BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2024-_____**

NOTICE OF FILING

To:

Pollution Control Board, Attn: Clerk
100 West Randolph Street
James R. Thompson Center
Suite 11-500
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. ADM. 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: February 20, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

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

I, Joshua R. More, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY 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: February 20, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2024-_____**

APPEARANCE OF BINA JOSHI
AND CONSENT TO E-MAIL SERVICE

I, Bina Joshi, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY 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:

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/s/ *Bina Joshi*
Bina Joshi

Dated: February 20, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2024-_____**

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

I, Samuel A. Rasche, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY 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: February 20, 2024

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2024-_____**

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 Illinois Power Generating Company ("IPGC" 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 Coffeen Power Plant Ash Pond No. 2 submitted to the Agency on December 15, 2023 (the "Coffeen ASD"). IEPA's non-concurrence is stated in a letter from IEPA Division of Water Pollution Control Permit Section Manager Darin E. LeCrone to IPGC dated January 11, 2024, and served upon IPGC on January 16, 2023, via U.S. Mail, which is attached as **Exhibit A** (the "IEPA Denial"). As detailed in Section II below, IEPA's Denial is contrary to the applicable regulations and arbitrary and capricious. For the reasons set forth in Section III below, Petitioner also requests a partial stay of Part 845 requirements as they apply to the exceedances at issue in this Petition.

In support of this Petition and Motion for Stay, IPGC 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).

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.*

[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.

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. IPGC's Alternative Source Demonstration

8. IPGC owns and operated the now retired Coffeen Power Plant ("Coffeen") located in Montgomery County, Illinois, approximately two miles south of the City of Coffeen in Section 11, Township 7 North, and Range 7 East. Coffeen includes Ash Pond No. 2 ("AP2"), a CCR surface impoundment regulated under Part 845.

9. On October 16, 2023, groundwater monitoring at Coffeen identified a GWPS exceedance for cobalt at well G401 (the "Cobalt Exceedance"). IPGC notified IEPA of its groundwater monitoring results, including the Cobalt Exceedance, placed the information in its

operating record, and contracted with an environmental consultant to further investigate the cause of the GWPS exceedance. Coffeen Power Plant Ash Pond No. 2; IEPA ID # W135015004-02, Groundwater Monitoring Data and Detected Exceedances 2023 Quarter 2 (October 16, 2023), available at https://www.luminant.com/documents/ccr/il-ccr/Coffeen/2023/2023-Coffeen%20AP2%202023%202nd%20qtr%2035%20IAC%20845%20GW%20report-Coffeen-Ash%20Pond%202-W1350150004%E2%80%9002.pdf.

10. On December 15, 2023, IPGC submitted the Coffeen ASD to IEPA. The Coffeen ASD concluded that sources other than AP2 were responsible for the Cobalt Exceedance. The Coffeen ASD is attached as **Exhibit B**.

11. The Coffeen ASD identified four lines of evidence to demonstrate that AP2 is not the cause of or contributing to the Cobalt Exceedance. First, the Coffeen ASD demonstrated that AP2 porewater samples either "do not contain detectable concentrations of aqueous cobalt" or contained concentrations far below the concentrations detected at well G401. **Exhibit B** at 9. The Coffeen ASD explained that porewater samples were collected from four different locations within AP2 and one location in the AP2 leachate collection system and were analyzed for cobalt. *Id.* at 4. The Coffeen ASD further explained that the "cobalt concentrations detected in the porewater samples" were lower than the concentrations detected at well G401. *Id.* Accordingly, the Coffeen ASD concluded that AP2 "can therefore not be the source of cobalt exceedances to downgradient groundwater." *Id.* at 9.

12. Second, the Coffeen ASD demonstrated that "naturally occurring cobalt is present and ubiquitous throughout the site" and upgradient of well G401. *Id.* at 6. The Coffeen ASD explained that aquifer solids samples were collected and analyzed using sequential extraction procedure ("SEP"). The SEP analysis indicated that "cobalt is naturally present in the solids

comprising the screened interval of both well of interest G401 and background location G270." *Id.* at 5. Accordingly, the Coffeen ASD concluded that cobalt in solids in the area of Coffeen "constitute a naturally occurring cobalt source." *Id.* at 9.

13. Third, the Coffeen ASD demonstrated that "solid phase data and geochemical conditions at G401 provide evidence that the naturally occurring cobalt within the solid phase is mobilized to groundwater." *Id.* at 6. The Coffeen ASD explained that the results of SEP testing and a mineralogical analysis using X-ray diffraction showed that small changes in the geochemistry around well G401 could cause the cobalt present in solids to "undergo dissolution reactions." The Coffeen ASD concluded that these reactions "are expected to result in the . . . release of cobalt . . . into the groundwater."

14. Finally, the Coffeen ASD used the results of additional geochemical modeling to demonstrate that the "[l]ower pH levels documented in G401 groundwater are predicted to result in elevated aqueous cobalt . . ." *Id.* at 9. The Coffeen ASD explained that, under the geochemical conditions present around AP2, cobalt concentrations "are predicted to be higher at lower pH values (such as those observed at G401)" due to the processes observed and described in the third line of evidence above. *Id.* at 8. These processes were simulated using a geochemical model, and the Coffeen ASD concluded that the "[g]eochemical modeling results support the hypothesis that the lower pH levels documented at G401 . . . are the primary cause of elevated aqueous cobalt concentrations. *Id.*

15. For the above reasons, the Coffeen ASD concluded that the evidence "demonstrated that the cobalt GWPS exceedance is not due to a release from the AP2 CCR unit and that the unit has not contributed to the exceedance[.]" *Id.* at 9. Instead, the evidence showed that "the

exceedance is attributed to a natural source[,]" namely "the influence of the till lithology on groundwater composition." *Id.*

C. The IEPA Denial

16. On January 11, 2024, IEPA sent a two-page letter notifying IPGC of IEPA's non-concurrence with the Coffeen ASD (the "IEPA Denial"). The IEPA Denial states that IEPA "does not concur" due to two "data gaps." **Exhibit A** at 1. The two listed data gaps according to IEPA are:

17. First, "[s]ource characterization of the CCR at Ash Pond No. 2 must include total solids sampling in accordance with SW846" ("Data Gap 1"). *Id.* IEPA cited to the requirement of § 845.650(e) that an ASD demonstrate the CCR surface impoundment "did not contribute to the contamination" and asserted that "[IEPA] cannot concur with ASDs that do not include source characterization of the CCR with adequate sampling and analysis of the CCR horizontally and vertically within the [CCR surface impoundment]." *Id.*

18. Second, "[r]esearch on porewater characterizations of CCR does not come from an independent peer reviewed publication." ("Data Gap 2"). *Id.* IEPA cited generally to Section 8 of the Illinois Groundwater Protection Act and stated that IEPA "accepts government publications, textbook publications, independent peer-reviewed scientific and engineering publications and other nationally accepted guidelines as acceptable approaches to the characterization of CCR." *Id.*

19. The IEPA Denial did not include any additional explanation or analysis.

II. Discussion

20. IEPA's bases for its non-concurrence, the two "Data Gaps," are each arbitrary and capricious and not supported by IEPA's regulatory authority under Section 845.650.

A. There are no data gaps in the ASD

21. IEPA's Denial unreasonably demands data and analysis that is not required by Section 845.650. The regulation requires only that IPGC 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." 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 Coffeen 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*, Declaration of Melinda Hahn at 2-3 (February 20, 2024), attached as **Exhibit C**. The 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 result, and the fact the data was not submitted is inadequate to support the Agency's nonconcurrence with the Coffeen ASD.

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

22. "Data Gap 1" demands that the Coffeen ASD should have included a "source characterization of the CCR" at AP2 including "total solids sampling in accordance with SW846." **Exhibit A**. However, there is no requirement in Part 845 that source characterization of CCR for an ASD be conducted "in accordance with SW846," and IEPA's Denial provides no justification for its demand. Further, from a technical basis, the porewater analysis conducted in the Coffeen ASD is a more appropriate and accurate method to characterize the AP2 source material's impact on groundwater than SW846.

23. There is no legal requirement that a source characterization for purposes of an ASD conducted under Section 845.650(e) utilize SW846. Method SW846 is incorporated by reference

into Part 845 by Section 845.150. However, inclusion in the general "incorporations by reference" section of Part 845 does not create an affirmative obligation to use SW846 in all circumstances. The Board has explained that where Illinois rules incorporate analytical methods by reference via a "centralized listing of incorporations by reference" such as Section 845.150, "Illinois rules further indicate where each method is used *in the body of the substantive provisions*." *See In the Matter of: SDWA Update, USEPA Amendments (January 1, 2013 through June 30, 2013)*, R 14-8, slip op. at 24-25 (Jan. 23, 2014) (emphasis added). Further, Chapter 2 of SW846 states that the 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.[2] USEPA guidance also makes clear that SW846 is only legally required where "explicitly specified" in a regulation. USEPA, *Disclaimer for Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*, (July 2014), at 1.[3] The only substantive provision of Part 845 specifically requiring analysis using SW846 is Section 845.640(j), which applies to analyzing groundwater monitoring samples under a groundwater monitoring program and is not at issue here. 35 Ill. Adm. Code § 845.640(e). There is no requirement to use SW846 under Section 845.650(e). The plain language of the rules does not require the utilization of SW846 for purposes of source characterization for an ASD, and IEPA has provided no justification for any alternative interpretation.

24. Additionally, source characterization of AP2 was conducted using the best scientifically available procedure. As detailed in the Coffeen ASD, "CCR porewater most accurately represents the mobile constituents associated with the waste management activity

[2] Available at https://www.epa.gov/sites/default/files/2015-10/documents/chap2_1.pdf.
[3] Available at https://www.epa.gov/sites/default/files/2015-10/documents/disclaim.pdf.

within [AP2]" and is "the truest representation of mobile constituents throughout [a CCR surface impoundment]." **Exhibit B** at 4. Laboratory leach tests such as those prescribed by SW846 are less direct and less appropriate for understanding the potential impact of a release because, unlike porewater, they are not representative of the actual water quality from a CCR surface impoundment that would mix with groundwater. *Id*. Because "ASDs are prepared to evaluate the potential of *actual porewater* leaking from a CCR [surface impoundment] to be the cause of a detected exceedance observed," SW846's "use of leach test results performed under variable conditions collected from any number of locations within the CCR [surface impoundment] to estimate a total potential for chemical leaching from CCR into groundwater under a variety of different conditions is irrelevant to an ASD." *Id.* at 5 (emphasis added). The porewater analysis used for the Coffeen ASD is the best and most accurate scientifically available information for source characterization of AP2 and demonstration that AP2 did not contribute to the cobalt contamination in well G401. *Id.* at 4-5; **Exhibit C** at 10-11.

25. The IEPA Denial is not clear regarding what procedure under SW846 IEPA believes should have been utilized for source characterization including total solids sampling in accordance with SW846. **Exhibit A**. However, no method under SW846 would have been preferable to or provide more appropriate information than the source characterization methodology utilized for the Coffeen ASD. **Exhibit C** at 9-10. That sampling would have included a laboratory simulation of potential leachate from material in AP2, while the methodology utilized for the Coffeen ASD included a direct analysis of porewater to determine what constituents are *actually* leaching from AP2. *Id.*

26. If source characterization of CCR at the AP2 did include total solids sampling in accordance with SW846, it would not be expected to change the results of the Coffeen ASD. *Id.* at 11.

27. IEPA's denial of the Coffeen ASD based on "Data Gap 1" is accordingly arbitrary and capricious.

2. "Data Gap 2"

28. "Data Gap 2" demands that the Coffeen ASD should have provided "[r]esearch on porewater characterization of CCR" from "an independent peer reviewed publication." **Exhibit A**. However, this is partially contradicted by subparagraph 2.a. in the IEPA denial, which states that, in addition to "independent peer-reviewed scientific and engineering publications," IEPA also "accepts government publications, textbook publications . . . and *other nationally accepted guidelines* as acceptable approaches to characterization of CCR." *Id.* (emphasis added). "Data Gap 2" appears simply to be a request by IEPA for additional sources supporting the use of porewater analysis to characterize the CCR in AP2. As explained above in Section II.A.1., nothing in Part 845 requires that any specific approach be utilized for conducting source characterization of CCR for an ASD, and IEPA provides no justification for this demand. Moreover, as explained above, the porewater analysis conducted in the Coffeen ASD is the best and most accurate scientifically available information for source characterization of CCR for an ASD, as confirmed by numerous independent scientific sources.

29. As an initial matter, there is no reference in Section 845.650(e) or elsewhere in Part 845 to "independent peer-reviewed" publications, much less a specific requirement that *only* peer-reviewed publications may be used to support the method of source characterization of CCR used in an ASD (or that every potentially applicable publication in support of a particular type of evidence used in an ASD must be cited in the ASD). Nor does IEPA point to any provisions from

which it could infer such a requirement. Again, Section 845.650(e) simply requires 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." The Coffeen ASD did just that.

30. IEPA suggests that its requirement that only peer-reviewed publications may be used to support an ASD is in "accordance with Section 8 of the Illinois Groundwater Protection Act" (415 ILCS 55/8) ("IGPA Section 8"). **Exhibit A.** But that provision only authorizes and provides standards for IEPA to "propose regulations establishing comprehensive water quality standards" promulgated by the Board under 35 Ill. Adm. Code Part 620, and is not applicable to the standards governing IEPA review of ASDs under Part 845. 415 ILCS 55/8(a). Regardless, there is no reference to "peer-reviewed" publications in either IGPA Section 8 or in 35 Ill. Adm. Code Part 620 promulgated under IGPA Section 8. IEPA has provided no explanation of why it believes IGPA Section 8 supports "Data Gap 2" or why IGPA Section 8 applies to ASDs at all.

31. Finally, a large body of scientific publications support the use of porewater data for CCR source characterization. **Exhibit B** at 4; **Exhibit C** at 9-10. The Coffeen ASD cited to multiple reports and guidelines from the Electric Power Research Institute ("EPRI") and an additional report by USEPA supporting the use of porewater data for CCR source characterization. **Exhibit B** at 4.[4] Further, as explained by Ms. Hahn in Exhibit C, various additional independent peer reviewed and USEPA publications support the use of porewater over leach tests for CCR source characterization. **Exhibit C** at 9-10.

[4] EPRI is an independent non-profit organization whose research and guidance is recognized and relied upon by industry and government actors both nationally and internationally. IEPA has provided no explanation for why it believes EPRI guidance is not sufficiently "nationally accepted" and, as explained above, the porewater analysis proscribed by EPRI and used in the Coffeen ASD is the best most accurate data available for CCR source characterization in an ASD.

32. IEPA's denial of the Coffeen ASD based on "Data Gap 2" is accordingly arbitrary and capricious and not supported by Illinois law.

B. IEPA's Denial imposes practically infeasible requirements.

33. IEPA's interpretation of Section 845.650(e) is further unreasonable because "Data Gap 1" demands complex sampling and analysis that cannot feasibly be completed within the timeframes contemplated by the regulations, if at all. Section 845.650(e) requires owners and operators to submit an ASD within 60 days after detecting a GWPS exceedance. The regulations further require IEPA to reach a final decision within 30 days after receiving an ASD. 35 Ill Adm. Code § 845.650(e)(4).

34. "Data Gap 1" requests that IPGC provide source characterization of the CCR at the AP2 that includes "total solids sampling in accordance with SW846." **Exhibit A**. Because AP2 is a closed unit with a geomembrane cover, such a characterization, which contains scientific limitations, would require IPGC to puncture the geomembrane in multiple locations to obtain solids samples and then repair the geomembrane after sampling is completed. **Exhibit D**, Declaration of Cynthia Vodopivec at 1. This process could take approximately 26 weeks to complete and could threaten the integrity of the geomembrane cap placed upon AP2 (and, therefore, the closure of the unit).[5] *Id.* There would be no reason for an owner or operator to begin such a characterization until after a GWPS exceedance is detected. Thus, even if IPGC anticipated IEPA's request for this data and began the CCR source characterization at the exact moment the GWPS exceedance is detected, the characterization could not reasonably be completed until

[5] Undertaking the steps required to provide the information IEPA seeks through "Data Gap 1" would also be costly: collecting the information requested by "Data Gap 1" would likely cost approximately $196,000. **Exhibit D** at 1. While cost is not a driver of actions taken for completing an ASD, as Dr. Hahn explains, accepted scientific practice is to not develop costly additional lines of evidence when sufficient evidence exists from other, better lines of evidence to support a conclusion. **Exhibit C** at 2-3.

months *after* IEPA's deadline to reach a final decision on the Coffeen ASD (let alone IPGC's deadline to submit an ASD).

35. The data the IEPA Denial categorizes as a "gap" in the Coffeen ASD could not feasibly be completed before the prescribed deadline for submitting an ASD, if at all. IEPA's interpretation that Section 845.650 requires these characterizations would thus make the entire ASD provision meaningless, as it would be impossible for any owner or operator to submit a sufficient ASD.

36. Accordingly, IEPA's Denial is arbitrary and capricious and also ignores reality.

37. Furthermore, even if the data requested was required to be collected elsewhere under Part 845, there is no requirement in Section 845.650 that such data be used in connection with an ASD. Here, qualified professionals used best available information to develop an ASD within the regulatory deadline and in conformance with regulatory requirements. Certainly, additional lines of evidence could be added to the ASD analysis; however, professional judgment and practicality dictate that every possible line of evidence need not and cannot be developed. **Exhibit C** at 2-3. Doing so would take an unreasonable amount of time. Additionally, doing so is unnecessary when existing information is sufficient to support the conclusion that an alternative source caused the contamination detected and that the CCR surface impoundment at issue did not contribute to that contamination. *Id.* at 10-11.

III. MOTION FOR PARTIAL STAY

38. Because Part 845 does not authorize an automatic stay, IPGC asks the Board to stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 for the Cobalt 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.

39. 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 16-60, slip op. at 1 (Dec. 17, 2015). Section 845.650(e)(7), which authorizes a petition for review of an IEPA nonconcurrence with an ASD, "would be rendered meaningless" if the Board had no authority to stay the associated regulations. *See Id.* 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.[6]

40. Further, the rules specifically contemplate that the Board may stay certain regulatory requirements pending resolution of a petition for review: "The filing of a petition for review under subsection (e)(7) does not automatically stay any requirements of this Part as to the owner or operator, including the 90-day deadline to initiate an assessment of corrective measures (see Section 845.660(a)(1))." Section 845.650(e)(7). If the Board had no authority to stay the corrective measure requirements, there would have been no need for the rules to specify that the stay is not automatic.

B. A partial stay is appropriate under Illinois law.

41. The Board considers four factors[7] when determining whether to grant a discretionary stay of a final Agency decision:

[6] 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 . . ."

[7] 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*

a. a certain and clearly ascertainable right needs protection;

b. irreparable injury will occur without injunction;

c. adequate remedy at law exists;

d. a probability of success on the merits.

PCB 16-60, slip op. at 2 (Dec. 17, 2015), 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 all of these factors exist in order to grant a discretionary stay. *Id.* The Board will also consider the likelihood of environmental harm should stay be granted. *Id.*, citing *Motor Oils Refining Co. v. IEPA*, PCB 89-116, slip op. at 2 (Aug. 31, 1989).

42. For the reasons stated in this Petition, a stay is necessary to protect IPGC's right to appeal the IEPA Denial and to prevent IPGC 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, IPGC has an ascertainable right that needs protection.

43. IPGC 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 Cobalt Exceedance at issue in this Petition. Compliance with these requirements would require IPGC 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 Coffeen ASD and this Petition, likely never occurred. The assessments of corrective measures alone would likely cost approximately $35,000. **Exhibit D** at 1. Selecting an appropriate remedy and developing a

Junkunc v. S.J. Advanced Technology & Mfg., 101 Ill. Dec. 671, 498 N.E.2d 1179 (Ill. App. 1 Dist. 1986).

corrective action plan could cost approximately an additional $225,000. *Id*. If IPGC complied with the corrective measure requirements for Cobalt at the Coffeen Ash Pond No. 2 and then succeeded on the merits of this Petition, costs, as well as time and other resources, would be lost. *Id*. Thus, IPGC would suffer irreparable injury.

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

45. It is also likely that IPGC will succeed on the merits of this Petition. IPGC has demonstrated by a preponderance of the evidence that a source other than AP2 is responsible for the Cobalt Exceedances and that AP2 did not contribute to that contamination as evidenced through the thorough analysis of a qualified professional engineer, and IPGC is prepared to demonstrate that IEPA's nonconcurrence was arbitrary and capricious and/or inconsistent with applicable laws and regulations. *See, e.g.,* **Exhibit B**; **Exhibit C**.

46. Finally, no harm to human health or the environment will result from a stay of these requirements. The exceedance is limited to a single monitoring well. As demonstrated in the Coffeen ASD and this Petition, the Coffeen AP2 is not the source of the Cobalt Exceedance. AP2 is located directly north of Coffeen Ash Pond 1 ("AP1") and would be expected to interact with similar receptors to AP1. A human health and risk assessment conducted for AP1 found there is no likely exposure pathway through any potable water source and that there are "no unacceptable risks to human or ecological receptors resulting from CCR exposures associated with AP1 . . ." Human Health and Ecological Risk Assessment, Ash Pond 1, Coffeen Power Plant, Coffeen Illinois at 16, 32 (July 28, 2022), available at https://www.luminant.com/documents/ccr/Illinois/Coffeen/2022/Coffeen%20AP%20No%201%20Construction%20Permit%20Application.pdf. Notably, the IEPA Denial does not suggest that

IEPA believes AP2 is the cause of or is contributing to the GWPS exceedance – 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 exceedances.[8] 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. Lastly, IPGC 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

47. For the above reasons, IPGC respectfully requests that the Board stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 relating to the Cobalt 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, IPGC respectfully requests that the Board grant this Petition for Review and remand to IEPA to issue a new final written response concurring with the Coffeen ASD.

Respectfully submitted,

/s/ Joshua R. More
Joshua R. More

[8] *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.").

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Attorneys for Illinois Power Generating Company

BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2024-_____**

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 20th Day of February, 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:

Pollution Control Board, Attn: Clerk
100 West Randolph Street
James R. Thompson Center
Suite 11-500
Chicago, Illinois 60601-3218
PCB.Clerks@illinois.gov

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

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

The number of pages in the e-mail transmission is 180.

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

/s/ Samuel A. Rasche
Samuel A. Rasche

Dated: February 20, 2024

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BEFORE THE
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Exhibit A	Letter from Darin E. LeCrone, P.G., Manager, Permit Section, Division of Water Pollution Control, Illinois Environmental Protection Agency to Dianna Tickner, Illinois Power Generating Company (January 11, 2023).
Exhibit B	Ramboll, 35 I.A.C. § 845.650(e): Alternative Source Demonstration, Coffeen Power Plant, Canton, Illinois, IEPA ID: W0578010001-04 (December 15, 2023).
Exhibit C	Declaration of Melinda W. Hahn, PhD (February 20, 2024)
Exhibit D	Declaration of Cynthia Vodopivec on behalf of Illinois Power Generating Company (February 19, 2024)

Exhibit A

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

January 11, 2024

Dianna Tickner
Electric Energy, Inc.
1500 Eastport Plaza drive
Collinsville, Illinois 62234

Re: Coffeen Power Plant Ash Pond No. 2; W1350150004-02
Alternative Source Demonstration Submittal

Dear Ms. Tickner:

The purpose of this correspondence is to notify you that the Illinois Environmental Protection Agency (Illinois EPA) does not concur with the Coffeen Ash Pond No.2 Alternative Source Demonstration (ASD) for cobalt dated December 15, 2023. The Illinois EPA does not concur due to the following data gaps:

1. Source characterization of the CCR at Ash Pond No.2 include total solids sampling in accordance with SW846.
    a. 35 IAC 845.650(e) states "the owner or operator of a CCRSI may…submit a demonstration to the Agency that a source other than the CCRSI caused the contamination and the CCRSI did not contribute to the contamination… Either type of ASD must include a report that contains the factual or evidentiary basis for any conclusions…"
        i. The Illinois EPA cannot concur with ASDs that do not include source characterization of the CCR with adequate sampling and analysis of the CCR which must characterize the CCR horizontally and vertically within the CCRSI.
2. Research on porewater characterization of CCR does not come from an independent peer reviewed publication.
    a. In accordance with Section 8 of the Illinois Groundwater Protection Act (415 ILCS 55), the Illinois EPA accepts government publications, textbook publications, independent peer-reviewed scientific and engineering publications and other nationally accepted guidelines as acceptable approaches to characterization of CCR.

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

cc: Heather Mullenax
Lauren Hunt
Keegan MacDonna
Records Files 06M

Exhibit B

Luminant

Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, IL 62234

December 15, 2023
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: Coffen Power Plant Ash Pond No 2; IEPA ID # W1350150004-02

Dear Mr. LeCrone:

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.650(e), Illinois Power Generating Company (IPGC) is submitting this Alternative Source Demonstration (ASD) for the cobalt exceedance observed at well G401 from the Quarter 2 2023 sampling event at the Coffeen Power Plant Ash Pond No. 2, identified by Illinois Environmental Protection Agency (IEPA) ID No. W1350150004-02.

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,

Dianna Tickner

Dianna Tickner
Sr. Director – Decommission and Demolition

Enclosures
Alternate Source Demonstration, Quarter 2 2023, Ash Pond No.2 Coffeen Power Plant, Coffeen Illinois

Geosyntec consultants

engineers | scientists | innovators

Alternative Source Demonstration

Coffeen Power Plant Ash Pond No. 2
(Unit ID #102)
IEPA ID: W1350150004-02
35 I.A.C. 845.650

Prepared for

Illinois Power Generating Company
134 Cips Lane
Coffeen, Ilinois 62017

Prepared by

Geosyntec Consultants, Inc.
500 W. Wilson Bridge Rd, Suite 250
Worthington, OH 43085

Project Number: GLP8029

December 2023

Geosyntec consultants

Alternative Source Demonstration

Coffeen Power Plant Bottom Ash Pond No. 2
(Unit ID #102)
IEPA ID: W1350150004-02
35 I.A.C. § 845.650

Prepared for

Illinois Power Generating Company
134 Cips Lane
Coffeen, Illinois 62017

Prepared by

Geosyntec Consultants, Inc.
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License No.: 062.040562
Expires: 11/30/2025

John Seymour, P.E.
Senior Principal

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

Project Number: GLP8029

December 2023

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ACRONYMS AND ABBREVIATIONS

ASD	Alternative source demonstration
AP2	Ash Pond 2
CCR	Coal combustion residuals
CPP	Coffeen Power Plant
DA	Deep aquifer
EPRI	Electric Power Research Institute
GWB	Geochemists Workbench
GWPS	Groundwater protection standard
HCR	Hydrogeologic site characterization report
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
LCU	Lower confining unit
LEAF	Leaching Environmental Assessment Framework
LOE	Line of evidence
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NID	National Inventory of Dams
redox	oxidation/reduction
SEP	Sequential extraction procedure
SI	Surface impoundment
SU	standard units
UA	Uppermost aquifer
UCU	Upper confining unit
USEPA	United States Environmental Protection Agency
XRD	X-ray diffraction

1. INTRODUCTION

Geosyntec Consultants, Inc. has prepared this alternative source demonstration (ASD) on behalf of Illinois Power Generating Company (IPGC) regarding the Ash Pond No. 2 coal combustion residuals (CCR) unit at the Coffeen Power Plant (CPP) near Coffeen, Illinois. The ASD is completed pursuant to Illinois Administrative Code (IAC) Title 35, Part 845 ("Standards for the Disposal of CCR in Surface Impoundments") and was completed by December 15, 2023, within 60 days of determination of the exceedances (October 16, 2023), as required by 35 I.A.C.§ 845.650(e). This report applies specifically to the CCR Unit referred to as Ash Pond No. 2 (AP2), identification (ID) number (No.) 102, IEPA ID No. W1350150004-02, and National Inventory of Dams (NID) ID No. IL50723 and was prepared 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 Protection Agency (USEPA)'s Solid Waste Disposal Facility Criteria: Technical Manual (USEPA 1993).

An exceedance of cobalt was identified above the site-specific groundwater protection standard (GWPS) of 0.006 milligrams per liter (mg/L) at downgradient monitoring well G401 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 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 845.650(e), the lines of evidence (LOEs) documented in this ASD demonstrate that a source other than the CPP AP2 CCR unit was the cause of the GWPS exceedance for cobalt at downgradient monitoring well G401 and that AP2 did not contribute to the exceedance. Natural variability associated with the lithology of the aquifer was identified as the alternative source for the elevated cobalt concentrations at G401.

2. BACKGROUND

2.1 Site Location and Description

The CPP, operated by the IPGC is located in Montgomery County, Illinois approximately two miles south of the City of Coffeen in Section 11, Township 7 North, and Range 7 East. The CPP is located between the two lobes of Coffeen Lake to the west, east, and south, and is bordered by agricultural land to the north. The CPP operated as a coal-fired power plant from 1964 to November 2019 and has five CCR management units. The approximately 1,100-acre Coffeen Lake was built by damming the McDavid Branch of the East Fork of Shoal Creek in 1963 for use as an artificial cooling lake for the CPP. Historically, underground coal mines were operated in the vicinity of the CPP. An aerial view of the site is shown in **Attachment 1**.

2.2 Description of the CCR Unit

Coffeen AP2 is an unlined surface impoundment with a surface area of approximately 60 acres, with berms up to 47 feet above the surrounding land surface. AP2 was removed from service and capped in the mid-1980s using a two-foot compacted clay and soil cap (Ramboll 2019).

