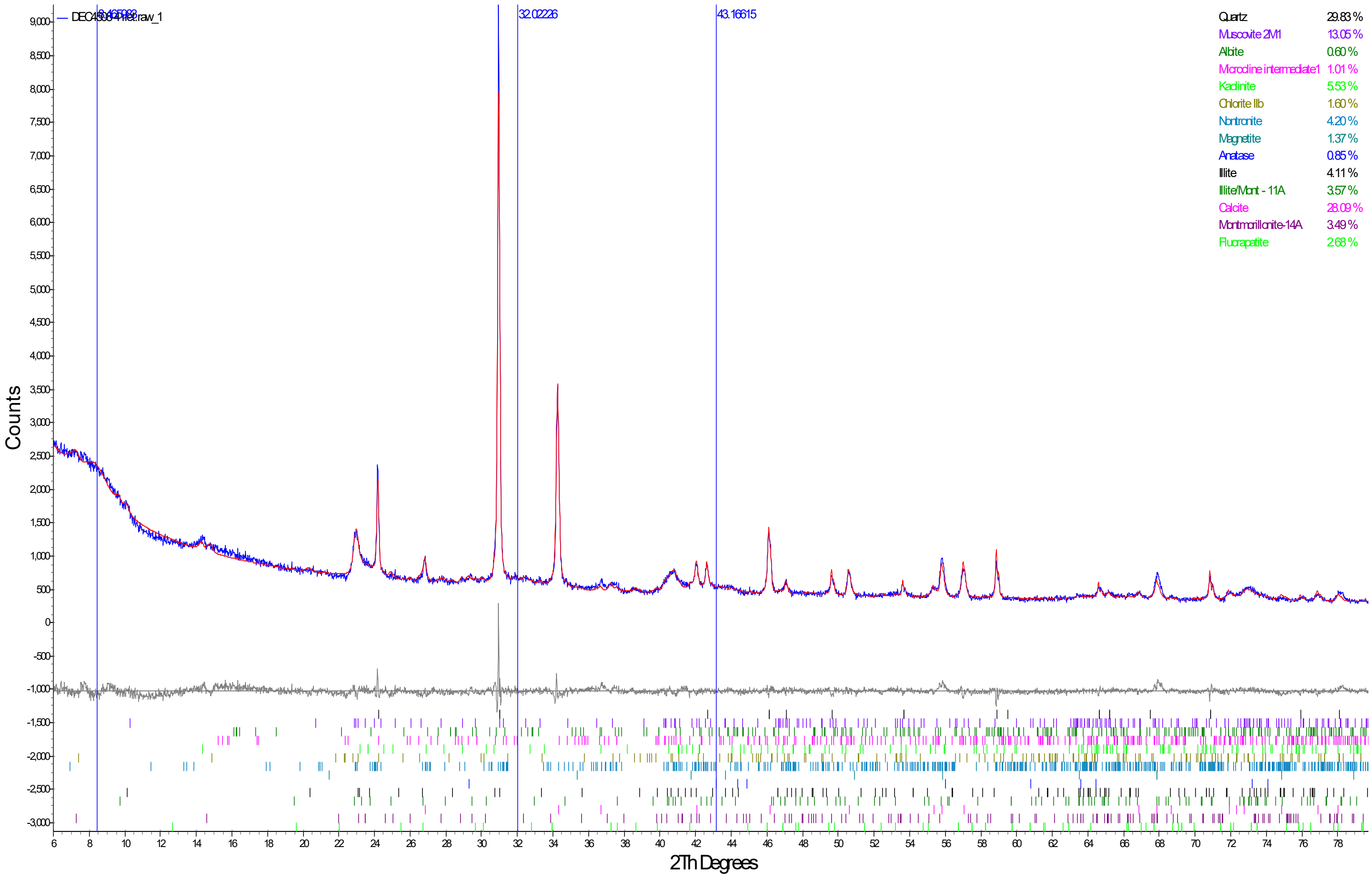
Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-358 (86-88)



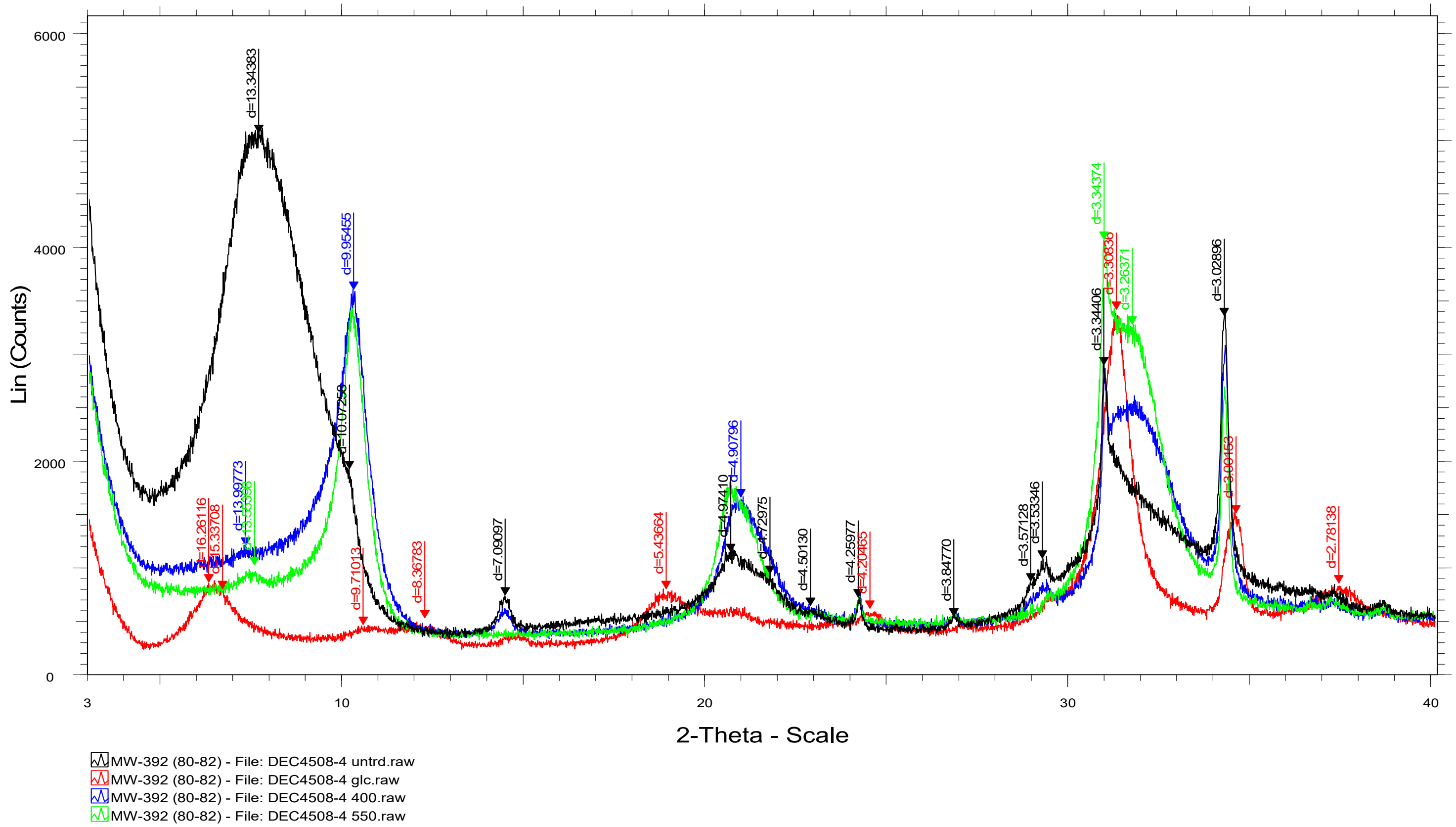
Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23

MW-392 (80-82)



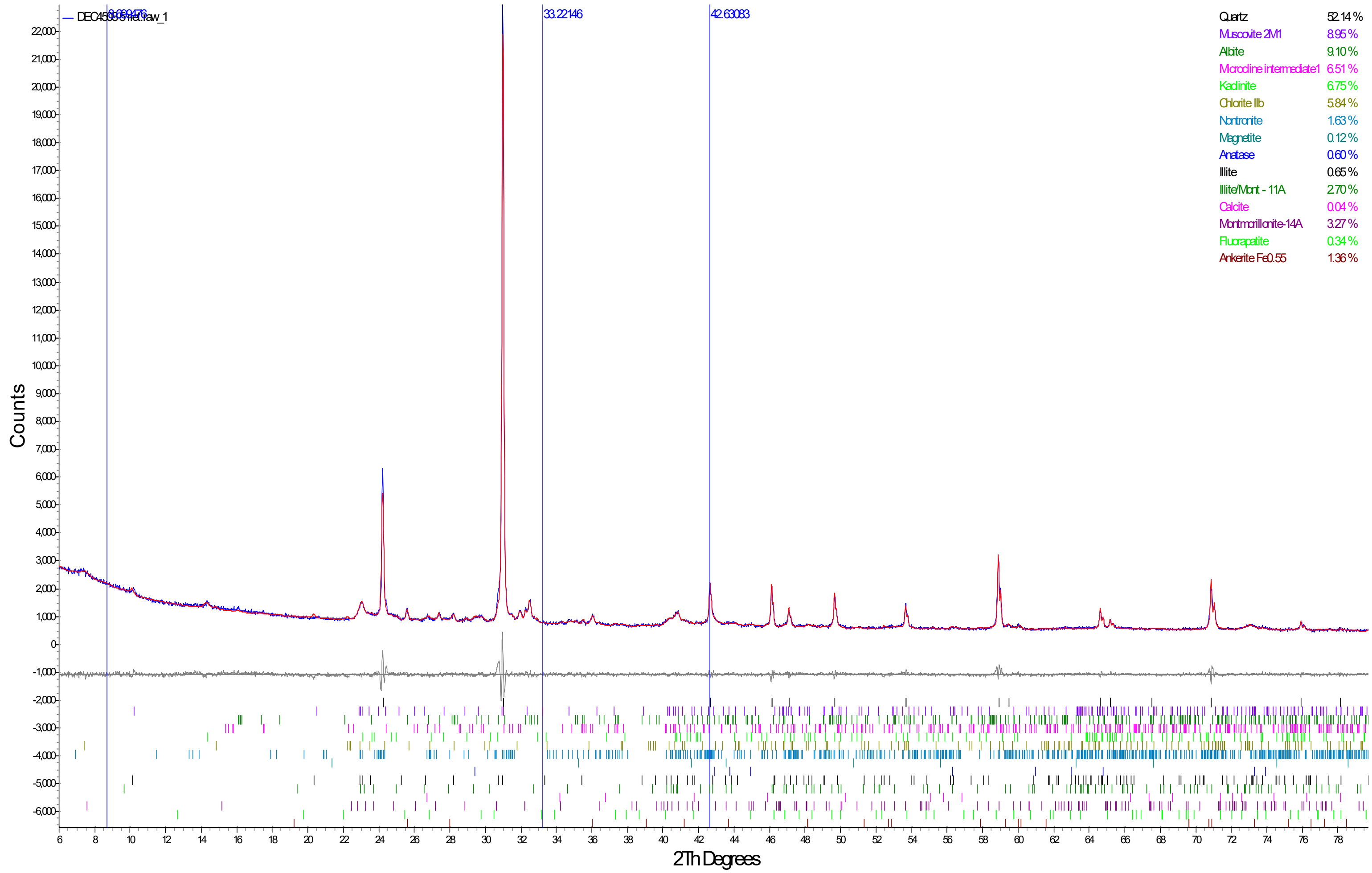
Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-392 (80-82)



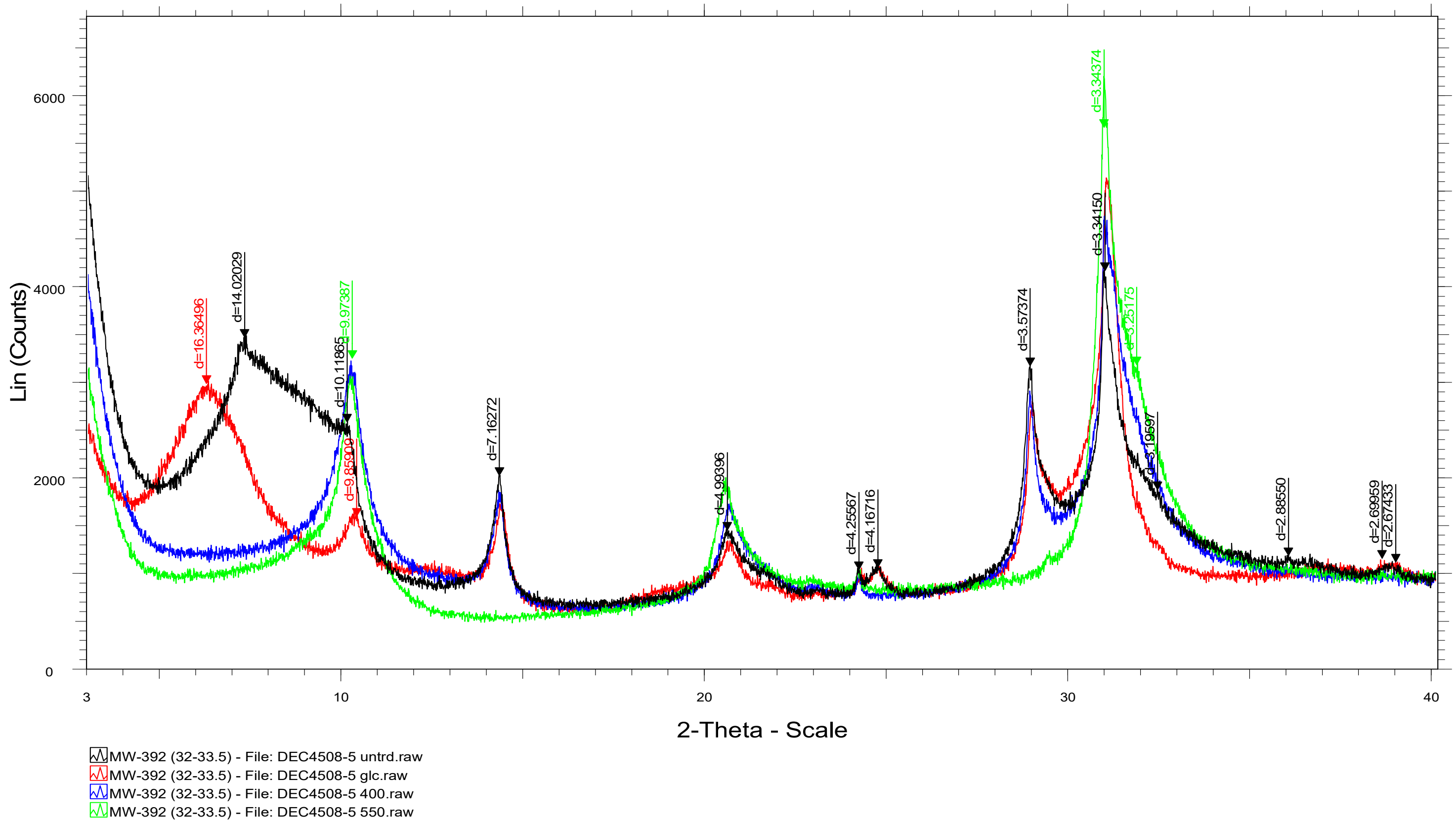
Environmental Services
Custom XRD/MI4508-DEC22
24-Apr-23