AP2 was recapped starting in 2019 using a geomembrane cover system in accordance with a closure plan submitted to the Illinois Environmental Protection Agency (IEPA; AECOM, 2017). The cover system installation was completed on November 17, 2020. The geomembrane cap design addresses the potential for slope failure and water infiltration into the closed CCR unit by directing the drainage of surface water (i.e., precipitation) off the cover system.

2.3 Geology and Hydrogeology

Significant site investigation has been completed to fully characterize the geology, hydrogeology, and groundwater quality as provided in the AP2 Initial Operating Permit Application (Burns & McDonnell 2021) and the Hydrogeologic Site Characterization Report (HCR) for AP2 (NRT 2017). These materials are incorporated herein.

There are multiple layers of unlithified material present beneath AP2 and above bedrock which are categorized into hydrostratigraphic units listed below (from the surface downward) based on stratigraphic relationships and hydrogeologic characteristics:

- **Upper Confining Unit (UCU):** Composed of the Roxana and Peoria Silts (Loess Unit) and the upper clayey portion of the Hagarstown member which are classified as silts-clayey silts and gravelly clay below the surficial soil.

- **Uppermost Aquifer (UA):** Composed of the Hagarstown Member which is classified as primarily sandy-gravelly silts and clays with beds of sedimentary deposits. Beds consist of thin (generally less than three feet in thickness), moderate to high permeability sand, silty sand, and sandy silt/clay units.

- **Lower Confining Unit (LCU):** Comprised of the Vandalia Member, Mulberry Grove Member, and Smithboro Member. The LCU in the vicinity of AP2 consists of thick (generally greater than 15 feet), very low permeability sandy to silty till or clay till.

- **Deep Aquifer (DA):** Comprised of sand and sandy silt/clay units of the Yarmouth Soil, which include accretionary deposits of fine sediment and organic materials, typically less than five feet thick and discontinuous across the CPP.

Bedrock is comprised of the Pennsylvanian-age Bond Formation, which consists of limestone and calcareous clays and shale. A geologic cross-section modified from a version provided in the Hydrogeologic Characterization Report is provided as **Figure 1**. CCR within AP2 is underlain by the UCU in the majority of the footprint.

G401 is screened from 14.36 feet below ground surface (ft. bgs) to 18.8 ft. bgs (608.7 to 604.2 feet in elevation [North American Vertical Datum of 1988, NAVD88]). The boring log for G401, provided in **Attachment 2**, indicates that the lithology of the upper portion of the screened interval is gray/yellowish brown clay with some silt and sand, and the lithology of the lower portion of the screened interval is yellowish brown fine sand and silt.

The groundwater monitoring well network for AP2 consists of 11 monitoring wells: three background monitoring wells (G270, G280, G281) and eight downgradient monitoring locations (G1001, G401, G402, G403, G404, G405, G406, G407) (**Attachment 1**). Monitoring wells within the network are screened in the Uppermost Aquifer from approximately elevations 600 to 610 ft.

The potentiometric groundwater contours and generalized groundwater flow directions at the site are shown in **Attachment 3**. Groundwater flow in the vicinity of AP2 is generally to the south and east. The groundwater to the west of AP2 is separated from the groundwater flow regime under AP2 by a groundwater divide.

3. G401 ASD LINES OF EVIDENCE

3.1 LOE #1: AP2 Porewater Samples Do Not Contain Detectable Concentrations of Cobalt

Porewater (i.e., water within the CCR) samples were collected from four locations (Ap2e, AP2f, AP2g, Ap2h) throughout AP2 in 2016 and analyzed for total cobalt. The locations of these porewater samples are shown on **Attachment 5**. Of these samples, none contained cobalt at concentrations above the method detection limit of 0.002 mg/L (**Figure 2**). One additional porewater sample was collected from an AP2 leachate collection system in May 2020 and analyzed for cobalt. This sample contained cobalt at a concentration of 0.0046 mg/L (**Figure 2**). Analytical data for the porewater samples is provided in **Attachment 6**. The cobalt concentrations detected in the porewater samples are less than the lower confidence limits of cobalt concentrations observed at downgradient well G401 for the Second Quarter 2023 sampling event (0.0629 mg/L calculated using a confidence band around a linear regression, Ramboll 2023).

Because the concentrations in porewater within AP2 are lower than the concentrations of cobalt at monitoring well G401, this exceedance is not attributed to impacts from the AP2 CCR unit.

As background information, CCR porewater most accurately represents the mobile constituents associated with the waste management activity within the CCR surface impoundment (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 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.*, toxicity characteristic leaching procedure, synthetic precipitation leaching procedure, Leachate Environmental Assessment Framework [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 oxidation-reduction (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.

Testing of 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 or contribute to a detected exceedance observed in a compliance well.

3.2 LOE #2: Cobalt Is Present in Aquifer Solids

Aquifer solids samples were collected from three soil borings across CPP in May 2021, including one sample adjacent to the screened interval of G401 and one sample adjacent to the screened interval of background well G270. The field boring logs for these samples are provided as **Attachment 7**. These samples were submitted for analyses of total cobalt and cobalt distribution within the aquifer solids using sequential extraction procedure (SEP). Results for total and SEP analyses of cobalt in these samples are presented in **Table 1** and the analytical laboratory reports are provided as **Attachment 7**[1].

SEP is an analytical technique that uses progressively stronger reagents to solubilize metals from specific phases within the solid matrix and is used to infer associations between constituents and different classes of solids (Tessier et al. 1979). These classes of solids are identified based on their solubility under different reagents and include the exchangeable fraction, the carbonate-bound fraction, the fraction bound to non-crystalline materials (typically amorphous oxides), the iron/manganese oxide-bound fraction, the organic matter-bound fraction, and the residual fraction. To evaluate data quality in an SEP analysis, first the sum of individual extraction steps from the SEP was compared to the total cobalt concentration. The sum of the SEP is not expected to be exactly equal to the total metals analysis but should be generally consistent with the total metals result. The total cobalt concentration from the G401 sample was reported as 7.7 milligrams per kilogram of soil (mg/kg). The total cobalt concentration from the background G270 sample was reported as 7.3 mg/kg. The summed concentration of cobalt from the SEP analyses of the G401 sample was 5.2 mg/kg, and the summed concentration of cobalt from the G270 sample was 9.1 mg/kg, indicating general consistency between the total metals analyses and the summed SEP steps and therefore good metals recovery and data quality.

These results indicate that cobalt is naturally present in the solids comprising the screened interval of both well of interest G401 and background location G270. In both samples, the largest component of cobalt was found to be associated with the ammonium oxalate reactive fraction (often correlated to non-crystalline metal oxides) and the reducing agent extractable fraction (often correlated to iron/manganese oxides), which together comprise 82% of recovered cobalt from G401 and 78% of recovered cobalt from G270 (**Table 1**). Smaller components of cobalt were found to be associated with the stronger reagents used to mobilize constituents from sulfides or

[1] Sample G1001 is included in Attachment 7 but excluded from subsequent results tables and discussion in order to emphasize findings associated with the cobalt exceedance at G401.

residual materials within the solid phase. These results demonstrate that naturally occurring cobalt is present and ubiquitous throughout the site, including at upgradient locations.

3.3 LOE #3: Geochemical Conditions Favor Mobilization of Cobalt from Iron-bearing Minerals

Additional evaluation of solid phase data and geochemical conditions at G401 provide evidence that the naturally occurring cobalt within the solid phase is mobilized to groundwater.

3.3.1 Mineralogical Analysis

SEP testing indicated that the largest components of cobalt are likely associated with non-crystalline metal oxides and iron/manganese oxides (Section 3.2). Mineralogical analysis of aquifer solids collected adjacent to G401 was completed using X-ray Diffraction (XRD) to evaluate the mineralogy of the screened interval and identify the phases present in the aquifer matrix material. Mineralogy results are provided in **Table 2,** and the laboratory analytical report is included as **Attachment 8**. Mineralogy of the sampled interval of G401 consists primarily of quartz, various feldspars (albite, microcline), and various phyllosilicate minerals (muscovite, stilpnomelane [smectite-group], biotite). Minor abundances of diopside, actinolite, and ankerite were reported as well.

The results of the SEP analyses indicated that non-crystalline oxides and crystalline oxide minerals were found to have the greatest and second association with cobalt, respectively (**Table 1**). The iron concentration measured during step 3 of the extraction procedure (the extraction phase typically associated with amorphous oxides) was 580 mg/kg and the iron concentration measured in step 4 (the extraction phase typically associated with crystalline iron and manganese oxides) was 6,400 mg/kg, suggesting that iron oxides are present within the aquifer matrix and are strongly associated with cobalt (**Attachment 7**). Total metals concentrations are provided in **Attachment 9**. In contrast to SEP and total metals results, no crystalline iron or manganese oxide minerals were reported in the XRD analyses. XRD does not provide an assessment of amorphous materials due to analytical limitations; XRD results are normalized to 100% to exclude non-crystalline components.

Cobalt is known to undergo isomorphic substitution for iron in crystalline iron minerals such as iron oxides, iron sulfides, and iron carbonates due to the similar ionic radii (Clementi and Raimondi, 1963; Krupka and Serne, 2002; Hitzman et al., 2017). Cobalt which has been isomorphically substituted for iron in the crystal structure of iron-bearing minerals or adsorbed to their surfaces would also be subject to mobilization via initiation of weathering reactions in which mineral crystal structures dissolve. Minor abundances of ankerite, an iron-bearing carbonate mineral, were reported in XRD results. Iron carbonate minerals are known to undergo pH and redox-driven reversible weathering reactions with ferric iron minerals such as iron oxides (Taylor 1980, Schwertmann and Taylor 1989, Schwertmann and Fitzpatrick 1993). The likely presence of iron oxide minerals coupled with the reported presence of an iron-bearing carbonate mineral

suggests that iron exists in multiple solid phases in the G401 aquifer material which have the potential to undergo dissolution reactions in response to aqueous geochemistry. Such reactions would mobilize iron and isomorphically substituted cobalt into groundwater.

3.3.2 Geochemical Conditions

The SEP results indicate that cobalt is likely associated with the iron oxide fraction and the non-crystalline material fraction of the aquifer matrix. An Eh-pH diagram was generated using the average composition of G401 groundwater (**Figure 3**) to evaluate groundwater conditions at G401 relative to the thermodynamic stability of iron oxide and iron carbonate minerals. Groundwater geochemistry from G401 sampling events consistently plot along the stability boundaries between aqueous Fe^{2+}, ferrous iron carbonate (siderite, $FeCO_3$), and amorphous ferric iron oxide ($Fe(OH)_3$), indicating that groundwater is in a state of dynamic equilibrium between the three phases. Based on **Figure 3**, subtle shifts in pH or redox conditions within G401 groundwater would be expected to result in alteration reactions between ferrous and ferric iron minerals which may trigger mineral dissolution and subsequent mobilization of iron and the associated cobalt to groundwater.

Further evidence of the association of cobalt with iron mineral phases is provided by **Figure 4**, which indicates a strong correlation between aqueous iron and aqueous cobalt in groundwater at G401 as well as a general shift in aqueous cobalt and iron trends occurring within the same time interval. This strong correlation reinforces the likelihood that isomorphic substitution of cobalt into iron minerals is occurring in the natural lithology adjacent to AP2, as aqueous iron is observed to behave in a very similar manner to aqueous cobalt. Such concurrent changes suggest an identical source of both aqueous cobalt and aqueous iron, that source being the presence of mineral-bearing minerals.

G401 groundwater has a notably lower pH than all other AP2 compliance wells (**Figure 5**). Measured pH values at G401 range from 5.58 to 6.40 Standard Units (SU). These values are lower than those measured from AP2 porewater samples during 2016 sampling, which range from 6.5 to 7.2 SU, suggesting that AP2 is not affecting the pH at G401 and it is instead driven by variability in the aquifer. The lower pH values at G401 contribute to the relative instability of iron-bearing minerals as shown in the thermodynamic speciation diagram in **Figure 3**. The lower pH condition at G401 groundwater likely accounts for the elevated aqueous iron and cobalt concentrations in G401 groundwater relative to other compliance wells.

3.4 LOE #4: Geochemical Modeling of Cobalt Mobilization from Aquifer Solids Supports the Determination of Naturally Occurring Cobalt

Geochemical modeling was used to investigate the influence of pH conditions on aqueous cobalt concentrations at well G401. Thermodynamic reaction pathway modeling was conducted using the React module of Geochemist's Workbench (GWB) geochemical modeling software package (version 17.0.1). The purpose of the model is to show the relationship between pH and aqueous cobalt concentrations as a function of variable pH and iron mineral instability and sorption capability.

The initial aqueous component of the geochemical model was populated using the groundwater composition of the most recent sample collected at G401 on June 7, 2023 (**Table 3**). The pH value of the aqueous component was not defined and was set as a sliding scale. Solid-phase reactants incorporated into the model were limited to iron-bearing minerals to evaluate iron and associated cobalt dynamics in the system and were defined based on results of the solid phase analyses: 0.1 weight percentage (wt. %) siderite ($FeCO_3$) as a proxy for ankerite and 0.1 wt. % of iron hydroxide, $Fe(OH)_3$. Ankerite ($Ca[Fe,Mg,Mn][CO_3]_2$) is a complex iron-carbonate solid-solution mineral with limited thermodynamic data available and is not included in most thermodynamic databases. $Fe(OH)_3$ was included to account for the iron oxide mineral phase which is suggested by SEP results (**Table 1**) and predicted to occur based on thermodynamic speciation (**Figure 3**). Both siderite and iron hydroxide were included as reactant phases, and $Fe(OH)_3$ was modified in the thermodynamic database to incorporate a small fraction of cobalt (**Table 3**) to represent isomorphically substituted cobalt within the crystal structure of this mineral as suggested by SEP results (**Table 1**). The cobalt-iron hydroxide phase represents a natural cobalt source within the model and allows for evaluation of cobalt stability as a function of pH variability.

The thermodynamic database used for the model (thermo.dat) was adjusted to include the newly-defined cobalt-iron hydroxide mineral phase discussed above. Sorption to iron oxyhydroxides was incorporated into model calculations using the Dzombak and Morel (1990) two-layer surface complexation model. This sorption dataset was modified to recognize the cobalt-substituted source phase of $Fe(OH)_3$. Crystalline iron minerals ferrite, hematite, goethite, and magnetite were suppressed during model simulations due to their lack of detection by XRD. A porosity value of 25% was used for the UA.

The geochemical model simulates cobalt and iron concentrations over the pH range observed in groundwater at well G401 from November 2015 (the beginning of monitoring) to the present, as well as the average pH value across all other AP2 compliance wells since sampling began (**Figure 6**). Iron concentrations are included to illustrate the effects of dissolution of the cobalt-bearing iron mineral source phase on aqueous conditions. Generally, both aqueous iron and cobalt concentrations are predicted to be higher at lower pH values (such as those observed at G401). This effect is due to the combined instability of the cobalt-bearing iron hydroxide and desorption of aqueous cobalt from the surface complexes of the $Fe(OH)_3$ mineral with declining pH. **Figure 7a** shows the fraction of cobalt predicted to sorb to this iron oxide component at varying pH levels (maximum adsorption at pH 7.19), and **Figure 7b** shows the predicted mass of each mineral at varying pH levels, which represents the availability of sorption sites for cobalt. The results of the equilibrium geochemical model demonstrate an increase in aqueous cobalt in groundwater as desorption from iron oxide surfaces and dissolution of iron-bearing oxide minerals are promoted at groundwater pH conditions below 7.0. Geochemical modeling results support the hypothesis that the lower pH levels documented at G401 relative to all other AP2 compliance wells are the primary cause of elevated aqueous cobalt concentrations.

4. CONCLUSIONS

It has been demonstrated that the cobalt GWPS exceedance at G401 is not due to a release from the AP2 CCR unit and that the unit has not contributed to the exceedance, but instead the exceedance is attributed to a natural source. The following summarizes the four LOEs used to support this alternative source demonstration:

1. AP2 porewater samples do not contain detectable concentrations of aqueous cobalt and can therefore not be the source of cobalt exceedances to downgradient groundwater.
2. Cobalt has been detected in aquifer solids samples collected adjacent to well G401 and adjacent to background well G270 which constitute a naturally occurring cobalt source.
3. Geochemical conditions of G401 groundwater indicate that multiple iron phases are present in the aquifer-groundwater system, and small changes in pH or redox conditions are expected to result in the dissolution of cobalt-bearing phases and the release of cobalt and dissolved iron into groundwater.
4. Geochemical modeling of cobalt mobilization from aquifer solids predicts that pH conditions govern aqueous cobalt concentrations in Site groundwater. Lower pH levels documented in G401 groundwater are predicted to result in elevated aqueous cobalt relative to other AP2 compliance wells.

The alternative source of cobalt at G401 is the influence of the till lithology on groundwater composition. This demonstration fulfills the requirements of 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.

5. REFERENCES

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TABLES

Coffeen Power Plant

Soil Boring Location		G270A		G401A	
Sample Depth (ft)		(12-16)		(16-20)	
Location		Background		Upgradient	
Field Boring Log Description		Brown silty sand		Brown sand transitioning to light gray/brown sandy clay	
Total Cobalt		7.3		7.7	
SEP Results					
SEP Fraction	SEP Reagent	Concentration	% of Total	Concentration	% of Total
Exchangeable Metals Fraction	$MgSO_4$	<0.21	--	<0.21	--
Bound to Carbonates Fraction	Sodium acetate, acetic acid	<0.22	--	<0.22	--
Bound to Non-crystalline Materials	Ammonium oxalate (pH 3)	4.3	47%	2.4 J	46%
Bound to Fe/Mn Oxides Fraction	Hydroxylamine HCl and acetic acid	2.8 J	31%	1.9 J	36%
Bound to Organic Material Fraction	5% sodium hypochlorite (pH 9.5)	<0.70	--	<0.69	--
Bound to Sulfides Fraction	HNO_3-HCl-H_2O solution	1.6 J	18%	0.85 J	16%
Residual Metals Fraction	HF, HNO_3, HCL, and H_3BO_3	0.36 J	4%	0.061 J	1.0%
SEP Total		9.1	100%	5.1	100%

Notes:
SEP - sequential extraction procedure
ft bgs - feet below ground surface
All results shown in milligram of cobalt per kilogram of soil (mg/kg).
Non-detect values are shown as less than the detection limit.
The cobalt fraction associated with each SEP phase is shown.
% of total cobalt is calculated from the sum of the SEP fractions.

Coffeen Power Plant

Field Boring Location			G270A	G401A
Sample Depth (ft bgs)			(12-16)	(16-20)
Location			Upgradient	Downgradient
Field Boring Log Description			Brown silty sand	Brown sand transitioning to light gray/brown sandy clay
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)
Quartz	SiO_2	Silicate	60.6	68.9
Albite	$NaAlSi_3O_8$	Feldspar	9.1	8.6
Microcline	$KAlSi_3O_8$	Feldspar	9.8	7.8
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	Mica	9.0	6.8
Stilpnomelane	$K(Fe,Mg)_8(Si,Al)_{12}(O,OH)_{27}•H_2O$	Clay	2.0	2.7
Biotite	$K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$	Mica	2.4	2.1
Diopside	$CaMgSi_2O_6$	Pyroxene	1.3	1.4
Actinolite	$Ca_2(Mg,Fe)_3Si_8O_{22}(OH)_2$	Amphibole	3.3	1.4
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	Clay	1.4	-
Dolomite	$(Mg,Ca)(CO_3)_2$	Carbonate	0.6	-
Ankerite	$CaFe(CO_3)_2$	Carbonate	0.5	0.1
Pyrite	FeS_2	Sulfide	0.2	-

Notes:
Sample depth is shown in feet below ground surface (ft bgs).
wt %: percentage by weight
- : Mineral was not detected at abundances above the instrument detection limit

Table 4: Summary of Geochemical Model Inputs

Coffeen Power Plant

Aqueous Phase			
Parameter	**Unit**	**Input Value**	**Source**
Calcium	mg/L	490	June 7, 2023 sampling event
Chloride	mg/L	3.60	June 7, 2023 sampling event
Cobalt	mg/L	0.110	June 7, 2023 sampling event
Iron	mg/L	84.0	June 7, 2023 sampling event
Magnesium	mg/L	150	June 7, 2023 sampling event
Manganese	mg/L	27.0	June 7, 2023 sampling event
Potassium	mg/L	2.20	June 7, 2023 sampling event
Sodium	mg/L	71.0	June 7, 2023 sampling event
Sulfate	mg/L	2100	June 7, 2023 sampling event
Bicarbonate Alkalinity	mg/L	140	June 7, 2023 sampling event
Eh	V	0.168	June 7, 2023 sampling event
Temperature	°C	12.3	June 7, 2023 sampling event
pH	SU	5.0-8.0	Model variable
Solid Phase			
Reactant	**Unit**	**Input Value**	**Source**
$Fe(OH)_3$-Cobalt Source Phase[1]	wt.%	0.1	Assumption based on SEP results indicating iron oxide presence and thermodynamic speciation modeling
Siderite	wt.%	0.1	May 2021 sample XRD results (for iron carbonate mineral ankerite[2])
Porosity	%	25	Assumed

Notes:

mg/L: milligrams per liter

V: volts

°C: degrees Celsius

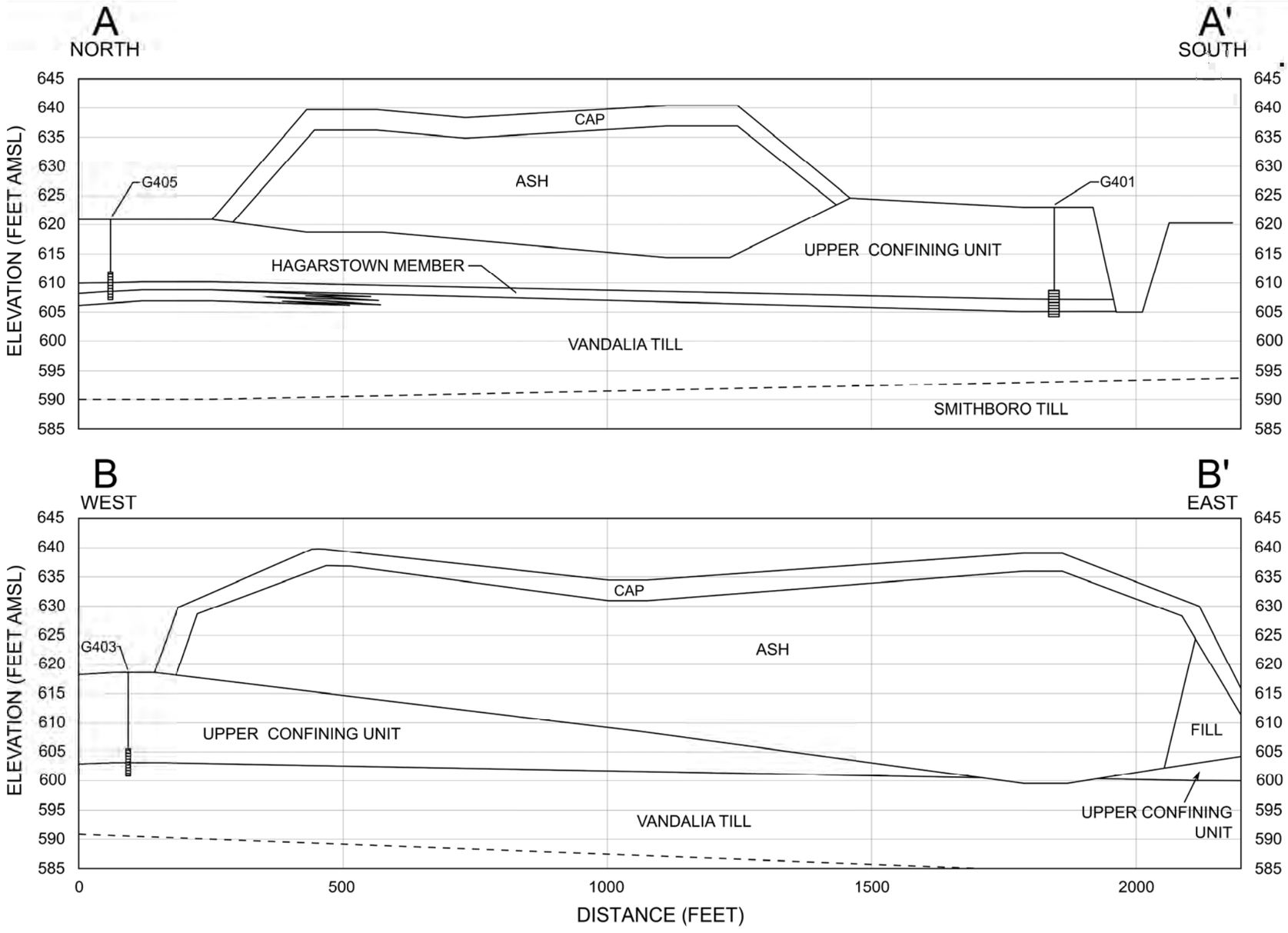
SU: standard units

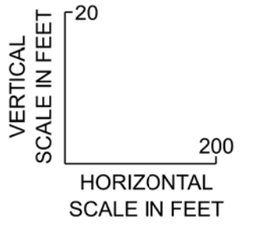
wt. %: weight percentage

1: Mineral formula $Fe^{3+}_{0.99}Co^{2+}_{0.015}(OH)_3$

2: Thermodynamic information for ankerite is not readily available, so iron carbonate mineral siderite was used in modeling efforts in place of ankerite

FIGURES





VERTICAL EXAGGERATION = 10

Legend

- Monitoring Wells
- Pond Outline
- Well Screen

Notes

- Well locations are approximate
- Geologic cross-sections modified from Hydrogeologic Monitoring Plan (Natural Resource Technology, 2017)
- Cap thickness is approximate

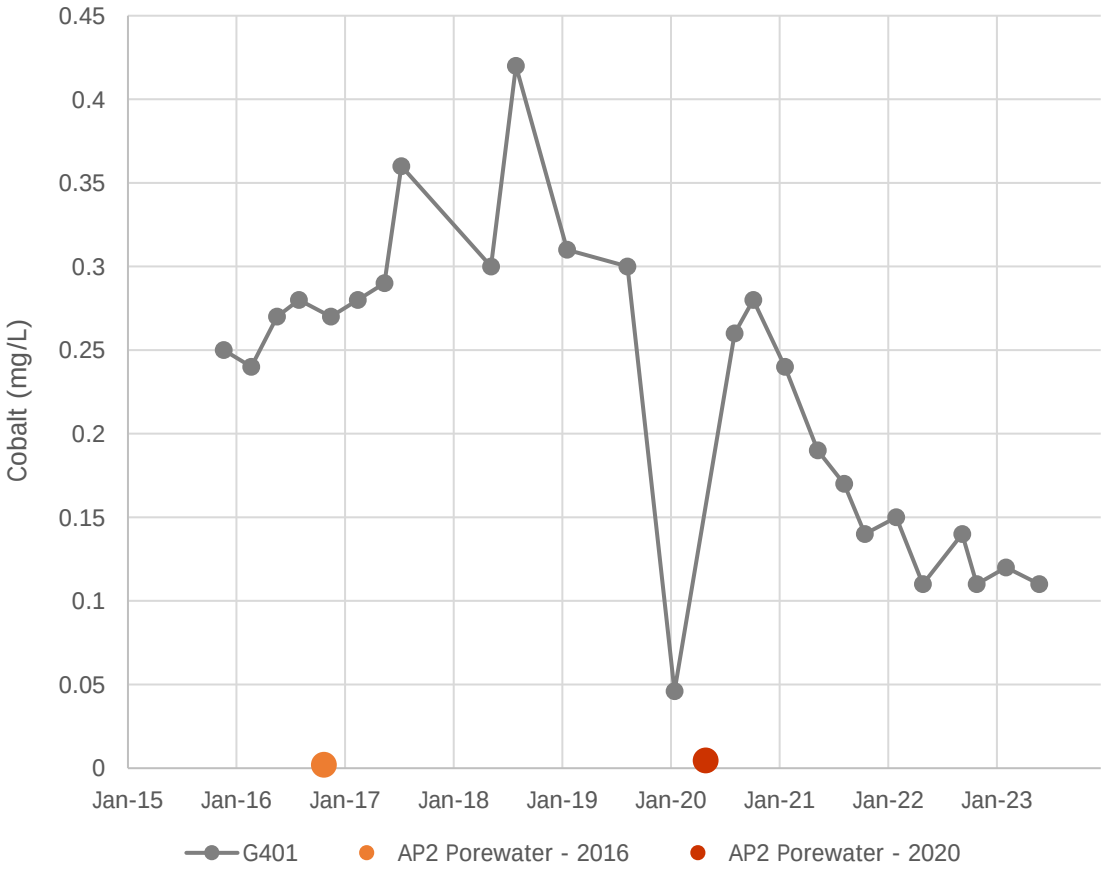
Ash Pond No. 2 Geologic Cross-Section

134 Cips Lane
Coffeen, Illinois

Geosyntec consultants

Columbus, OH | November 2023

Figure 1



Notes: Cobalt results are shown for unfiltered samples in units of milligrams per liter (mg/L). The 2016 porewater sample datapoint represents four separate sampling locations throughout AP2, all of which did not contain detectable cobalt. The method detection limit of 0.002 mg/L is shown.

Cobalt Time Series

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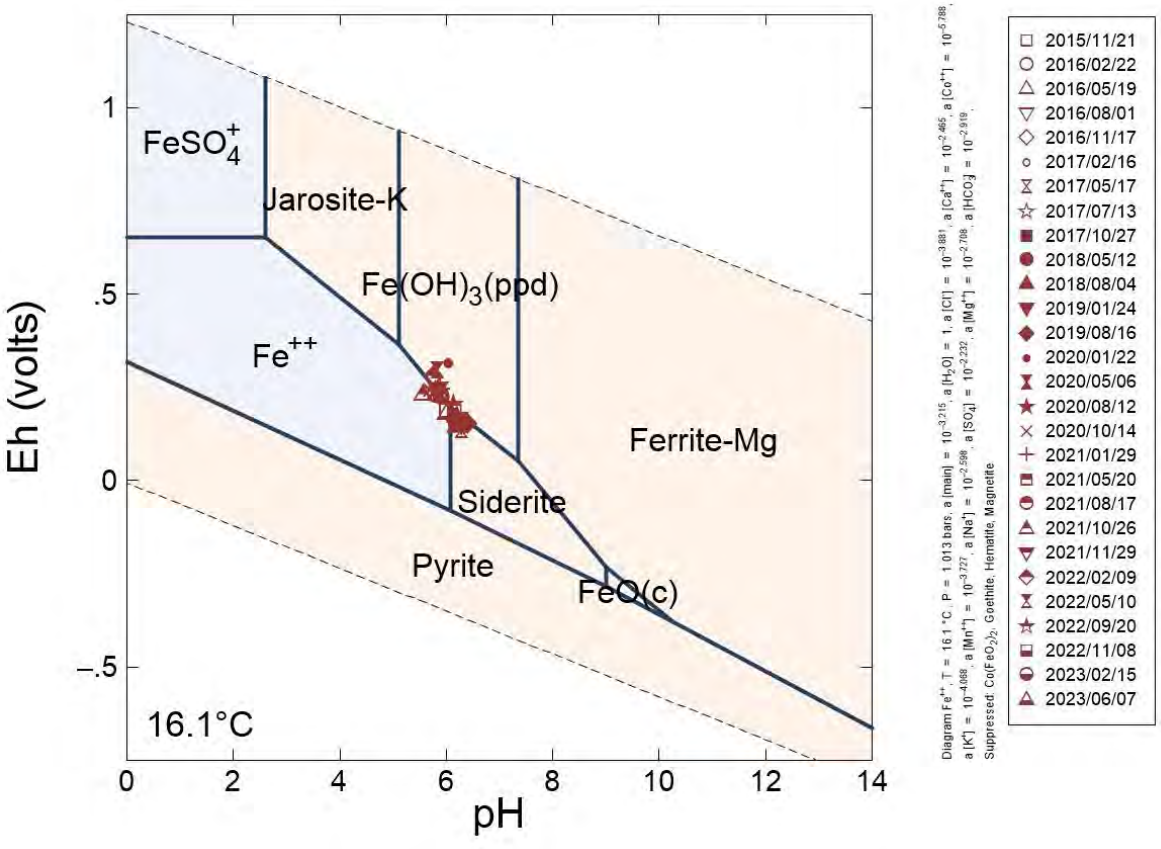
Columbus, OH | November 2023

Figure **2**



Notes: Groundwater compositions from all G401 sampling events were averaged and used to establish baseline conditions for the diagram. Eh and pH values for sampling dates at G401 are shown on the diagram. pH is displayed in standard units (SU).
V - volts

Iron Eh-pH Phase Stability Diagram – G401

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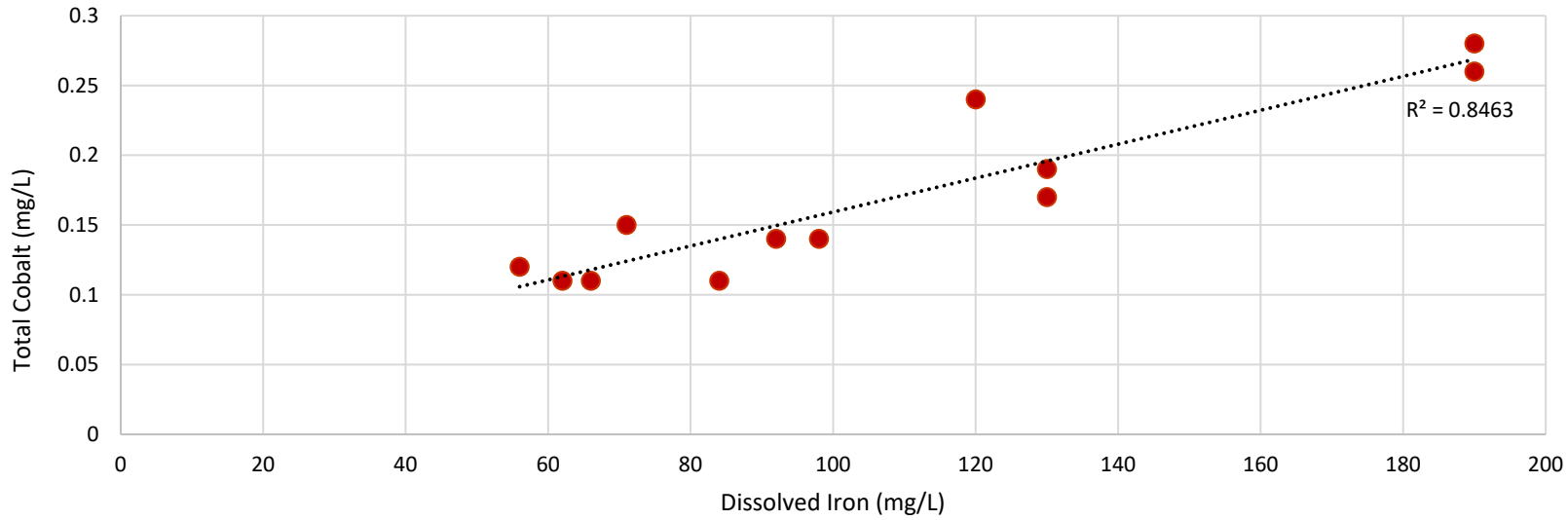
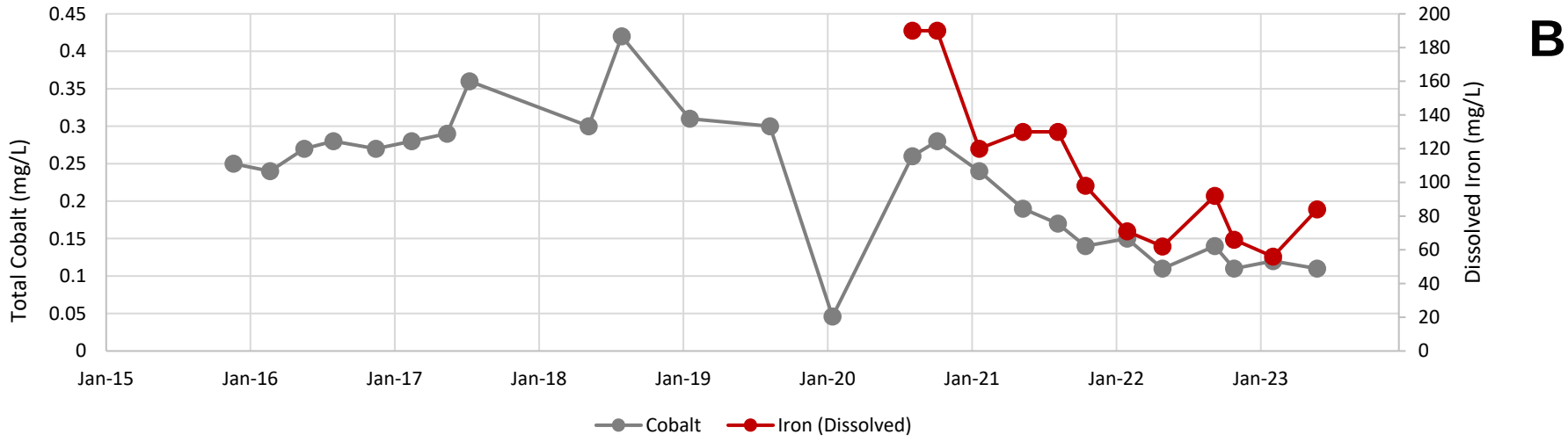
Columbus, OH | October 2023

Figure **3**





Notes: Figure A displays a scatterplot of groundwater data for G401 samples in units of milligrams per liter (mg/L). Iron concentrations are from filtered samples, and cobalt concentrations are from unfiltered samples. Figure B displays a time series plot of aqueous iron and cobalt concentrations at G401 in units of mg/L. Iron concentrations are from filtered samples, and cobalt concentrations are from unfiltered samples.

G401 Cobalt-Iron Relationship

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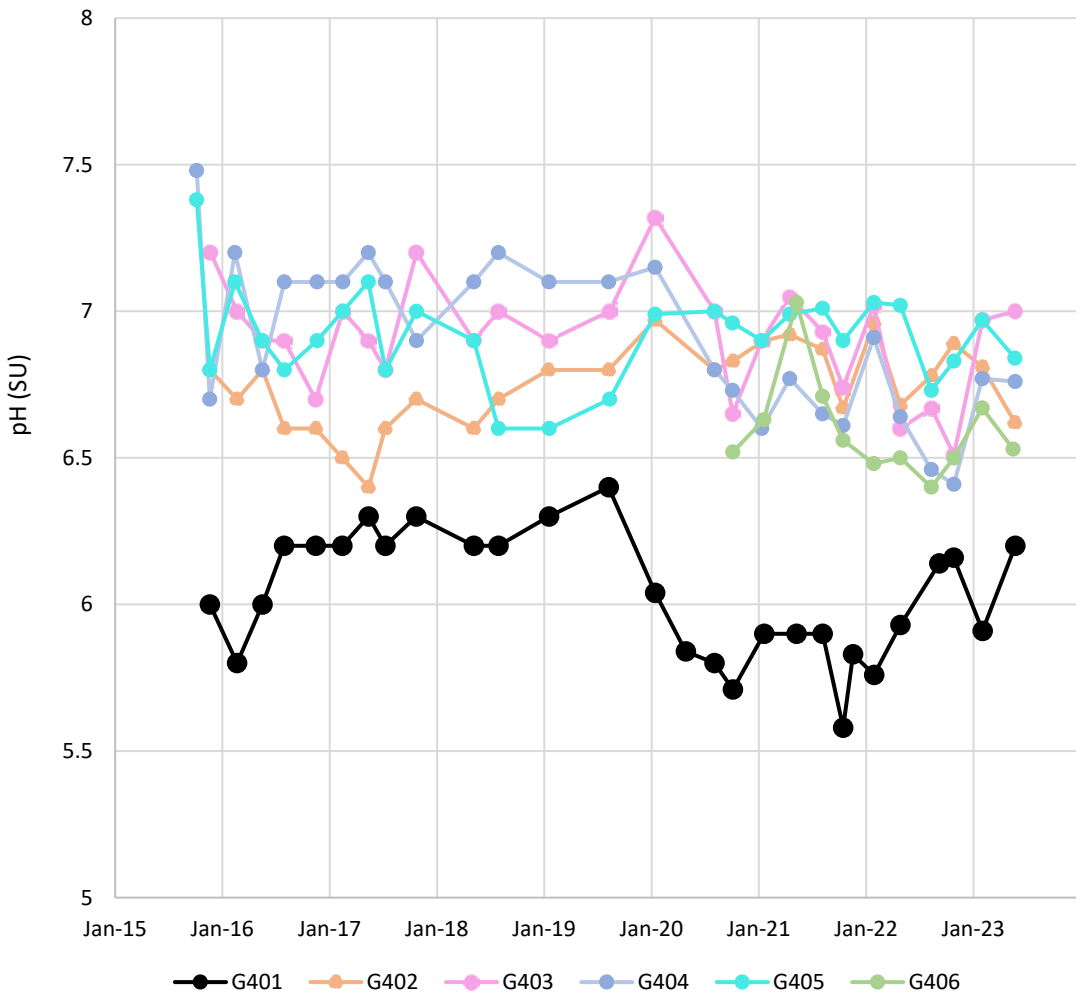
Figure 4



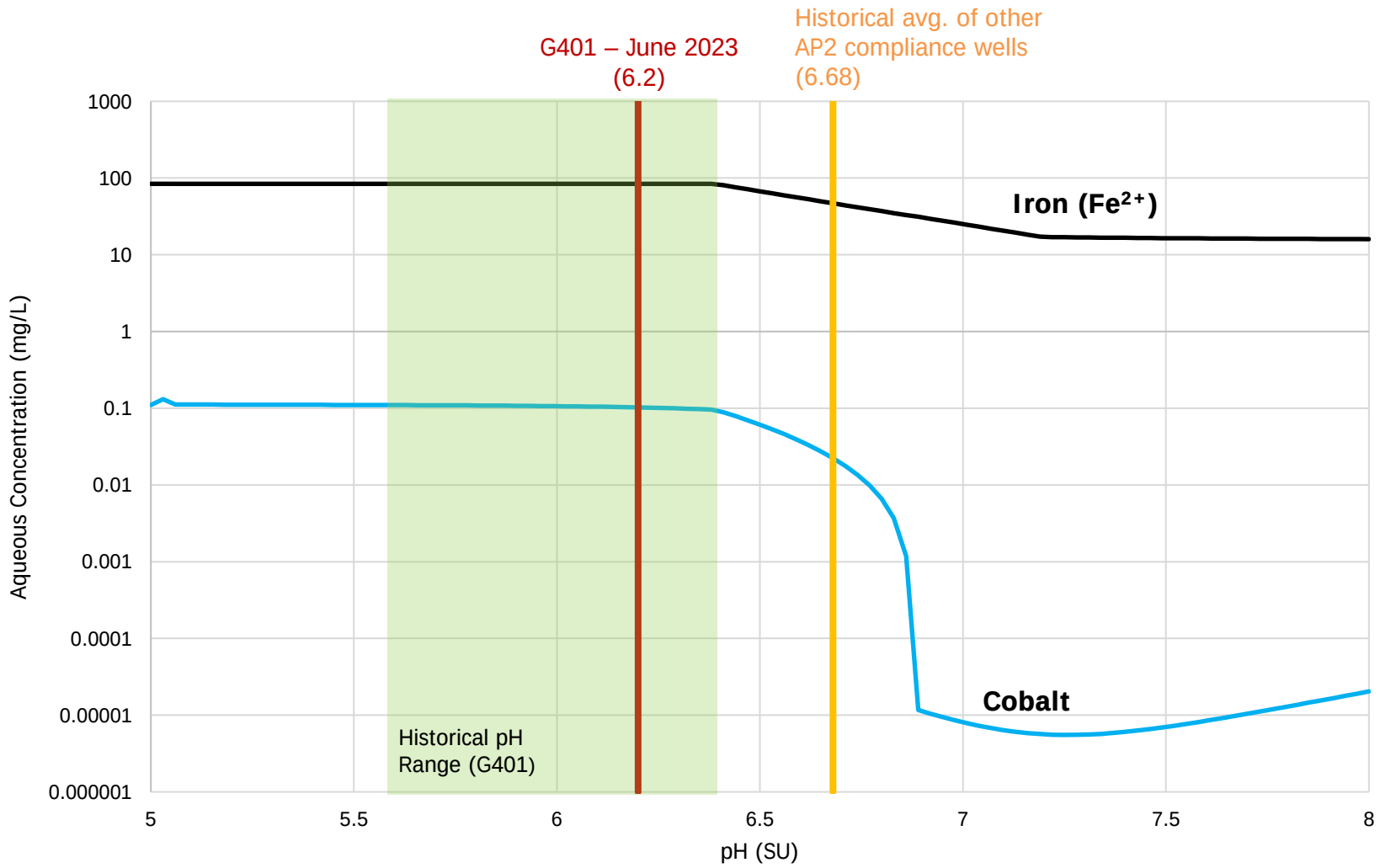
Notes: Field-measured values for pH at all Coffeen Ash Pond 2 compliance wells are shown in standard units (SU).

AP2 Groundwater pH Time Series

Geosyntec consultants

Columbus, OH | November 2023

Figure 5



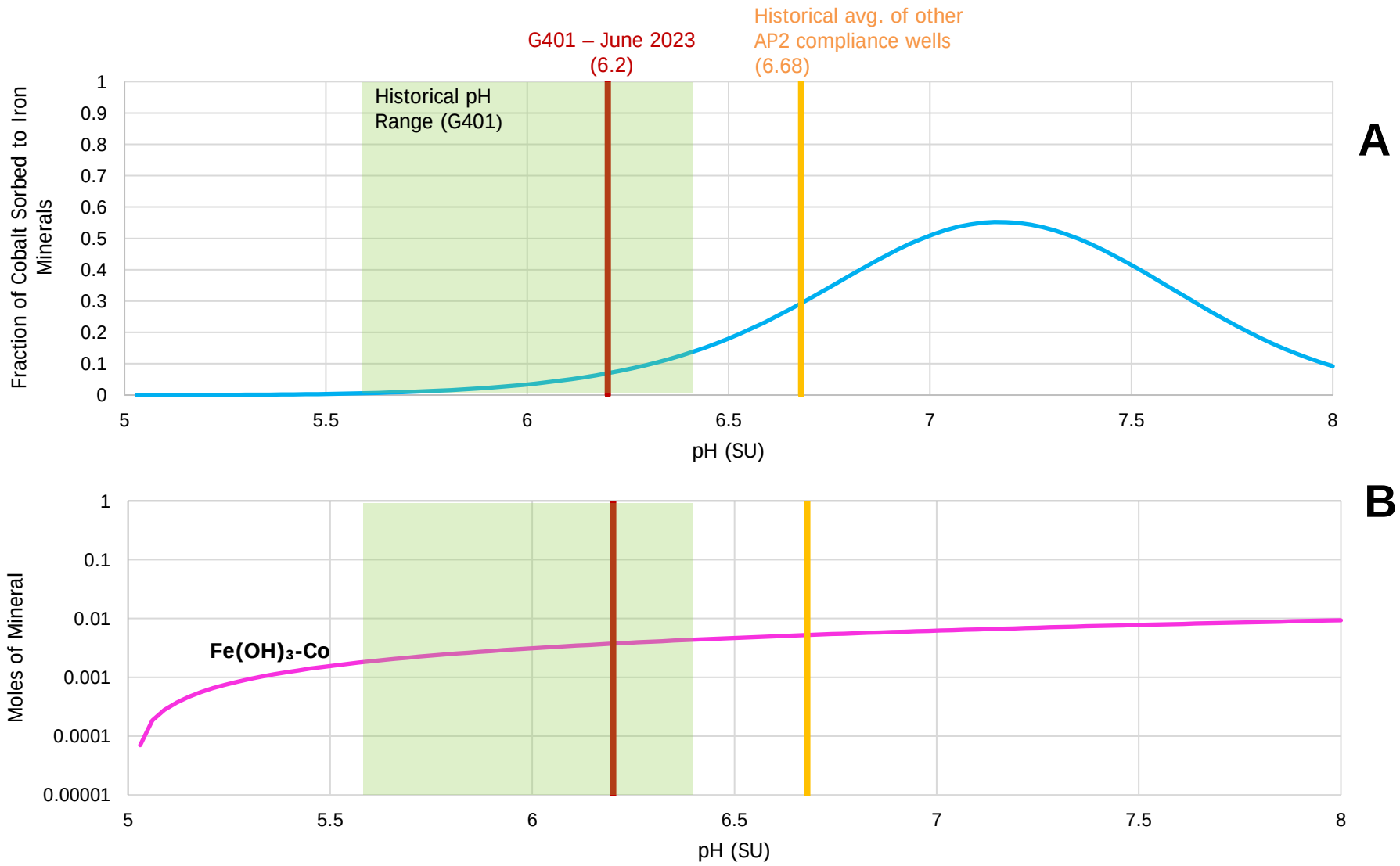
Notes: pH values are shown in standard units (SU). Predicted concentrations of aqueous cobalt and iron in units of milligrams per liter (mg/L) on a log scale as a function of pH are shown. The historical range of measured pH values at monitoring well G401 groundwater from 2015 to the present are indicated by the green shading. The pH value of the most recent groundwater sample from G401 is indicated by the red line. The average pH value of all sampling events from all AP2 compliance wells (not including G401) is indicated by the orange line.

Geochemical Model Output – Aqueous Cobalt and Iron Concentrations

Geosyntec consultants

Columbus, OH | November 2023

Figure **6**



Notes: pH values are shown in standard units (SU). Plot A displays the fraction of cobalt in the system that is predicted to sorb to iron-bearing minerals. Plot B displays the predicted number of moles of $Fe(OH_3)$-Co as a function of pH. The historical range of measured pH values at monitoring well G401 groundwater from 2015 to the present are indicated by the green shading. The pH value of the most recent groundwater sample from G401 is indicated by the red line. The average pH value of all sampling events from all AP2 compliance wells (not including G401) is indicated by the orange line.

Geochemical Model Output – Sorbed Cobalt and Mineral Mass

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Columbus, OH | December 2023

Figure 7

ATTACHMENT 1
Proposed 845 Groundwater Monitoring Network

Y:\Mapping\Projects\22\22185\MXD\845_Operating_Permit\Coffeen\AP2_GMP\Figure 2-1_Proposed Monitoring Well_Network.mxd

PROJECT: 1690000XXX | DATED: 10/6/2021 | DESIGNER: STOLZSD

COMPLIANCE WELL
BACKGROUND WELL
MONITORING WELL
STAFF GAGE

PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 200 400 Feet

PROPOSED 845 GROUNDWATER MONITORING WELL NETWORK

ADDENDUM TO THE GROUNDWATER MONITORING PLAN
ASH POND NO. 2
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 2

G401 Boring Log and Well Construction Diagram

FIELD BORING LOG

HANSON

CLIENT: Natural Resource Technology, Inc.
Site: Coffeen Energy Center
Location: Coffeen, Illinois
Project: 15E0030
DATES: **Start:** 9/14/2015
Finish: 9/14/2015
WEATHER: Sunny, hi 60's

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: D-50 Turbo Tracked MST 800ATV
Drilling Method: Hollow Stem Auger (3¼"overdrill / 4¼")
FIELD STAFF: **Driller:** D. Crump
Helper: D. Groves
Eng/Geo: R. Hasenyager

BOREHOLE ID: G401
Well ID: G401
Surface Elev: 623.03 ft. MSL
Completion: 19.30 ft. BGS
Station: 2,515,614.84N
872,510.57E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - During Drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	16/24 67%	ss	2-2 3-7 N=5	17			0	Dark grayish brown (10YR4/2), moist, soft, CLAY with little silt and trace very fine- to fine-grained sand - FILL.		622	
							2	Yellowish brown (10YR5/6) moist, medium, CLAY with some silt and trace very fine- to coarse-grained sand - FILL.			
2A	21/24 88%	ss	8-11 8-9 N=19	17		1.80		Dark gray (10YR4/1), moist, stiff, SILT with little clay and trace very fine-grained sand.		620	
2B				25			4	Yellowish brown (10YR5/6), moist, stiff, CLAY with some silt and trace very fine- to fine-grained sand.			
3A	23/24 96%	ss	3-4 7-8 N=11	23		2.50		Gray (10YR5/1) with 20% yellowish brown (10YR5/6) mottles, moist, medium, CLAY with some silt and trace very fine- to fine-grained sand.		618	
4A	24/24 100%	ss	8-9 12-14 N=21	21		3.30	6			616	
4B				19		2.80	8	Gray (10YR5/1) with 30% yellowish brown (10YR5/8) mottles, moist, stiff, SILT and very fine-grained SAND with trace clay.			
5A	24/24 100%	ss	2-3 4-5 N=7	21		1.30				614	
6A	24/24 100%	ss	2-4 5-6 N=9	17		2.50	10	Gray (10YR5/1) with 30% yellowish brown (10YR5/6) mottles, moist, medium, CLAY with some silt and trace very fine- to fine-grained sand.		612	
7A	24/24 100%	ss	9-7 8-9 N=15	21		1.40	12			610	
8A	24/24 100%	ss	2-3 2-4 N=5	17		1.30	14	Gray (10YR6/1), moist soft, CLAY with very fine- to fine-grained sand and little silt.		608	
8B				19			16	Yellowish brown (10YR5/6), wet, loose, very fine- to fine-grained SAND with trace silt.			
9A	20/24 83%	ss	5-4 5-10 N=9	21				Yellowish brown (10YR5/6), wet medium, SILT with some very fine-grained sand and little clay.		606	
9B				16				Yellowish brown (10YR5/6), wet, loose, very fine- to medium-grained SAND with trace silt.			
10A	12/16 75%	ss	23-41 50/4"	6		4.50	18	Gray (10YR5/1), moist, very hard, SILT with few clay and little very fine- to very coarse sand.		604	

End of boring = 19.3 feet

NOTE(S): G401 installed in borehole.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G401

Site Name: Natural Resource Technology, Inc. Coffeen Energy Center Borehole #: G401

State Plane Coordinate: X 872,510.6 Y 2,515,614.8 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: D. Crump

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): none

Logged By: Rhonald W. Hasenyager Date Started: 9/14/2015 Date Finished: 9/14/2015

Report Form Completed By: Suzanna L. Keim Date: 10/7/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite Chips

Installation Method: Gravity

Setting Time: >24 hours

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 25 minutes

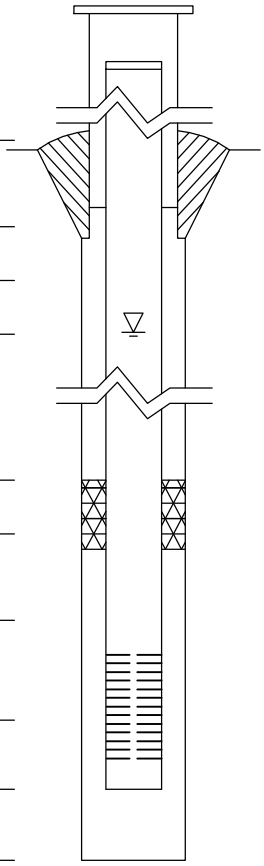
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
625.84	-2.81	Top of Protective Casing
625.57	-2.54	Top of Riser Pipe
623.03	0.00	Ground Surface
621.33	1.70	Top of Annular Sealant
_____	_____	Static Water Level (After Completion)
n/a	n/a	Top of Seal
610.12	12.91	Top of Sand Pack
608.67	14.36	Top of Screen
604.24	18.79	Bottom of Screen
603.74	19.29	Bottom of Well
603.73	19.30	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	16.70
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.63
Total Length of Casing	(feet)	21.83
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

ATTACHMENT 3

Potentiometric Surface Map – May 30,2023

PROJECT: 169000XXXX | DATED: 11/15/2023 | DESIGNER: egreaves

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Coffeen\AP2_102\2023_AP2_102.aprx

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- SOURCE SAMPLE LOCATION
- PORE WATER WELL
- LEACHATE WELL
- MONITORING WELL
- STAFF GAGE, CCR UNIT
- STAFF GAGE, RIVER

- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY
- REGULATED UNIT (SUBJECT UNIT)

POTENTIOMETRIC SURFACE MAP
MAY 30, 2023

0 325 650 Feet

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

ASH POND NO. 2
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 4
Field Boring Logs

Geosyntec consultants
engineers | scientists | innovators

Client: Dynegy
Project: GLP8005, Coffeen Power Station
Address: Coffeen, IL 62017

BORING LOG

Boring No. G401A
Page: 1 of 1

Drilling Start Date:	**04/05/2021**	Boring Depth (ft):	**20**
Drilling End Date:	**04/05/2021**	Boring Diameter (in):	**6**
Drilling Company:	**Roberts Drilling**	Sampling Method(s):	**Direct Push**
Drilling Method:	**Direct Push**	DTW During Drilling (ft):	
Drilling Equipment:	**Geoprobe**	DTW After Drilling (ft):	
Driller:		Ground Surface Elev. (ft):	
Logged By:	**A. Toye**	Northing, Easting (NAD83):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Recovery (in)	COLLECT: Blow Counts	COLLECT: N Value RQD (%)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: Lab Sample	ELEVATION (ft)
0				DP	12/48			(0') CLAY (CL); brown (7.5YR 5/2), soft, moist, low plasticity.		
				DP	27/48			(4') 14" of As above: trace gravel.		
5								(4.16') 13" of CLAYEY SILT (ML); trace gravel, medium stiff, moist.		
				DP	48/48			(8') SILTY CLAY (CL); brown (7.5YR 5/4), stiff to medium stiff, moist, low plasticity.		
10				DP	48/48			(12') As above: trace gravel and siltier starting at 45", some sand for first 12".		
15				DP	48/48			(16') 22" of SAND (SP); strong brown (7.5YR 4/6) to brown (7.5YR 5/2), fine to coarse grained, stiff to soft,	Chem (16-20')	
								(17.83') 26" of SANDY CLAY (CL); light gray (7.5YR 7/1) to strong brown (7.5YR 5/8), soft, moist, medium plasticity, trace ash.		
20								(20') End of Boring.		

NOTES: No groundwater encountered.