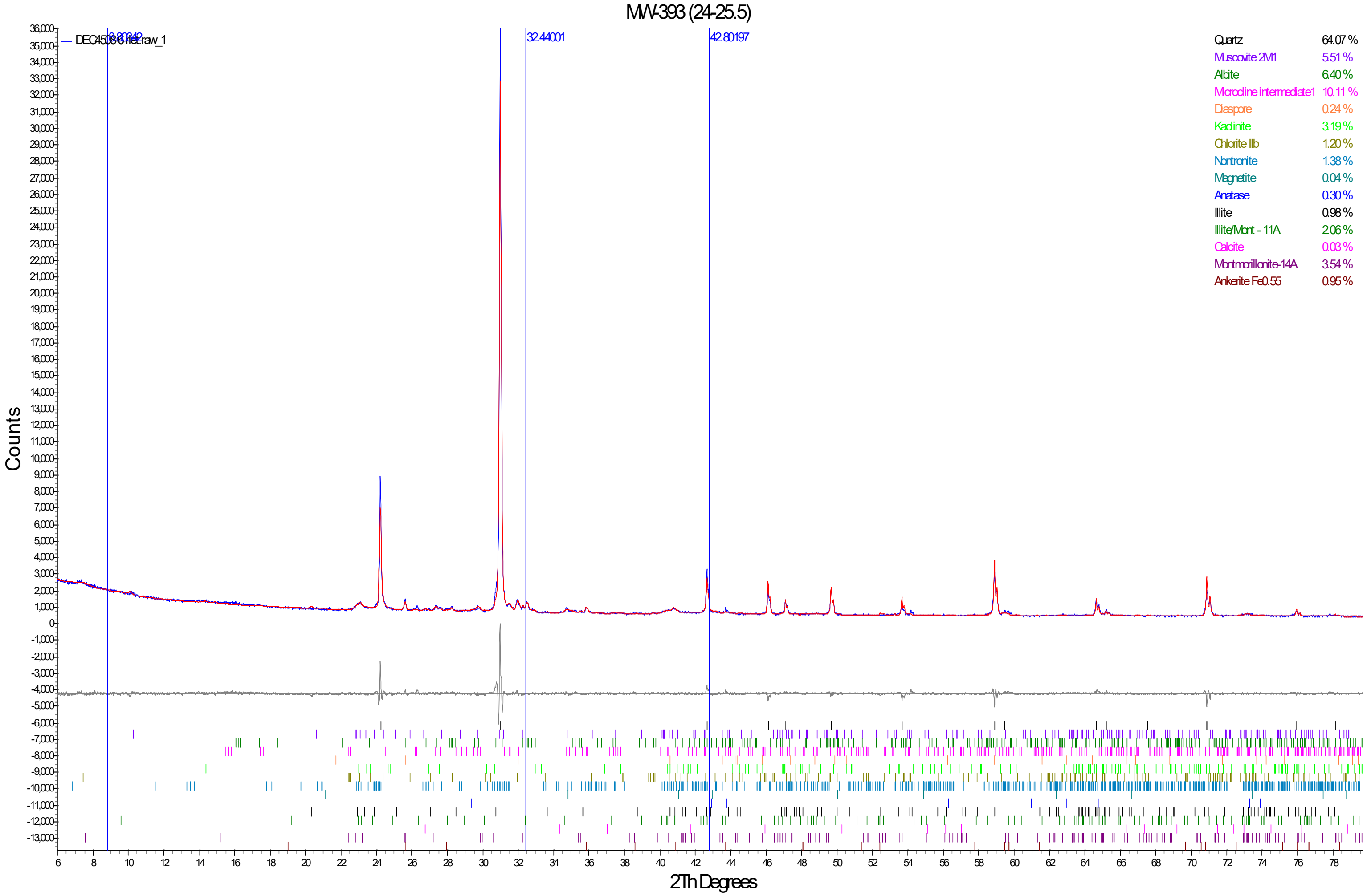
MW-392 (32-33.5)



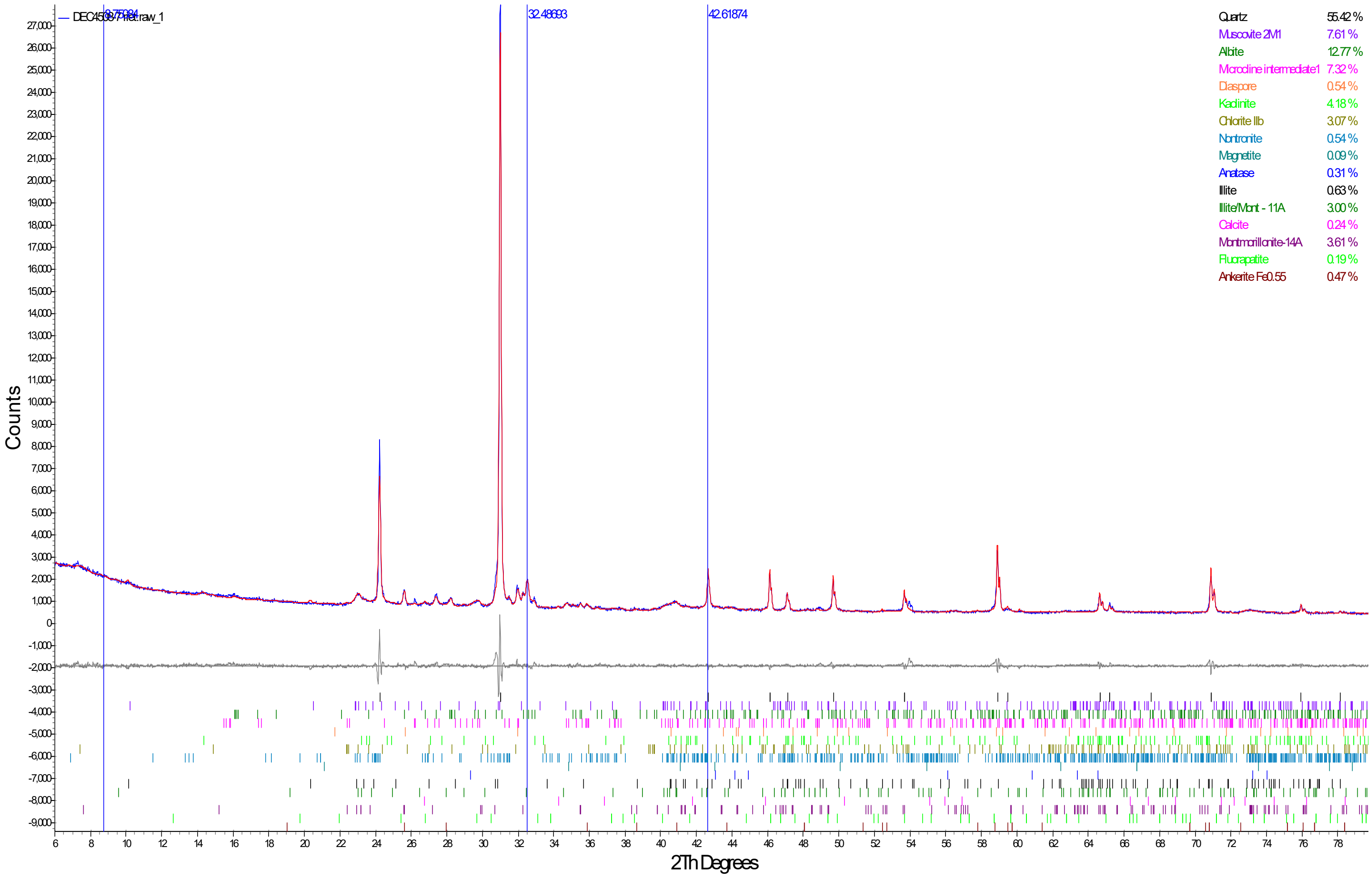
Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

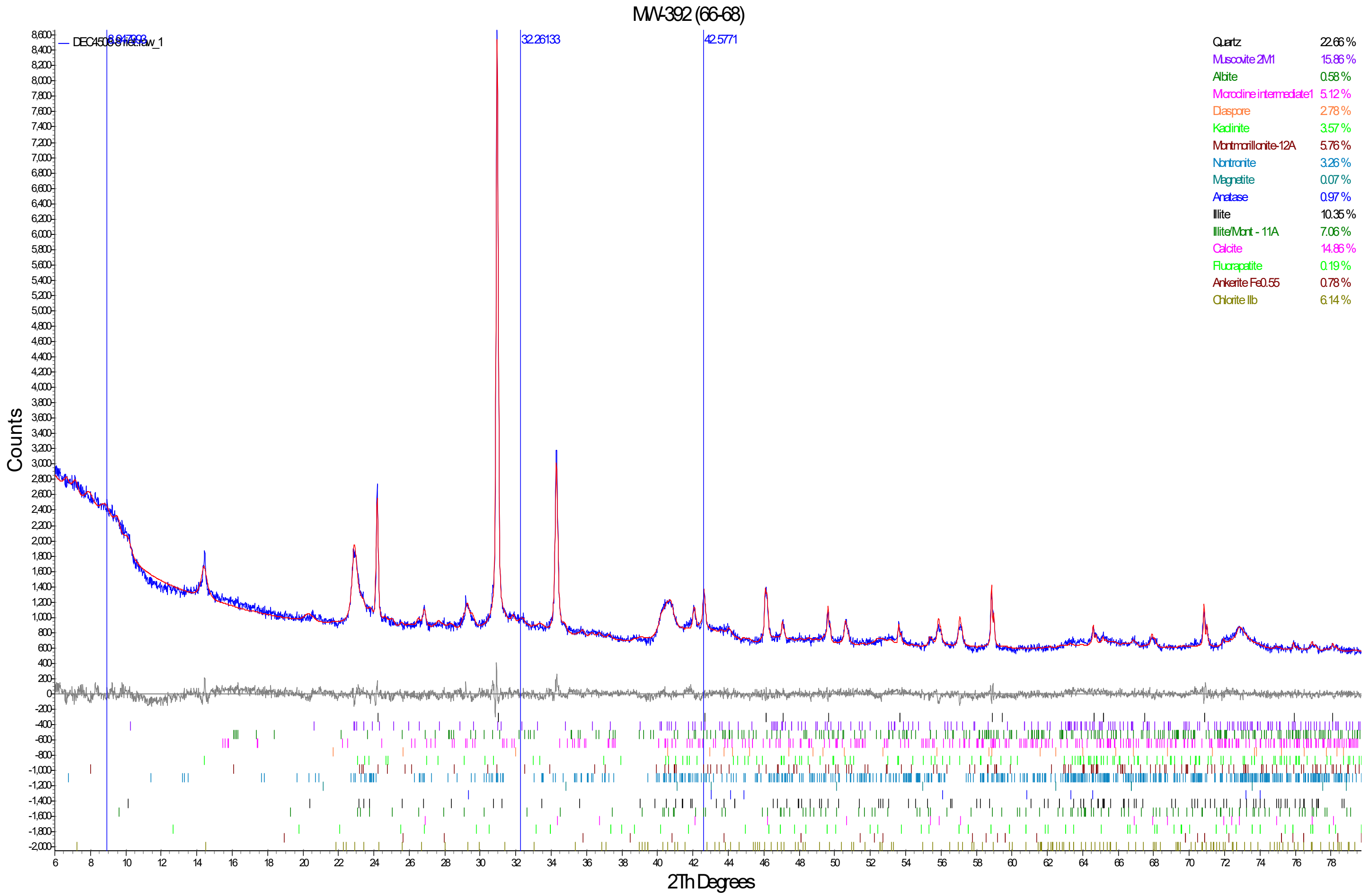
MW-392 (32-33.5)




MW-393 (24-25.5)
DEC4508-6 file.raw_1
8.80742
32.44001
42.80197
Counts
2Th Degrees
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 %

MW-394 (20.5-22)

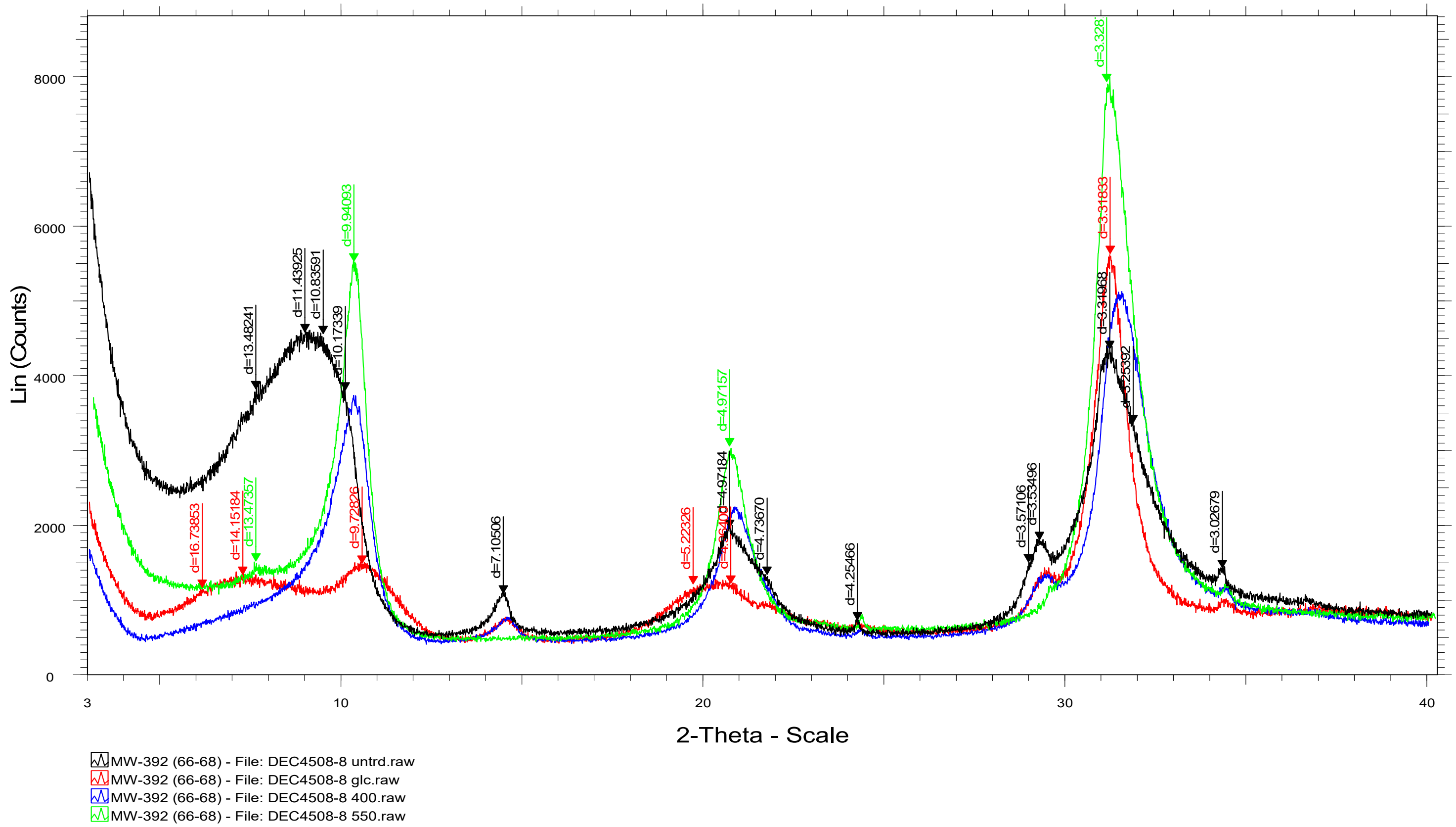

32.48693
42.61874
Counts
2Th Degrees
Quartz 55.42 %
Muscovite 2M1 7.61 %
Albite 12.77 %
Microcline intermediate1 7.32 %
Diaspore 0.54 %
Kaolinite 4.18 %
Chlorite IIb 3.07 %
Nontronite 0.54 %
Magnetite 0.09 %
Anatase 0.31 %
Illite 0.63 %
Illite/Mont - 11A 3.00 %
Calcite 0.24 %
Montmorillonite-14A 3.61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


MW-392 (66-68)
DEC4508-9rfet.raw_1
8.947993
32.26133
42.5771
Counts
2Th Degrees
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 %

SGS

Environmental Services
Custom XRD/MI4508-DEC22
21-Dec-22

MW-392 (66-68)



ATTACHMENT 9

CCR Solids Total Metals Laboratory Analytical Report http://www.teklabinc.com/

October 10, 2022

Andrew Hardwick
Ramboll
300 S. Wacker Drive
Suite 130
Chicago, IL 60606
TEL: (217) 494-2978
FAX: (414) 837-3608

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

RE: Baldwin **WorkOrder:** 22091779

Dear Andrew Hardwick:

TEKLAB, INC received 23 samples on 9/28/2022 6:00:00 PM for the analysis presented in the following report.