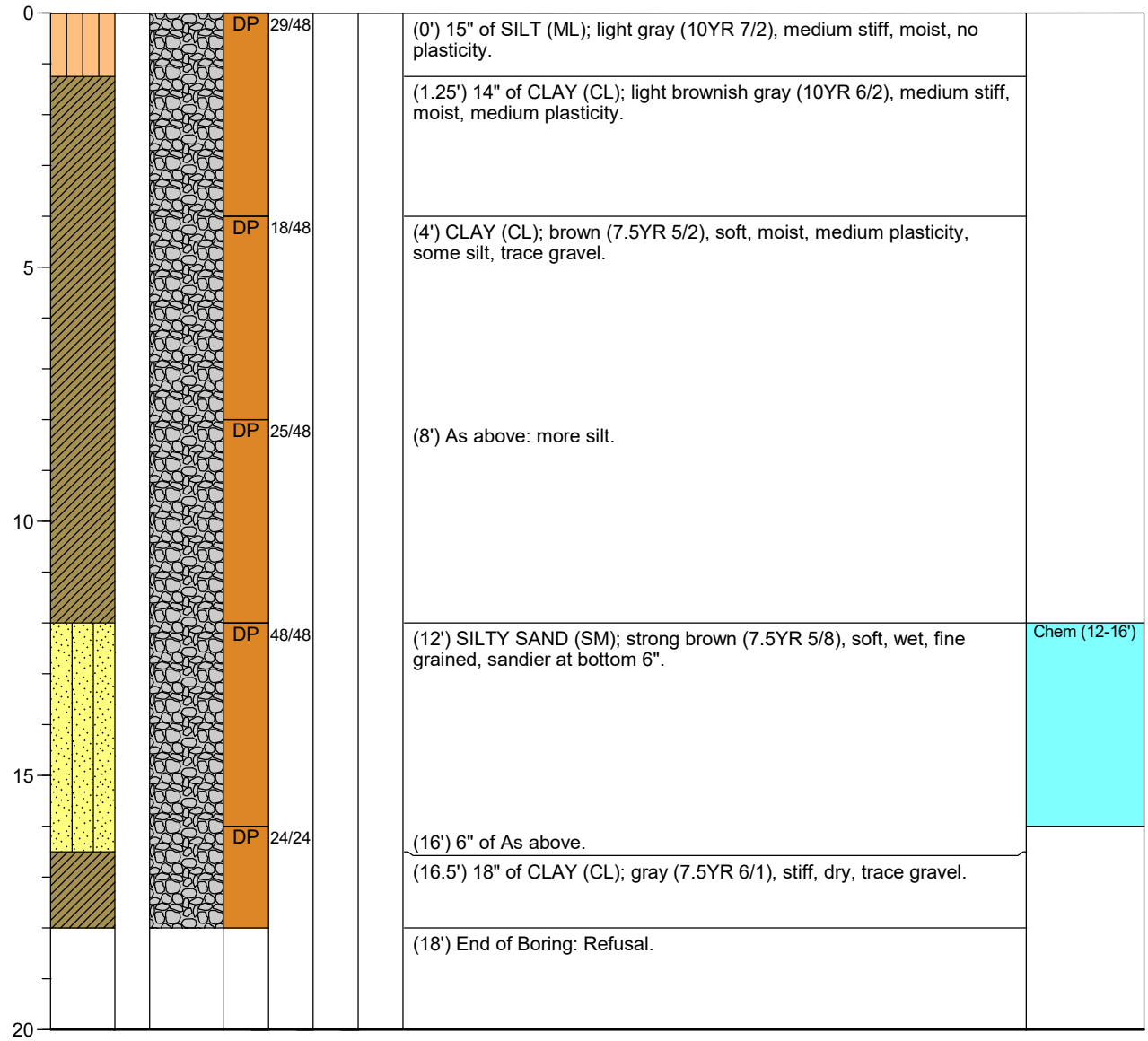
Geosyntec consultants
engineers | scientists | innovators

Client: Dynegy
Project: GLP8005, Coffeen Power Station
Address: Coffeen, IL 62017

BORING LOG

Boring No. G270A
Page: 1 of 1

Drilling Start Date:	**04/05/2021**	Boring Depth (ft):	**18**
Drilling End Date:	**04/05/2021**	Boring Diameter (in):	**6**
Drilling Company:	**Roberts Drilling**	Sampling Method(s):	**Direct Push**
Drilling Method:	**Direct Push**	DTW During Drilling (ft):	
Drilling Equipment:	**Geoprobe**	DTW After Drilling (ft):	
Driller:		Ground Surface Elev. (ft):	
Logged By:	**A. Toye**	Northing, Easting (NAD83):	

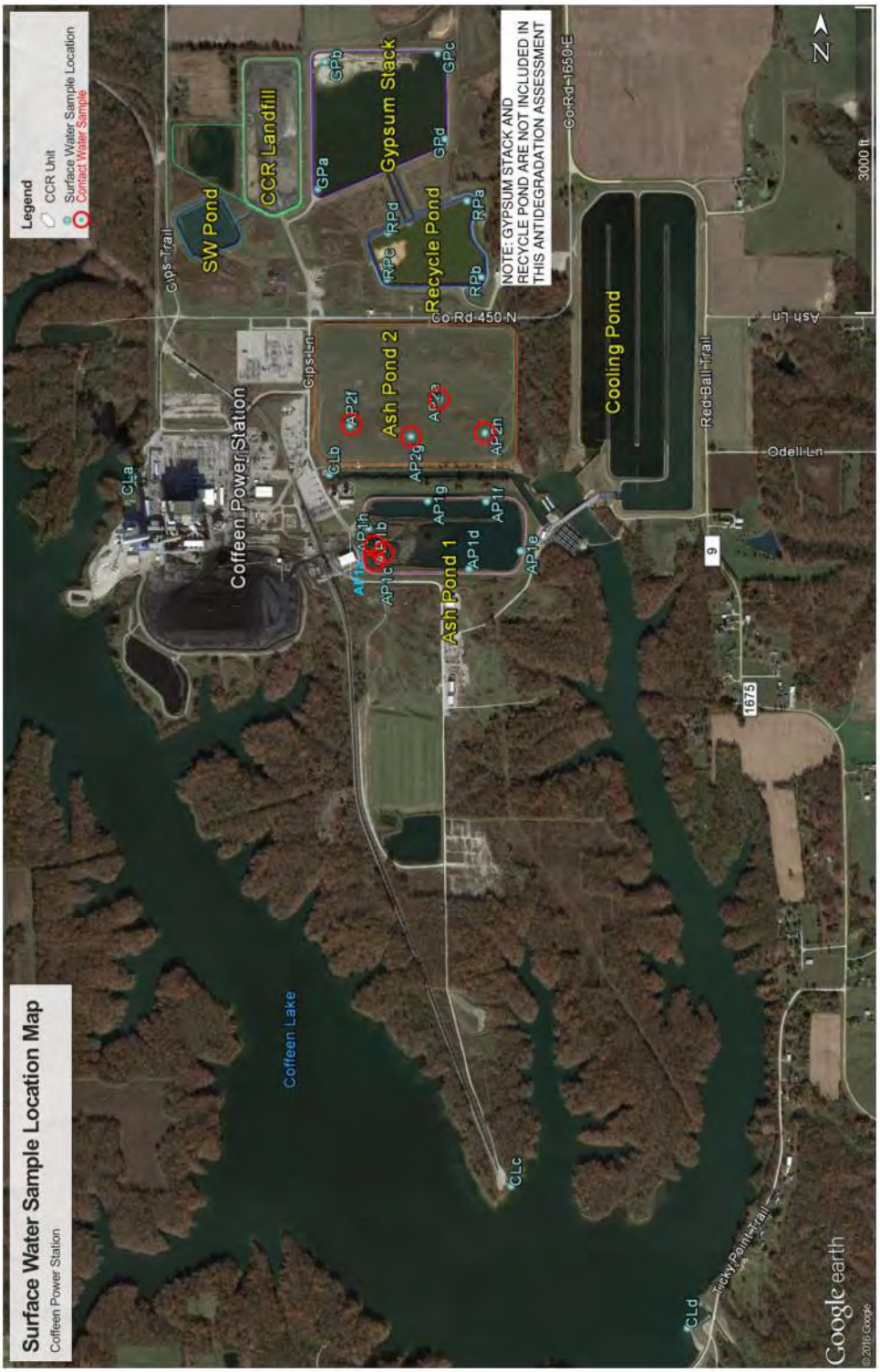


NOTES: No groundwater encountered.

ATTACHMENT 5

2016 AP2 Porewater Sampling Locations

Figure 1 Site Map



ATTACHMENT 6

Coffeen AP2 Porewater Laboratory Analytical Data

PDC Laboratories, Inc.
PROFESSIONAL ŁDEPENDABLE ŁCOMMITTED

May 29, 2020

John Romang
Vistra - Coffeen
134 CIPS Lane
Coffeen, IL 62017

RE: COFFEEN DEWATERING

Dear John Romang:

Please find enclosed the **revised** analytical results for the **1** sample(s) the laboratory received on **5/7/20 8:54 am** and logged in under work order **0051246**. All testing is performed according to our current TNI accreditations unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of PDC Laboratories, Inc.

If you have any questions regarding your report, please contact your project manager. Quality and timely data is of the utmost importance to us.

PDC Laboratories, Inc. appreciates the opportunity to provide you with analytical expertise. We are always trying to improve our customer service and we welcome you to contact the Director of Client Services, Lisa Grant, with any feedback you have about your experience with our laboratory at 309-683-1764 or lgrant@pdclab.com.

Sincerely,

Gail J Schindler

Gail Schindler
Project Manager
(309) 692-9688 x1716
gschindler@pdclab.com

PDC Laboratories, Inc.

ANALYTICAL RESULTS

Sample: 0051246-01
Name: CO 102 PumpQbox Source Water CCR
Matrix: Ground Water - Grab

Sampled: 05/06/20 10:40
Received: 05/07/20 08:54
PO #: 663168

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	1.9	mg/L		05/07/20 20:22	1	1.0	05/07/20 20:22	TMS	EPA 300.0 REV 2.1
Fluoride	0.490	mg/L		05/07/20 20:22	1	0.250	05/07/20 20:22	TMS	EPA 300.0 REV 2.1
Sulfate	1600	mg/L		05/08/20 14:03	500	500	05/08/20 14:03	TMS	EPA 300.0 REV 2.1
General Chemistry - PIA									
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L		05/18/20 14:15	1	2.0	05/18/20 14:15	TMS	SM 2320B 1997*
pH	4.82	pH Units	H	05/21/20 11:27	1		05/21/20 11:27	PMN	SM 4500H B 2000
Solids - total dissolved solids (TDS)	2100	mg/L		05/12/20 09:48	1	26	05/12/20 11:07	BMS	SM 2540C
Solids - total suspended solids (TSS)	65	mg/L		05/12/20 08:24	1	4.0	05/12/20 14:00	BMS	SM 2540 D 1997
Temperature at pH measurement	17	°C		05/21/20 11:27	1		05/21/20 11:27	PMN	SM 2550 B*
Soluble Metals - PIA									
Cobalt	4.1	ug/L		05/12/20 05:43	5	2.0	05/13/20 13:20	JMW	EPA 6020A
Iron	530000	ug/L		05/12/20 05:43	100	200	05/13/20 14:07	JMW	EPA 6020A*
Manganese	3200	ug/L		05/12/20 05:43	5	1.0	05/13/20 13:20	JMW	EPA 6020A
Total Metals - PIA									
Antimony	< 3.0	ug/L		05/13/20 05:18	5	3.0	05/19/20 08:49	JMW	EPA 6020A
Arsenic	5.5	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Barium	16	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Boron	2600	ug/L		05/13/20 05:18	5	10	05/19/20 08:49	JMW	EPA 6020A
Cadmium	< 1.0	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Calcium	230	mg/L		05/13/20 05:18	5	0.15	05/19/20 08:49	JMW	EPA 6020A
Cobalt	4.6	ug/L		05/13/20 05:18	5	2.0	05/19/20 08:49	JMW	EPA 6020A
Iron	530000	ug/L		05/13/20 05:18	100	200	05/19/20 10:06	JMW	EPA 6020A*
Lead	< 1.0	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Magnesium	55	mg/L		05/13/20 05:18	5	0.10	05/19/20 14:28	JMW	EPA 6020A
Manganese	3200	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Mercury	< 0.20	ug/L		05/13/20 05:18	5	0.20	05/19/20 08:49	JMW	EPA 6020A
Molybdenum	29	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Potassium	21	mg/L		05/13/20 05:18	5	0.10	05/19/20 14:28	JMW	EPA 6020A
Selenium	< 1.0	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Sodium	19	mg/L		05/13/20 05:18	5	0.10	05/19/20 08:49	JMW	EPA 6020A
Thallium	< 1.0	ug/L		05/13/20 05:18	5	1.0	05/19/20 08:49	JMW	EPA 6020A
Lithium	140	ug/L		05/13/20 05:18	1	20	05/14/20 09:39	ZSA	EPA 6010B*

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B010928 - IC No Prep - EPA 300.0 REV 2.1									
Calibration Blank (B010928-CCB1)				Prepared & Analyzed: 05/07/20					
Chloride	0.00	mg/L							
Fluoride	0.00	mg/L							
Calibration Check (B010928-CCV1)				Prepared & Analyzed: 05/07/20					
Chloride	4.48	mg/L		5.000		90	90-110		
Fluoride	5.01	mg/L		5.000		100	90-110		
Batch B011061 - IC No Prep - EPA 300.0 REV 2.1									
Calibration Blank (B011061-CCB1)				Prepared & Analyzed: 05/08/20					
Sulfate	0.00	mg/L							
Calibration Check (B011061-CCV1)				Prepared & Analyzed: 05/08/20					
Sulfate	4.77	mg/L		5.000		95	90-110		
Batch B011151 - 6020 Sol no prep - EPA 6020A									
Blank (B011151-BLK1)				Prepared: 05/12/20 Analyzed: 05/13/20					
Cobalt	< 2.0	ug/L							
Iron	< 10	ug/L							
Manganese	< 1.0	ug/L							
LCS (B011151-BS1)				Prepared: 05/12/20 Analyzed: 05/13/20					
Cobalt	234	ug/L		250.0		94	80-120		
Iron	23900	ug/L		25000		96	80-120		
Manganese	243	ug/L		250.0		97	80-120		
Matrix Spike (B011151-MS1)	**Sample: 0051228-06**			Prepared: 05/12/20 Analyzed: 05/13/20					
Cobalt	230	ug/L		250.0	ND	92	75-125		
Iron	23800	ug/L		25000	ND	95	75-125		
Manganese	242	ug/L		250.0	1.60	96	75-125		
Matrix Spike Dup (B011151-MSD1)	**Sample: 0051228-06**			Prepared: 05/12/20 Analyzed: 05/13/20					
Cobalt	224	ug/L		250.0	ND	89	75-125	3	20
Iron	23100	ug/L		25000	ND	92	75-125	3	20
Manganese	236	ug/L		250.0	1.60	94	75-125	3	20
Batch B011162 - No Prep - SM 2540 D 1997									
Blank (B011162-BLK1)				Prepared & Analyzed: 05/12/20					
Solids - total suspended solids (TSS)	< 4.0	mg/L							
LCS (B011162-BS1)				Prepared & Analyzed: 05/12/20					
Solids - total suspended solids (TSS)	480	mg/L		500.0		96	0-200		
Duplicate (B011162-DUP1)	**Sample: 0051312-02**			Prepared & Analyzed: 05/12/20					
Solids - total suspended solids (TSS)	3.20	mg/L			2.40			29	5
Duplicate (B011162-DUP2)	**Sample: 0051314-02**			Prepared & Analyzed: 05/12/20					
Solids - total suspended solids (TSS)	5.60	mg/L			4.80			15	5
Batch B011183 - No Prep - SM 2540C									
Blank (B011183-BLK1)				Prepared & Analyzed: 05/12/20					
Solids - total dissolved solids (TDS)	< 17	mg/L							

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B011183 - No Prep - SM 2540C									
LCS (B011183-BS1)				Prepared & Analyzed: 05/12/20					
Solids - total dissolved solids (TDS)	967	mg/L		1000		97	67.9-132		
Duplicate (B011183-DUP1)	**Sample: 0051246-01**			Prepared & Analyzed: 05/12/20					
Solids - total dissolved solids (TDS)	2120	mg/L			2120			0	5
Duplicate (B011183-DUP2)	**Sample: 0051350-01**			Prepared & Analyzed: 05/12/20					
Solids - total dissolved solids (TDS)	2140	mg/L			2210			3	5
Batch B011270 - SW 3015 - EPA 6020A									
Blank (B011270-BLK1)				Prepared: 05/13/20 Analyzed: 05/19/20					
Antimony	< 3.0	ug/L							
Arsenic	< 1.0	ug/L							
Barium	< 1.0	ug/L							
Boron	< 10	ug/L							
Cadmium	< 1.0	ug/L							
Calcium	< 0.20	mg/L							
Cobalt	< 2.0	ug/L							
Iron	< 10	ug/L							
Lead	< 1.0	ug/L							
Magnesium	< 0.10	mg/L							
Manganese	< 1.0	ug/L							
Mercury	< 0.20	ug/L							
Molybdenum	< 1.0	ug/L							
Potassium	< 0.10	mg/L							
Selenium	< 1.0	ug/L							
Sodium	< 0.10	mg/L							
Thallium	< 1.0	ug/L							
Lithium	< 20	ug/L							
LCS (B011270-BS1)				Prepared: 05/13/20 Analyzed: 05/19/20					
Antimony	533	ug/L		555.6		96	80-120		
Arsenic	556	ug/L		555.6		100	80-120		
Barium	557	ug/L		555.6		100	80-120		
Boron	508	ug/L		555.6		91	80-120		
Cadmium	552	ug/L		555.6		99	80-120		
Calcium	5.33	mg/L		5.556		96	80-120		
Cobalt	586	ug/L		555.6		105	80-120		
Iron	577	ug/L		555.6		104	80-120		
Lead	572	ug/L		555.6		103	80-120		
Magnesium	5.48	mg/L		5.556		99	80-120		
Manganese	568	ug/L		555.6		102	80-120		
Mercury	54.8	ug/L		55.56		99	80-120		
Molybdenum	550	ug/L		555.6		99	80-120		
Potassium	5.11	mg/L		5.556		92	80-120		
Selenium	541	ug/L		555.6		97	80-120		
Sodium	5.53	mg/L		5.556		100	80-120		

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B011270 - SW 3015 - EPA 6020A									
LCS (B011270-BS1)				Prepared: 05/13/20 Analyzed: 05/19/20					
Thallium	549	ug/L		555.6		99	80-120		
Lithium	587	ug/L		555.6		106	80-120		
Matrix Spike (B011270-MS1)	**Sample: 0051254-01**			Prepared: 05/13/20 Analyzed: 05/19/20					
Antimony	539	ug/L		555.6	ND	97	75-125		
Arsenic	578	ug/L		555.6	ND	104	75-125		
Barium	605	ug/L		555.6	20.2	105	75-125		
Boron	499	ug/L		555.6	65.9	78	75-125		
Cadmium	575	ug/L		555.6	ND	103	75-125		
Calcium	118	mg/L	Q4	5.556	114	87	75-125		
Cobalt	584	ug/L		555.6	ND	105	75-125		
Iron	661	ug/L		555.6	39.4	112	75-125		
Lead	573	ug/L		555.6	ND	103	75-125		
Magnesium	75.6	mg/L		5.556	69.2	116	75-125		
Manganese	588	ug/L		555.6	5.24	105	75-125		
Mercury	55.0	ug/L		55.56	ND	99	75-125		
Molybdenum	584	ug/L		555.6	0.261	105	75-125		
Potassium	10.1	mg/L		5.556	4.20	105	75-125		
Selenium	562	ug/L		555.6	ND	101	75-125		
Sodium	9.38	mg/L		5.556	4.03	96	75-125		
Thallium	555	ug/L		555.6	ND	100	75-125		
Matrix Spike Dup (B011270-MSD1)	**Sample: 0051254-01**			Prepared: 05/13/20 Analyzed: 05/19/20					
Antimony	527	ug/L		555.6	ND	95	75-125	2	20
Arsenic	568	ug/L		555.6	ND	102	75-125	2	20
Barium	585	ug/L		555.6	20.2	102	75-125	3	20
Boron	499	ug/L		555.6	65.9	78	75-125	0.1	20
Cadmium	565	ug/L		555.6	ND	102	75-125	2	20
Calcium	118	mg/L	Q4	5.556	114	69	75-125	0.8	20
Cobalt	570	ug/L		555.6	ND	103	75-125	3	20
Iron	623	ug/L		555.6	39.4	105	75-125	6	20
Lead	570	ug/L		555.6	ND	103	75-125	0.5	20
Magnesium	75.0	mg/L		5.556	69.2	105	75-125	0.8	20
Manganese	579	ug/L		555.6	5.24	103	75-125	1	20
Mercury	55.2	ug/L		55.56	ND	99	75-125	0.3	20
Molybdenum	576	ug/L		555.6	0.261	104	75-125	2	20
Potassium	9.88	mg/L		5.556	4.20	102	75-125	2	20
Selenium	549	ug/L		555.6	ND	99	75-125	2	20
Sodium	9.41	mg/L		5.556	4.03	97	75-125	0.3	20
Thallium	551	ug/L		555.6	ND	99	75-125	0.7	20
Batch B011779 - No Prep - SM 2320B 1997									
Blank (B011779-BLK1)				Prepared & Analyzed: 05/18/20					
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L							
LCS (B011779-BS1)				Prepared & Analyzed: 05/18/20					

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B011779 - No Prep - SM 2320B 1997									
LCS (B011779-BS1)				Prepared & Analyzed: 05/18/20					
Alkalinity - bicarbonate as CaCO3	80.0	mg/L					90-110		
Batch B012057 - No Prep - SM 2550 B									
Duplicate (B012057-DUP1)	**Sample: 0052610-02**			Prepared & Analyzed: 05/21/20					
Temperature at pH measurement	14.2	°C			14.4			2	200
pH	7.62	pH Units	H		7.58			0.6	10
Duplicate (B012057-DUP2)	**Sample: 0052632-01**			Prepared & Analyzed: 05/21/20					
pH	8.17	pH Units	H		8.13			0.5	10
Temperature at pH measurement	14.4	°C			15.2			5	200
Duplicate (B012057-DUP3)	**Sample: 0052653-01**			Prepared & Analyzed: 05/21/20					
pH	7.53	pH Units	H, M		7.64			1	10
Temperature at pH measurement	15.0	°C	M		15.4			2	200
Duplicate (B012057-DUP4)	**Sample: 0052653-02**			Prepared & Analyzed: 05/21/20					
pH	8.18	pH Units	H		8.16			0.3	10
Temperature at pH measurement	16.0	°C			15.6			3	200
Duplicate (B012057-DUP5)	**Sample: 0052781-02**			Prepared & Analyzed: 05/21/20					
pH	8.41	pH Units	H		8.46			0.6	10
Temperature at pH measurement	16.5	°C			16.1			2	200
Duplicate (B012057-DUP6)	**Sample: 0052615-01**			Prepared & Analyzed: 05/21/20					
pH	7.98	pH Units	H		7.93			0.7	10
Temperature at pH measurement	17.2	°C			17.0			1	200
Duplicate (B012057-DUP7)	**Sample: 0053401-01**			Prepared & Analyzed: 05/21/20					
Temperature at pH measurement	17.7	°C			17.8			0.2	200
pH	7.73	pH Units	H		7.73			0.03	10
Duplicate (B012057-DUP8)	**Sample: 0052828-01**			Prepared & Analyzed: 05/21/20					
Temperature at pH measurement	12.5	°C			12.9			3	200
pH	7.20	pH Units	H		7.21			0.2	10

NOTES

Specific method revisions used for analysis are available upon request.

* Not a TNI accredited analyte

Memos

Revisesd Report - client requested sample name change

Certifications

CHI - McHenry, IL - 4314 W Crystal Lake Road A, McHenry, IL 60050
TNI Accreditation for Drinking Water, Wastewater, Fields of Testing through IL EPA Lab No. 100279
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17556

PIA - Peoria, IL - 2231 W Altorfer Drive, Peoria, IL 61615
TNI Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Iowa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

SPIL - Springfield, IL - 1210 Capitol Airport Drive, Springfield, IL 62707
TNI Accreditation through IL EPA Lab No. 100323

SPMO - Springfield, MO - 1805 W Sunset Street, Springfield, MO 65807
USEPA DMR-QA Program

STL - St. Louis, MO - 3278 N Highway 67, Florissant, MO 63033
TNI Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS Lab No. E-10389
TNI Accreditation for Wastewater, Hazardous, and Solid Waste Analysis through IL EPA No. 200080
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 171050
Missouri Department of Natural Resources
Microbiological Laboratory Service for Drinking Water

Qualifiers

H	Test performed after the expiration of the appropriate regulatory/advisory maximum allowable hold time.
M	Analyte failed to meet the required acceptance criteria for duplicate analysis.
Q4	The matrix spike recovery result is unusable since the analyte concentration in the sample is greater than four times the spike level. The associated blank spike was acceptable.

Gail J Schindler

Certified by: Gail Schindler, Project Manager

PDC LABORATORIES, INC.
WWW.PDCLAB.COM

REGULATORY PROGRAM (CIRCLE):	NPDES
RCRA	CWA
CCDD	TACO: RES OR IND/COMM

CHAIN OF CUSTODY RECORD

STATE WHERE SAMPLE COLLECTED IL

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

1 CLIENT	PROJECT NUMBER	PROJECT LOCATION	PURCHASE ORDER #
VISTRA - COFFEEN	GMZ		
ADDRESS: 134 CIPS LANE	PHONE NUMBER	E-MAIL	DATE SHIPPED
CITY / STATE / ZIP: COFFEEN, IL 62017	SAMPLER (PLEASE PRINT): Jim David		MATRIX TYPES: WW- WASTEWATER; DW- DRINKING WATER; GW- GROUND WATER; WWSL- SLUDGE; NAS- NON AQUEOUS SOLID; LCHT-LEACHATE; OIL-OIL; SO-SOIL; SOL-SOLID
CONTACT PERSON: JOHN ROMANG	SAMPLER'S SIGNATURE: Jim Dvi		

2 SAMPLE DESCRIPTION (UNIQUE DESCRIPTION AS IT WILL APPEAR ON THE ANALYTICAL REPORT)	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	BOTTLE COUNT	PRES CODE (CLIENT PROVIDED)	3 ANALYSIS REQUESTED: CO*, FE*, FE, MN*, MN, TDS	CA, MG, NA, K, ALK HCO3	CN, NO3, PERCHLORIATE	V, CU, NI, AG, ZN, B, CA, CL	F, SO4, PH, SB, AS, BA, CD,	CO, PB, MO, SE, TL, LI, HG	REMARKS
SOURCE WATER CCR SAMPLE	5/6/20	1040	X			7	3, 4, 6	X	X	X	X	X	X	*DISSOLVED
														W/well pump discharge
														F, B, G on during
														Sampling

4 (FOR LAB USE ONLY)
LOGIN # 005246-01
LOGGED BY: DCW
CLIENT: VISTRA-COFFEEN
PROJECT: COFFEEN SOURCE WATER CCR
PROJ. MGR.: GJ SCHINDLER

CHEMICAL PRESERVATION CODES: 1 – HCL; 2 – H2SO4; 3 – HNO3; 4 – NAOH; 5 – NA2S2O3; 6 – UNPRESERVED; 7 – OTHER

5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
RUSH RESULTS VIA (PLEASE CIRCLE) EMAIL PHONE
EMAIL IF DIFFERENT FROM ABOVE: PHONE # IF DIFFERENT FROM ABOVE:
DATE RESULTS NEEDED

6 *I understand that by initialing this box I give the lab permission to proceed with analysis, even though it may not meet all sample conformance requirements as defined in the receiving facility's Sample Acceptance Policy and the data will be qualified. Qualified data may NOT be acceptable to report to all regulatory authorities.*
PROCEED WITH ANALYSIS AND QUALIFY RESULTS: (INITIALS) _____

7	DATE	TIME
RELINQUISHED BY: (SIGNATURE) Jim Dvi	5/6/20	1830
RELINQUISHED BY: (SIGNATURE) Charles Hostetler	5/7/20	554
RELINQUISHED BY: (SIGNATURE)		
RECEIVED BY: (SIGNATURE) Charles Hostetler	5/7/20	730
RECEIVED BY: (SIGNATURE)		
RECEIVED BY: (SIGNATURE)	5/7/20	854

8 COMMENTS: (FOR LAB USE ONLY)

SAMPLE TEMPERATURE UPON RECEIPT 1.6 °C
CHILL PROCESS STARTED PRIOR TO RECEIPT Y OR N
SAMPLE(S) RECEIVED ON ICE Y OR N
SAMPLE ACCEPTANCE NONCONFORMANT REPORT IS NEEDED Y OR N
DATE AND TIME TAKEN FROM SAMPLE BOTTLE _____

PDC Laboratories, Inc.
PROFESSIONAL ŁDEPENDABLE ŁCOMMITTED

November 08, 2016

Rhonald Hasenyager
Hanson Professional Services, Inc.
1525 South Sixth Street
Springfield, IL 62703-2886

Dear Rhonald Hasenyager:

Please find enclosed the analytical results for the sample(s) the laboratory received on **10/25/16 7:45 am** and logged in under work order **6103663**. All testing is performed according to our current TNI certifications unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of PDC Laboratories, Inc.

If you have any questions regarding your report, please contact your project manager. Quality and timely data is of the utmost importance to us.

PDC Laboratories, Inc. appreciates the opportunity to provide you with analytical expertise. We are always trying to improve our customer service and we welcome you to contact the Vice President , John LaPayne with any feedback you have about your experience with our laboratory.

Sincerely,

Gail J Schindler

Gail Schindler
Project Manager
(309) 692-9688 x1716
gschindler@pdclab.com

PDC Laboratories, Inc.
2231 West Altorfer Drive
Peoria, IL 61615
(800) 752-6651

ANALYTICAL RESULTS

Sample: 6103663-01
Name: AP1a
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:52
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	3.2	mg/L		10/25/16 11:16	10/25/16 11:16	TAS	EPA 300.0
Fluoride	< 0.250	mg/L		10/25/16 11:16	10/25/16 11:16	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 11:16	10/25/16 11:16	TAS	EPA 300.0
Sulfate	1500	mg/L		10/27/16 13:02	10/27/16 13:02	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.99	pH Units		10/24/16 11:52	10/24/16 11:52	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	90	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	1800	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	3.1	ug/L		10/26/16 13:38	11/02/16 12:10	JMW	SW 6020
Arsenic	7.2	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Barium	130	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Boron	3800	ug/L		10/26/16 13:38	11/03/16 07:54	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Calcium	380	mg/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Lithium	39	ug/L		10/26/16 13:38	10/27/16 11:24	KJP	SW 6010*
Magnesium	67	mg/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 13:53	JMW	SW 6020
Molybdenum	47	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Potassium	7.3	mg/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Selenium	3.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Sodium	33	mg/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:23	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-02
Name: AP1b
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:56
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	13	mg/L		10/27/16 13:20	10/27/16 13:20	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 12:45	10/25/16 12:45	TAS	EPA 300.0
Sulfate	1300	mg/L		10/27/16 13:38	10/27/16 13:38	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.01	pH Units		10/24/16 11:56	10/24/16 11:56	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	120	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	0.977	mg/L		10/27/16 13:26	10/27/16 13:26	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	1600	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	3.3	ug/L		10/26/16 13:38	11/02/16 12:23	JMW	SW 6020
Arsenic	17	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Barium	100	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Boron	3100	ug/L		10/26/16 13:38	11/03/16 07:59	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Calcium	320	mg/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Lithium	47	ug/L		10/26/16 13:38	10/27/16 11:33	KJP	SW 6010*
Magnesium	52	mg/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:06	JMW	SW 6020
Molybdenum	100	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Potassium	18	mg/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Selenium	6.9	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Sodium	53	mg/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:36	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-03
Name: AP1c
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:10
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	13	mg/L		10/27/16 13:55	10/27/16 13:55	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 13:21	10/25/16 13:21	TAS	EPA 300.0
Sulfate	1600	mg/L		10/27/16 14:13	10/27/16 14:13	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.05	pH Units		10/24/16 12:10	10/24/16 12:10	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	80	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	0.614	mg/L		10/27/16 13:30	10/27/16 13:30	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	1900	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:26	JMW	SW 6020
Arsenic	18	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Barium	130	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Boron	2900	ug/L		10/26/16 13:38	11/03/16 08:01	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Calcium	390	mg/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Lithium	51	ug/L		10/26/16 13:38	10/27/16 11:36	KJP	SW 6010*
Magnesium	49	mg/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:10	JMW	SW 6020
Molybdenum	81	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Potassium	18	mg/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Selenium	3.1	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Sodium	59	mg/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:39	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-04
Name: AP1d
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:15
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	18	mg/L		10/27/16 14:31	10/27/16 14:31	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 13:57	10/25/16 13:57	TAS	EPA 300.0
Sulfate	1000	mg/L		10/27/16 14:48	10/27/16 14:48	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.21	pH Units		10/24/16 12:15	10/24/16 12:15	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	90	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Alkalinity - carbonate as CaCO3	< 20	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Fluoride	1.08	mg/L		10/27/16 13:43	10/27/16 13:43	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	980	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:30	JMW	SW 6020
Arsenic	2.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Barium	200	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Boron	2000	ug/L		10/26/16 13:38	11/03/16 08:02	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Calcium	210	mg/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Lithium	55	ug/L		10/26/16 13:38	10/27/16 11:39	KJP	SW 6010*
Magnesium	35	mg/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:13	JMW	SW 6020
Molybdenum	31	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Potassium	26	mg/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Selenium	1.5	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Sodium	83	mg/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:43	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-05
Name: AP1e
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:01
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	18	mg/L		10/27/16 18:37	10/27/16 18:37	TAS	EPA 300.0
Fluoride	1.00	mg/L		10/25/16 13:26	10/25/16 13:26	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 13:26	10/25/16 13:26	TAS	EPA 300.0
Sulfate	960	mg/L		10/28/16 11:36	10/28/16 11:36	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.12	pH Units		10/24/16 12:01	10/24/16 12:01	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	80	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	1200	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:45	JMW	SW 6020
Arsenic	1.4	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Barium	160	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Boron	2100	ug/L		10/26/16 13:38	11/03/16 08:03	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Calcium	200	mg/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Lithium	55	ug/L		10/26/16 13:38	10/27/16 11:48	KJP	SW 6010*
Magnesium	34	mg/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:17	JMW	SW 6020
Molybdenum	30	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Potassium	26	mg/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Selenium	1.2	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Sodium	80	mg/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:46	JMW	SW 6020

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Peoria, IL 61615
(800) 752-6651

ANALYTICAL RESULTS

Sample: 6103663-06
Name: AP1f
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:40
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	17	mg/L		10/27/16 15:06	10/27/16 15:06	TAS	EPA 300.0
Fluoride	1.00	mg/L		10/25/16 14:03	10/25/16 14:03	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 14:03	10/25/16 14:03	TAS	EPA 300.0
Sulfate	1000	mg/L		10/27/16 15:23	10/27/16 15:23	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.20	pH Units		10/24/16 12:40	10/24/16 12:40	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	110	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Alkalinity - carbonate as CaCO3	< 20	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Solids - total dissolved solids (TDS)	1200	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:48	JMW	SW 6020
Arsenic	1.5	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Barium	150	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Boron	2100	ug/L		10/26/16 13:38	11/03/16 08:13	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Calcium	200	mg/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Lithium	57	ug/L		10/26/16 13:38	10/27/16 11:51	KJP	SW 6010*
Magnesium	35	mg/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:21	JMW	SW 6020
Molybdenum	31	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Potassium	26	mg/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Selenium	1.2	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Sodium	82	mg/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 11:50	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-07
Name: AP1g
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:50
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	17	mg/L		10/27/16 15:41	10/27/16 15:41	TAS	EPA 300.0
Fluoride	1.00	mg/L		10/25/16 15:34	10/25/16 15:34	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 15:34	10/25/16 15:34	TAS	EPA 300.0
Sulfate	970	mg/L		10/28/16 11:54	10/28/16 11:54	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.21	pH Units		10/24/16 12:50	10/24/16 12:50	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	75	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	1200	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:52	JMW	SW 6020
Arsenic	1.3	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Barium	140	ug/L		10/26/16 13:38	11/01/16 14:37	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Boron	2100	ug/L		10/26/16 13:38	11/03/16 08:16	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Calcium	210	mg/L		10/26/16 13:38	11/02/16 12:52	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:37	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 12:52	JMW	SW 6020
Lithium	56	ug/L		10/26/16 13:38	10/27/16 11:54	KJP	SW 6010*
Magnesium	32	mg/L		10/26/16 13:38	11/01/16 14:37	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:37	JMW	SW 6020
Molybdenum	29	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Potassium	26	mg/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Selenium	1.4	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020
Sodium	100	mg/L		10/26/16 13:38	11/02/16 12:52	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:09	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-08
Name: AP1h
Matrix: Surface Water - Grab

Sampled: 10/24/16 12:55
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	17	mg/L		10/27/16 16:51	10/27/16 16:51	TAS	EPA 300.0
Fluoride	0.980	mg/L		10/25/16 16:11	10/25/16 16:11	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 16:11	10/25/16 16:11	TAS	EPA 300.0
Sulfate	1000	mg/L		10/28/16 12:12	10/28/16 12:12	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.41	pH Units		10/24/16 12:55	10/24/16 12:55	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	90	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Alkalinity - carbonate as CaCO3	< 20	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Solids - total dissolved solids (TDS)	1200	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:55	JMW	SW 6020
Arsenic	1.5	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Barium	180	ug/L		10/26/16 13:38	11/01/16 14:40	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Boron	2200	ug/L		10/26/16 13:38	11/03/16 08:18	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Calcium	230	mg/L		10/26/16 13:38	11/02/16 12:55	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:40	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 12:55	JMW	SW 6020
Lithium	55	ug/L		10/26/16 13:38	10/27/16 11:57	KJP	SW 6010*
Magnesium	30	mg/L		10/26/16 13:38	11/01/16 14:40	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:40	JMW	SW 6020
Molybdenum	31	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Potassium	27	mg/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Selenium	1.2	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020
Sodium	110	mg/L		10/26/16 13:38	11/02/16 12:55	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:12	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-09
Name: AP2e
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:30
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	< 5.0	mg/L		10/27/16 17:27	10/27/16 17:27	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 14:33	10/25/16 14:33	TAS	EPA 300.0
Sulfate	1500	mg/L		10/28/16 12:31	10/28/16 12:31	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.49	pH Units		10/24/16 11:30	10/24/16 11:30	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	55	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Alkalinity - carbonate as CaCO3	< 20	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Fluoride	0.438	mg/L		10/27/16 13:58	10/27/16 13:58	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	1700	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 12:59	JMW	SW 6020
Arsenic	23	ug/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020
Barium	26	ug/L		10/26/16 13:38	11/01/16 14:44	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/02/16 12:59	JMW	SW 6020
Boron	5300	ug/L		10/26/16 13:38	11/03/16 08:19	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020
Calcium	210	mg/L		10/26/16 13:38	11/02/16 12:59	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:44	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 12:59	JMW	SW 6020
Lithium	190	ug/L		10/26/16 13:38	10/27/16 12:00	KJP	SW 6010*
Magnesium	40	mg/L		10/26/16 13:38	11/01/16 14:44	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:44	JMW	SW 6020
Molybdenum	90	ug/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020
Potassium	27	mg/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020
Sodium	25	mg/L		10/26/16 13:38	11/02/16 12:59	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:16	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-10
Name: AP2f
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:20
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	< 5.0	mg/L		10/27/16 18:02	10/27/16 18:02	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 15:09	10/25/16 15:09	TAS	EPA 300.0
Sulfate	1500	mg/L		10/28/16 12:49	10/28/16 12:49	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.42	pH Units		10/24/16 11:20	10/24/16 11:20	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	100	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Alkalinity - carbonate as CaCO3	< 20	mg/L		10/25/16 09:29	10/25/16 09:29	CJN	SM 2320B*
Fluoride	0.398	mg/L		10/27/16 14:02	10/27/16 14:02	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	1700	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:03	JMW	SW 6020
Arsenic	1.2	ug/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020
Barium	22	ug/L		10/26/16 13:38	11/01/16 14:47	JMW	SW 6020
Beryllium	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:54	JMW	SW 6020
Boron	2000	ug/L		10/26/16 13:38	11/03/16 08:20	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020
Calcium	170	mg/L		10/26/16 13:38	11/02/16 13:54	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:47	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:03	JMW	SW 6020
Lithium	130	ug/L		10/26/16 13:38	10/27/16 12:03	KJP	SW 6010*
Magnesium	33	mg/L		10/26/16 13:38	11/01/16 14:47	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:47	JMW	SW 6020
Molybdenum	3.2	ug/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020
Potassium	21	mg/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020
Sodium	14	mg/L		10/26/16 13:38	11/02/16 13:03	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:20	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-11
Name: AP2g
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:10
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	< 5.0	mg/L		10/27/16 19:12	10/27/16 19:12	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 16:20	10/25/16 16:20	TAS	EPA 300.0
Sulfate	2300	mg/L		10/28/16 13:07	10/28/16 13:07	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.46	pH Units		10/24/16 11:10	10/24/16 11:10	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	4.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	0.506	mg/L		10/27/16 14:07	10/27/16 14:07	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	2400	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:06	JMW	SW 6020
Arsenic	5.5	ug/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020
Barium	20	ug/L		10/26/16 13:38	11/01/16 14:51	JMW	SW 6020
Beryllium	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:57	JMW	SW 6020
Boron	4300	ug/L		10/26/16 13:38	11/03/16 08:22	JMW	SW 6020
Cadmium	4.6	ug/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020
Calcium	410	mg/L		10/26/16 13:38	11/02/16 13:57	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:51	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:06	JMW	SW 6020
Lithium	180	ug/L		10/26/16 13:38	10/27/16 12:06	KJP	SW 6010*
Magnesium	51	mg/L		10/26/16 13:38	11/01/16 14:51	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:51	JMW	SW 6020
Molybdenum	41	ug/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020
Potassium	29	mg/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020
Sodium	27	mg/L		10/26/16 13:38	11/02/16 13:06	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:23	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-12
Name: AP2h
Matrix: Surface Water - Grab

Sampled: 10/24/16 11:40
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1.7	mg/L		10/25/16 16:56	10/25/16 16:56	TAS	EPA 300.0
Fluoride	0.406	mg/L		10/25/16 16:56	10/25/16 16:56	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 16:56	10/25/16 16:56	TAS	EPA 300.0
Sulfate	1300	mg/L		10/28/16 14:57	10/28/16 14:57	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.17	pH Units		10/24/16 11:40	10/24/16 11:40	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	140	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	1500	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:10	JMW	SW 6020
Arsenic	75	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020
Barium	23	ug/L		10/26/16 13:38	11/01/16 14:55	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020
Boron	14000	ug/L		10/26/16 13:38	11/03/16 08:23	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020
Calcium	310	mg/L		10/26/16 13:38	11/02/16 13:10	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:55	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:10	JMW	SW 6020
Lithium	120	ug/L		10/26/16 13:38	10/27/16 12:09	KJP	SW 6010*
Magnesium	29	mg/L		10/26/16 13:38	11/01/16 14:55	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:55	JMW	SW 6020
Molybdenum	570	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020
Potassium	40	mg/L		10/26/16 13:38	11/03/16 08:23	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020
Sodium	39	mg/L		10/26/16 13:38	11/02/16 13:10	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:27	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-13
Name: CLa
Matrix: Surface Water - Grab

Sampled: 10/24/16 15:30
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	23	mg/L		10/27/16 20:41	10/27/16 20:41	TAS	EPA 300.0
Fluoride	0.443	mg/L		10/25/16 17:32	10/25/16 17:32	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 17:32	10/25/16 17:32	TAS	EPA 300.0
Sulfate	55	mg/L		10/25/16 17:50	10/25/16 17:50	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.22	pH Units		10/24/16 15:30	10/24/16 15:30	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	80	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	190	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:14	JMW	SW 6020
Arsenic	1.8	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Barium	54	ug/L		10/26/16 13:38	11/01/16 14:58	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Boron	270	ug/L		10/26/16 13:38	11/03/16 08:24	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Calcium	23	mg/L		10/26/16 13:38	11/02/16 13:14	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 14:58	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:14	JMW	SW 6020
Lithium	< 10	ug/L		10/26/16 13:38	10/27/16 12:12	KJP	SW 6010*
Magnesium	12	mg/L		10/26/16 13:38	11/01/16 14:58	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 14:58	JMW	SW 6020
Molybdenum	5.0	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Potassium	7.4	mg/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020
Sodium	19	mg/L		10/26/16 13:38	11/02/16 13:14	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:30	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-14
Name: CLb
Matrix: Surface Water - Grab

Sampled: 10/24/16 13:35
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	22	mg/L		10/27/16 20:58	10/27/16 20:58	TAS	EPA 300.0
Fluoride	0.425	mg/L		10/25/16 18:08	10/25/16 18:08	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 18:08	10/25/16 18:08	TAS	EPA 300.0
Sulfate	56	mg/L		10/25/16 18:26	10/25/16 18:26	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.52	pH Units		10/24/16 13:35	10/24/16 13:35	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	80	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	180	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:17	JMW	SW 6020
Arsenic	1.8	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Barium	52	ug/L		10/26/16 13:38	11/01/16 15:02	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Boron	280	ug/L		10/26/16 13:38	11/03/16 08:26	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Calcium	23	mg/L		10/26/16 13:38	11/02/16 13:17	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:02	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:17	JMW	SW 6020
Lithium	< 10	ug/L		10/26/16 13:38	10/27/16 12:15	KJP	SW 6010*
Magnesium	11	mg/L		10/26/16 13:38	11/01/16 15:02	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 15:02	JMW	SW 6020
Molybdenum	4.9	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Potassium	7.8	mg/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020
Sodium	19	mg/L		10/26/16 13:38	11/02/16 13:17	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:34	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-15
Name: CLc
Matrix: Surface Water - Grab

Sampled: 10/24/16 13:15
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	22	mg/L		10/27/16 21:16	10/27/16 21:16	TAS	EPA 300.0
Fluoride	0.426	mg/L		10/25/16 18:43	10/25/16 18:43	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 18:43	10/25/16 18:43	TAS	EPA 300.0
Sulfate	54	mg/L		10/25/16 19:01	10/25/16 19:01	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.62	pH Units		10/24/16 13:15	10/24/16 13:15	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	75	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	160	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:29	JMW	SW 6020
Arsenic	1.8	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Barium	56	ug/L		10/26/16 13:38	11/01/16 15:05	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Boron	280	ug/L		10/26/16 13:38	11/03/16 08:27	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Calcium	23	mg/L		10/26/16 13:38	11/02/16 13:29	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:05	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:29	JMW	SW 6020
Lithium	< 10	ug/L		10/26/16 13:38	10/27/16 12:24	KJP	SW 6010*
Magnesium	12	mg/L		10/26/16 13:38	11/01/16 15:05	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 15:05	JMW	SW 6020
Molybdenum	4.7	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Potassium	7.4	mg/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020
Sodium	19	mg/L		10/26/16 13:38	11/02/16 13:29	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:38	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-16
Name: CLd
Matrix: Surface Water - Grab

Sampled: 10/24/16 15:55
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	23	mg/L		10/27/16 21:34	10/27/16 21:34	TAS	EPA 300.0
Fluoride	0.421	mg/L		10/25/16 19:55	10/25/16 19:55	TAS	EPA 300.0
Nitrite-N	< 0.15	mg/L		10/25/16 19:55	10/25/16 19:55	TAS	EPA 300.0
Sulfate	54	mg/L		10/25/16 20:13	10/25/16 20:13	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.30	pH Units		10/24/16 15:55	10/24/16 15:55	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	80	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Solids - total dissolved solids (TDS)	170	mg/L		10/25/16 14:59	10/25/16 15:33	DMB/ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:32	JMW	SW 6020
Arsenic	1.8	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Barium	54	ug/L		10/26/16 13:38	11/01/16 15:09	JMW	SW 6020
Beryllium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Boron	270	ug/L		10/26/16 13:38	11/03/16 08:41	JMW	SW 6020
Cadmium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Calcium	23	mg/L		10/26/16 13:38	11/02/16 13:32	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:09	JMW	SW 6020
Cobalt	< 2.0	ug/L		10/26/16 13:38	11/02/16 13:32	JMW	SW 6020
Lithium	< 10	ug/L		10/26/16 13:38	10/27/16 12:27	KJP	SW 6010*
Magnesium	12	mg/L		10/26/16 13:38	11/01/16 15:09	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 13:38	11/01/16 15:09	JMW	SW 6020
Molybdenum	4.8	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Potassium	7.5	mg/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Selenium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020
Sodium	20	mg/L		10/26/16 13:38	11/02/16 13:32	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 12:41	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-17
Name: GPa
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:00
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1900	mg/L		10/27/16 21:51	10/27/16 21:51	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 11:42	10/26/16 11:42	TAS	EPA 300.0
Sulfate	17000	mg/L		11/01/16 09:58	11/01/16 09:58	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	7.16	pH Units		10/24/16 14:00	10/24/16 14:00	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	4.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	42.7	mg/L		10/27/16 17:31	10/27/16 17:31	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	17000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:36	JMW	SW 6020
Arsenic	4.7	ug/L		10/26/16 13:38	11/02/16 15:00	JMW	SW 6020
Barium	120	ug/L		10/26/16 13:38	11/02/16 13:36	JMW	SW 6020
Beryllium	2.6	ug/L		10/26/16 13:38	11/02/16 14:16	JMW	SW 6020
Boron	59000	ug/L		10/26/16 13:38	11/03/16 08:44	JMW	SW 6020
Cadmium	40	ug/L		10/26/16 13:38	11/02/16 15:53	JMW	SW 6020
Calcium	450	mg/L		10/26/16 13:38	11/02/16 14:16	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:20	JMW	SW 6020
Cobalt	52	ug/L		10/26/16 13:38	11/02/16 15:00	JMW	SW 6020
Lithium	300	ug/L		10/26/16 13:38	10/27/16 12:30	KJP	SW 6010*
Magnesium	1500	mg/L		10/26/16 13:38	11/02/16 14:16	JMW	SW 6020
Mercury	< 0.80	ug/L		10/26/16 13:38	11/02/16 15:00	JMW	SW 6020
Molybdenum	130	ug/L		10/26/16 13:38	11/02/16 14:16	JMW	SW 6020
Potassium	210	mg/L		10/26/16 13:38	11/03/16 09:03	JMW	SW 6020
Selenium	890	ug/L		10/26/16 13:38	11/02/16 15:00	JMW	SW 6020
Sodium	620	mg/L		10/26/16 13:38	11/02/16 13:36	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 15:20	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-18
Name: GPb
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:10
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	2600	mg/L		10/27/16 22:26	10/27/16 22:26	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 12:00	10/26/16 12:00	TAS	EPA 300.0
Sulfate	27000	mg/L		10/28/16 14:39	10/28/16 14:39	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.65	pH Units		10/24/16 14:10	10/24/16 14:10	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	10	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	69.4	mg/L		10/27/16 15:56	10/27/16 15:56	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	28000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	8.6	ug/L		10/26/16 13:38	11/02/16 14:20	JMW	SW 6020
Arsenic	92	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Barium	1100	ug/L		10/26/16 13:38	11/02/16 14:20	JMW	SW 6020
Beryllium	< 20	ug/L		10/26/16 13:38	11/02/16 14:34	JMW	SW 6020
Boron	97000	ug/L		10/26/16 13:38	11/03/16 08:45	JMW	SW 6020
Cadmium	67	ug/L		10/26/16 13:38	11/02/16 15:55	JMW	SW 6020
Calcium	1400	mg/L		10/26/16 13:38	11/02/16 14:34	JMW	SW 6020
Chromium	150	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Cobalt	110	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Lithium	480	ug/L		10/26/16 13:38	10/27/16 12:33	KJP	SW 6010*
Magnesium	2500	mg/L		10/26/16 13:38	11/02/16 14:34	JMW	SW 6020
Mercury	27	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Molybdenum	140	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Potassium	360	mg/L		10/26/16 13:38	11/03/16 08:45	JMW	SW 6020
Selenium	1500	ug/L		10/26/16 13:38	11/02/16 15:03	JMW	SW 6020
Sodium	1000	mg/L		10/26/16 13:38	11/02/16 14:34	JMW	SW 6020
Thallium	< 4.0	ug/L		10/26/16 13:38	11/07/16 15:07	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-19
Name: GPc
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:20
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1800	mg/L		10/28/16 01:58	10/28/16 01:58	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 12:18	10/26/16 12:18	TAS	EPA 300.0
Sulfate	20000	mg/L		10/28/16 02:16	10/28/16 02:16	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.73	pH Units		10/24/16 14:20	10/24/16 14:20	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	5.5	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	49.2	mg/L		10/27/16 17:35	10/27/16 17:35	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	17000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 6.0	ug/L		10/26/16 13:38	11/02/16 14:23	JMW	SW 6020
Arsenic	4.4	ug/L		10/26/16 13:38	11/02/16 15:07	JMW	SW 6020
Barium	110	ug/L		10/26/16 13:38	11/02/16 13:43	JMW	SW 6020
Beryllium	2.6	ug/L		10/26/16 13:38	11/02/16 14:23	JMW	SW 6020
Boron	72000	ug/L		10/26/16 13:38	11/03/16 08:46	JMW	SW 6020
Cadmium	41	ug/L		10/26/16 13:38	11/02/16 15:56	JMW	SW 6020
Calcium	570	mg/L		10/26/16 13:38	11/02/16 14:38	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:27	JMW	SW 6020
Cobalt	54	ug/L		10/26/16 13:38	11/02/16 15:07	JMW	SW 6020
Lithium	300	ug/L		10/26/16 13:38	10/27/16 12:36	KJP	SW 6010*
Magnesium	1500	mg/L		10/26/16 13:38	11/02/16 14:23	JMW	SW 6020
Mercury	< 0.80	ug/L		10/26/16 13:38	11/02/16 15:07	JMW	SW 6020
Molybdenum	120	ug/L		10/26/16 13:38	11/02/16 14:23	JMW	SW 6020
Potassium	260	mg/L		10/26/16 13:38	11/03/16 08:46	JMW	SW 6020
Selenium	890	ug/L		10/26/16 13:38	11/02/16 15:07	JMW	SW 6020
Sodium	650	mg/L		10/26/16 13:38	11/02/16 13:43	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 15:27	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-20
Name: GPd
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:30
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1900	mg/L		10/28/16 03:09	10/28/16 03:09	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 12:36	10/26/16 12:36	TAS	EPA 300.0
Sulfate	19000	mg/L		10/28/16 03:26	10/28/16 03:26	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.73	pH Units		10/24/16 14:30	10/24/16 14:30	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	6.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	51.3	mg/L		10/27/16 17:39	10/27/16 17:39	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	16000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 13:38	11/02/16 13:47	JMW	SW 6020
Arsenic	4.2	ug/L		10/26/16 13:38	11/02/16 15:10	JMW	SW 6020
Barium	110	ug/L		10/26/16 13:38	11/02/16 13:47	JMW	SW 6020
Beryllium	< 20	ug/L		10/26/16 13:38	11/02/16 14:41	JMW	SW 6020
Boron	66000	ug/L		10/26/16 13:38	11/03/16 08:48	JMW	SW 6020
Cadmium	38	ug/L		10/26/16 13:38	11/02/16 15:57	JMW	SW 6020
Calcium	560	mg/L		10/26/16 13:38	11/02/16 14:41	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 13:38	11/01/16 15:31	JMW	SW 6020
Cobalt	52	ug/L		10/26/16 13:38	11/02/16 15:10	JMW	SW 6020
Lithium	300	ug/L		10/26/16 13:38	10/27/16 12:39	KJP	SW 6010*
Magnesium	1500	mg/L		10/26/16 13:38	11/02/16 14:27	JMW	SW 6020
Mercury	< 0.80	ug/L		10/26/16 13:38	11/02/16 15:10	JMW	SW 6020
Molybdenum	120	ug/L		10/26/16 13:38	11/02/16 14:27	JMW	SW 6020
Potassium	230	mg/L		10/26/16 13:38	11/03/16 08:48	JMW	SW 6020
Selenium	800	ug/L		10/26/16 13:38	11/01/16 15:31	JMW	SW 6020
Sodium	660	mg/L		10/26/16 13:38	11/02/16 13:47	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 13:38	11/01/16 15:31	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-21
Name: RPb
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:50
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1800	mg/L		10/28/16 03:44	10/28/16 03:44	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 12:53	10/26/16 12:53	TAS	EPA 300.0
Sulfate	18000	mg/L		10/28/16 04:01	10/28/16 04:01	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.49	pH Units		10/24/16 14:50	10/24/16 14:50	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	44.4	mg/L		10/27/16 17:44	10/27/16 17:44	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	16000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020
Arsenic	2.8	ug/L		10/26/16 11:03	11/02/16 11:16	JMW	SW 6020
Barium	90	ug/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020
Beryllium	2.1	ug/L		10/26/16 11:03	11/01/16 10:30	JMW	SW 6020
Boron	56000	ug/L		10/26/16 11:03	11/02/16 16:34	JMW	SW 6020
Cadmium	33	ug/L		10/26/16 11:03	11/02/16 11:32	JMW	SW 6020
Calcium	380	mg/L		10/26/16 11:03	11/01/16 10:30	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020
Cobalt	45	ug/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020
Lithium	310	ug/L		10/26/16 11:03	10/27/16 11:01	KJP	SW 6010*
Magnesium	1200	mg/L		10/26/16 11:03	11/01/16 10:30	JMW	SW 6020
Mercury	< 0.40	ug/L		10/26/16 11:03	11/02/16 11:16	JMW	SW 6020
Molybdenum	64	ug/L		10/26/16 11:03	11/01/16 10:30	JMW	SW 6020
Potassium	210	mg/L		10/26/16 11:03	11/02/16 11:32	JMW	SW 6020
Selenium	780	ug/L		10/26/16 11:03	11/02/16 11:16	JMW	SW 6020
Sodium	470	mg/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 11:03	11/01/16 09:42	JMW	SW 6020

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Peoria, IL 61615
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ANALYTICAL RESULTS

Sample: 6103663-22
Name: RPc
Matrix: Surface Water - Grab

Sampled: 10/24/16 15:00
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	2000	mg/L		10/28/16 04:19	10/28/16 04:19	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 14:05	10/26/16 14:05	TAS	EPA 300.0
Sulfate	20000	mg/L		10/28/16 04:37	10/28/16 04:37	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.32	pH Units		10/24/16 15:00	10/24/16 15:00	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	45.0	mg/L		10/27/16 17:48	10/27/16 17:48	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	16000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020
Arsenic	3.1	ug/L		10/26/16 11:03	11/02/16 11:20	JMW	SW 6020
Barium	88	ug/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020
Beryllium	2.2	ug/L		10/26/16 11:03	11/01/16 10:34	JMW	SW 6020
Boron	59000	ug/L		10/26/16 11:03	11/02/16 16:36	JMW	SW 6020
Cadmium	37	ug/L		10/26/16 11:03	11/02/16 11:36	JMW	SW 6020
Calcium	380	mg/L		10/26/16 11:03	11/01/16 10:34	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020
Cobalt	43	ug/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020
Lithium	310	ug/L		10/26/16 11:03	10/27/16 11:04	KJP	SW 6010*
Magnesium	1200	mg/L		10/26/16 11:03	11/01/16 10:34	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 11:03	11/02/16 10:36	JMW	SW 6020
Molybdenum	64	ug/L		10/26/16 11:03	11/01/16 10:34	JMW	SW 6020
Potassium	200	mg/L		10/26/16 11:03	11/02/16 11:36	JMW	SW 6020
Selenium	830	ug/L		10/26/16 11:03	11/02/16 11:20	JMW	SW 6020
Sodium	440	mg/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 11:03	11/01/16 09:46	JMW	SW 6020