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

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

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

Sincerely,

Elizabeth A. Hurley

Elizabeth A. Hurley
Director of Customer Service
(618)344-1004 ex 33
ehurley@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

This reporting package includes the following:

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

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

Client: Ramboll | **Work Order:** 22091779

Client Project: Baldwin | **Report Date:** 10-Oct-22

Qualifiers

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

Teklab, Inc. Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

Cooler Receipt Temp: 4.4 °C

Locations

Collinsville

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

Springfield

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

Kansas City

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

Collinsville Air

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

Chicago

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

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2023	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2023	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2023	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2023	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2023	Collinsville
Arkansas	ADEQ	88-0966		3/14/2023	Collinsville
Illinois	IDPH	17584		5/31/2023	Collinsville
Iowa	IDNR	430		6/1/2024	Collinsville
Kentucky	UST	0073		1/31/2023	Collinsville
Missouri	MDNR	00930		5/31/2023	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville

Client: Ramboll
Client Project: Baldwin
Lab ID: 22091779-001
Matrix: SOLID

Work Order: 22091779
Report Date: 10-Oct-22
Client Sample ID: XPW06 (5-7)
Collection Date: 09/22/2022 11:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**7.5**	%	1	09/30/2022 18:20	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.7	J	**3.1**	mg/Kg-dry	1	10/05/2022 14:57	182336
Arsenic	NELAP	2.3	J	**1.8**	mg/Kg-dry	1	10/05/2022 16:51	198379
Barium	NELAP	0.45		**115**	mg/Kg-dry	1	10/05/2022 16:51	198379
Beryllium	NELAP	0.05		**0.55**	mg/Kg-dry	1	10/05/2022 16:51	198379
Boron	NELAP	1.82		**30.6**	mg/Kg-dry	1	10/05/2022 16:51	198379
Cadmium	NELAP	0.18		**0.25**	mg/Kg-dry	1	10/05/2022 16:51	198379
Chromium	NELAP	0.45		**14.5**	mg/Kg-dry	1	10/05/2022 16:51	198379
Cobalt	NELAP	0.45		**2.45**	mg/Kg-dry	1	10/05/2022 16:51	198379
Lead	NELAP	1.36		**2.29**	mg/Kg-dry	1	10/05/2022 16:51	198379
Lithium	NELAP	0.45		**3.69**	mg/Kg-dry	1	10/05/2022 16:51	198379
Molybdenum	NELAP	0.91		**3.88**	mg/Kg-dry	1	10/05/2022 16:51	198379
Selenium	NELAP	3.6	J	**1.9**	mg/Kg-dry	1	10/05/2022 16:51	198379
Thallium	NELAP	4.55		**< 4.55**	mg/Kg-dry	1	10/05/2022 16:51	198379
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 15:45	198345

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 22091779
Client Project: Baldwin
Report Date: 10-Oct-22
Lab ID: 22091779-002
Client Sample ID: XPW06 (7-9)
Matrix: SOLID
Collection Date: 09/22/2022 11:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**24.1**	%	1	09/30/2022 18:21	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.7	J	**3.0**	mg/Kg-dry	1	10/05/2022 14:59	182336
Arsenic	NELAP	2.4	J	**1.8**	mg/Kg-dry	1	10/05/2022 16:52	198379
Barium	NELAP	0.49		**190**	mg/Kg-dry	1	10/05/2022 16:52	198379
Beryllium	NELAP	0.05		**0.60**	mg/Kg-dry	1	10/05/2022 16:52	198379
Boron	NELAP	1.96		**27.8**	mg/Kg-dry	1	10/05/2022 16:52	198379
Cadmium	NELAP	0.20		**0.23**	mg/Kg-dry	1	10/05/2022 16:52	198379
Chromium	NELAP	0.49		**18.3**	mg/Kg-dry	1	10/05/2022 16:52	198379
Cobalt	NELAP	0.49		**2.75**	mg/Kg-dry	1	10/05/2022 16:52	198379
Lead	NELAP	1.47		**2.32**	mg/Kg-dry	1	10/05/2022 16:52	198379
Lithium	NELAP	0.49		**4.11**	mg/Kg-dry	1	10/05/2022 16:52	198379
Molybdenum	NELAP	0.98		**4.06**	mg/Kg-dry	1	10/05/2022 16:52	198379
Selenium	NELAP	3.9	J	**2.1**	mg/Kg-dry	1	10/05/2022 16:52	198379
Thallium	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	10/05/2022 16:52	198379
SW-846 7471B								
Mercury	NELAP	0.013		**0.109**	mg/Kg-dry	1	10/04/2022 15:52	198345

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-003 **Client Sample ID:** EB-02

Matrix: AQUEOUS **Collection Date:** 09/22/2022 17:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/05/2022 10:59	198257
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	10/06/2022 14:12	198257
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/05/2022 10:59	198257
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	10/05/2022 10:59	198257
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 10:59	198257
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/05/2022 10:59	198257
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:37	198357

Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-004

Matrix: SOLID

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: XPW01 (8-10)

Collection Date: 09/23/2022 14:05

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**24.3**	%	1	09/30/2022 18:21	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.6	J	**2.5**	mg/Kg-dry	1	10/05/2022 15:00	182336
Arsenic	NELAP	2.31		**< 2.31**	mg/Kg-dry	1	10/05/2022 16:54	198379
Barium	NELAP	0.46		**85.4**	mg/Kg-dry	1	10/05/2022 16:54	198379
Beryllium	NELAP	0.05		**0.43**	mg/Kg-dry	1	10/05/2022 16:54	198379
Boron	NELAP	1.85		**20.2**	mg/Kg-dry	1	10/05/2022 16:54	198379
Cadmium	NELAP	0.19	J	**0.10**	mg/Kg-dry	1	10/05/2022 16:54	198379
Chromium	NELAP	0.46		**8.10**	mg/Kg-dry	1	10/05/2022 16:54	198379
Cobalt	NELAP	0.46		**2.14**	mg/Kg-dry	1	10/05/2022 16:54	198379
Lead	NELAP	1.39		**2.06**	mg/Kg-dry	1	10/05/2022 16:54	198379
Lithium	NELAP	0.46		**3.20**	mg/Kg-dry	1	10/05/2022 16:54	198379
Molybdenum	NELAP	0.93		**1.31**	mg/Kg-dry	1	10/05/2022 16:54	198379
Selenium	NELAP	3.70		**< 3.70**	mg/Kg-dry	1	10/05/2022 16:54	198379
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	10/05/2022 16:54	198379
SW-846 7471B								
Mercury	NELAP	0.013		**< 0.013**	mg/Kg-dry	1	10/04/2022 15:54	198345

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Laboratory Results

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Client: Ramboll | **Work Order:** 22091779

Client Project: Baldwin | **Report Date:** 10-Oct-22

Lab ID: 22091779-005 | **Client Sample ID:** XPW01 (1.3-3.2)

Matrix: SOLID | **Collection Date:** 09/23/2022 14:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**22.5**	%	1	09/30/2022 18:22	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	10/03/2022 18:03	184562
Arsenic	NELAP	2.5	J	**1.0**	mg/Kg-dry	1	10/05/2022 13:03	198356
Barium	NELAP	0.50		**25.5**	mg/Kg-dry	1	10/05/2022 13:03	198356
Beryllium	NELAP	0.05		**0.15**	mg/Kg-dry	1	10/05/2022 13:03	198356
Boron	NELAP	2.00		**2.87**	mg/Kg-dry	1	10/05/2022 13:03	198356
Cadmium	NELAP	0.20	J	**0.05**	mg/Kg-dry	1	10/05/2022 13:03	198356
Chromium	NELAP	0.50	B	**9.99**	mg/Kg-dry	1	10/05/2022 13:03	198356
Cobalt	NELAP	0.50		**1.59**	mg/Kg-dry	1	10/05/2022 13:03	198356
Lead	NELAP	1.50		**3.23**	mg/Kg-dry	1	10/05/2022 13:03	198356
Lithium	NELAP	0.50		**1.52**	mg/Kg-dry	1	10/05/2022 13:03	198356
Molybdenum	NELAP	1.0	J	**0.65**	mg/Kg-dry	1	10/05/2022 13:03	198356
Selenium	NELAP	4.00		**< 4.00**	mg/Kg-dry	1	10/05/2022 13:03	198356
Thallium	NELAP	5.00		**< 5.00**	mg/Kg-dry	1	10/05/2022 13:03	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.013		**< 0.013**	mg/Kg-dry	1	10/04/2022 15:57	198345

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll | **Work Order:** 22091779
Client Project: Baldwin | **Report Date:** 10-Oct-22
Lab ID: 22091779-006 | **Client Sample ID:** XPW01 (11-12)
Matrix: SOLID | **Collection Date:** 09/23/2022 14:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.0**	%	1	09/30/2022 18:22	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.55		**< 4.55**	mg/Kg-dry	1	10/03/2022 18:08	184562
Arsenic	NELAP	2.31		**< 2.31**	mg/Kg-dry	1	10/05/2022 13:05	198356
Barium	NELAP	0.46		**6.99**	mg/Kg-dry	1	10/05/2022 13:05	198356
Beryllium	NELAP	0.05		**0.10**	mg/Kg-dry	1	10/05/2022 13:05	198356
Boron	NELAP	1.85		**5.73**	mg/Kg-dry	1	10/05/2022 13:05	198356
Cadmium	NELAP	0.19		**< 0.19**	mg/Kg-dry	1	10/05/2022 13:05	198356
Chromium	NELAP	0.46	B	**5.02**	mg/Kg-dry	1	10/05/2022 13:05	198356
Cobalt	NELAP	0.46		**0.56**	mg/Kg-dry	1	10/05/2022 13:05	198356
Lead	NELAP	1.4	J	**0.78**	mg/Kg-dry	1	10/05/2022 13:05	198356
Lithium	NELAP	0.46		**0.71**	mg/Kg-dry	1	10/05/2022 13:05	198356
Molybdenum	NELAP	0.93		**1.86**	mg/Kg-dry	1	10/05/2022 13:05	198356
Selenium	NELAP	3.7	J	**3.0**	mg/Kg-dry	1	10/05/2022 13:05	198356
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	10/05/2022 13:05	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.010		**< 0.010**	mg/Kg-dry	1	10/04/2022 15:59	198345

Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-007

Matrix: AQUEOUS

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: EB03

Collection Date: 09/23/2022 17:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/04/2022 18:21	198257
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:21	198257
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:21	198257
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/04/2022 18:21	198257
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:21	198257
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 11:43	198257
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/04/2022 18:21	198257
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:39	198357

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Laboratory Results

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Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-008 **Client Sample ID:** XPW05 (5-7)

Matrix: SOLID **Collection Date:** 09/24/2022 12:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**12.2**	%	1	09/30/2022 18:23	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.6	J	**1.9**	mg/Kg-dry	1	10/03/2022 18:22	184562
Arsenic	NELAP	2.4	J	**1.2**	mg/Kg-dry	1	10/05/2022 16:56	198379
Barium	NELAP	0.47		**868**	mg/Kg-dry	1	10/05/2022 16:56	198379
Beryllium	NELAP	0.05		**1.09**	mg/Kg-dry	1	10/05/2022 16:56	198379
Boron	NELAP	1.89		**59.8**	mg/Kg-dry	1	10/05/2022 16:56	198379
Cadmium	NELAP	0.19	J	**0.17**	mg/Kg-dry	1	10/05/2022 16:56	198379
Chromium	NELAP	0.47		**18.5**	mg/Kg-dry	1	10/05/2022 16:56	198379
Cobalt	NELAP	0.47		**6.62**	mg/Kg-dry	1	10/05/2022 16:56	198379
Lead	NELAP	1.42		**1.95**	mg/Kg-dry	1	10/05/2022 16:56	198379
Lithium	NELAP	0.47		**10.9**	mg/Kg-dry	1	10/05/2022 16:56	198379
Molybdenum	NELAP	0.94		**1.64**	mg/Kg-dry	1	10/05/2022 16:56	198379
Selenium	NELAP	3.77		**< 3.77**	mg/Kg-dry	1	10/05/2022 16:56	198379
Thallium	NELAP	4.72		**< 4.72**	mg/Kg-dry	1	10/05/2022 16:56	198379
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 16:01	198345

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-009 **Client Sample ID:** XPW05 (12-13)

Matrix: SOLID **Collection Date:** 09/24/2022 12:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.4**	%	1	09/30/2022 18:24	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.8	J	**1.6**	mg/Kg-dry	1	10/05/2022 15:05	182336
Arsenic	NELAP	2.40		**< 2.40**	mg/Kg-dry	1	10/05/2022 16:57	198379
Barium	NELAP	0.48		**265**	mg/Kg-dry	1	10/05/2022 16:57	198379
Beryllium	NELAP	0.05		**0.48**	mg/Kg-dry	1	10/05/2022 16:57	198379
Boron	NELAP	1.92		**33.1**	mg/Kg-dry	1	10/05/2022 16:57	198379
Cadmium	NELAP	0.19	J	**0.11**	mg/Kg-dry	1	10/05/2022 16:57	198379
Chromium	NELAP	0.48		**8.50**	mg/Kg-dry	1	10/05/2022 16:57	198379
Cobalt	NELAP	0.48		**2.79**	mg/Kg-dry	1	10/05/2022 16:57	198379
Lead	NELAP	1.4	J	**0.88**	mg/Kg-dry	1	10/05/2022 16:57	198379
Lithium	NELAP	0.48		**3.72**	mg/Kg-dry	1	10/05/2022 16:57	198379
Molybdenum	NELAP	0.96		**1.03**	mg/Kg-dry	1	10/05/2022 16:57	198379
Selenium	NELAP	3.85		**< 3.85**	mg/Kg-dry	1	10/05/2022 16:57	198379
Thallium	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	10/05/2022 16:57	198379
SW-846 7471B								
Mercury	NELAP	0.010		**< 0.010**	mg/Kg-dry	1	10/04/2022 16:06	198345

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Laboratory Results

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Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-010

Matrix: SOLID

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: XPW05 (22-24)

Collection Date: 09/24/2022 12:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**41.5**	%	1	09/30/2022 18:25	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.72		**6.75**	mg/Kg-dry	1	10/05/2022 15:06	182336
Arsenic	NELAP	2.36		**22.8**	mg/Kg-dry	1	10/05/2022 16:59	198379
Barium	NELAP	0.47		**252**	mg/Kg-dry	1	10/05/2022 16:59	198379
Beryllium	NELAP	0.05		**1.99**	mg/Kg-dry	1	10/05/2022 16:59	198379
Boron	NELAP	1.89		**70.5**	mg/Kg-dry	1	10/05/2022 16:59	198379
Cadmium	NELAP	0.19		**2.82**	mg/Kg-dry	1	10/05/2022 16:59	198379
Chromium	NELAP	0.47		**161**	mg/Kg-dry	1	10/05/2022 16:59	198379
Cobalt	NELAP	0.47		**12.7**	mg/Kg-dry	1	10/05/2022 16:59	198379
Lead	NELAP	1.42		**23.7**	mg/Kg-dry	1	10/05/2022 16:59	198379
Lithium	NELAP	0.47		**12.1**	mg/Kg-dry	1	10/05/2022 16:59	198379
Molybdenum	NELAP	0.94		**33.8**	mg/Kg-dry	1	10/05/2022 16:59	198379
Selenium	NELAP	3.77		**140**	mg/Kg-dry	1	10/05/2022 16:59	198379
Thallium	NELAP	4.7	J	**4.4**	mg/Kg-dry	1	10/05/2022 16:59	198379
SW-846 7471B								
Mercury	NELAP	0.016		**0.027**	mg/Kg-dry	1	10/04/2022 16:08	198345

Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-011

Matrix: SOLID

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: XPW05 (26.2-28.2)

Collection Date: 09/24/2022 12:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**6.9**	%	1	09/30/2022 18:27	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	5.0	J	**1.5**	mg/Kg-dry	1	10/05/2022 15:08	182336
Arsenic	NELAP	2.4	J	**1.6**	mg/Kg-dry	1	10/05/2022 17:01	198379
Barium	NELAP	0.49		**249**	mg/Kg-dry	1	10/05/2022 17:01	198379
Beryllium	NELAP	0.05		**0.35**	mg/Kg-dry	1	10/05/2022 17:01	198379
Boron	NELAP	1.96		**15.3**	mg/Kg-dry	1	10/05/2022 17:01	198379
Cadmium	NELAP	0.20	J	**0.07**	mg/Kg-dry	1	10/05/2022 17:01	198379
Chromium	NELAP	0.49		**7.49**	mg/Kg-dry	1	10/05/2022 17:01	198379
Cobalt	NELAP	0.49		**1.62**	mg/Kg-dry	1	10/05/2022 17:01	198379
Lead	NELAP	1.5	J	**0.94**	mg/Kg-dry	1	10/05/2022 17:01	198379
Lithium	NELAP	0.49		**4.03**	mg/Kg-dry	1	10/05/2022 17:01	198379
Molybdenum	NELAP	0.98		**1.19**	mg/Kg-dry	1	10/05/2022 17:01	198379
Selenium	NELAP	3.92		**< 3.92**	mg/Kg-dry	1	10/05/2022 17:01	198379
Thallium	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	10/05/2022 17:01	198379
SW-846 7471B								
Mercury	NELAP	0.010		**< 0.010**	mg/Kg-dry	1	10/04/2022 16:10	198345

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-012 **Client Sample ID:** Dup-01

Matrix: SOLID **Collection Date:** 09/24/2022 12:35

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**20.8**	%	1	09/30/2022 18:27	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.55		**< 4.55**	mg/Kg-dry	1	10/03/2022 18:24	184562
Arsenic	NELAP	2.4	J	**1.1**	mg/Kg-dry	1	10/05/2022 13:09	198356
Barium	NELAP	0.48		**110**	mg/Kg-dry	1	10/05/2022 13:09	198356
Beryllium	NELAP	0.05		**0.29**	mg/Kg-dry	1	10/05/2022 13:09	198356
Boron	NELAP	1.92		**21.4**	mg/Kg-dry	1	10/05/2022 13:09	198356
Cadmium	NELAP	0.19		**0.30**	mg/Kg-dry	1	10/05/2022 13:09	198356
Chromium	NELAP	0.48	B	**9.67**	mg/Kg-dry	1	10/05/2022 13:09	198356
Cobalt	NELAP	0.48		**1.88**	mg/Kg-dry	1	10/05/2022 13:09	198356
Lead	NELAP	1.44		**1.64**	mg/Kg-dry	1	10/05/2022 13:09	198356
Lithium	NELAP	0.48		**2.25**	mg/Kg-dry	1	10/05/2022 13:09	198356
Molybdenum	NELAP	0.96		**2.63**	mg/Kg-dry	1	10/05/2022 13:09	198356
Selenium	NELAP	3.8	J	**2.4**	mg/Kg-dry	1	10/05/2022 13:09	198356
Thallium	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	10/05/2022 13:09	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	10/04/2022 16:12	198345

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-013 **Client Sample ID:** XPW02 (2-3)

Matrix: SOLID **Collection Date:** 09/24/2022 14:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**19.6**	%	1	09/30/2022 18:27	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.8	J	**1.8**	mg/Kg-dry	1	10/03/2022 18:25	184562
Arsenic	NELAP	2.5	J	**1.5**	mg/Kg-dry	1	10/05/2022 13:11	198356
Barium	NELAP	0.50		**430**	mg/Kg-dry	1	10/05/2022 13:11	198356
Beryllium	NELAP	0.05		**0.84**	mg/Kg-dry	1	10/05/2022 13:11	198356
Boron	NELAP	2.00		**38.0**	mg/Kg-dry	1	10/05/2022 13:11	198356
Cadmium	NELAP	0.20	J	**0.15**	mg/Kg-dry	1	10/05/2022 13:11	198356
Chromium	NELAP	0.50	B	**16.6**	mg/Kg-dry	1	10/05/2022 13:11	198356
Cobalt	NELAP	0.50		**3.68**	mg/Kg-dry	1	10/05/2022 13:11	198356
Lead	NELAP	1.50		**1.79**	mg/Kg-dry	1	10/05/2022 13:11	198356
Lithium	NELAP	0.50		**6.72**	mg/Kg-dry	1	10/05/2022 13:11	198356
Molybdenum	NELAP	1.00		**2.34**	mg/Kg-dry	1	10/05/2022 13:11	198356
Selenium	NELAP	4.0	J	**2.0**	mg/Kg-dry	1	10/05/2022 13:11	198356
Thallium	NELAP	5.00		**< 5.00**	mg/Kg-dry	1	10/05/2022 13:11	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	10/04/2022 16:15	198345

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Laboratory Results

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Client: Ramboll
Client Project: Baldwin
Lab ID: 22091779-014
Matrix: SOLID

Work Order: 22091779
Report Date: 10-Oct-22
Client Sample ID: XPW02 (5-7)
Collection Date: 09/24/2022 14:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**10.3**	%	1	09/30/2022 18:27	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.6	J	**2.6**	mg/Kg-dry	1	10/03/2022 18:27	184562
Arsenic	NELAP	2.40		**5.33**	mg/Kg-dry	1	10/05/2022 13:20	198356
Barium	NELAP	0.48		**319**	mg/Kg-dry	1	10/05/2022 13:20	198356
Beryllium	NELAP	0.05		**1.40**	mg/Kg-dry	1	10/05/2022 13:20	198356
Boron	NELAP	1.92		**156**	mg/Kg-dry	1	10/05/2022 13:20	198356
Cadmium	NELAP	0.19		**0.50**	mg/Kg-dry	1	10/05/2022 13:20	198356
Chromium	NELAP	0.48	B	**25.8**	mg/Kg-dry	1	10/05/2022 13:20	198356
Cobalt	NELAP	0.48		**4.24**	mg/Kg-dry	1	10/05/2022 13:20	198356
Lead	NELAP	1.44		**5.73**	mg/Kg-dry	1	10/05/2022 13:20	198356
Lithium	NELAP	0.48		**6.44**	mg/Kg-dry	1	10/05/2022 13:20	198356
Molybdenum	NELAP	0.96		**4.66**	mg/Kg-dry	1	10/05/2022 13:20	198356
Selenium	NELAP	3.85		**< 3.85**	mg/Kg-dry	1	10/05/2022 13:20	198356
Thallium	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	10/05/2022 13:20	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 16:21	198345

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

Lab ID: 22091779-015 **Client Sample ID:** XPW02 (9-11)

Matrix: SOLID **Collection Date:** 09/24/2022 14:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**10.6**	%	1	09/30/2022 18:27	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.7	J	**3.8**	mg/Kg-dry	1	10/05/2022 15:32	182336
Arsenic	NELAP	2.3	J	**1.3**	mg/Kg-dry	1	10/05/2022 17:15	198379
Barium	NELAP	0.46		**57.8**	mg/Kg-dry	1	10/05/2022 17:15	198379
Beryllium	NELAP	0.05		**0.76**	mg/Kg-dry	1	10/05/2022 17:15	198379
Boron	NELAP	1.85		**69.3**	mg/Kg-dry	1	10/05/2022 17:15	198379
Cadmium	NELAP	0.19		**0.28**	mg/Kg-dry	1	10/06/2022 10:48	198379
Chromium	NELAP	0.46		**11.6**	mg/Kg-dry	1	10/05/2022 17:15	198379
Cobalt	NELAP	0.46		**1.97**	mg/Kg-dry	1	10/05/2022 17:15	198379
Lead	NELAP	1.39		**2.10**	mg/Kg-dry	1	10/05/2022 17:15	198379
Lithium	NELAP	0.46		**3.42**	mg/Kg-dry	1	10/06/2022 9:29	198379
Molybdenum	NELAP	0.93		**2.59**	mg/Kg-dry	1	10/05/2022 17:15	198379
Selenium	NELAP	3.70		**< 3.70**	mg/Kg-dry	1	10/05/2022 17:15	198379
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	10/05/2022 17:15	198379
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 16:24	198345

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Laboratory Results

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Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-016

Matrix: SOLID

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: XPW04 (3-5)

Collection Date: 09/24/2022 16:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**7.1**	%	1	09/30/2022 18:28	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.6	J	**1.8**	mg/Kg-dry	1	10/03/2022 18:29	184562
Arsenic	NELAP	2.31		**2.69**	mg/Kg-dry	1	10/05/2022 15:30	198356
Barium	NELAP	0.46		**98.7**	mg/Kg-dry	1	10/05/2022 13:22	198356
Beryllium	NELAP	0.05		**1.01**	mg/Kg-dry	1	10/05/2022 13:22	198356
Boron	NELAP	1.85		**76.7**	mg/Kg-dry	1	10/05/2022 13:22	198356
Cadmium	NELAP	0.19		**0.39**	mg/Kg-dry	1	10/05/2022 13:22	198356
Chromium	NELAP	0.46	B	**17.0**	mg/Kg-dry	1	10/05/2022 13:22	198356
Cobalt	NELAP	0.46		**4.12**	mg/Kg-dry	1	10/05/2022 13:22	198356
Lead	NELAP	1.39		**6.29**	mg/Kg-dry	1	10/05/2022 13:22	198356
Lithium	NELAP	0.46		**8.34**	mg/Kg-dry	1	10/05/2022 13:22	198356
Molybdenum	NELAP	0.93		**2.81**	mg/Kg-dry	1	10/05/2022 13:22	198356
Selenium	NELAP	3.70		**< 3.70**	mg/Kg-dry	1	10/05/2022 13:22	198356
Thallium	NELAP	4.6	J	**0.86**	mg/Kg-dry	1	10/05/2022 13:22	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 16:30	198345

Client: Ramboll
Client Project: Baldwin
Lab ID: 22091779-017
Matrix: SOLID

Work Order: 22091779
Report Date: 10-Oct-22
Client Sample ID: XPW04 (8-10)
Collection Date: 09/24/2022 16:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**17.5**	%	1	09/30/2022 18:28	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.81		**< 4.81**	mg/Kg-dry	1	10/03/2022 18:30	184562
Arsenic	NELAP	2.31		**< 2.31**	mg/Kg-dry	1	10/05/2022 13:24	198356
Barium	NELAP	0.46		**23.9**	mg/Kg-dry	1	10/05/2022 13:24	198356
Beryllium	NELAP	0.05		**0.25**	mg/Kg-dry	1	10/05/2022 13:24	198356
Boron	NELAP	1.85		**6.71**	mg/Kg-dry	1	10/05/2022 13:24	198356
Cadmium	NELAP	0.19	J	**0.05**	mg/Kg-dry	1	10/05/2022 13:24	198356
Chromium	NELAP	0.46	B	**7.01**	mg/Kg-dry	1	10/05/2022 13:24	198356
Cobalt	NELAP	0.46		**1.20**	mg/Kg-dry	1	10/05/2022 13:24	198356
Lead	NELAP	1.39		**< 1.39**	mg/Kg-dry	1	10/05/2022 13:24	198356
Lithium	NELAP	0.46		**2.27**	mg/Kg-dry	1	10/05/2022 13:24	198356
Molybdenum	NELAP	0.93	J	**0.56**	mg/Kg-dry	1	10/05/2022 13:24	198356
Selenium	NELAP	3.70		**< 3.70**	mg/Kg-dry	1	10/05/2022 13:24	198356
Thallium	NELAP	4.63		**< 4.63**	mg/Kg-dry	1	10/05/2022 13:24	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.011		**< 0.011**	mg/Kg-dry	1	10/04/2022 16:33	198345

Client: Ramboll
Work Order: 22091779
Client Project: Baldwin
Report Date: 10-Oct-22
Lab ID: 22091779-018
Client Sample ID: XPW04 (14.5-16.5)
Matrix: SOLID
Collection Date: 09/24/2022 16:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**19.9**	%	1	09/30/2022 18:28	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	4.90		**< 4.90**	mg/Kg-dry	1	10/03/2022 19:01	184562
Arsenic	NELAP	2.27		**< 2.27**	mg/Kg-dry	1	10/05/2022 13:25	198356
Barium	NELAP	0.45		**5.69**	mg/Kg-dry	1	10/05/2022 13:25	198356
Beryllium	NELAP	0.05		**0.05**	mg/Kg-dry	1	10/05/2022 13:25	198356
Boron	NELAP	1.82		**2.40**	mg/Kg-dry	1	10/05/2022 13:25	198356
Cadmium	NELAP	0.18		**< 0.18**	mg/Kg-dry	1	10/05/2022 13:25	198356
Chromium	NELAP	0.45	B	**1.88**	mg/Kg-dry	1	10/05/2022 13:25	198356
Cobalt	NELAP	0.45		**< 0.45**	mg/Kg-dry	1	10/05/2022 13:25	198356
Lead	NELAP	1.36		**< 1.36**	mg/Kg-dry	1	10/05/2022 13:25	198356
Lithium	NELAP	0.45		**0.46**	mg/Kg-dry	1	10/05/2022 13:25	198356
Molybdenum	NELAP	0.91		**< 0.91**	mg/Kg-dry	1	10/05/2022 13:25	198356
Selenium	NELAP	3.64		**< 3.64**	mg/Kg-dry	1	10/05/2022 13:25	198356
Thallium	NELAP	4.55		**< 4.55**	mg/Kg-dry	1	10/05/2022 13:25	198356
Sample result for Cr exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 7471B								
Mercury	NELAP	0.012		**< 0.012**	mg/Kg-dry	1	10/04/2022 16:35	198345

Client: Ramboll
Work Order: 22091779
Client Project: Baldwin
Report Date: 10-Oct-22
Lab ID: 22091779-019
Client Sample ID: EB-04
Matrix: AQUEOUS
Collection Date: 09/24/2022 18:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/04/2022 18:27	198257
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:27	198257
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:27	198257
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/04/2022 18:27	198257
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:27	198257
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 11:49	198257
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/04/2022 18:27	198257
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:41	198357