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ANALYTICAL RESULTS

Sample: 6103663-23
Name: RPd
Matrix: Surface Water - Grab

Sampled: 10/24/16 15:05
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1600	mg/L		10/28/16 04:25	10/28/16 04:25	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 14:23	10/26/16 14:23	TAS	EPA 300.0
Sulfate	16000	mg/L		10/28/16 04:43	10/28/16 04:43	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.32	pH Units		10/24/16 15:05	10/24/16 15:05	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	51.2	mg/L		10/27/16 17:53	10/27/16 17:53	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	17000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020
Arsenic	3.4	ug/L		10/26/16 11:03	11/02/16 11:23	JMW	SW 6020
Barium	89	ug/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020
Beryllium	2.4	ug/L		10/26/16 11:03	11/01/16 10:37	JMW	SW 6020
Boron	59000	ug/L		10/26/16 11:03	11/02/16 16:37	JMW	SW 6020
Cadmium	36	ug/L		10/26/16 11:03	11/02/16 11:40	JMW	SW 6020
Calcium	400	mg/L		10/26/16 11:03	11/01/16 10:37	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020
Cobalt	45	ug/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020
Lithium	310	ug/L		10/26/16 11:03	10/27/16 11:13	KJP	SW 6010*
Magnesium	1300	mg/L		10/26/16 11:03	11/01/16 10:37	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 11:03	11/02/16 10:39	JMW	SW 6020
Molybdenum	66	ug/L		10/26/16 11:03	11/01/16 10:37	JMW	SW 6020
Potassium	200	mg/L		10/26/16 11:03	11/02/16 11:40	JMW	SW 6020
Selenium	860	ug/L		10/26/16 11:03	11/02/16 11:23	JMW	SW 6020
Sodium	460	mg/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 11:03	11/01/16 09:49	JMW	SW 6020

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(800) 752-6651

ANALYTICAL RESULTS

Sample: 6103663-24
Name: RPa
Matrix: Surface Water - Grab

Sampled: 10/24/16 14:40
Received: 10/25/16 07:45

Parameter	Result	Unit	Qualifier	Prepared	Analyzed	Analyst	Method
Anions - PIA							
Chloride	1600	mg/L		10/28/16 05:02	10/28/16 05:02	TAS	EPA 300.0
Nitrite-N	< 3.0	mg/L		10/26/16 13:11	10/26/16 13:11	TAS	EPA 300.0
Sulfate	17000	mg/L		10/28/16 05:20	10/28/16 05:20	TAS	EPA 300.0
Field - PIA							
pH, Field Measured	6.70	pH Units		10/24/16 14:40	10/24/16 14:40	FIELD	Field*
General Chemistry - PIA							
Alkalinity - bicarbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Alkalinity - carbonate as CaCO3	< 2.0	mg/L		10/31/16 13:36	10/31/16 13:36	LAM	SM 2320B*
Fluoride	47.0	mg/L		10/27/16 15:52	10/27/16 15:52	TTH	SM 4500-F C
Solids - total dissolved solids (TDS)	16000	mg/L		10/27/16 12:04	10/27/16 12:28	ARL	SM 2540C
Total Metals - PIA							
Antimony	< 3.0	ug/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020
Arsenic	3.3	ug/L		10/26/16 11:03	11/02/16 11:27	JMW	SW 6020
Barium	89	ug/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020
Beryllium	2.3	ug/L		10/26/16 11:03	11/01/16 10:41	JMW	SW 6020
Boron	60000	ug/L		10/26/16 11:03	11/02/16 16:38	JMW	SW 6020
Cadmium	37	ug/L		10/26/16 11:03	11/02/16 11:43	JMW	SW 6020
Calcium	380	mg/L		10/26/16 11:03	11/01/16 10:41	JMW	SW 6020
Chromium	< 4.0	ug/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020
Cobalt	44	ug/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020
Lithium	310	ug/L		10/26/16 11:03	10/27/16 11:16	KJP	SW 6010*
Magnesium	1200	mg/L		10/26/16 11:03	11/01/16 10:41	JMW	SW 6020
Mercury	< 0.20	ug/L		10/26/16 11:03	11/02/16 10:43	JMW	SW 6020
Molybdenum	63	ug/L		10/26/16 11:03	11/01/16 10:41	JMW	SW 6020
Potassium	190	mg/L		10/26/16 11:03	11/02/16 11:43	JMW	SW 6020
Selenium	840	ug/L		10/26/16 11:03	11/02/16 11:27	JMW	SW 6020
Sodium	450	mg/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020
Thallium	< 1.0	ug/L		10/26/16 11:03	11/01/16 09:53	JMW	SW 6020

PDC Laboratories, Inc.
2231 West Altorfer Drive
Peoria, IL 61615
(800) 752-6651

NOTES

Specific method revisions used for analysis are available upon request.

Certifications

PIA - Peoria, IL
TNI Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Missouri Department of Natural Resources Certificate of Approval for Microbiological Laboratory Service No. 870
Drinking Water Certifications: Iowa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

SPMO - Springfield, MO
USEPA DMR-QA Program

STL - St. Louis, MO
TNI Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS Lab No. E-10389
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 171050
Drinking Water Certifications: Missouri (1050)
Missouri Department of Natural Resources

* Not a TNI accredited analyte

Gail J Schindler

Certified by: Gail Schindler, Project Manager

PDC LABORATORIES, INC.
2231 WEST ALTORFER DRIVE
PEORIA, IL 61615

PHONE # 309-692-9688
FAX # 309-692-9689

CHAIN OF CUSTODY RECORD

GJS 10-26-16

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

(1) CLIENT	PROJECT NUMBER	P.O. NUMBER	MEANS SHIPPED
Hanson Professional Services COFFEEN ENERGY CENTER			
ADDRESS 134 CIPS LANE	**PHONE NUMBER**	**FAX NUMBER**	**DATE SHIPPED**
CITY STATE ZIP COFFEEN IL 62017	**SAMPLER (PLEASE PRINT)** R. ZINSER	**MATRIX TYPES:** WW- WASTEWATER DW- DRINKING WATER GW- GROUND WATER WWSL- SLUDGE NAS- SOLID OTHER:	
CONTACT PERSON JOHN ROMANG	**SAMPLER'S SIGNATURE**		

(3) ANALYSIS REQUESTED — GJS 10-26-16

(FOR LAB USE ONLY)
LOGIN # 6103663-24
LOGGED BY: KDM

NATURAL RESOURCE TECHNOLOGY

COFFEEN POND LAKE

GAIL J SCHINDLER

(2) SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	TOTAL # OF CONT	SB,AS,BA,BE,ALKHCO3	B,CD,CA,ALK CO3, CL	CR,CR+6,CO,CU,ON,F	PE,PB,LI,MG,MN,HG,MO	NI,GRO,PHENOL,P,SE,	AG,NA,SO4,TL,TDS,ZN	TSS,NO2,NO3,NH3,TKN	REMARKS
							Custom list							
AP1 a	10/24/16	11:52	X		SW	7	Per Chain							pH 6.99
AP1 b	10/24/16	11:56	X		SW	7								pH 7.01
AP1 c	10/24/16	12:10	X		SW	7								pH 7.05
AP1 d	10/24/16	12:15	X		SW	7								pH 7.21
AP1 e	10/24/16	12:01	X		SW	7								pH 7.12
AP1 f	10/24/16	12:40	X		SW	7								pH 7.20
AP1 g	10/24/16	12:50	X		SW	7								pH 7.21
AP1 h	10/24/16	12:55	X		SW	7								pH 7.41
AP2 e	10/24/16	11:30	X		SW	7								pH 6.49
AP2 f	10/24/16	11:20	X		SW	7								pH 6.42
AP2 g	10/24/16	11:10	X		SW	7								pH 6.46

(5) TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
X(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
RUSH RESULTS VIA (PLEASE CIRCLE) FAX PHONE

FAX # IF DIFFERENT FROM ABOVE: PHONE # IF DIFFERENT FROM ABOVE:

(6) *The sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.*

(7) RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
	10/25/16	7:47			
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED AT LAB BY: (SIGNATURE)	DATE 10/25/16	TIME 745

(8) COMMENTS: (FOR LAB USE ONLY)

SAMPLE TEMPERATURE UPON RECEIPT	6 °C
CHILL PROCESS STARTED PRIOR TO RECEIPT	Y OR N
SAMPLE(S) RECEIVED ON ICE	Y OR N
BOTTLES RECEIVED IN GOOD CONDITION	Y OR N
BOTTLES FILLED TO APPROX. THE NECK	Y OR N
SAMPLES RECEIVED WITHIN HOLD TIME(S)	Y OR N

PDC LABORATORIES, INC.
2231 WEST ALTORFER DRIVE
PEORIA, IL 61615

PHONE # 309-692-9688
FAX # 309-692-9689

GJS 10-26-16

CHAIN OF CUSTODY RECORD

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

1				
CLIENT: Hanson Professional Services **COFFEEN ENERGY CENTER**	PROJECT NUMBER	P.O. NUMBER	MEANS SHIPPED	
ADDRESS: **134 CIPS LANE**	PHONE NUMBER	FAX NUMBER	DATE SHIPPED	
CITY / STATE / ZIP: **COFFEEN IL 62017**	SAMPLER (PLEASE PRINT): R. ZINSER		MATRIX TYPES: WW- WASTEWATER; DW- DRINKING WATER; GW- GROUND WATER; WWSL- SLUDGE; NAS- SOLID; OTHER:	
CONTACT PERSON: **JOHN ROMANG**	SAMPLER'S SIGNATURE			

3 ANALYSIS REQUESTED — GJS 10-26-16

(FOR LAB USE ONLY)
LOGIN # _____
LOGGED BY: _____

NATURAL RESOURCE TECHNOLOGY

COFFEEN POND LAKE

GAIL J SCHINDLER

2 SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	TOTAL # OF CONT	SB,AS,BA,BE,ALKHCO3	B,CD,CA,ALK CO3, CL	CR,CR+6,CO,CU,ON,F	PB,LI,MG,MN,HG,MO	M,GEO,PHENOL,P,SE,	AG,NA,SO4,TL,TDS,ZN	TSS,NO2,NO3,NH3,TKN	REMARKS
AP2 h	10/24/16	11:40	X		SW	7	/	/	/	/	/	/	/	pH 7.17
CL a	10/24/16	15:30	X		SW	7	/	/	/	/	/	/	/	pH 7.22
CL b	10/24/16	13:35	X		SW	7	/	/	/	/	/	/	/	pH 7.52
CL c	10/24/16	13:15	X		SW	7	/	/	/	/	/	/	/	pH 7.62
CL d	10/24/16	15:55	X		SW	7	/	/	/	/	/	/	/	pH 7.30
GP a	10/24/16	14:00	X		SW	7	/	/	/	/	/	/	/	pH 7.16
GP b	10/24/16	14:10	X		SW	7	/	/	/	/	/	/	/	pH 6.65
GP c	10/24/16	14:20	X		SW	7	/	/	/	/	/	/	/	pH 6.73
GP d	10/24/16	14:30	X		SW	7	/	/	/	/	/	/	/	pH 6.73
RP b	10/24/16	14:50	X		SW	7	/	/	/	/	/	/	/	pH 6.49
RP c	10/24/16	15:00	X		SW	7	/	/	/	/	/	/	/	pH 6.32

5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) — NORMAL / RUSH
X(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
RUSH RESULTS VIA (PLEASE CIRCLE) — FAX / PHONE
FAX # IF DIFFERENT FROM ABOVE:
PHONE # IF DIFFERENT FROM ABOVE:

6 *The sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.*

7					
RELINQUISHED BY: (SIGNATURE)	DATE 10/25/16	RECEIVED BY: (SIGNATURE)	DATE	8 COMMENTS: (FOR LAB USE ONLY)	
	TIME 7:45		TIME		
RELINQUISHED BY: (SIGNATURE)	DATE	RECEIVED AT LAB BY: (SIGNATURE)	DATE 10/25/16	SAMPLE TEMPERATURE UPON RECEIPT 6 °C	
	TIME		TIME 745	CHILL PROCESS STARTED PRIOR TO RECEIPT (Y OR N)	
				SAMPLE(S) RECEIVED ON ICE (Y OR N)	
				BOTTLES RECEIVED IN GOOD CONDITION (Y OR N)	
				BOTTLES FILLED TO APPROX. THE NECK (Y OR N)	
				SAMPLES RECEIVED WITHIN HOLD TIME(S) (Y OR N)	

PDC LABORATORIES, INC.
2231 WEST ALTORFER DRIVE
PEORIA, IL 61615

PHONE # 309-692-9688
FAX # 309-692-9689

CHAIN OF CUSTODY RECORD

GJS 10/26/16

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

(1) CLIENT: Hanson Professional Services
COFFEEN ENERGY CENTER

ADDRESS: 134 CIPS LANE

CITY STATE ZIP: COFFEEN IL 62017

CONTACT PERSON: JOHN ROMANG

PROJECT NUMBER | P.O. NUMBER | MEANS SHIPPED

PHONE NUMBER | FAX NUMBER | DATE SHIPPED

SAMPLER (PLEASE PRINT): R. ZINSER

SAMPLER'S SIGNATURE

MATRIX TYPES:
WW- WASTEWATER
DW- DRINKING WATER
GW- GROUND WATER
WWSL- SLUDGE
NAS- SOLID
OTHER: _____

(3) ANALYSIS REQUESTED
GJS 10/26/16

(FOR LAB USE ONLY)
LOGIN # _____
LOGGED BY: _____

NATURAL RESOURCE TECHNOLOGY

COFFEEN POND LAKE

GAIL J SCHINDLER

(2) SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	TOTAL # OF CONT	SB,AS,BA,BE,ALKHCO3	B,CD,CA,ALK CO3, CL	CR,CR+6,CO,CU,ON,F	FE,PB,LI,MG,MN,HG,MO	NI,GRO,PHENOL,P,SE,	AG,NA,SO4,TL,TDS,ZN	TSS,NO2,NO3,NH3,TKN	REMARKS
RPd	10/24/16	15:05	X		SW	7	/	/	/	/	/	/	/	pH 6.32
RPa	10/24/16	14:40	X		SW	7	/	/	/	/	/	/	/	pH 6.70

(5) TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
X(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
RUSH RESULTS VIA (PLEASE CIRCLE) FAX PHONE
FAX # IF DIFFERENT FROM ABOVE:
PHONE # IF DIFFERENT FROM ABOVE:

(6) *The sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.*

(7) RELINQUISHED BY: (SIGNATURE)
DATE: 10/25/16
TIME: 7:45

RECEIVED BY: (SIGNATURE)
DATE:
TIME:

RELINQUISHED BY: (SIGNATURE)
DATE:
TIME:

RECEIVED AT LAB BY: (SIGNATURE)
DATE: 10/25/16
TIME: 7:45

(8) COMMENTS: (FOR LAB USE ONLY)

SAMPLE TEMPERATURE UPON RECEIPT 6 °C
CHILL PROCESS STARTED PRIOR TO RECEIPT Y OR N
SAMPLE(S) RECEIVED ON ICE Y OR N
BOTTLES RECEIVED IN GOOD CONDITION Y OR N
BOTTLES FILLED TO APPROX. THE NECK Y OR N
SAMPLES RECEIVED WITHIN HOLD TIME(S) Y OR N

Chain of Custody Parameters (as totals)

Antimony
Arsenic
Barium
Beryllium
Bicarbonate Alkalinity
Boron
Cadmium
Calcium
Carbonate Alkalinity
Chloride
Chromium
Cobalt
Fluoride
Lithium
Magnesium
Mercury
Molybdenum
Nitrite
pH
Potassium
Selenium
Sodium
Sulfate
Thallium
Total Dissolved Solids (TDS)

ATTACHMENT 7
Sequential Extraction Procedure Laboratory Analytical Report

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Michael Healey
Sirem, div of Geosyntec Consultants
130 Stone Rd West
Guelph, Ontario N1G 3Z2

Generated 5/22/2023 11:20:16 AM Revision 1

JOB DESCRIPTION

Coffeen MNA

JOB NUMBER

140-23157-1

Eurofins Knoxville
5815 Middlebrook Pike
Knoxville TN 37921

See page two for job notes and contact information.

myEOL

Eurofins Knoxville

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

Authorization

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Revision 1

Authorized for release by
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Table of Contents

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Qualifiers

Metals

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
*1	LCS/LCSD RPD exceeds control limits.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Laboratory: Eurofins Knoxville

Narrative

Job Narrative
140-23157-1
Revised

Revision
The report being provided is a revision of the original report sent on 6/15/2021. The report (revision 1) is being revised to include a different analyte list for sample 2.

Receipt
The samples were received on 5/19/2021 at 10:15am and arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 12.8º C.

Receipt Exceptions
The following samples were received at the laboratory outside the required temperature criteria: G1001-(6-11) (140-23157-1), 401B-(16-20) (140-23157-2) and 270A-(12-16) (140-23157-3). The client was contacted regarding this issue, and the laboratory was instructed to proceed with analysis.

The Field Sampler was not listed on the Chain of Custody.

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. COC not relinquished.

Metals
7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0008, “7 Step Sequential Extraction Procedure”. SW-846 Method 6010B as incorporated in Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analyses.

An aliquot of each sample was sequentially extracted using the steps listed below:

· Step 1 - Exchangeable Fraction: A 5 gram aliquot of sample was extracted with 25 mL of 1M magnesium sulfate (MgSO4), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 2 - Carbonate Fraction: The sample residue from step 1 was extracted with 25 mL of 1M sodium acetate/acetic acid (NaOAc/HOAc) at pH 5, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 3 - Non-crystalline Materials Fraction: The sample residue from step 2 was extracted with 25 mL of 0.2M ammonium oxalate (pH 3), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 4 - Metal Hydroxide Fraction: The sample residue from step 3 was extracted with 25 mL of 1M hydroxylamine hydrochloride solution in 25% v/v acetic acid, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 5 - Organic-bound Fraction: The sample residue from step 4 was extracted three times with 25 mL of 5% sodium hypochlorite (NaClO) at pH 9.5, centrifuged and filtered. The resulting leachates were combined and 5 mL were digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 6 - Acid/Sulfide Fraction: The sample residue from step 5 was extracted with 25 mL of a 3:1:2 v/v solution of HCl-HNO3-H2O, centrifuged and filtered. 5 mL of the resulting leachate was diluted to 50 mL with reagent water and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
· Step 7 - Residual Fraction: A 1.0 g aliquot of the sample residue from step 6 was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Results are reported in mg/kg on a dry weight basis.

In addition, a 1.0 g aliquot of the original sample was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Total metal results are reported in mg/kg on a dry weight basis.

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Job ID: 140-23157-1 (Continued)

Laboratory: Eurofins Knoxville (Continued)

Results were calculated using the following equation:

Result, µg/g or mg/Kg, dry weight = (C × V × V1 × D) / (W × S × V2)

Where:
C = Concentration from instrument readout, µg/mL
V = Final volume of digestate, mL
D = Instrument dilution factor
V1 = Total volume of leachate, mL
V2 = Volume of leachate digested, mL
W = Wet weight of sample, g
S = Percent solids/100

A method blank, laboratory control sample and laboratory control sample duplicate were prepared and analyzed with each SEP step in order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of interest from the extraction solutions. Results outside of laboratory QC limits do not reflect out of control performance, but rather the effect of the extraction solution upon the analyte.

A laboratory sample duplicate was prepared and analyzed with each batch of samples in order to provide information regarding the reproducibility of the procedure.

SEP Report Notes:

The final report lists the results for each step, the result for the total digestion of the sample, and a sum of the results of steps 1 through 7 by element.

Magnesium was not reported for step 1 because the extraction solution for this step (magnesium sulfate) contains high levels of magnesium. Sodium was not reported for steps 2 and 5 since the extraction solutions for these steps contain high levels of sodium. The sum of steps 1 through 7 is much higher than the total result for sodium and magnesium due to the magnesium and sodium introduced by the extraction solutions.

The digestates for steps 1, 2 and 5 were analyzed at a dilution due to instrument problems caused by the high solids content of the digestates. The reporting limits were adjusted accordingly.

Method 6010B: The following samples were diluted due to the presence of titanium which interferes with Cobalt: G1001-(6-11) (140-23157-1) and 401B-(16-20) (140-23157-2). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for preparation batch 140-50371 and 140-50451 and analytical batch 140-50529 recovered outside control limits for the following analyte: Lithium. This analyte was biased high in the LCS and LCSD and was not detected in the associated samples; therefore, the data have been reported. Lithium results for the samples were either non-detect or estimated values.

Method 6010B SEP: The following samples were diluted due to the presence of silicon which interferes with Arsenic: G1001-(6-11) (140-23157-1), 401B-(16-20) (140-23157-2) and 270A-(12-16) (140-23157-3). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The method blank for preparation batch 140-50257 and 140-50291 and analytical batch 140-50418 contained Manganese above the reporting limit (RL). Associated sample was not re-extracted and/or re-analyzed because result was greater than 10X the value found in the method blank.

Method 6010B SEP: The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for preparation batch 140-50257 and 140-50291 and analytical batch 140-50418 recovered outside control limits for the following analyte: Manganese.

Method 6010B SEP: The method blank for step 5 has Iron detected above the reporting limit. The following samples were affected:

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Job ID: 140-23157-1 (Continued)

Laboratory: Eurofins Knoxville (Continued)

401B-(16-20) (140-23157-2) and (MB 140-50371/16-B ^5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-23157-1	G1001-(6-11)	Solid	05/17/21 10:00	05/19/21 10:15
140-23157-2	401B-(16-20)	Solid	05/17/21 10:15	05/19/21 10:15
140-23157-3	270A-(12-16)	Solid	05/17/21 10:30	05/19/21 10:15

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: G1001-(6-11)
Date Collected: 05/17/21 10:00
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-1
Matrix: Solid
Percent Solids: 90.1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.2	0.58	mg/Kg	☼	05/27/21 08:00	06/02/21 12:49	4
Boron	ND		44	44	mg/Kg	☼	05/27/21 08:00	06/02/21 12:49	4
Cobalt	ND		11	0.20	mg/Kg	☼	05/27/21 08:00	06/02/21 12:49	4
Lithium	ND		11	0.67	mg/Kg	☼	05/27/21 08:00	06/02/21 12:49	4
Molybdenum	ND		8.9	0.36	mg/Kg	☼	05/27/21 08:00	06/02/21 12:49	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.7	0.43	mg/Kg	☼	05/28/21 08:00	06/02/21 14:42	3
Boron	ND		33	33	mg/Kg	☼	05/28/21 08:00	06/02/21 14:42	3
Cobalt	**1.2**	**J**	8.3	0.21	mg/Kg	☼	05/28/21 08:00	06/02/21 14:42	3
Lithium	ND		8.3	0.50	mg/Kg	☼	05/28/21 08:00	06/02/21 14:42	3
Molybdenum	ND		6.7	0.27	mg/Kg	☼	05/28/21 08:00	06/02/21 14:42	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.43**	**J**	0.56	0.14	mg/Kg	☼	06/01/21 08:00	06/02/21 16:34	1
Boron	ND		11	11	mg/Kg	☼	06/01/21 08:00	06/02/21 16:34	1
Cobalt	**0.74**	**J**	2.8	0.050	mg/Kg	☼	06/01/21 08:00	06/02/21 16:34	1
Lithium	ND		2.8	0.17	mg/Kg	☼	06/01/21 08:00	06/02/21 16:34	1
Molybdenum	**0.19**	**J**	2.2	0.091	mg/Kg	☼	06/01/21 08:00	06/02/21 16:34	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.6**	**B**	0.56	0.24	mg/Kg	☼	06/02/21 08:00	06/05/21 12:15	1
Boron	ND		11	11	mg/Kg	☼	06/02/21 08:00	06/05/21 12:15	1
Cobalt	**1.5**	**J**	2.8	0.059	mg/Kg	☼	06/02/21 08:00	06/05/21 12:15	1
Lithium	**2.4**	**J**	2.8	0.17	mg/Kg	☼	06/02/21 08:00	06/05/21 12:15	1
Molybdenum	**0.59**	**J**	2.2	0.091	mg/Kg	☼	06/02/21 08:00	06/05/21 12:15	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		8.3	2.1	mg/Kg	☼	06/04/21 08:00	06/05/21 14:09	5
Boron	ND		170	170	mg/Kg	☼	06/04/21 08:00	06/05/21 14:09	5
Cobalt	ND	*1	42	0.67	mg/Kg	☼	06/04/21 08:00	06/05/21 14:09	5
Lithium	**8.8**	**J B *+**	42	2.4	mg/Kg	☼	06/04/21 08:00	06/05/21 14:09	5
Molybdenum	ND		33	1.4	mg/Kg	☼	06/04/21 08:00	06/05/21 14:09	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.1**		0.56	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:02	1
Boron	ND		11	11	mg/Kg	☼	06/04/21 08:00	06/05/21 16:02	1
Cobalt	**2.0**	**J**	2.8	0.051	mg/Kg	☼	06/04/21 08:00	06/05/21 16:02	1
Lithium	**6.8**	**B**	2.8	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:02	1
Molybdenum	**0.21**	**J**	2.2	0.11	mg/Kg	☼	06/04/21 08:00	06/05/21 16:02	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.0**	**B**	1.1	0.29	mg/Kg	☼	06/07/21 08:00	06/09/21 14:39	2
Cobalt	**0.69**	**J**	5.6	0.058	mg/Kg	☼	06/07/21 08:00	06/09/21 14:39	2
Lithium	**11**		2.8	0.17	mg/Kg	☼	06/07/21 08:00	06/09/21 13:18	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Client Sample ID: G1001-(6-11)
Lab Sample ID: 140-23157-1
Date Collected: 05/17/21 10:00
Matrix: Solid
Date Received: 05/19/21 10:15
Percent Solids: 90.1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	0.10	J	2.2	0.091	mg/Kg	☼	06/07/21 08:00	06/09/21 13:18	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	6.1		0.50	0.13	mg/Kg			06/13/21 11:52	1
Cobalt	6.1		2.5	0.023	mg/Kg			06/13/21 11:52	1
Lithium	29		2.5	0.15	mg/Kg			06/13/21 11:52	1
Molybdenum	1.1	J	2.0	0.082	mg/Kg			06/13/21 11:52	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	8.6	B	0.56	0.14	mg/Kg	☼	05/27/21 08:00	06/10/21 13:08	1
Cobalt	5.3	J	5.6	0.058	mg/Kg	☼	05/27/21 08:00	06/10/21 14:47	2
Lithium	21		2.8	0.17	mg/Kg	☼	05/27/21 08:00	06/10/21 13:08	1
Molybdenum	1.5	J	2.2	0.091	mg/Kg	☼	05/27/21 08:00	06/10/21 13:08	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 401B-(16-20)

Date Collected: 05/17/21 10:15
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-2

Matrix: Solid
Percent Solids: 86.5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.3	0.60	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Boron	ND		46	46	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Cobalt	ND		12	0.21	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Lithium	ND		12	0.69	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Molybdenum	ND		9.3	0.38	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Iron	ND		23	13	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4
Manganese	**17**		3.5	0.14	mg/Kg	☼	05/27/21 08:00	06/02/21 12:54	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.7	0.45	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Boron	ND		35	35	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Cobalt	ND		8.7	0.22	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Lithium	ND		8.7	0.52	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Molybdenum	ND		6.9	0.28	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Iron	ND		17	10	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3
Manganese	**8.1**		2.6	0.97	mg/Kg	☼	05/28/21 08:00	06/02/21 14:47	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.59**		0.58	0.15	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Boron	ND		12	12	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Cobalt	**2.4**	**J**	2.9	0.052	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Lithium	**0.17**	**J**	2.9	0.17	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Molybdenum	**0.16**	**J**	2.3	0.095	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Iron	**580**		5.8	3.4	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1
Manganese	**340**	**B *+**	0.87	0.031	mg/Kg	☼	06/01/21 08:00	06/02/21 16:39	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.6**	**B**	0.58	0.25	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Boron	ND		12	12	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Cobalt	**1.9**	**J**	2.9	0.061	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Lithium	**2.9**		2.9	0.17	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Molybdenum	**0.17**	**J**	2.3	0.095	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Iron	**6400**		5.8	3.4	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1
Manganese	**130**		0.87	0.15	mg/Kg	☼	06/02/21 08:00	06/05/21 12:20	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		8.7	2.2	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Boron	ND		170	170	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Cobalt	ND	*1	43	0.69	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Lithium	**8.9**	**J B *+**	43	2.5	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Molybdenum	ND		35	1.4	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Iron	**160**	**B**	87	51	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5
Manganese	ND	*1	13	2.1	mg/Kg	☼	06/04/21 08:00	06/05/21 14:14	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.5**		0.58	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 401B-(16-20)
Date Collected: 05/17/21 10:15
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-2
Matrix: Solid
Percent Solids: 86.5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		12	12	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1
Cobalt	**0.85**	**J**	2.9	0.053	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1
Lithium	**4.5**	**B**	2.9	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1
Molybdenum	ND		2.3	0.11	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1
Iron	**5100**		5.8	3.4	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1
Manganese	**29**		0.87	0.29	mg/Kg	☼	06/04/21 08:00	06/05/21 16:07	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.9**	**B**	1.2	0.30	mg/Kg	☼	06/07/21 08:00	06/09/21 14:44	2
Cobalt	**0.061**	**J**	2.9	0.030	mg/Kg	☼	06/07/21 08:00	06/09/21 13:23	1
Lithium	**9.2**		2.9	0.17	mg/Kg	☼	06/07/21 08:00	06/09/21 13:23	1
Molybdenum	ND		2.3	0.095	mg/Kg	☼	06/07/21 08:00	06/09/21 13:23	1
Iron	**3000**		5.8	4.7	mg/Kg	☼	06/07/21 08:00	06/09/21 13:23	1
Manganese	**32**		0.87	0.13	mg/Kg	☼	06/07/21 08:00	06/09/21 13:23	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**6.6**		0.50	0.13	mg/Kg			06/13/21 11:52	1
Cobalt	**5.1**		2.5	0.023	mg/Kg			06/13/21 11:52	1
Lithium	**26**		2.5	0.15	mg/Kg			06/13/21 11:52	1
Molybdenum	**0.34**	**J**	2.0	0.082	mg/Kg			06/13/21 11:52	1
Iron	**15000**		5.0	4.1	mg/Kg			06/13/21 11:52	1
Manganese	**550**		0.75	0.052	mg/Kg			06/13/21 11:52	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**6.4**	**B**	0.58	0.15	mg/Kg	☼	05/27/21 08:00	06/10/21 13:13	1
Cobalt	**7.7**		5.8	0.060	mg/Kg	☼	05/27/21 08:00	06/10/21 14:52	2
Lithium	**18**		2.9	0.17	mg/Kg	☼	05/27/21 08:00	06/10/21 13:13	1
Molybdenum	**0.52**	**J**	2.3	0.095	mg/Kg	☼	05/27/21 08:00	06/10/21 13:13	1
Iron	**16000**		5.8	4.7	mg/Kg	☼	05/27/21 08:00	06/10/21 13:13	1
Manganese	**920**	**B**	0.87	0.13	mg/Kg	☼	05/27/21 08:00	06/10/21 13:13	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 270A-(12-16)
Date Collected: 05/17/21 10:30
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-3
Matrix: Solid
Percent Solids: 85.8