Laboratory Results

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Client: Ramboll
Work Order: 22091779
Client Project: Baldwin
Report Date: 10-Oct-22
Lab ID: 22091779-020
Client Sample ID: MW394 (20.5-22)
Matrix: SOLID
Collection Date: 09/25/2022 16:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA SW846 3550B, 5035A, ASTM D2974								
Percent Moisture	*	0.1		**8.2**	%	1	09/30/2022 18:29	R318856
SW-846 3050B, 6010B, METALS BY ICP								
Antimony	NELAP	5.0	J	**3.1**	mg/Kg-dry	1	10/05/2022 15:41	182336
Arsenic	NELAP	2.36		**11.3**	mg/Kg-dry	1	10/05/2022 17:13	198379
Barium	NELAP	0.47		**494**	mg/Kg-dry	1	10/05/2022 17:13	198379
Beryllium	NELAP	0.05		**0.65**	mg/Kg-dry	1	10/05/2022 17:13	198379
Boron	NELAP	1.9	J	**1.4**	mg/Kg-dry	1	10/05/2022 17:13	198379
Cadmium	NELAP	0.19		**0.85**	mg/Kg-dry	1	10/05/2022 17:13	198379
Chromium	NELAP	0.47		**19.4**	mg/Kg-dry	1	10/05/2022 17:13	198379
Cobalt	NELAP	0.47		**16.3**	mg/Kg-dry	1	10/05/2022 17:13	198379
Lead	NELAP	1.42		**13.7**	mg/Kg-dry	1	10/05/2022 17:13	198379
Lithium	NELAP	0.47		**5.47**	mg/Kg-dry	1	10/05/2022 17:13	198379
Molybdenum	NELAP	0.94		**7.32**	mg/Kg-dry	1	10/05/2022 17:13	198379
Selenium	NELAP	3.77		**< 3.77**	mg/Kg-dry	1	10/05/2022 17:13	198379
Thallium	NELAP	4.7	J	**1.3**	mg/Kg-dry	1	10/05/2022 17:13	198379
SW-846 7471B								
Mercury	NELAP	0.010	J	**0.008**	mg/Kg-dry	1	10/05/2022 13:59	198346

Client: Ramboll | **Work Order:** 22091779

Client Project: Baldwin | **Report Date:** 10-Oct-22

Lab ID: 22091779-021 | **Client Sample ID:** EB-05

Matrix: AQUEOUS | **Collection Date:** 09/25/2022 17:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/04/2022 18:33	198257
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:33	198257
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:33	198257
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/04/2022 18:33	198257
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:33	198257
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 11:55	198257
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/04/2022 18:33	198257
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:48	198357

Client: Ramboll

Client Project: Baldwin

Lab ID: 22091779-022

Matrix: AQUEOUS

Work Order: 22091779

Report Date: 10-Oct-22

Client Sample ID: EB-06

Collection Date: 09/26/2022 17:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Barium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/04/2022 18:40	198257
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Chromium	NELAP	0.0015	J	**0.0008**	mg/L	5	10/04/2022 18:40	198257
Cobalt	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:40	198257
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/04/2022 18:40	198257
Molybdenum	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:40	198257
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 12:01	198257
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/04/2022 18:40	198257
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:50	198357

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll **Work Order:** 22091779
Client Project: Baldwin **Report Date:** 10-Oct-22
Lab ID: 22091779-023 **Client Sample ID:** EB-07
Matrix: AQUEOUS **Collection Date:** 09/28/2022 17:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	S	**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Arsenic	NELAP	0.0010	S	**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Barium	NELAP	0.0010	B	**< 0.0010**	mg/L	5	10/05/2022 12:26	198258
Beryllium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Boron	NELAP	0.0250		**< 0.0250**	mg/L	5	10/04/2022 18:46	198258
Cadmium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Chromium	NELAP	0.0015		**< 0.0015**	mg/L	5	10/04/2022 18:46	198258
Cobalt	NELAP	0.0010	S	**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Lead	NELAP	0.0010		**< 0.0010**	mg/L	5	10/04/2022 18:46	198258
Lithium	*	0.0030		**< 0.0030**	mg/L	5	10/04/2022 18:46	198258
Molybdenum	NELAP	0.0015	S	**< 0.0015**	mg/L	5	10/04/2022 18:46	198258
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	10/05/2022 12:26	198258
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	10/04/2022 18:46	198258

Contamination present in the MBLK for for Ba. Sample results below the reporting limit are reportable per the TNI Standard.
Matrix spike recovered outside upper control limits for Sb, As, Co, and Mo. Sample results are below the reporting limit. Data is reportable.

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	10/05/2022 9:53	198357

Teklab, Inc. Environmental Laboratory

Sample Summary

http://www.teklabinc.com/

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
22091779-001	XPW06 (5-7)	Solid	1	09/22/2022 11:50
22091779-002	XPW06 (7-9)	Solid	1	09/22/2022 11:20
22091779-003	EB-02	Aqueous	1	09/22/2022 17:30
22091779-004	XPW01 (8-10)	Solid	1	09/23/2022 14:05
22091779-005	XPW01 (1.3-3.2)	Solid	1	09/23/2022 14:00
22091779-006	XPW01 (11-12)	Solid	1	09/23/2022 14:30
22091779-007	EB03	Aqueous	1	09/23/2022 17:20
22091779-008	XPW05 (5-7)	Solid	1	09/24/2022 12:15
22091779-009	XPW05 (12-13)	Solid	1	09/24/2022 12:20
22091779-010	XPW05 (22-24)	Solid	1	09/24/2022 12:25
22091779-011	XPW05 (26.2-28.2)	Solid	1	09/24/2022 12:30
22091779-012	Dup-01	Solid	1	09/24/2022 12:35
22091779-013	XPW02 (2-3)	Solid	1	09/24/2022 14:00
22091779-014	XPW02 (5-7)	Solid	1	09/24/2022 14:10
22091779-015	XPW02 (9-11)	Solid	1	09/24/2022 14:15
22091779-016	XPW04 (3-5)	Solid	1	09/24/2022 16:00
22091779-017	XPW04 (8-10)	Solid	1	09/24/2022 16:15
22091779-018	XPW04 (14.5-16.5)	Solid	1	09/24/2022 16:30
22091779-019	EB-04	Aqueous	1	09/24/2022 18:00
22091779-020	MW394 (20.5-22)	Solid	2	09/25/2022 16:00
22091779-021	EB-05	Aqueous	1	09/25/2022 17:30
22091779-022	EB-06	Aqueous	1	09/26/2022 17:00
22091779-023	EB-07	Aqueous	1	09/28/2022 17:00

Dates Report

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
22091779-001A	XPW06 (5-7)	09/22/2022 11:50	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:20
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 14:57
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:51
	SW-846 7471B			10/04/2022 10:46	10/04/2022 15:45
22091779-002A	XPW06 (7-9)	09/22/2022 11:20	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:21
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 14:59
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:52
	SW-846 7471B			10/04/2022 10:46	10/04/2022 15:52
22091779-003A	EB-02	09/22/2022 17:30	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/04/2022 17:12
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/05/2022 10:59
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/06/2022 14:12
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:37
22091779-004A	XPW01 (8-10)	09/23/2022 14:05	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:21
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:00
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:54
	SW-846 7471B			10/04/2022 10:46	10/04/2022 15:54
22091779-005A	XPW01 (1.3-3.2)	09/23/2022 14:00	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:22
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:03
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:03
	SW-846 7471B			10/04/2022 10:46	10/04/2022 15:57
22091779-006A	XPW01 (11-12)	09/23/2022 14:30	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:22
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:08
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:05
	SW-846 7471B			10/04/2022 10:46	10/04/2022 15:59
22091779-007A	EB03	09/23/2022 17:20	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/04/2022 18:21
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/05/2022 11:43
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:39
22091779-008A	XPW05 (5-7)	09/24/2022 12:15	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:23
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:22

Teklab, Inc. Environmental Laboratory

Dates Report

http://www.teklabinc.com/

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:56
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:01
22091779-009A	XPW05 (12-13)	09/24/2022 12:20	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:24
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:05
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:57
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:06
22091779-010A	XPW05 (22-24)	09/24/2022 12:25	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:25
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:06
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 16:59
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:08
22091779-011A	XPW05 (26.2-28.2)	09/24/2022 12:30	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:08
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 17:01
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:10
22091779-012A	Dup-01	09/24/2022 12:35	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:24
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:09
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:12
22091779-013A	XPW02 (2-3)	09/24/2022 14:00	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:25
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:11
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:15
22091779-014A	XPW02 (5-7)	09/24/2022 14:10	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:20
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:21
22091779-015A	XPW02 (9-11)	09/24/2022 14:15	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:27
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:32
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 17:15
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/06/2022 9:29

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/06/2022 10:48
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:24
22091779-016A	XPW04 (3-5)	09/24/2022 16:00	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:28
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:29
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:22
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 15:30
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:30
22091779-017A	XPW04 (8-10)	09/24/2022 16:15	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:28
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 18:30
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:24
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:33
22091779-018A	XPW04 (14.5-16.5)	09/24/2022 16:30	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:28
	SW-846 3050B, 6010B, Metals by ICP			09/30/2022 8:50	10/03/2022 19:01
	SW-846 3050B, 6010B, Metals by ICP			10/04/2022 14:10	10/05/2022 13:25
	SW-846 7471B			10/04/2022 10:46	10/04/2022 16:35
22091779-019A	EB-04	09/24/2022 18:00	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/04/2022 18:27
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/05/2022 11:49
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:41
22091779-020A	MW394 (20.5-22)	09/25/2022 16:00	09/28/2022 18:00		
	EPA SW846 3550B, 5035A, ASTM D2974				09/30/2022 18:29
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:51	10/05/2022 15:41
	SW-846 3050B, 6010B, Metals by ICP			10/05/2022 6:39	10/05/2022 17:13
	SW-846 7471B			10/05/2022 11:42	10/05/2022 13:59
22091779-021A	EB-05	09/25/2022 17:30	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/04/2022 18:33
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/05/2022 11:55
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:48
22091779-022A	EB-06	09/26/2022 17:00	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/04/2022 18:40
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:12	10/05/2022 12:01
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:50
22091779-023A	EB-07	09/28/2022 17:00	09/28/2022 18:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:16	10/04/2022 18:46

Teklab, Inc. Environmental Laboratory

Dates Report

http://www.teklabinc.com/

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Total)			09/30/2022 17:16	10/05/2022 12:26
	SW-846 7470A (Total)			10/04/2022 14:19	10/05/2022 9:53

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin
Work Order: 22091779
Report Date: 10-Oct-22

EPA SW846 3550B, 5035A, ASTM D2974

Batch R318856 **SampType:** LCS Units **%**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	09/30/2022

Batch R318856 **SampType:** LCSQC Units **%**
SampID: LCSQC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Percent Moisture	*	0.1		**99.0**	99.00	0	100.0	90	110	09/30/2022

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

Batch 198257 **SampType:** MBLK Units **mg/L**
SampID: MBLK-198257

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**< 0.0010**	0.0004	0	0	-100	100	10/04/2022
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	10/04/2022
Barium		0.0010		**< 0.0010**	0.0007	0	0	-100	100	10/04/2022
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	10/04/2022
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	10/04/2022
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	10/04/2022
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	10/04/2022
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	10/04/2022
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	10/04/2022
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	10/04/2022
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	10/04/2022
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	10/05/2022
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	10/04/2022

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

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

Batch 198257 **SampType:** LCS Units **mg/L**

SampID: LCS-198257

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.552**	0.5000	0	110.3	80	120	10/04/2022
Arsenic		0.0010		**0.547**	0.5000	0	109.5	80	120	10/04/2022
Barium		0.0010		**2.14**	2.000	0	106.8	80	120	10/04/2022
Beryllium		0.0010		**0.0491**	0.0500	0	98.2	80	120	10/04/2022
Boron		0.0250		**0.513**	0.5000	0	102.6	80	120	10/04/2022
Cadmium		0.0010		**0.0514**	0.0500	0	102.8	80	120	10/04/2022
Chromium		0.0015		**0.206**	0.2000	0	103.2	80	120	10/04/2022
Cobalt		0.0010		**0.527**	0.5000	0	105.5	80	120	10/04/2022
Lead		0.0010		**0.522**	0.5000	0	104.5	80	120	10/04/2022
Lithium	*	0.0030		**0.512**	0.5000	0	102.4	80	120	10/04/2022
Molybdenum		0.0015		**0.549**	0.5000	0	109.8	80	120	10/04/2022
Selenium		0.0010		**0.480**	0.5000	0	96.0	80	120	10/05/2022
Thallium		0.0020		**0.255**	0.2500	0	102.2	80	120	10/04/2022

Batch 198257 **SampType:** MS Units **mg/L**

SampID: 22091779-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.466**	0.5000	0	93.2	75	125	10/05/2022
Arsenic		0.0010		**0.485**	0.5000	0	97.0	75	125	10/05/2022
Barium		0.0010		**1.87**	2.000	0	93.3	75	125	10/05/2022
Beryllium		0.0010		**0.0445**	0.0500	0	89.0	75	125	10/05/2022
Boron		0.0250		**0.465**	0.5000	0	93.0	75	125	10/05/2022
Cadmium		0.0010		**0.0445**	0.0500	0	88.9	75	125	10/05/2022
Chromium		0.0015		**0.184**	0.2000	0	91.8	75	125	10/06/2022
Cobalt		0.0010		**0.478**	0.5000	0	95.6	75	125	10/05/2022
Lead		0.0010		**0.489**	0.5000	0	97.8	75	125	10/05/2022
Lithium	*	0.0030		**0.473**	0.5000	0	94.6	75	125	10/05/2022
Molybdenum		0.0015		**0.454**	0.5000	0	90.9	75	125	10/05/2022
Selenium		0.0010		**0.438**	0.5000	0	87.6	75	125	10/05/2022
Thallium		0.0020		**0.208**	0.2500	0	83.2	75	125	10/05/2022

Client: Ramboll **Work Order:** 22091779

Client Project: Baldwin **Report Date:** 10-Oct-22

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

Batch 198257 **SampType:** MSD Units mg/L RPD Limit: 20

SampID: 22091779-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.523**	0.5000	0	104.7	0.4661	11.57	10/05/2022
Arsenic		0.0010		**0.506**	0.5000	0	101.2	0.4852	4.18	10/05/2022
Barium		0.0010		**2.03**	2.000	0	101.5	1.867	8.40	10/05/2022
Beryllium		0.0010		**0.0501**	0.0500	0	100.2	0.04448	11.90	10/05/2022
Boron		0.0250		**0.502**	0.5000	0	100.5	0.4648	7.76	10/05/2022
Cadmium		0.0010		**0.0492**	0.0500	0	98.4	0.04447	10.11	10/05/2022
Chromium		0.0015		**0.192**	0.2000	0	96.0	0.1835	4.52	10/06/2022
Cobalt		0.0010		**0.511**	0.5000	0	102.1	0.4781	6.55	10/05/2022
Lead		0.0010		**0.498**	0.5000	0	99.6	0.4891	1.83	10/05/2022
Lithium	*	0.0030		**0.521**	0.5000	0	104.3	0.4729	9.75	10/05/2022
Molybdenum		0.0015		**0.483**	0.5000	0	96.6	0.4543	6.10	10/05/2022
Selenium		0.0010		**0.467**	0.5000	0	93.4	0.4382	6.39	10/05/2022
Thallium		0.0020		**0.231**	0.2500	0	92.4	0.2081	10.44	10/05/2022

Batch 198258 **SampType:** MBLK Units mg/L

SampID: MBLK-198258

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**< 0.0010**	0.0004	0	0	-100	100	10/04/2022
Arsenic		0.0010		**< 0.0010**	0.0004	0	0	-100	100	10/04/2022
Barium		0.0010	S	**0.0020**	0.0007	0	292.9	-100	100	10/05/2022
Beryllium		0.0010		**< 0.0010**	0.0002	0	0	-100	100	10/04/2022
Boron		0.0250		**< 0.0250**	0.0093	0	0	-100	100	10/04/2022
Cadmium		0.0010		**< 0.0010**	0.0001	0	0	-100	100	10/04/2022
Chromium		0.0015		**< 0.0015**	0.0007	0	0	-100	100	10/04/2022
Cobalt		0.0010		**< 0.0010**	0.0001	0	0	-100	100	10/04/2022
Lead		0.0010		**< 0.0010**	0.0006	0	0	-100	100	10/04/2022
Lithium	*	0.0030		**< 0.0030**	0.0015	0	0	-100	100	10/04/2022
Molybdenum		0.0015		**< 0.0015**	0.0006	0	0	-100	100	10/04/2022
Selenium		0.0010		**< 0.0010**	0.0006	0	0	-100	100	10/05/2022
Thallium		0.0020		**< 0.0020**	0.0010	0	0	-100	100	10/04/2022

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

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

Batch 198258 **SampType:** LCS Units **mg/L**

SampID: LCS-198258

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010		**0.490**	0.5000	0	98.0	85	115	10/04/2022
Arsenic		0.0010		**0.504**	0.5000	0	100.8	85	115	10/04/2022
Barium		0.0010	B	**1.92**	2.000	0	96.1	85	115	10/05/2022
Beryllium		0.0010		**0.0456**	0.0500	0	91.2	85	115	10/04/2022
Boron		0.0250		**0.472**	0.5000	0	94.5	85	115	10/04/2022
Cadmium		0.0010		**0.0456**	0.0500	0	91.3	85	115	10/04/2022
Chromium		0.0015		**0.194**	0.2000	0	96.8	85	115	10/04/2022
Cobalt		0.0010		**0.536**	0.5000	0	107.3	85	115	10/04/2022
Lead		0.0010		**0.487**	0.5000	0	97.4	85	115	10/04/2022
Lithium	*	0.0030		**0.463**	0.5000	0	92.7	85	115	10/04/2022
Molybdenum		0.0015		**0.492**	0.5000	0	98.4	85	115	10/04/2022
Selenium		0.0010		**0.455**	0.5000	0	90.9	85	115	10/05/2022
Thallium		0.0020		**0.232**	0.2500	0	92.9	85	115	10/04/2022

Batch 198258 **SampType:** MS Units **mg/L**

SampID: 22091779-023AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		0.0010	S	**0.658**	0.5000	0	131.7	75	125	10/04/2022
Arsenic		0.0010	S	**0.636**	0.5000	0	127.1	75	125	10/04/2022
Barium		0.0010	B	**1.91**	2.000	0	95.5	75	125	10/05/2022
Beryllium		0.0010		**0.0567**	0.0500	0	113.4	75	125	10/04/2022
Boron		0.0250		**0.559**	0.5000	0	111.9	75	125	10/04/2022
Cadmium		0.0010		**0.0618**	0.0500	0	123.5	75	125	10/04/2022
Chromium		0.0015		**0.247**	0.2000	0	123.4	75	125	10/04/2022
Cobalt		0.0010	S	**0.653**	0.5000	0	130.6	75	125	10/04/2022
Lead		0.0010		**0.620**	0.5000	0	124.0	75	125	10/04/2022
Lithium	*	0.0030		**0.575**	0.5000	0	114.9	75	125	10/04/2022
Molybdenum		0.0015	S	**0.642**	0.5000	0	128.5	75	125	10/04/2022
Selenium		0.0010		**0.445**	0.5000	0	89.0	75	125	10/05/2022
Thallium		0.0020		**0.299**	0.2500	0	119.6	75	125	10/04/2022

Quality Control Results

Teklab, Inc. Environmental Laboratory

http://www.teklabinc.com/

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

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

Batch 198258 **SampType:** MSD Units **mg/L** RPD Limit: **20**

SampID: 22091779-023AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		0.0010		**0.596**	0.5000	0	119.2	0.6585	9.96	10/04/2022
Arsenic		0.0010		**0.591**	0.5000	0	118.2	0.6357	7.26	10/04/2022
Barium		0.0010	B	**1.86**	2.000	0	93.2	1.909	2.36	10/05/2022
Beryllium		0.0010		**0.0534**	0.0500	0	106.7	0.05670	6.07	10/04/2022
Boron		0.0250		**0.527**	0.5000	0	105.4	0.5594	5.95	10/04/2022
Cadmium		0.0010		**0.0581**	0.0500	0	116.3	0.06175	6.03	10/04/2022
Chromium		0.0015		**0.220**	0.2000	0	110.1	0.2469	11.41	10/04/2022
Cobalt		0.0010		**0.604**	0.5000	0	120.7	0.6532	7.89	10/04/2022
Lead		0.0010		**0.569**	0.5000	0	113.9	0.6201	8.53	10/04/2022
Lithium	*	0.0030		**0.549**	0.5000	0	109.8	0.5746	4.54	10/04/2022
Molybdenum		0.0015		**0.573**	0.5000	0	114.5	0.6423	11.45	10/04/2022
Selenium		0.0010		**0.451**	0.5000	0	90.1	0.4452	1.20	10/05/2022
Thallium		0.0020		**0.287**	0.2500	0	114.9	0.2991	4.05	10/04/2022

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

Batch 182336 **SampType:** MBLK Units **mg/Kg-dry**

SampID: MBLK-182336

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		5.00		< **5.00**	1.230	0	0	-100	100	10/05/2022

Batch 182336 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-182336

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		5.00		**102**	100.0	0	102.1	85	115	10/05/2022

Batch 182336 **SampType:** MS Units **mg/Kg-dry**

SampID: 22091779-015AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		4.81		**101**	96.15	3.840	100.9	75	125	10/05/2022

Batch 182336 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **20**

SampID: 22091779-015AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		4.81		**100**	96.15	3.840	100.4	100.9	0.50	10/05/2022

Teklab, Inc. Environmental Laboratory

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

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

Batch 184562 **SampType:** MS Units **mg/Kg-dry**
SampID: 22091779-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		4.81		**50.0**	48.08	0	104.0	75	125	10/03/2022

Batch 184562 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **20**
SampID: 22091779-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		4.81		**48.5**	48.08	0	100.9	50.00	3.05	10/03/2022

Batch 198356 **SampType:** MBLK Units **mg/Kg-dry**
SampID: MBLK-198356

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**< 2.50**	0.9700	0	0	-100	100	10/05/2022
Barium		0.50		**< 0.50**	0.1700	0	0	-100	100	10/05/2022
Beryllium		0.05		**< 0.05**	0.0410	0	0	-100	100	10/05/2022
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	10/05/2022
Cadmium		0.20		**< 0.20**	0.0500	0	0	-100	100	10/05/2022
Chromium		0.50	S	**1.27**	0.2300	0	552.2	-100	100	10/05/2022
Cobalt		0.50		**< 0.50**	0.1900	0	0	-100	100	10/05/2022
Lead		1.50		**< 1.50**	0.5900	0	0	-100	100	10/05/2022
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	10/05/2022
Molybdenum		1.00		**< 1.00**	0.5000	0	0	-100	100	10/05/2022
Selenium		4.00		**< 4.00**	1.680	0	0	-100	100	10/05/2022
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	10/05/2022

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

Batch 198356 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-198356

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**52.7**	50.00	0	105.5	85	115	10/05/2022
Barium		0.50		**202**	200.0	0	101.0	85	115	10/05/2022
Beryllium		0.05		**5.20**	5.000	0	104.0	85	115	10/05/2022
Boron		2.00		**49.5**	50.00	0	99.0	85	115	10/05/2022
Cadmium		0.20		**4.89**	5.000	0	97.8	85	115	10/05/2022
Chromium		0.50	B	**20.7**	20.00	0	103.4	85	115	10/05/2022
Cobalt		0.50		**51.4**	50.00	0	102.8	85	115	10/05/2022
Lead		1.50		**50.0**	50.00	0	99.9	85	115	10/05/2022
Lithium		0.50		**50.0**	50.00	0	100.0	85	115	10/05/2022
Molybdenum		1.00		**49.3**	50.00	0	98.7	85	115	10/05/2022
Selenium		4.00		**47.7**	50.00	0	95.5	85	115	10/05/2022
Thallium		5.00		**24.9**	25.00	0	99.7	85	115	10/05/2022

Batch 198356 **SampType:** MS Units **mg/Kg-dry**

SampID: 22091779-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.36		**51.2**	47.17	0	108.6	75	125	10/05/2022
Barium		0.47		**201**	188.7	6.991	102.8	75	125	10/05/2022
Beryllium		0.05		**5.15**	4.717	0.1019	107.0	75	125	10/05/2022
Boron		1.89		**59.6**	47.17	5.731	114.1	75	125	10/05/2022
Cadmium		0.19		**4.89**	4.717	0	103.6	75	125	10/05/2022
Chromium		0.47	B	**25.6**	18.87	5.019	109.3	75	125	10/05/2022
Cobalt		0.47		**49.6**	47.17	0.5648	104.0	75	125	10/05/2022
Lead		1.42		**48.7**	47.17	0.7778	101.5	75	125	10/05/2022
Lithium		0.47		**48.6**	47.17	0.7130	101.6	75	125	10/05/2022
Molybdenum		0.94		**48.5**	47.17	1.861	98.9	75	125	10/05/2022
Selenium		3.77		**49.4**	47.17	2.963	98.4	75	125	10/05/2022
Thallium		4.72		**23.3**	23.58	0	98.9	75	125	10/05/2022

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll **Work Order:** 22091779
Client Project: Baldwin **Report Date:** 10-Oct-22

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

Batch 198356 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **20**
SampID: 22091779-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		2.31		**50.2**	46.30	0	108.4	51.22	2.05	10/05/2022
Barium		0.46		**199**	185.2	6.991	103.7	200.9	0.93	10/05/2022
Beryllium		0.05		**5.06**	4.630	0.1019	107.0	5.151	1.87	10/05/2022
Boron		1.85		**58.4**	46.30	5.731	113.7	59.56	2.04	10/05/2022
Cadmium		0.19		**4.69**	4.630	0	101.4	4.887	4.02	10/05/2022
Chromium		0.46	B	**28.1**	18.52	5.019	124.8	25.64	9.25	10/05/2022
Cobalt		0.46		**48.4**	46.30	0.5648	103.3	49.64	2.59	10/05/2022
Lead		1.39		**48.1**	46.30	0.7778	102.1	48.67	1.27	10/05/2022
Lithium		0.46		**47.4**	46.30	0.7130	100.8	48.64	2.65	10/05/2022
Molybdenum		0.93		**48.3**	46.30	1.861	100.2	48.51	0.50	10/05/2022
Selenium		3.70		**51.5**	46.30	2.963	104.9	49.38	4.23	10/05/2022
Thallium		4.63		**22.6**	23.15	0	97.8	23.33	3.01	10/05/2022

Batch 198379 **SampType:** MBLK Units **mg/Kg-dry**
SampID: MBLK-198379

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**< 2.50**	0.9700	0	0	-100	100	10/05/2022
Barium		0.50		**< 0.50**	0.1700	0	0	-100	100	10/05/2022
Beryllium		0.05		**< 0.05**	0.0400	0	0	-100	100	10/05/2022
Boron		2.00		**< 2.00**	0.8600	0	0	-100	100	10/05/2022
Cadmium		0.20		**< 0.20**	0.0500	0	0	-100	100	10/05/2022
Chromium		0.50		**< 0.50**	0.2300	0	0	-100	100	10/05/2022
Cobalt		0.50		**< 0.50**	0.1900	0	0	-100	100	10/05/2022
Lead		1.50		**< 1.50**	0.5900	0	0	-100	100	10/05/2022
Lithium		0.50		**< 0.50**	0.1500	0	0	-100	100	10/05/2022
Molybdenum		1.00		**< 1.00**	0.5000	0	0	-100	100	10/05/2022
Selenium		4.00		**< 4.00**	1.680	0	0	-100	100	10/05/2022
Thallium		5.00		**< 5.00**	0.7600	0	0	-100	100	10/05/2022

Client: Ramboll

Client Project: Baldwin

Work Order: 22091779

Report Date: 10-Oct-22

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

Batch 198379 **SampType:** LCS Units **mg/Kg-dry**

SampID: LCS-198379

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**111**	100.0	0	111.2	85	115	10/05/2022
Barium		0.50		**414**	400.0	0	103.5	85	115	10/05/2022
Beryllium		0.05		**11.0**	10.00	0	109.9	85	115	10/05/2022
Boron		2.00		**103**	100.0	0	102.8	85	115	10/05/2022
Cadmium		0.20		**10.5**	10.00	0	104.8	85	115	10/05/2022
Chromium		0.50		**42.2**	40.00	0	105.6	85	115	10/05/2022
Cobalt		0.50		**107**	100.0	0	106.9	85	115	10/05/2022
Lead		1.50		**105**	100.0	0	105.0	85	115	10/05/2022
Lithium		0.50		**103**	100.0	0	103.0	85	115	10/05/2022
Molybdenum		1.00		**103**	100.0	0	102.7	85	115	10/05/2022
Selenium		4.00		**101**	100.0	0	101.0	85	115	10/05/2022
Thallium		5.00		**50.7**	50.00	0	101.5	85	115	10/05/2022

Batch 198379 **SampType:** MS Units **mg/Kg-dry**

SampID: 22091779-015AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		2.50		**108**	100.0	1.259	106.5	75	125	10/05/2022
Barium		0.50		**454**	400.0	57.81	99.0	75	125	10/05/2022
Beryllium		0.05		**11.4**	10.00	0.7593	106.7	75	125	10/05/2022
Boron		2.00		**182**	100.0	69.29	113.1	75	125	10/05/2022
Cadmium		0.20		**10.4**	10.00	0.2778	101.6	75	125	10/06/2022
Chromium		0.50		**53.8**	40.00	11.59	105.5	75	125	10/05/2022
Cobalt		0.50		**105**	100.0	1.972	102.9	75	125	10/05/2022
Lead		1.50		**103**	100.0	2.102	101.3	75	125	10/05/2022
Lithium		0.50		**115**	100.0	3.417	111.6	75	125	10/06/2022
Molybdenum		1.00		**102**	100.0	2.593	99.0	75	125	10/05/2022
Selenium		4.00		**98.0**	100.0	0	98.0	75	125	10/05/2022
Thallium		5.00		**49.8**	50.00	0	99.7	75	125	10/05/2022

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

Batch 198379 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **20**
SampID: 22091779-015AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		2.36		**97.0**	94.34	1.259	101.5	107.8	10.55	10/05/2022
Barium		0.47		**405**	377.4	57.81	91.9	454.0	11.48	10/05/2022
Beryllium		0.05		**10.2**	9.434	0.7593	100.4	11.43	11.12	10/05/2022
Boron		1.89		**150**	94.34	69.29	86.0	182.4	19.25	10/05/2022
Cadmium		0.19		**9.76**	9.434	0.2778	100.6	10.44	6.69	10/06/2022
Chromium		0.47		**47.2**	37.74	11.59	94.4	53.80	13.03	10/05/2022
Cobalt		0.47		**94.2**	94.34	1.972	97.8	104.8	10.68	10/05/2022
Lead		1.42		**92.9**	94.34	2.102	96.2	103.4	10.70	10/05/2022
Lithium		0.47		**107**	94.34	3.417	109.4	115.0	7.58	10/06/2022
Molybdenum		0.94		**90.6**	94.34	2.593	93.3	101.6	11.38	10/05/2022
Selenium		3.77		**87.8**	94.34	0	93.0	98.05	11.07	10/05/2022
Thallium		4.72		**44.8**	47.17	0	94.9	49.83	10.69	10/05/2022

SW-846 7470A (TOTAL)

Batch 198357 **SampType:** MBLK Units **mg/L**
SampID: MBLK-198357

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		< **0.00020**	0.0001	0	0	-100	100	10/05/2022

Batch 198357 **SampType:** LCS Units **mg/L**
SampID: LCS-198357

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00499**	0.0050	0	99.7	85	115	10/05/2022

Batch 198357 **SampType:** MS Units **mg/L**
SampID: 22091779-019AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.00020		**0.00482**	0.0050	0	96.5	75	125	10/05/2022