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.3	0.61	mg/Kg	☼	05/27/21 08:00	06/02/21 12:59	4
Boron	ND		47	47	mg/Kg	☼	05/27/21 08:00	06/02/21 12:59	4
Cobalt	ND		12	0.21	mg/Kg	☼	05/27/21 08:00	06/02/21 12:59	4
Lithium	ND		12	0.70	mg/Kg	☼	05/27/21 08:00	06/02/21 12:59	4
Molybdenum	ND		9.3	0.38	mg/Kg	☼	05/27/21 08:00	06/02/21 12:59	4

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.7	0.45	mg/Kg	☼	05/28/21 08:00	06/02/21 14:52	3
Boron	ND		35	35	mg/Kg	☼	05/28/21 08:00	06/02/21 14:52	3
Cobalt	ND		8.7	0.22	mg/Kg	☼	05/28/21 08:00	06/02/21 14:52	3
Lithium	ND		8.7	0.52	mg/Kg	☼	05/28/21 08:00	06/02/21 14:52	3
Molybdenum	ND		7.0	0.29	mg/Kg	☼	05/28/21 08:00	06/02/21 14:52	3

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.0**		0.58	0.15	mg/Kg	☼	06/01/21 08:00	06/02/21 16:44	1
Boron	ND		12	12	mg/Kg	☼	06/01/21 08:00	06/02/21 16:44	1
Cobalt	**4.3**		2.9	0.052	mg/Kg	☼	06/01/21 08:00	06/02/21 16:44	1
Lithium	**0.35**	**J**	2.9	0.17	mg/Kg	☼	06/01/21 08:00	06/02/21 16:44	1
Molybdenum	**0.26**	**J**	2.3	0.096	mg/Kg	☼	06/01/21 08:00	06/02/21 16:44	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**6.0**	**B**	0.58	0.26	mg/Kg	☼	06/02/21 08:00	06/05/21 12:25	1
Boron	ND		12	12	mg/Kg	☼	06/02/21 08:00	06/05/21 12:25	1
Cobalt	**2.8**	**J**	2.9	0.062	mg/Kg	☼	06/02/21 08:00	06/05/21 12:25	1
Lithium	**2.4**	**J**	2.9	0.17	mg/Kg	☼	06/02/21 08:00	06/05/21 12:25	1
Molybdenum	**0.35**	**J**	2.3	0.096	mg/Kg	☼	06/02/21 08:00	06/05/21 12:25	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		8.7	2.2	mg/Kg	☼	06/04/21 08:00	06/05/21 14:19	5
Boron	ND		170	170	mg/Kg	☼	06/04/21 08:00	06/05/21 14:19	5
Cobalt	ND	*1	44	0.70	mg/Kg	☼	06/04/21 08:00	06/05/21 14:19	5
Lithium	**8.8**	**J B *+**	44	2.6	mg/Kg	☼	06/04/21 08:00	06/05/21 14:19	5
Molybdenum	ND		35	1.5	mg/Kg	☼	06/04/21 08:00	06/05/21 14:19	5

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.2**		0.58	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:12	1
Boron	ND		12	12	mg/Kg	☼	06/04/21 08:00	06/05/21 16:12	1
Cobalt	**1.6**	**J**	2.9	0.054	mg/Kg	☼	06/04/21 08:00	06/05/21 16:12	1
Lithium	**4.6**	**B**	2.9	0.17	mg/Kg	☼	06/04/21 08:00	06/05/21 16:12	1
Molybdenum	**0.14**	**J**	2.3	0.12	mg/Kg	☼	06/04/21 08:00	06/05/21 16:12	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.1**	**B**	1.2	0.30	mg/Kg	☼	06/07/21 08:00	06/09/21 14:49	2
Cobalt	**0.36**	**J**	2.9	0.030	mg/Kg	☼	06/07/21 08:00	06/09/21 13:28	1
Lithium	**9.8**		2.9	0.17	mg/Kg	☼	06/07/21 08:00	06/09/21 13:28	1

Client Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 270A-(12-16)

Date Collected: 05/17/21 10:30
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-3

Matrix: Solid
Percent Solids: 85.8

Method: SW846 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	ND		2.3	0.096	mg/Kg	☼	06/07/21 08:00	06/09/21 13:28	1

Method: SW846 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**12**		0.50	0.13	mg/Kg			06/13/21 11:52	1
Cobalt	**9.1**		2.5	0.023	mg/Kg			06/13/21 11:52	1
Lithium	**26**		2.5	0.15	mg/Kg			06/13/21 11:52	1
Molybdenum	**0.75**	**J**	2.0	0.082	mg/Kg			06/13/21 11:52	1

Method: SW846 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**9.5**	**B**	0.58	0.15	mg/Kg	☼	05/27/21 08:00	06/10/21 13:28	1
Cobalt	**7.3**		2.9	0.030	mg/Kg	☼	05/27/21 08:00	06/10/21 13:28	1
Lithium	**15**		2.9	0.17	mg/Kg	☼	05/27/21 08:00	06/10/21 13:28	1
Molybdenum	**0.65**	**J**	2.3	0.096	mg/Kg	☼	05/27/21 08:00	06/10/21 13:28	1

Default Detection Limits

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Method: 6010B SEP - SEP Metals (ICP) - Step 1
Prep: 3010A
SEP: Exchangeable

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.031	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 2
Prep: 3010A
SEP: Carbonate

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.063	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.28	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 3
Prep: 3010A
SEP: Non-Crystalline

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.027	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 4
Prep: 3010A
SEP: Metal Hydroxide

Analyte	RL	MDL	Units
Arsenic	0.50	0.22	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.053	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.13	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 5
Prep: 3010A
SEP: Organic-Bound

Analyte	RL	MDL	Units
Arsenic	1.5	0.38	mg/Kg
Boron	30	30	mg/Kg

Default Detection Limits

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Method: 6010B SEP - SEP Metals (ICP) - Step 5 (Continued)

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units
Cobalt	7.5	0.12	mg/Kg
Iron	15	8.8	mg/Kg
Lithium	7.5	0.44	mg/Kg
Manganese	2.3	0.37	mg/Kg
Molybdenum	6.0	0.25	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 6

SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Arsenic	0.50	0.15	mg/Kg
Boron	10	10	mg/Kg
Cobalt	2.5	0.046	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.25	mg/Kg
Molybdenum	2.0	0.099	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Prep: Residual

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.11	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.023	mg/Kg
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.052	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

Method: 6010B - SEP Metals (ICP) - Total

Prep: Total

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.11	mg/Kg
Molybdenum	2.0	0.082	mg/Kg

QC Sample Results

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Method: 6010B - SEP Metals (ICP) - Total

Lab Sample ID: MB 140-50176/17-A
Matrix: Solid
Analysis Batch: 50709

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 50176

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.240	J	0.50	0.13	mg/Kg		05/27/21 08:00	06/10/21 11:30	1
Cobalt	ND		2.5	0.026	mg/Kg		05/27/21 08:00	06/10/21 11:30	1
Lithium	ND		2.5	0.15	mg/Kg		05/27/21 08:00	06/10/21 11:30	1
Molybdenum	ND		2.0	0.082	mg/Kg		05/27/21 08:00	06/10/21 11:30	1
Iron	ND		5.0	4.1	mg/Kg		05/27/21 08:00	06/10/21 11:30	1
Manganese	0.736	J	0.75	0.11	mg/Kg		05/27/21 08:00	06/10/21 11:30	1

Lab Sample ID: LCS 140-50176/18-A
Matrix: Solid
Analysis Batch: 50709

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 50176

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	5.00	5.11		mg/Kg		102	80 - 120
Cobalt	5.00	5.11		mg/Kg		102	80 - 125
Lithium	5.00	4.95		mg/Kg		99	80 - 120
Molybdenum	25.0	25.7		mg/Kg		103	80 - 125
Iron	50.0	53.9		mg/Kg		108	80 - 120
Manganese	5.00	5.26		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 140-50176/19-A
Matrix: Solid
Analysis Batch: 50709

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 50176

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	5.00	5.02		mg/Kg		100	80 - 120	2	30
Cobalt	5.00	5.01		mg/Kg		100	80 - 125	2	30
Lithium	5.00	4.86		mg/Kg		97	80 - 120	2	30
Molybdenum	25.0	25.2		mg/Kg		101	80 - 125	2	30
Iron	50.0	56.3		mg/Kg		113	80 - 120	4	30
Manganese	5.00	5.29		mg/Kg		106	80 - 120	1	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-50177/16-B ^4
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 50219

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.0	0.52	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Boron	ND		40	40	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Cobalt	ND		10	0.18	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Lithium	ND		10	0.60	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Molybdenum	ND		8.0	0.33	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Iron	ND		20	12	mg/Kg		05/27/21 08:00	06/02/21 11:27	4
Manganese	ND		3.0	0.12	mg/Kg		05/27/21 08:00	06/02/21 11:27	4

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-50177/17-B ^5
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 50219

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	5.00	4.85		mg/Kg		97	80 - 120
Boron	50.0	ND		mg/Kg		92	
Cobalt	5.00	4.80	J	mg/Kg		96	80 - 120
Lithium	5.00	4.95	J	mg/Kg		99	80 - 120
Molybdenum	25.0	24.3		mg/Kg		97	80 - 120
Iron	50.0	51.1		mg/Kg		102	80 - 120
Manganese	5.00	4.87		mg/Kg		97	80 - 120

Lab Sample ID: LCSD 140-50177/18-B ^5
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 50219

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	5.00	4.83		mg/Kg		97	80 - 120	0	30
Boron	50.0	ND		mg/Kg		96		5	
Cobalt	5.00	4.94	J	mg/Kg		99	80 - 120	3	30
Lithium	5.00	4.67	J	mg/Kg		93	80 - 120	6	30
Molybdenum	25.0	24.6		mg/Kg		99	80 - 120	1	30
Iron	50.0	49.6		mg/Kg		99	80 - 120	3	30
Manganese	5.00	5.01		mg/Kg		100	80 - 120	3	30

Lab Sample ID: MB 140-50220/16-B ^3
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 50254

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.5	0.39	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Boron	ND		30	30	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Cobalt	ND		7.5	0.19	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Lithium	ND		7.5	0.45	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Molybdenum	ND		6.0	0.25	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Iron	ND		15	8.7	mg/Kg		05/28/21 08:00	06/02/21 13:18	3
Manganese	ND		2.3	0.84	mg/Kg		05/28/21 08:00	06/02/21 13:18	3

Lab Sample ID: LCS 140-50220/17-B ^5
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 50254

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	5.00	4.29		mg/Kg		86	60 - 120
Boron	50.0	ND		mg/Kg		92	
Cobalt	5.00	4.72	J	mg/Kg		94	80 - 120
Lithium	5.00	4.91	J	mg/Kg		98	80 - 120
Molybdenum	25.0	20.8		mg/Kg		83	70 - 120
Iron	50.0	ND		mg/Kg		7	
Manganese	5.00	4.83		mg/Kg		97	80 - 120

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCSD 140-50220/18-B ^5
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 50254

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic			5.00	3.95		mg/Kg		79	60 - 120	8	30
Boron			50.0	ND		mg/Kg		94		2	
Cobalt			5.00	4.71	J	mg/Kg		94	80 - 120	0	30
Lithium			5.00	4.53	J	mg/Kg		91	80 - 120	8	30
Molybdenum			25.0	21.1		mg/Kg		84	70 - 120	2	30
Iron			50.0	ND		mg/Kg		21		97	
Manganese			5.00	4.88		mg/Kg		98	80 - 120	1	30

Lab Sample ID: MB 140-50257/16-B
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 50291

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.13	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Boron	ND		10	10	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Cobalt	ND		2.5	0.045	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Lithium	ND		2.5	0.15	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Molybdenum	ND		2.0	0.082	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Iron	ND		5.0	2.9	mg/Kg		06/01/21 08:00	06/02/21 15:12	1
Manganese	2.11		0.75	0.027	mg/Kg		06/01/21 08:00	06/02/21 15:12	1

Lab Sample ID: LCS 140-50257/17-B
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 50291

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Arsenic			5.00	4.85		mg/Kg		97	80 - 120		
Boron			50.0	49.3		mg/Kg		99			
Cobalt			5.00	5.10		mg/Kg		102	80 - 120		
Lithium			5.00	4.89		mg/Kg		98	80 - 120		
Molybdenum			25.0	25.3		mg/Kg		101	80 - 120		
Iron			50.0	51.9		mg/Kg		104	80 - 120		
Manganese			5.00	6.35	*+	mg/Kg		127	80 - 120		

Lab Sample ID: LCSD 140-50257/18-B
Matrix: Solid
Analysis Batch: 50418

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 50291

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic			5.00	4.91		mg/Kg		98	80 - 120	1	30
Boron			50.0	49.7		mg/Kg		99		1	
Cobalt			5.00	5.18		mg/Kg		104	80 - 120	2	30
Lithium			5.00	4.93		mg/Kg		99	80 - 120	1	30
Molybdenum			25.0	25.5		mg/Kg		102	80 - 120	1	30
Iron			50.0	52.3		mg/Kg		105	80 - 120	1	30
Manganese			5.00	6.44	*+	mg/Kg		129	80 - 120	1	30

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: MB 140-50292/16-B
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 50364

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.259	J	0.50	0.22	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Boron	ND		10	10	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Cobalt	ND		2.5	0.053	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Lithium	ND		2.5	0.15	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Molybdenum	ND		2.0	0.082	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Iron	ND		5.0	2.9	mg/Kg		06/02/21 08:00	06/05/21 10:52	1
Manganese	ND		0.75	0.13	mg/Kg		06/02/21 08:00	06/05/21 10:52	1

Lab Sample ID: LCS 140-50292/17-B
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 50364

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	5.00	5.39		mg/Kg		108	80 - 130
Boron	50.0	50.9		mg/Kg		102	
Cobalt	5.00	5.15		mg/Kg		103	80 - 120
Lithium	5.00	5.22		mg/Kg		104	80 - 120
Molybdenum	25.0	26.3		mg/Kg		105	80 - 120
Iron	50.0	52.6		mg/Kg		105	80 - 120
Manganese	5.00	5.29		mg/Kg		106	80 - 120

Lab Sample ID: LCSD 140-50292/18-B
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 4
Prep Batch: 50364

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	5.00	5.27		mg/Kg		105	80 - 130	2	30
Boron	50.0	49.8		mg/Kg		100		2	
Cobalt	5.00	5.02		mg/Kg		100	80 - 120	3	30
Lithium	5.00	5.08		mg/Kg		102	80 - 120	3	30
Molybdenum	25.0	25.7		mg/Kg		103	80 - 120	2	30
Iron	50.0	51.3		mg/Kg		103	80 - 120	2	30
Manganese	5.00	5.16		mg/Kg		103	80 - 120	2	30

Lab Sample ID: MB 140-50371/16-B ^5
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 50451

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		7.5	1.9	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Boron	ND		150	150	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Cobalt	ND		38	0.60	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Lithium	8.12	J	38	2.2	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Molybdenum	ND		30	1.3	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Iron	333		75	44	mg/Kg		06/04/21 08:00	06/05/21 12:44	5
Manganese	ND		11	1.9	mg/Kg		06/04/21 08:00	06/05/21 12:44	5

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-50371/17-B ^5
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 50451

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	15.0	11.3		mg/Kg		76	60 - 100
Boron	150	159		mg/Kg		106	
Cobalt	15.0	0.720	J	mg/Kg		5	1 - 60
Lithium	15.0	23.9	J *+	mg/Kg		159	80 - 150
Molybdenum	75.0	54.0		mg/Kg		72	60 - 100
Iron	150	87.9		mg/Kg		59	
Manganese	15.0	4.04	J	mg/Kg		27	1 - 60

Lab Sample ID: LCSD 140-50371/18-B ^5
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 50451

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	15.0	12.3		mg/Kg		82	60 - 100	8	30
Boron	150	162		mg/Kg		108		1	
Cobalt	15.0	1.05	J *1	mg/Kg		7	1 - 60	37	30
Lithium	15.0	25.3	J *+	mg/Kg		169	80 - 150	6	30
Molybdenum	75.0	54.3		mg/Kg		72	60 - 100	1	30
Iron	150	ND		mg/Kg		4		174	
Manganese	15.0	ND	*1	mg/Kg		8	1 - 60	108	30

Lab Sample ID: MB 140-50452/16-A
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 50452

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.15	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Boron	ND		10	10	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Cobalt	ND		2.5	0.046	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Lithium	0.159	J	2.5	0.15	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Molybdenum	ND		2.0	0.099	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Iron	ND		5.0	2.9	mg/Kg		06/04/21 08:00	06/05/21 14:39	1
Manganese	ND		0.75	0.25	mg/Kg		06/04/21 08:00	06/05/21 14:39	1

Lab Sample ID: LCS 140-50452/17-A
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 50452

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	5.00	4.92		mg/Kg		98	80 - 120
Boron	50.0	50.6		mg/Kg		101	
Cobalt	5.00	4.94		mg/Kg		99	80 - 120
Lithium	5.00	4.88		mg/Kg		98	80 - 120
Molybdenum	25.0	24.8		mg/Kg		99	80 - 120
Iron	50.0	48.8		mg/Kg		98	80 - 120
Manganese	5.00	4.94		mg/Kg		99	80 - 120

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCSD 140-50452/18-A
Matrix: Solid
Analysis Batch: 50529

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 50452

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic			5.00	4.85		mg/Kg		97	80 - 120	2	30
Boron			50.0	49.8		mg/Kg		100		2	
Cobalt			5.00	4.88		mg/Kg		98	80 - 120	1	30
Lithium			5.00	4.92		mg/Kg		98	80 - 120	1	30
Molybdenum			25.0	24.5		mg/Kg		98	80 - 120	1	30
Iron			50.0	48.0		mg/Kg		96	80 - 120	2	30
Manganese			5.00	4.85		mg/Kg		97	80 - 120	2	30

Lab Sample ID: MB 140-50497/16-A
Matrix: Solid
Analysis Batch: 50662

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 50497

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.213	J	0.50	0.13	mg/Kg		06/07/21 08:00	06/09/21 11:46	1
Cobalt	ND		2.5	0.026	mg/Kg		06/07/21 08:00	06/09/21 11:46	1
Lithium	ND		2.5	0.15	mg/Kg		06/07/21 08:00	06/09/21 11:46	1
Molybdenum	ND		2.0	0.082	mg/Kg		06/07/21 08:00	06/09/21 11:46	1
Iron	ND		5.0	4.1	mg/Kg		06/07/21 08:00	06/09/21 11:46	1
Manganese	ND		0.75	0.11	mg/Kg		06/07/21 08:00	06/09/21 11:46	1

Lab Sample ID: LCS 140-50497/17-A
Matrix: Solid
Analysis Batch: 50662

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 50497

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic			5.00	5.16		mg/Kg		103	80 - 120
Cobalt			5.00	5.17		mg/Kg		103	80 - 125
Lithium			5.00	4.98		mg/Kg		100	80 - 120
Molybdenum			25.0	26.1		mg/Kg		104	80 - 125
Iron			50.0	53.1		mg/Kg		106	80 - 120
Manganese			5.00	5.32		mg/Kg		106	80 - 120

Lab Sample ID: LCSD 140-50497/18-A
Matrix: Solid
Analysis Batch: 50662

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 50497

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic			5.00	5.12		mg/Kg		102	80 - 120	1	30
Cobalt			5.00	5.13		mg/Kg		103	80 - 125	1	30
Lithium			5.00	4.89		mg/Kg		98	80 - 120	2	30
Molybdenum			25.0	25.8		mg/Kg		103	80 - 125	1	30
Iron			50.0	52.5		mg/Kg		105	80 - 120	1	30
Manganese			5.00	5.28		mg/Kg		106	80 - 120	1	30

QC Association Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Metals

Prep Batch: 50176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Total/NA	Solid	Total	
140-23157-2	401B-(16-20)	Total/NA	Solid	Total	
140-23157-3	270A-(12-16)	Total/NA	Solid	Total	
MB 140-50176/17-A	Method Blank	Total/NA	Solid	Total	
LCS 140-50176/18-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-50176/19-A	Lab Control Sample Dup	Total/NA	Solid	Total	

SEP Batch: 50177

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 1	Solid	Exchangeable	
140-23157-2	401B-(16-20)	Step 1	Solid	Exchangeable	
140-23157-3	270A-(12-16)	Step 1	Solid	Exchangeable	
MB 140-50177/16-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-50177/17-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-50177/18-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	

Prep Batch: 50219

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 1	Solid	3010A	50177
140-23157-2	401B-(16-20)	Step 1	Solid	3010A	50177
140-23157-3	270A-(12-16)	Step 1	Solid	3010A	50177
MB 140-50177/16-B ^4	Method Blank	Step 1	Solid	3010A	50177
LCS 140-50177/17-B ^5	Lab Control Sample	Step 1	Solid	3010A	50177
LCSD 140-50177/18-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	50177

SEP Batch: 50220

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 2	Solid	Carbonate	
140-23157-2	401B-(16-20)	Step 2	Solid	Carbonate	
140-23157-3	270A-(12-16)	Step 2	Solid	Carbonate	
MB 140-50220/16-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-50220/17-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-50220/18-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	

Prep Batch: 50254

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 2	Solid	3010A	50220
140-23157-2	401B-(16-20)	Step 2	Solid	3010A	50220
140-23157-3	270A-(12-16)	Step 2	Solid	3010A	50220
MB 140-50220/16-B ^3	Method Blank	Step 2	Solid	3010A	50220
LCS 140-50220/17-B ^5	Lab Control Sample	Step 2	Solid	3010A	50220
LCSD 140-50220/18-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	50220

SEP Batch: 50257

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 3	Solid	Non-Crystalline	
140-23157-2	401B-(16-20)	Step 3	Solid	Non-Crystalline	
140-23157-3	270A-(12-16)	Step 3	Solid	Non-Crystalline	
MB 140-50257/16-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-50257/17-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-50257/18-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	

QC Association Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Metals

Prep Batch: 50291

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 3	Solid	3010A	50257
140-23157-2	401B-(16-20)	Step 3	Solid	3010A	50257
140-23157-3	270A-(12-16)	Step 3	Solid	3010A	50257
MB 140-50257/16-B	Method Blank	Step 3	Solid	3010A	50257
LCS 140-50257/17-B	Lab Control Sample	Step 3	Solid	3010A	50257
LCSD 140-50257/18-B	Lab Control Sample Dup	Step 3	Solid	3010A	50257

SEP Batch: 50292

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 4	Solid	Metal Hydroxide	
140-23157-2	401B-(16-20)	Step 4	Solid	Metal Hydroxide	
140-23157-3	270A-(12-16)	Step 4	Solid	Metal Hydroxide	
MB 140-50292/16-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-50292/17-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-50292/18-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	

Prep Batch: 50364

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 4	Solid	3010A	50292
140-23157-2	401B-(16-20)	Step 4	Solid	3010A	50292
140-23157-3	270A-(12-16)	Step 4	Solid	3010A	50292
MB 140-50292/16-B	Method Blank	Step 4	Solid	3010A	50292
LCS 140-50292/17-B	Lab Control Sample	Step 4	Solid	3010A	50292
LCSD 140-50292/18-B	Lab Control Sample Dup	Step 4	Solid	3010A	50292

SEP Batch: 50371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 5	Solid	Organic-Bound	
140-23157-2	401B-(16-20)	Step 5	Solid	Organic-Bound	
140-23157-3	270A-(12-16)	Step 5	Solid	Organic-Bound	
MB 140-50371/16-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-50371/17-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-50371/18-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	

Analysis Batch: 50418

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 1	Solid	6010B SEP	50219
140-23157-1	G1001-(6-11)	Step 2	Solid	6010B SEP	50254
140-23157-1	G1001-(6-11)	Step 3	Solid	6010B SEP	50291
140-23157-2	401B-(16-20)	Step 1	Solid	6010B SEP	50219
140-23157-2	401B-(16-20)	Step 2	Solid	6010B SEP	50254
140-23157-2	401B-(16-20)	Step 3	Solid	6010B SEP	50291
140-23157-3	270A-(12-16)	Step 1	Solid	6010B SEP	50219
140-23157-3	270A-(12-16)	Step 2	Solid	6010B SEP	50254
140-23157-3	270A-(12-16)	Step 3	Solid	6010B SEP	50291
MB 140-50177/16-B ^4	Method Blank	Step 1	Solid	6010B SEP	50219
MB 140-50220/16-B ^3	Method Blank	Step 2	Solid	6010B SEP	50254
MB 140-50257/16-B	Method Blank	Step 3	Solid	6010B SEP	50291
LCS 140-50177/17-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	50219
LCS 140-50220/17-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	50254
LCS 140-50257/17-B	Lab Control Sample	Step 3	Solid	6010B SEP	50291

QC Association Summary

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Metals (Continued)

Analysis Batch: 50418 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 140-50177/18-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	50219
LCSD 140-50220/18-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	50254
LCSD 140-50257/18-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	50291

Prep Batch: 50451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 5	Solid	3010A	50371
140-23157-2	401B-(16-20)	Step 5	Solid	3010A	50371
140-23157-3	270A-(12-16)	Step 5	Solid	3010A	50371
MB 140-50371/16-B ^5	Method Blank	Step 5	Solid	3010A	50371
LCS 140-50371/17-B ^5	Lab Control Sample	Step 5	Solid	3010A	50371
LCSD 140-50371/18-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	50371

SEP Batch: 50452

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 6	Solid	Acid/Sulfide	
140-23157-2	401B-(16-20)	Step 6	Solid	Acid/Sulfide	
140-23157-3	270A-(12-16)	Step 6	Solid	Acid/Sulfide	
MB 140-50452/16-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-50452/17-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-50452/18-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	

Prep Batch: 50497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 7	Solid	Residual	
140-23157-2	401B-(16-20)	Step 7	Solid	Residual	
140-23157-3	270A-(12-16)	Step 7	Solid	Residual	
MB 140-50497/16-A	Method Blank	Step 7	Solid	Residual	
LCS 140-50497/17-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-50497/18-A	Lab Control Sample Dup	Step 7	Solid	Residual	

Analysis Batch: 50529

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 4	Solid	6010B SEP	50364
140-23157-1	G1001-(6-11)	Step 5	Solid	6010B SEP	50451
140-23157-1	G1001-(6-11)	Step 6	Solid	6010B SEP	50452
140-23157-2	401B-(16-20)	Step 4	Solid	6010B SEP	50364
140-23157-2	401B-(16-20)	Step 5	Solid	6010B SEP	50451
140-23157-2	401B-(16-20)	Step 6	Solid	6010B SEP	50452
140-23157-3	270A-(12-16)	Step 4	Solid	6010B SEP	50364
140-23157-3	270A-(12-16)	Step 5	Solid	6010B SEP	50451
140-23157-3	270A-(12-16)	Step 6	Solid	6010B SEP	50452
MB 140-50292/16-B	Method Blank	Step 4	Solid	6010B SEP	50364
MB 140-50371/16-B ^5	Method Blank	Step 5	Solid	6010B SEP	50451
MB 140-50452/16-A	Method Blank	Step 6	Solid	6010B SEP	50452
LCS 140-50292/17-B	Lab Control Sample	Step 4	Solid	6010B SEP	50364
LCS 140-50371/17-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	50451
LCS 140-50452/17-A	Lab Control Sample	Step 6	Solid	6010B SEP	50452
LCSD 140-50292/18-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	50364
LCSD 140-50371/18-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	50451
LCSD 140-50452/18-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	50452