Batch 198357 **SampType:** MSD Units **mg/L** RPD Limit: **15**
SampID: 22091779-019AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.00020		**0.00496**	0.0050	0	99.1	0.004825	2.70	10/05/2022

SW-846 7471B

Batch 198345 **SampType:** MBLK Units **mg/Kg**

SampID: MBLK-198345

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		< **0.010**	0.0045	0	0	-100	100	10/04/2022

Batch 198345 **SampType:** LCS Units **mg/Kg**

SampID: LCS-198345

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.250**	0.2500	0	99.9	85	115	10/04/2022

Batch 198345 **SampType:** MS Units **mg/Kg-dry**

SampID: 22091779-015AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.011		**0.274**	0.2761	0	99.4	75	125	10/04/2022

Batch 198345 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **15**

SampID: 22091779-015AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.011		**0.271**	0.2761	0	98.0	0.2745	1.45	10/04/2022

Batch 198346 **SampType:** MBLK Units **mg/Kg**

SampID: MBLK-198346

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		< **0.010**	0.0045	0	0	-100	100	10/05/2022

Batch 198346 **SampType:** LCS Units **mg/Kg**

SampID: LCS-198346

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.241**	0.2500	0	96.2	85	115	10/05/2022

Batch 198346 **SampType:** MS Units **mg/Kg-dry**

SampID: 22091779-020AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.010		**0.270**	0.2624	0.007583	100.2	75	125	10/05/2022

Batch 198346 **SampType:** MSD Units **mg/Kg-dry** RPD Limit: **15**

SampID: 22091779-020AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.010		**0.264**	0.2624	0.007583	97.9	0.2704	2.23	10/05/2022

Teklab Inc. Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll
Client Project: Baldwin

Work Order: 22091779
Report Date: 10-Oct-22

Carrier: Evvan Plank

Received By: TWM

Completed by:
On:
29-Sep-22

Timothy W. Mathis

Reviewed by:
On:
29-Sep-22

Marvin L. Darling

Pages to follow: Chain of custody 3 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	4.4
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐
Chain of custody present?	Yes ☑	No ☐			
Chain of custody signed when relinquished and received?	Yes ☑	No ☐			
Chain of custody agrees with sample labels?	Yes ☐	No ☑			
Samples in proper container/bottle?	Yes ☑	No ☐			
Sample containers intact?	Yes ☑	No ☐			
Sufficient sample volume for indicated test?	Yes ☑	No ☐			
All samples received within holding time?	Yes ☑	No ☐			
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑		
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐			

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

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

pH strip #83484. - TMathis - 9/29/2022 8:41:22 AM

No samples containers were received for Dup-02. Client was notified via workorder summary. TWM 9/29/22

CHAIN OF CUSTODY

pg. 1 of 3 Work order # 22091779

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

Client: Ramboll
Address: 234 W. Florida St Fifth Floor, Milwaukee, WI 53204
City / State / Zip: Milwaukee, WI 53204
Contact: Andrew Hardwick Phone: (217) 494-2978
E-Mail: evvan.plank@ramboll.com Fax:

Samples on: ICE BLUE ICE NO ICE 4.4 °C LTG# 6

Preserved in: LAB FIELD **FOR LAB USE ONLY**

Lab Notes: ~~DM 8372~~ 83484
* NO SAMPLE RECEIVED FOR DUP-02

Client Comments:
Total Metals* = Part 845 List: 9. antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, and thallium

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No
Are these samples known to be hazardous? ☐ Yes ☐ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

Project Name/Number: Baldwin
Sample Collector's Name: Evvan Plank

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

Billing Instructions:

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	CEC	Chloride	Fluoride	Iron Oxide	Manganese Oxide	Ra226/228	Sulfate	TOC	Total Metals*	Total Nitrogen
22091779 001	XPW06 (5-7)	09/22/22 / 11:50	X										X												X	
002	XPW06 (7-9)	↓ / 11:20	X										X												X	
003	EB-02	↓ / 17:30		X							X														X	
004	XPW01 (8-10)	09/23/22 / 14:05	X										X												X	
005	XPW01 (1.3-3.2)	↓ / 14:00	X										X												X	
006	XPW01 (11-12)	↓ / 14:30	X										X												X	
007	EB03	↓ / 17:20		X							X														X	
008	XPW05 (5-7)	09/24/22 / 12:15	X										X												X	
009	XPW05 (12-13)	↓ / 12:20	X										X												X	
010	XPW05 (22-24)	↓ / 12:25	X										X												X	

Relinquished By	Date/Time	Received By	Date/Time
[signature]	09/28/22 / 18:00	[signature]	9-28-22 18:00

BottleOrder: 74894

CHAIN OF CUSTODY

 Work order # 22091779

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

Client: Ramboll
Address: 234 W. Florida St Fifth Floor, Milwaukee, WI 53204
City / State / Zip Milwaukee, WI 53204
Contact: Andrew Hardwick **Phone:** (217) 494-2978
E-Mail: evvan.plank@ramboll.com **Fax:**

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No
Are these samples known to be hazardous? ☐ Yes ☐ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

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

Client Comments:
Total Metals* = Part 845 List: 9. antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, and thallium

Project Name/Number: Baldwin
Sample Collector's Name: Evvan Plank

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

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	CEC	Chloride	Fluoride	Iron Oxide	Manganese Oxide	Ra226/228	Sulfate	TOC	Total Metals*	Total Nitrogen
011	XPW05(26.2-28.2)	09/24/22 / 12:30	X										X												X	
012	Dup-01	/ 12:35	X										X												X	
013	XPW02(2-3)	/ 14:00	X										X												X	
014	XPW02(5-7)	/ 14:10	X										X												X	
015	XPW02(9-11)	/ 14:15	X										X												X	
016	XPW04(3-5)	/ 16:00	X										X												X	
017	XPW04(8-10)	/ 16:15	X										X												X	
018	XPW04(14.5-16.5)	/ 16:30	X										X												X	
~~019~~	Dup-02 *	/ 16:35	X										X												X	
019 ~~020~~	EB-04	/ 18:00		X							X														X	

Relinquished By	Date/Time	Received By	Date/Time
[signature]	09/28/22 / 18:00	[signature]	9.28.22 1800

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

BottleOrder: 74894

CHAIN OF CUSTODY

pg. 3 of 3 Work order # 22091779

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

Client: Ramboll
Address: 234 W. Florida St Fifth Floor, Milwaukee, WI 53204
City / State / Zip Milwaukee, WI 53204
Contact: Andrew Hardwick **Phone:** (217) 494-2978
E-Mail: evvan.plank@ramboll.com **Fax:**

Are these samples known to be involved in litigation? If yes, a surcharge will apply ☐ Yes ☐ No
Are these samples known to be hazardous? ☐ Yes ☐ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

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

Client Comments:
Total Metals* = Part 845 List: 9. antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, and thallium

Project Name/Number: Baldwin
Sample Collector's Name: Evvan Plank

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

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	UNPRES	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	OTHER	Aqueous	Drinking Water	Soil	Sludge	Special Waste	Groundwater	CEC	Chloride	Fluoride	Iron Oxide	Manganese Oxide	Ra226/228	Sulfate	TOC	Total Metals*	Total Nitrogen
020	MW394(20.5-22)	09/25/22 / 16:00	X								~~X~~		X												X	
021	EB-05	09/25/22 / 17:30		X							X														X	
022	EB-06	09/26/22 / 17:00		X							X														X	
023	EB-07	09/28/22 / 17:00		X							X														X	

EGP 09/28/22

Relinquished By	Date/Time	Received By	Date/Time
[signature]	09/28/22 / 18:00	[signature]	9-28-22 1800

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

BottleOrder: 74894

Exhibit G

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397

JB PRITZKER, GOVERNOR **JAMES JENNINGS**, INTERIM DIRECTOR

217-782-1020

August 8, 2024

Phil Morris
Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Re: Baldwin Power Plant Bottom Ash Pond; W1578510001-06
Alternative Source Demonstration (ASD) Submittal

Dear Mr. Morris:

The purpose of this correspondence is to notify you that the Illinois Environmental Protection Agency (Illinois EPA) concurs with the Baldwin Power Plant Bottom Ash Pond Alternative Source Demonstration dated July 8, 2024.

Based on the provided evidence, the Illinois EPA concurs that the lithium exceedance found in MW-370 does not come from the Baldwin Power Plant Bottom Ash Pond. The Illinois EPA also concurs that the likely source of the exceedance come from shale bedrock. Therefore, the groundwater monitoring may continue in accordance with Section 845.650(e)(5). The ASD provided must be included in the annual groundwater monitoring report and the corrective action report as required by Section 845.610(e).

If you have any questions, please contact: **Heather Mullenax** Illinois EPA, Bureau of Water, Groundwater Section DPWS #13, P.O. Box 19276, Springfield, Illinois 62794-9276. If you have any questions concerning the investigation described above, please call 217-782-1020.

Sincerely,

Darin E. LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control
Illinois Environmental Protection Agency

cc: Heather Mullenax
Anwar Azeem
Records Files 06M - W1578510001-06

Exhibit H

DECLARATION OF MELINDA W. HAHN, PhD

In support of Dynegy Midwest Generation, LLC's Petition for Review of IEPA's non-concurrence with the Baldwin Bottom Ash Pond Alternative Source Demonstration and Request for Stay

I, Dr. Melinda W. Hahn, declare and state as follows:

1) I am an Environmental Engineer and Senior Managing Consultant with BBJ Group LLC. Provided as Attachment 1 is a true and accurate copy of my Curriculum Vitae.

2) I hold a PhD in Environmental Engineering from Johns Hopkins University. The focus of my research for my PhD dissertation was contaminant transport in porous media (e.g., groundwater).

3) My practice over my 25-year career includes site investigation and remediation in multiple state and federal programs, such as voluntary remediation, Resource Conservation and Recovery Act (RCRA) corrective action, and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action. My work in these programs includes contaminant fate and transport modelling, site investigation and remediation, and statistics and forensic

analysis of environmental contamination data. I have evaluated sites from many different industrial sectors with many different contaminants of concern, including volatile organic compounds (VOCs), which include chlorinated volatile organic compounds (CVOCs), semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and dioxins/furans.

4) To prepare this Declaration, I reviewed the following Dynegy Midwest Generation, LLC (DMG) documents for the Baldwin Bottom Ash Pond (BAP):

a) October 27, 2023 DMG Alternative Source Demonstration (ASD) Report for chloride and fluoride exceedances of their groundwater protection standards (GWPS);
b) November 28, 2023 IEPA concurrence letter for the ASD submitted on October 27, 2023;
c) July 9, 2024 DMG ASD Report for a lithium GWPS exceedance;
d) August 8, 2024 IEPA concurrence letter for the ASD submitted on July 9, 2024;
e) September 17, 2024 DMG ASD Report for a lithium GWPS exceedance;
f) October 3, 2024 IEPA denial letter for the ASD submitted on September 17, 2024; and
g) Supporting documents including the 2021 Hydrogeologic Characterization Report for the BAP.

I reviewed the documents submitted by DMG independently and was not personally involved in their preparation.

5) In October 2023, DMG submitted an ASD regarding GWPS exceedances at the Baldwin BAP identified in the 2nd Quarter 2023 sampling event of chloride and fluoride at downgradient monitoring wells MW-370 and MW-393 respectively. Both wells are screened in the bedrock aquifer that is the uppermost aquifer (UA) in the vicinity of the BAP. The 2023 ASD identified the natural variability of bedrock aquifer lithology as the source for the chloride and fluoride GWPS exceedances observed in the wells. The four lines of evidence (LOE) to support this conclusion were the following: 1) the highest reported concentrations reported for BAP porewater samples for chloride and fluoride are an order of magnitude lower than the maximum concentrations observed at MW-370 and MW-393, respectively, 2) statistical analyses, including principal component analysis (PCA) and nonmetric multidimensional scaling (NMDS), indicate that the geochemical signatures of MW-370 an MW-393 are similar to the geochemical signature of MW-358, the upgradient monitoring well, and dissimilar to the CCR porewater geochemical signature, 3) the stable boron isotopic ratios suggest downgradient locations are strongly influenced by the bedrock lithology and not the CCR in the BAP, and 4) site-specific solid phase extraction sampling and analysis determined that chloride and fluoride are naturally occurring minerals of the bedrock

(the uppermost aquifer, or UA, at the BAP). In November 2023, the Illinois EPA (IEPA) concurred with the conclusions of the October 2023 ASD[1].

6) The October 2023 ASD report relied on a multiple lines of evidence (MLE) approach that is standard practice in causal determinations in environmental forensic analysis, risk assessment, and site investigation.[2,3,4,5,6] The MLE approach involves analysis of multiple independent sets of data to test whether an identified source can explain observed data. Information to consider can be site-specific, regional, or from the literature.[7,8] These independent lines of evidence are developed until sufficient confidence is achieved to either confirm or rule out a source.[9]

7) In July 2024, DMG submitted an ASD report to address a GWPS exceedance of lithium from the 1st Quarter 2024 sampling event in bedrock UA

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1 Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. November 28, 2023.

2 Miller, J. Methods and Advances in the Forensic Analysis of Contaminated Rivers, E3S Web of Conferences Vol. 125, 2019, p. 3.

3 U.S. EPA, U.S. Navy SPAWAR Systems Center, GeoChem Metrix Inc., and Battelle Memorial Institute, A Handbook for Determining the Sources of PCB Contamination in Sediments, Technical Report, TR-NAVFAC EXWC-EV-1302, October 2012, p. 13.

4 U.S. EPA, Office of the Science Advisor, Risk Assessment Forum, Weight of Evidence in Ecological Assessment, EPA/100/R-16/001, December 2016.

5 U.S. EPA, Office of Solid Waste and Emergency Response, OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor in Indoor Air, June 2015, pp. xv-xvii, 17-18, 38-40, 60-61, 117-123.

6 EPRI, Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Sites, 2017 Technical Report, p. viii.

7 U.S. EPA, Office of the Science Advisor, Risk Assessment Forum, Weight of Evidence in Ecological Assessment, EPA/100/R-16/001, December 2016, p. 20 et seq.

8 U.S. EPA, U.S. Navy SPAWAR Systems Center, GeoChem Metrix Inc., and Battelle Memorial Institute, A Handbook for Determining the Sources of PCB Contamination in Sediments, Technical Report, TR-NAVFAC EXWC-EV-1302, October 2012, p. 30.

9 Miller, J. Methods and Advances in the Forensic Analysis of Contaminated Rivers, E3S Web of Conferences Vol. 125, 2019, p. 3.

monitoring well MW-370. Exceedances of chloride and fluoride were also detected at MW-370 and MW-393, respectively, but had been addressed in the previously approved ASD. As in the prior ASD, the natural variability of the bedrock aquifer lithology was identified as the source of the increased lithium concentration. The LOEs to support this conclusion included the following: 1) BAP porewater lithium concentrations are historically lower than the concentrations reported at MW-370, 2) statistical analyses, PCA and NMDS analysis, suggest that the geochemical signatures of MW-370 are similar to the geochemical signature of MW-358, the upgradient monitoring well, and dissimilar to the porewater geochemical signature, 3) stable lithium and boron isotopes suggest downgradient locations are strongly influenced by the bedrock lithology and not the CCR in the BAP, and 4) solid phase extraction sampling and analysis from the bedrock unit determined that lithium is naturally occurring within shale bedrock. This ASD was also approved by the IEPA.[10]

8) These two IEPA-approved ASDs demonstrated that natural variability in the bedrock UA is the source of observed chloride, fluoride and lithium exceedances of GWPS in the bedrock UA.

9) In September 2024, DMG submitted another ASD report to address a new GWPS exceedance of fluoride at monitoring well MW-392 in the bedrock UA

[10] Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. August 8, 2024.

in the 2nd Quarter of 2024. Also in this quarter, GWPS exceedances of chloride and lithium were identified at MW-370, and of fluoride at MW-393, but these GWPS exceedances had been addressed in the two prior IEPA-approved ASDs. In the September 2024 ASD, the natural variability of the UA bedrock aquifer lithology was again identified as the source of increased concentration of fluoride at MW-392. The LOEs presented to support this conclusion included: 1) porewater samples fluoride are an order of magnitude lower than the minimum concentrations observed at MW-392, 2) statistical analyses, PCA and NMDS analysis, indicate that the geochemical signatures of MW-392 are similar to the geochemical signature of MW-358, the upgradient monitoring well, and dissimilar to the porewater geochemical signature, 3) stable boron and lithium isotopic ratios at MW-370 have an isotopic signature strongly influenced by the bedrock lithology that is distinct from that of the CCR in the BAP, and 4) solid phase extraction determined that chloride and fluoride are naturally occurring minerals of the bedrock. On October 3, 2024, the IEPA sent DMG a letter indicating that they did not concur with the September 2024 Baldwin Power Plant BAP ASD for arsenic.[11] As the submitted ASD did not address a GWPS exceedance for arsenic, DMG assumes that the IEPA's reference to arsenic is simply a typo. The IEPA indicated that their lack on concurrence was based on

[11] Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. October 3, 2024.

the following perceived data gaps: 1) "35 IAC 845.640(a) requires evidence of field collection methods and field and laboratory quality control and quality assurance" and 2) "35 IAC 845.650(e) requires alternative source data as evidence of the alternative source"[12]. The identified "data gaps" do not make clear why IEPA believes the supporting information in the ASD was inadequate and it is not possible to determine from the Denial letter what information could have been added to the ASD that would satisfy IEPA.

10) The IEPA's first data gap suggested a lack of field collection methods and laboratory quality control and quality assurance evidence within the September 2024 ASD report. However, similar to the two prior approved ASDs, this ASD included supplementary documentation such as soil boring logs, lithium isotope ratio laboratory analytical report with chain of custody documentation, and a quantitative x-ray diffraction analytical report with a method summary that support the ASD LOEs. Furthermore, the September 2024 ASD included the same level of field and laboratory documentation as the two previously approved ASDs described above. As such, the assertion that this document does not meet regulatory requirements for data documentation is inconsistent with IEPA's prior evaluations and decisions.

[12] Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. October 3, 2024.

11) The second data gap cited by IEPA in its denial asserts that data identifying the alternative source is required in order to approve an ASD. The September 2024 ASD did incorporate the solid phase sampling and analysis of rock cores from the alternative source, the bedrock, that demonstrates the presence of fluoride in the UA. This sampling and analysis included solid phase extraction of the bedrock and is the same sampling and analysis of the alternative source included in and relied upon for the prior two IEPA-approved ASDs. By identifying fluoride as a naturally occurring mineral within the alternative source, the ASD provides the necessary data and evidence to address IEPA's second identified data gap.

12) The two prior IEPA-approved ASDs had established that the natural variability of the bedrock UA causes exceedances of the GWPS for chloride, fluoride and lithium in this aquifer. The only difference in the denied ASD is that an exceedance was observed in an additional bedrock UA well. The LOEs presented in the two prior IEPA-approved ASDs are the same as and are equally applicable to those presented in the denied September 2024 ASD for the BPP BAP. The data presented (and the supporting documentation) in the two prior IEPA-approved ASDs are also equally applicable to the denied September ASD. In the two prior concurrence letters[13], the IEPA agreed that natural variability in the uppermost

[13] Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. November 28, 2023; and Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. August 8, 2024.

bedrock aquifer itself is the alternative source of chloride, fluoride and lithium in the UA monitoring wells. The only difference in the third and denied ASD, is that in the 2nd Quarter 2024, a new bedrock UA well had a GWPS exceedance for fluoride. This is not unexpected, as DMG has demonstrated and IEPA has concurred that the bedrock aquifer is the source of increasing concentrations of chloride, fluoride and lithium in UA wells.[14] As such, IEPA's decision to reject the September 2024 ASD is illogical and inconsistent with its prior decisions. Similar to the prior two ASDs, the September 2024 ASD demonstrated that that a source other than the BAP caused the fluoride GWPS exceedance and the BAP did not contribute.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: December 2, 2024

Melinda W. Hahn, PhD

[14] Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. November 28, 2023; and Illinois Environmental Protection Agency. Letter Response to Baldwin Power Plant Ash Pond; W157855100001-06 Alternative Source Demonstration Submittal. August 8, 2024.

ATTACHMENT 1

Curriculum Vitae of Melinda Hahn, PhD

MELINDA HAHN, PhD
PRINCIPAL SCIENTIST

Education

B.S., Mathematics, Department of Natural Science, The University of Texas at Austin, 1990

B.S., Physics, Department of Natural Science, The University of Texas at Austin, 1990

Ph.D., Environmental Engineering, Department of Geography and Environmental Engineering, The Johns Hopkins University, 1995

Academic Honors

National Science Foundation Graduate Fellow (1992 – 1995)

Most Distinguished Environmental Engineering Dissertation, American Association of Environmental Engineering Professionals

Professional Training

OSHA 40-Hour Health and Safety Course for Hazardous Waste Sites

Operations and Annual 8-Hr Refresher course (HAZWOPER)

GENERAL CAREER BACKGROUND

Dr. Hahn joined BBJ Group in 2024, where she currently serves as a Principal Scientist, working on site investigation, remediation, and litigation projects involving soil, groundwater and sediment contamination. Prior to that, she was a Senior Manager for ENVIRON and Ramboll Americas Engineering Solutions. Dr. Hahn started her career at ERM North Central in Deerfield, Illinois, and has served Midwest and national clients for more than 25 years.

REPRESENTATIVE CLIENT EXPERIENCE

Dr. Hahn's practice areas include site investigation and remediation, contaminant fate and transport modelling, statistics of environmental data, forensic analysis, and litigation support, including primarily toxic tort, environmental liability and cost allocation. Regulatory areas include RCRA, CERCLA, TSCA, Coal Combustion Residuals and Voluntary Cleanup/Risk-Based Corrective Action. Dr. Hahn has experience in the following industry categories: energy (electric utilities, petroleum dispensing, pipeline operations, former manufactured gas plant sites), industrial equipment manufacturing, metal working and metal recycling, automobile manufacturing, ink and chemical manufacturing, wood treating, mining, cement manufacturing, milling and smelting operations, secondary aluminum production, and dry cleaning.

GEOGRAPHICAL AREAS OF EXPERTISE

Dr. Hahn has completed projects in many states, including Alabama, California, Connecticut, Delaware, Louisiana, Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Oregon, Tennessee, Texas, and Wisconsin, Europe and the British Virgin Islands.

EXAMPLE PROJECTS

- Provided technical litigation support for over 50 matters regarding extent, severity, timing, and source of soil, sediment, air and ground water contamination, necessity for and costs of remediation, toxic tort liability, Superfund cost allocation (including consistency with the NCP), insurance cost recovery, and the siting and monitoring of a hazardous waste landfill. The regulatory frameworks included Illinois Voluntary Cleanup Program, Illinois Leaking Underground Storage Tank Program, RCRA, CERCLA, TSCA, NCP, and California Proposition

65. Contaminants of concern included chlorinated solvents, metals, PCBs, pesticides, dioxins/furans and PFAS. Completed projects in more than twenty states, with a focus in the Midwest.

- Provided expert testimony in matters involving Superfund cost allocation, statistics of environmental data, and contaminant fate and transport.
- Provided strategic support for sites undergoing investigation and remediation where multiple on- and off-site sources are in play.
- Provided litigation support for environmental liability/cost allocation mediation and litigation at several large sediment sites. Evaluated historical information on industrial processes and discharges, and conducted forensic/statistical analysis to estimate the relative contribution of contaminants to sediments.
- Provided litigation support for a number of insurance cost recovery projects, including a former wood treating facility, a jewelry manufacturer, metal plating facility, machine shop and dry cleaner. Tasks included the identification of likely sources and timing of contamination.
- Provided litigation support to a PRP for a municipal wellfield with chlorinated solvent contamination, including analysis of source areas and migration pathways. Completed an estimate of relative cost allocation between sources based on soil and groundwater data, and groundwater flow and contaminant transport modeling.
- Provided strategic support to a PRP responding to a release of chlorinated solvents and PFAS at a manufacturing site and off-site disposal area.
- Litigation support for a confidential client involving remediation response costs and Natural Resource Damage claims at multiple locations. Analysis included necessity and cost of remediation, identification of parties responsible for remediation, and assessment of claims of Natural Resource Damage injuries.
- Provided strategic support to a PRP in responding to a release of chlorinated solvent in an area with complex hydreogeology and deep municipal water supply wells contaminated with coal tar compounds, chlorinated solvents, 1,4-dioxane and PFAS.
- Evaluated claims of residents living near a scrap metal facility of transport and deposition of lead-containing particles in their homes using statistical analysis of plaintiffs' chemical data. Provided expert testimony based on this analysis.
- Evaluated the hydrogeological setting of a proposed petroleum pipeline pumping station and estimated the likelihood of a release and groundwater contamination. Provided expert testimony based on this analysis.
- Provided expert testimony on proposed coal ash impoundment closure regulations and proposed new state groundwater standards in Illinois.

- Retained as an expert on environmental fate and transport and environmental liability for arsenic at an urban inorganic pesticide manufacturing site.
- Conducted environmental forensic evaluations to determine sources of observed environmental contamination in soil, groundwater, sediment and sub-slab/indoor air for sites in litigation and pre-litigation phases.
- Performed multivariate statistical analyses of data for forensic analysis, for contaminant ecological impact analysis, to determine appropriate remedial objectives, and as part of human health and ecological risk assessments.
- Lead RCRA Corrective Action at a former manufacturing facility.
- Directed and assisted in the closure of a number of sites in the Illinois Voluntary Cleanup Program and the Illinois Leaking Underground Storage Tank Program.
- Evaluated the potential contribution of urban industrial sources of heavy metals to urban soil and sediments using both simple data comparisons and multivariate statistical techniques.
- Performed ground water and contaminant fate and transport modeling using MODFLOW and MT3D for use as a Superfund cost allocation tool in support of expert testimony. Relative mass of TCE from two PRP's properties was used as a basis for cost allocation. A Monte Carlo analysis was also performed to evaluate the sensitivity of the proposed allocation to changes in key variables.
- Performed Monte Carlo analysis of risk to ground water posed by a proposed petroleum pipeline in support of expert testimony. The analysis examined the likelihood of the exceedance of the Illinois Class I ground water standard for benzene per mile of proposed pipeline.
- Performed Monte Carlo cost allocation among four PRPs for a Superfund Site in support of expert testimony. Total volume, volume of hazardous substances, and volume of drummed materials were considered.
- Performed research and analysis of remedial activities and associated costs to determine compliance with the NCP for cost recovery matters for a number of sites.

PUBLICATIONS AND PRESENTATIONS

1993
Stochastic Models of Particle Deposition in Porous Media
Paper presented at the 1993 Midwest Regional Conference on Environmental Chemistry, University of Notre Dame
Authors: Hahn, M.W., and C. F. O'Melia

1994
Deposition and Reentrainment of Particles in Porous Media
Poster presented at the 1994 Gordon Research Conference on Environmental Science, Water, New Hampshire
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1994
Colloid Transport in Groundwaters: Filtration of Fine Particles at Low Filtration Rates
Presented at the 1994 ASCE National Conference, Boulder, Colorado
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1995
Deposition and Reentrainment of Brownian Particles under Unfavorable Chemical Conditions
Presented at the 1995 ACE National Conference, Environmental Chemistry Division
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1995
Deposition and Reentrainment of Brownian Particles under Unfavorable Chemical Conditions
Doctoral Dissertation, Johns Hopkins University
Author: Hahn, M.W.

1997
Some Effects of Particles Size in Separation Processes Involving Colloids
Wat. Sci. Tech. Vol. 36, No. 4 pp. 119–126
Authors: O'Melia, C.R., M.W. Hahn, and C. Chen

1997
Literature Review 1997: Storage, Disposal, Remediation, and Closure
Water Environment Research, Vol. 69, No. 4, pp 6389-719
Authors: Millano E.F. and M.W. Hahn

1998
The Statistics of Small Data Sets
Accepted for publication, Superfund Risk Assessment in Soil Contamination Studies: Third Volume, ASTM STP 1338, K.B. Hoddinott Ed., American Society for Testing and Materials
Authors: Ball, R.O., and M.W. Hahn

1998
RBCA Compliance for Small Data Sets
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues

The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp. 73-78
Authors: Hahn, M.W., A.E. Sevcik, and R.O.Ball

1998
Contaminant Plume and using 3D Geostatistics
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues
The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp. 85-90
Authors: Ball, R.O., M.W. Hahn, and A.E. Sevcik1998

RBCA Closure at DNAPL Sites
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues
The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp.181-186
Authors: Sheahan, J.W., R.O. Ball, and M.W. Hahn

2004
Deposition and Reentrainment of Brownian Particles in Porous Media under Unfavorable Chemical Conditions: Some Concepts and Applications
Environmental Science & Technology, Vol. 38, pp 210-220
Authors: Hahn, M.W. and C.R. O'Melia

2010
Making the Case for Causation in Toxic Tort Cases: Superfund Rules Don't Apply
Environmental Law Reporter, News & Analysis, July 2010, pp. 10638-10641
Authors: More, J.R. and M.W. Hahn

Exhibit I

DECLARATION OF CYNTHIA VODOPIVEC
ON BEHALF OF ELECTRIC ENERGY INC.

I, Cynthia Vodopivec, affirm and declare as follows:

1. I present this Declaration on behalf of Dynegy Midwest Generation (hereinafter "DMG"). I am Senior Vice President, Environmental Health and Safety at Vistra Corp., the indirect corporate parent of DMG. As part of my duties, I oversee permitting, regulatory development, compliance (air, water, and waste issues), and health and safety at the Company, including DMG's Baldwin Power Plant in Randolph and St. Clair Counties, Illinois. I received a Bachelor's Degree in Engineering from Dartmouth College in 1998 and an MBA from Rensselaer in 2009. I state the following in support of DMG's Petition for Review of Illinois Environmental Protection Agency's Non-Concurrence with Alternative Source Demonstration under 35 Ill. Adm. Code Part 845 and Motion for Stay ("Petition").

2. DMG received IEPA's letter dated October 3, 2024, notifying DMG of IEPA's nonconcurrence with the Baldwin Power Plant Bottom Ash Pond ("BAP") September 12, 2024, Alternative Source Demonstration via U.S. Mail on October 28, 2024. This letter is attached as Exhibit A of the Petition.

3. Completing an assessment of corrective measures for the fluoride exceedance identified in the ASD in accordance with the requirements and deadlines of 35 Ill. Adm. Code § 845.660 would likely cost approximately $200,000. Completing the requirements of 35 Ill. Adm. Code § 845.670, including determining nature and extent, conducting geochemical evaluation, preparing and submitting the semi-annual reports, a construction permit application and a corrective action plan for the fluoride exceedance would likely cost approximately $500,000. Undertaking the steps required in Sections 845.660 and 845.670 is a considerable undertaking that requires the dedication of many resources. For example, the corrective measures assessment may require development of groundwater models specific to fluoride and could result in the development of potential engineered remedies. The corrective action plan may require a 30 percent design for the selected remedy, a groundwater monitoring plan, a new construction permit application, and attendance at a public meeting. Significant personnel time and resources will be necessary to dedicate specifically to this work.

FURTHER, the Declarant sayeth not.

Dated: November 26, 2024

Cynthia E. Vodopivec