QC Association Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Metals

Analysis Batch: 50662

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Step 7	Solid	6010B SEP	50497
140-23157-1	G1001-(6-11)	Step 7	Solid	6010B SEP	50497
140-23157-2	401B-(16-20)	Step 7	Solid	6010B SEP	50497
140-23157-2	401B-(16-20)	Step 7	Solid	6010B SEP	50497
140-23157-3	270A-(12-16)	Step 7	Solid	6010B SEP	50497
140-23157-3	270A-(12-16)	Step 7	Solid	6010B SEP	50497
MB 140-50497/16-A	Method Blank	Step 7	Solid	6010B SEP	50497
LCS 140-50497/17-A	Lab Control Sample	Step 7	Solid	6010B SEP	50497
LCSD 140-50497/18-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	50497

Analysis Batch: 50709

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Total/NA	Solid	6010B	50176
140-23157-1	G1001-(6-11)	Total/NA	Solid	6010B	50176
140-23157-2	401B-(16-20)	Total/NA	Solid	6010B	50176
140-23157-2	401B-(16-20)	Total/NA	Solid	6010B	50176
140-23157-3	270A-(12-16)	Total/NA	Solid	6010B	50176
MB 140-50176/17-A	Method Blank	Total/NA	Solid	6010B	50176
LCS 140-50176/18-A	Lab Control Sample	Total/NA	Solid	6010B	50176
LCSD 140-50176/19-A	Lab Control Sample Dup	Total/NA	Solid	6010B	50176

Analysis Batch: 50770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Sum of Steps 1-7	Solid	6010B SEP	
140-23157-2	401B-(16-20)	Sum of Steps 1-7	Solid	6010B SEP	
140-23157-3	270A-(12-16)	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 50469

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23157-1	G1001-(6-11)	Total/NA	Solid	Moisture	
140-23157-2	401B-(16-20)	Total/NA	Solid	Moisture	
140-23157-3	270A-(12-16)	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: G1001-(6-11)

Date Collected: 05/17/21 10:00
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			50770	06/13/21 11:52	DKW	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50469	06/04/21 07:47	BKD	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: G1001-(6-11)

Date Collected: 05/17/21 10:00
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-1
Matrix: Solid
Percent Solids: 90.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 13:08	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		2			50709	06/10/21 14:47	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		4			50418	06/02/21 12:49	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		3			50418	06/02/21 14:42	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 16:34	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 12:15	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 14:09	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 16:02	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 13:18	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		2			50662	06/09/21 14:39	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 401B-(16-20)
Date Collected: 05/17/21 10:15
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			50770	06/13/21 11:52	DKW	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50469	06/04/21 07:47	BKD	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: 401B-(16-20)
Date Collected: 05/17/21 10:15
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-2
Matrix: Solid
Percent Solids: 86.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 13:13	KNC	EET KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		2			50709	06/10/21 14:52	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		4			50418	06/02/21 12:54	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		3			50418	06/02/21 14:47	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 16:39	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 12:20	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 14:14	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 16:07	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 13:23	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		2			50662	06/09/21 14:44	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: 270A-(12-16)
Date Collected: 05/17/21 10:30
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			50770	06/13/21 11:52	DKW	EET KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50469	06/04/21 07:47	BKD	EET KNX
	Instrument ID: NOEQUIP									

Client Sample ID: 270A-(12-16)
Date Collected: 05/17/21 10:30
Date Received: 05/19/21 10:15

Lab Sample ID: 140-23157-3
Matrix: Solid
Percent Solids: 85.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 13:28	KNC	EET KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		4			50418	06/02/21 12:59	KNC	EET KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		3			50418	06/02/21 14:52	KNC	EET KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 16:44	KNC	EET KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 12:25	KNC	EET KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 14:19	KNC	EET KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 16:12	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 13:28	KNC	EET KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		2			50662	06/09/21 14:49	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50176/17-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 11:30	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50177/16-B ^4
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		4			50418	06/02/21 11:27	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50220/16-B ^3
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		3			50418	06/02/21 13:18	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50257/16-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 15:12	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50292/16-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 10:52	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50371/16-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 12:44	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50452/16-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 14:39	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-50497/16-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 11:46	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50176/18-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 11:35	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50177/17-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		5			50418	06/02/21 17:24	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50220/17-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		5			50418	06/02/21 13:23	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50257/17-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 15:17	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50292/17-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 10:57	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50371/17-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 12:49	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50452/17-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 14:43	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Project/Site: Coffeen MNA

Job ID: 140-23157-1

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-50497/17-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 11:51	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50176/19-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	50176	05/27/21 08:00	JTB	EET KNX
Total/NA	Analysis	6010B		1			50709	06/10/21 11:40	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50177/18-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	50177	05/26/21 08:00	JTB	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	50219	05/27/21 08:00	KNC	EET KNX
Step 1	Analysis	6010B SEP		5			50418	06/02/21 11:37	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50220/18-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	50220	05/27/21 08:00	JTB	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	50254	05/28/21 08:00	KNC	EET KNX
Step 2	Analysis	6010B SEP		5			50418	06/02/21 13:28	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50257/18-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5 g	25 mL	50257	05/28/21 08:00	JTB	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	50291	06/01/21 08:00	KNC	EET KNX
Step 3	Analysis	6010B SEP		1			50418	06/02/21 15:21	KNC	EET KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50292/18-B
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	50292	06/01/21 08:00	KNC	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	50364	06/02/21 08:00	KNC	EET KNX
Step 4	Analysis	6010B SEP		1			50529	06/05/21 11:02	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50371/18-B ^5
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	50371	06/02/21 08:00	KNC	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	50451	06/04/21 08:00	JTB	EET KNX
Step 5	Analysis	6010B SEP		5			50529	06/05/21 12:54	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50452/18-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5 g	250 mL	50452	06/04/21 08:00	JTB	EET KNX
Step 6	Analysis	6010B SEP		1			50529	06/05/21 14:48	KNC	EET KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-50497/18-A
Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1 g	50 mL	50497	06/07/21 08:00	JTB	EET KNX
Step 7	Analysis	6010B SEP		1			50662	06/09/21 11:56	KNC	EET KNX
	Instrument ID: DUO									

Laboratory References:
EET KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Laboratory: Eurofins Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-03-22
ANAB	Dept. of Energy	L2311.01	02-03-22
ANAB	ISO/IEC 17025	L2311	02-03-22
Arkansas DEQ	State	88-0688	06-16-21
California	State	2423	06-30-22
Colorado	State	TN00009	02-28-22
Connecticut	State	PH-0223	09-29-21
Florida	NELAP	E87177	06-30-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	10-31-21
Kentucky (DW)	State	90101	12-31-21
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-21
Maryland	State	277	03-17-22
Michigan	State	9933	11-22-22
Nevada	State	TN00009	07-12-21
New Hampshire	NELAP	2999	01-17-22
New Jersey	NELAP	TN001	06-30-21
New York	NELAP	10781	03-31-22
North Carolina (DW)	State	21705	07-31-21
North Carolina (WW/SW)	State	64	12-31-21
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-21
Oregon	NELAP	TNI0189	12-31-21
Pennsylvania	NELAP	68-00576	12-31-21
Tennessee	State	02014	08-21-22
Texas	NELAP	T104704380-22-17	08-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	525-22-279-18762	07-13-22
Utah	NELAP	TN00009	07-31-21
Virginia	NELAP	460176	09-14-21
Washington	State	C593	01-19-22
West Virginia (DW)	State	9955C	12-31-21
West Virginia DEP	State	345	03-03-22
Wisconsin	State	998044300	08-17-21

Method Summary

Client: Sirem, div of Geosyntec Consultants
Job ID: 140-23157-1
Project/Site: Coffeen MNA

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	EET KNX
6010B SEP	SEP Metals (ICP)	SW846	EET KNX
Moisture	Percent Moisture	EPA	EET KNX
3010A	Preparation, Total Metals	SW846	EET KNX
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	EET KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	EET KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	EET KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	EET KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	EET KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	EET KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	EET KNX
Total	Preparation, Total Material	TAL-KNOX	EET KNX

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-KNOX = TestAmerica Laboratories, Knoxville, Facility Standard Operating Procedure.

Laboratory References:

EET KNX = Eurofins Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Michael Healey	Site Contact: Allison Kreinberg	Date: 17May21	COC No:
SiREM Lab	Email: mhealey@siremlab.com	Lab Contact: Rachel Hallman	Carrier:	_____ of _____ COCs
130 Stone Road	Tel/Fax: 519-515-0852			TALS Project #:
Guelph/ON/Canada/N1G 3Z2	Analysis Turnaround Time			Sampler:
(519) 822-2265 Phone	☑ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(519) 822-3151 FAX	TAT if different from Below _____			Walk-in Client:
Project Name: Coffeen MNA	☑ 2 weeks			Lab Sampling:
Site:	☐ 1 week			Job / SDG No.:
P O # 800003210A	☐ 2 days			
	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	SEP	Sample Specific Notes:
G1001-(6-11)	5/17/2021	10:00	G	Soil	1			X	[redacted] Prior to Analysis RH
401B-(16-20)	5/17/2021	10:15	G	Soil	1			X	
270A-(12-16)	5/17/2021	10:30	G	Soil	1			X	

NO CUSTODY SEALS
RECEIVED AT RT 12.7/CT 12.8°C
BKD 5-19-21
1 COOLER FEDEX#773740530953 INT PD

140-23157 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H_2SO_4; 4=HNO_3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Corr'd: _____		Therm ID No.: _____
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:
			[signature]	EFA KW X	5-19-21 10:15

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865 291 3000 fax 865 584 4315

Chain of Custody Record

eurofins

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Michael Healey	Site Contact: Allison Kreinberg	Date: 17May21	COC No:
SiREM Lab	Email: mhealey@siremlab.com	Lab Contact: Rachel Hallman	Carrier:	____ of ____ COCs
130 Stone Road	Tel/Fax: 519-515-0852			TALS Project #:
Guelph/ON/Canada/N1G 3Z2	Analysis Turnaround Time			Sampler:
(519) 822-2265 Phone	☑ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(519) 822-3151 FAX	TAT if different from Below ____			Walk-in Client:
Project Name: Coffeen MNA	☑ 2 weeks			Lab Sampling:
Site	☐ 1 week			
P O # 800003210A	☐ 2 days			Job / SDG No.:
	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	SEP	Sample Specific Notes:
G1001-(6-11)	5/17/2021	10:00	G	Soil	1			X	[redacted] RH
401B-(16-20)	5/17/2021	10:15	G	Soil	1			X	
270A-(12-16)	5/17/2021	10:30	G	Soil	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: ____ Corr'd: ____		Therm ID No.: ____
Relinquished by: Rachel Hallman	Company: SiREM	Date/Time: 5:00pm. 17May21	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Loc: 140
23157

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Log In Number:

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	✓			☐ Containers, Broken
2. Were ambient air containers received intact?			✓	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?			✓	☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : 5671 Correction factor: +0.1°C	✓	✓		☑ Cooler Out of Temp, Client Contacted, Proceed/Cancel ☐ Cooler Out of Temp, Same Day Receipt
5. Were all of the sample containers received intact?	✓			☐ Containers, Broken
6. Were samples received in appropriate containers?	✓			☐ Containers, Improper; Client Contacted; Proceed/Cancel
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ COC & Samples Do Not Match ☐ COC Incorrect/Incomplete ☐ COC Not Received
8. Were all of the samples listed on the COC received?	✓			☐ Sample Received, Not on COC ☐ Sample on COC, Not Received
9. Is the date/time of sample collection noted?	✓			☐ COC; No Date/Time; Client Contacted
10. Was the sampler identified on the COC?		✓		☑ Sampler Not Listed on COC
11. Is the client and project name/# identified?	✓			☐ COC Incorrect/Incomplete
12. Are tests/parameters listed for each sample?	✓			☐ COC No tests on COC
13. Is the matrix of the samples noted?	✓			☐ COC Incorrect/Incomplete
14. Was COC relinquished? (Signed/Dated/Timed)		✓		☑ COC Incorrect/Incomplete
15. Were samples received within holding time?	✓			☐ Holding Time - Receipt
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ pH Adjusted, pH Included (See box 16A) ☐ Incorrect Preservative
17. Were VOA samples received without headspace?			✓	☐ Headspace (VOA only)
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			✓	☐ Residual Chlorine
19. For 1613B water samples is pH<9?			✓	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

4

10

14

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: _____ PM Instructions: _____

Sample Receiving Associate: _____ Date: 5-19-21

QA026R32.doc, 062719

5/22/2023 (Rev. 1)

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/MI4544-MAY21*
Sample Receipt:	*May 27, 2021*
Sample Analysis:	*May 31, 2021*
Reporting Date:	*June 17, 2021*

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

Contents:

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

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

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

Method Summary

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

Mineral Identification and Interpretation:

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

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

Quantitative Rietveld Analysis:

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

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

Environmental Services
Custom XRD/MI4544-MAY21
06/17/2021

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	G1001-(6-11) MAY4544-01 (wt %)	401B-(16-20) MAY4544-02 (wt %)	270A-(12-16) MAY4544-03 (wt %)
Quartz	46.3	68.9	60.6
Muscovite	10.3	6.8	9.0
Biotite	2.4	2.1	2.4
Microcline	7.8	7.8	9.8
Albite	10.4	8.6	9.1
Calcite	4.2	-	-
Dolomite	11.3	-	0.6
Ankerite	1.5	0.1	0.5
Chlorite	1.5	-	1.4
Pyrite	0.1	-	0.2
Stilpnomelane	2.6	2.7	2.0
Diopside	0.8	1.4	1.3
Actinolite	0.9	1.4	3.3
TOTAL	100	100	100

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

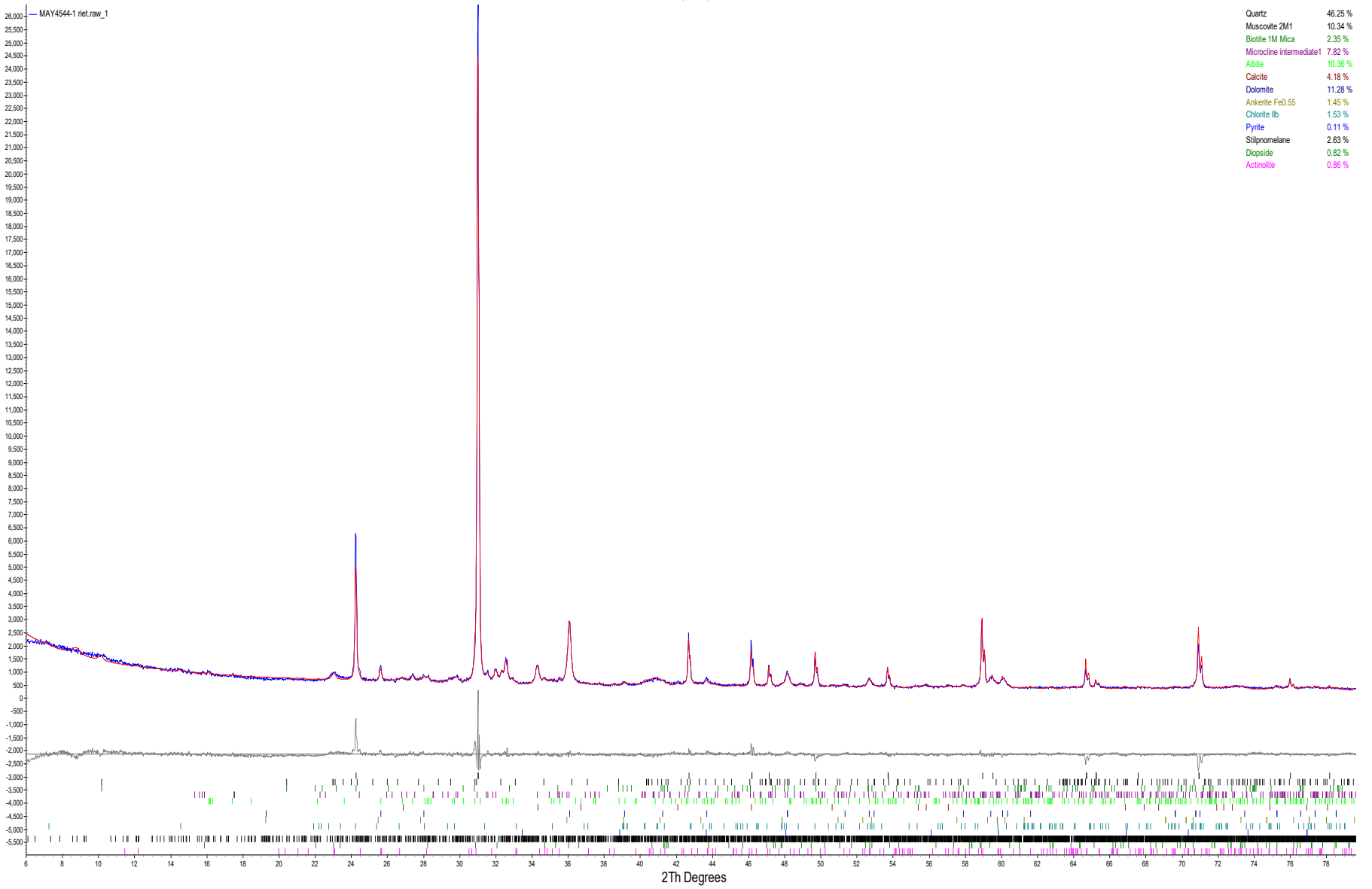
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

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	$KAl_2(AlSi_3O_{10})(OH)_2$
Biotite	$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$
Microcline	$KAlSi_3O_8$
Albite	$NaAlSi_3O_8$
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Ankerite	$CaFe(CO_3)_2$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Pyrite	FeS_2
Stilpnomelane	$K(Fe^{2+},Mg,Fe^{3+})_8(Si,Al)_{12}(O,OH)_{27}\cdot n(H_2O)$
Diopside	$CaMgSi_2O_6$
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$

Environmental Services
Custom XRD/MI4544-MAY21
06/17/2021

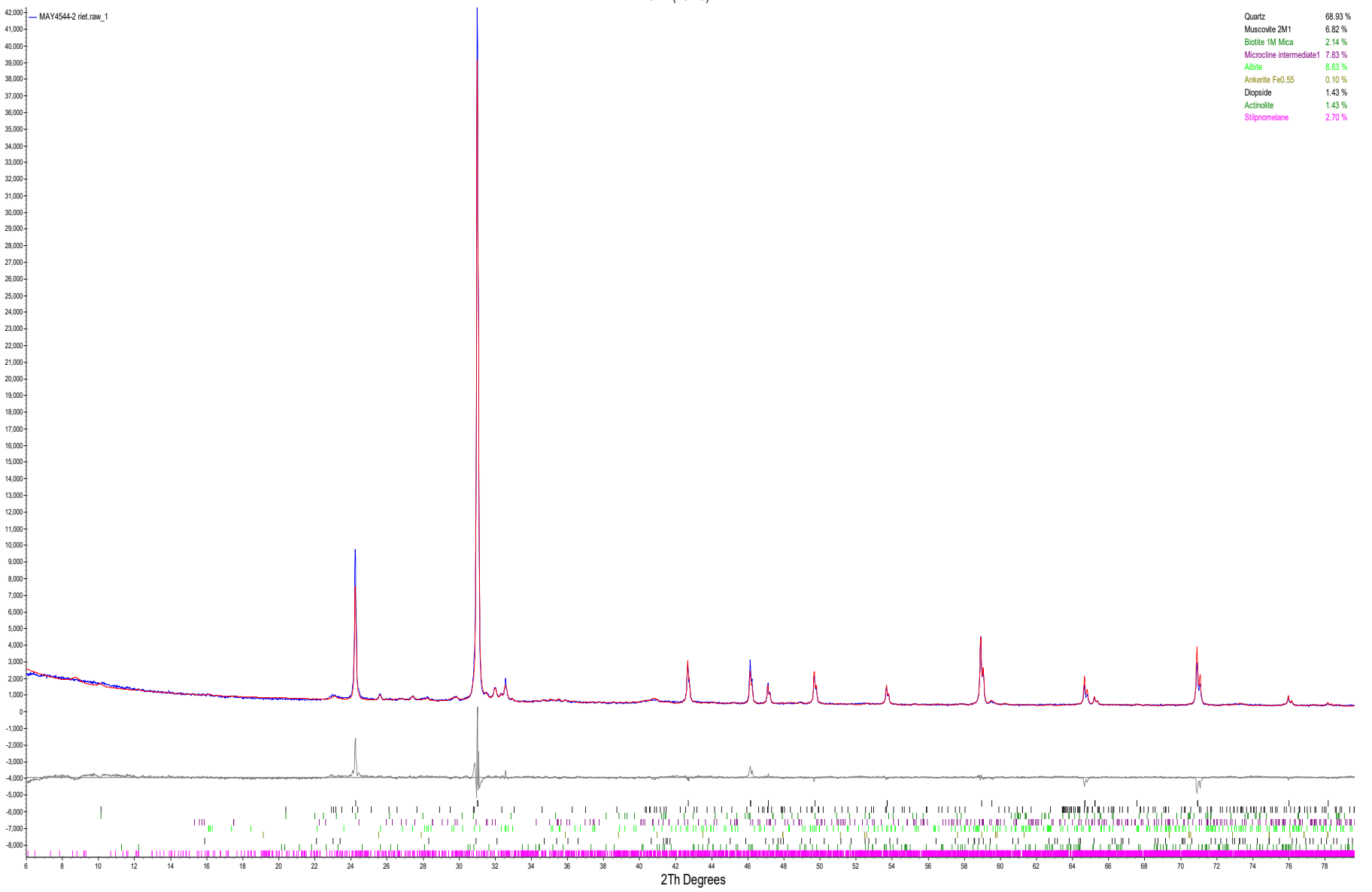
G1001-(6-11)



Quartz	46.25 %
Muscovite 2M1	10.34 %
Biotite 1M Mica	2.35 %
Microcline intermediate1	7.82 %
Albite	10.36 %
Calcite	4.18 %
Dolomite	11.28 %
Ankerite Fe0.55	1.45 %
Chlorite IIb	1.53 %
Pyrite	0.11 %
Stilpnomelane	2.63 %
Diopside	0.82 %
Actinolite	0.86 %

Environmental Services
Custom XRD/MI4544-MAY21
06/17/2021

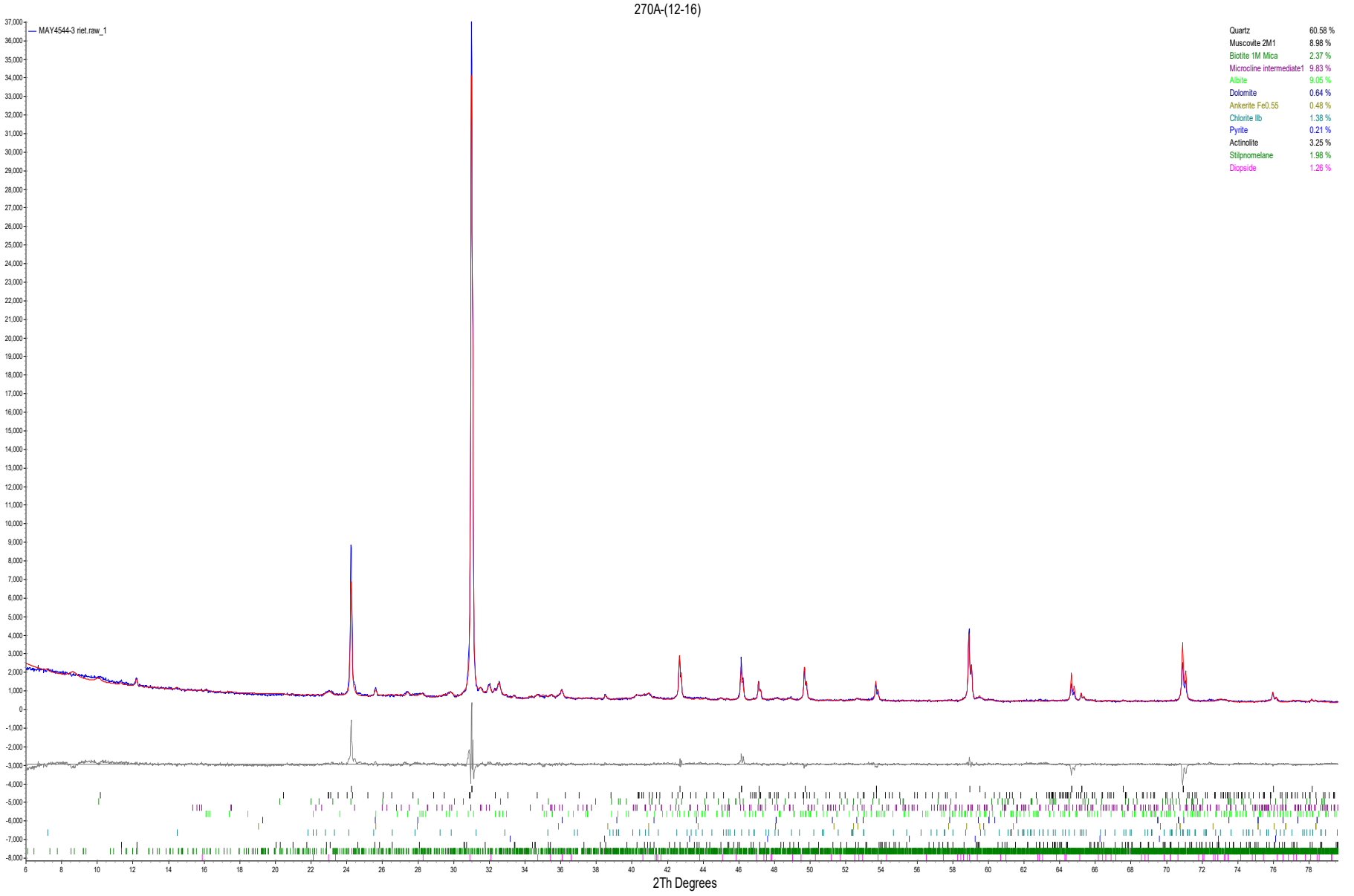
401B-(16-20)



Quartz	68.93 %
Muscovite 2M1	6.82 %
Biotite 1M Mica	2.14 %
Microcline intermediate1	7.83 %
Albite	8.63 %
Ankerite Fe0.55	0.10 %
Diopside	1.43 %
Actinolite	1.43 %
Stilpnomelane	2.70 %

Environmental Services
Custom XRD/MI4544-MAY21
06/17/2021

270A-(12-16)



Quartz	60.58 %
Muscovite 2M1	8.98 %
Biotite 1M Mica	2.37 %
Microcline intermediate1	9.83 %
Albite	9.05 %
Dolomite	0.64 %
Ankerite Fe0.55	0.48 %
Chlorite IIb	1.38 %
Pyrite	0.21 %
Actinolite	3.25 %
Stilpnomelane	1.98 %
Diopside	1.26 %

ATTACHMENT 9

Total Metals Laboratory Analytical Report

Project : Coffeen MNA

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

09-June-2021

SiREM Laboratory
Attn : Michael Healey

130 Stone Road W
Guelph, ON
N1G 3Z2, Canada

Phone: 519-822-2265
Fax:519-822-3151

Date Rec. : 18 May 2021
LR Report: **CA12646-MAY21**
Reference: P.O# 800003210A

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: G1001-(6-11)	6: 401B-(16-20)	7: 270A-(12-16)
Sample Date & Time					17-May-21 10:00	17-May-21 10:15	17-May-21 10:30
Temp Upon Receipt [°C]	---	---	---	---	5.0	5.0	5.0
Sulphide1 [%]	03-Jun-21	15:12	03-Jun-21	16:31	0.05	< 0.04	< 0.04
TOC [%]	07-Jun-21	09:12	07-Jun-21	15:08	0.852	0.082	0.138
Ag [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	< 0.05	< 0.05	< 0.05
Al [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	8200	9700	9600
As [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	6.2	5.5	12
Ba [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	120	190	210
Be [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.45	0.35	0.48
B [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	6	4	5
Bi [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.23	0.25	0.18
Ca [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	42000	1900	5000
Cd [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.13	0.03	0.12
Co [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	8.8	6.1	10
Cr [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	15	14	16
Cu [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	11	7.8	12
Fe [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	16000	14000	22000
K [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	1100	770	1400
Li [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	9	7	11
Mg [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	18000	1600	4700
Mn [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	450	540	1200
Mo [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	1.5	0.4	0.8
Na [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	110	80	110
Ni [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	15	10	20
Pb [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	11	9.5	12
Sb [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	< 0.8	< 0.8	< 0.8
Se [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	< 0.7	< 0.7	< 0.7
Sn [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.6	< 0.5	< 0.5
Sr [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	35	9.1	10
Ti [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	170	65	230
Tl [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.16	0.12	0.16
U [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.82	0.39	0.46
V [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	19	14	22
W [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	0.07	0.04	0.13

OnLine LIMS

0002522990

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

Project : Coffeen MNA

LR Report : **CA12646-MAY21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: G1001-(6-11)	6: 401B-(16-20)	7: 270A-(12-16)
Y [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	8.1	8.2	9.4
Zn [µg/g]	04-Jun-21	15:33	07-Jun-21	10:42	35	28	50

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

0002522990

Exhibit C

DECLARATION OF MELINDA W. HAHN, PhD

In support of Illinois Power Generation Company's Petition for Review of IEPA's Non-concurrence with the Coffeen Alternative Source Demonstration for Cobalt 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 Ramboll Americas Engineering Solutions, Inc. 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 includes chlorinated volatile organic compounds (CVOCs), semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and dioxins/furans.

4) To prepare this Declaration, I reviewed the Illinois Power Generation Company (IPGC) December 15, 2023 Alternative Source Demonstration (ASD) Report for the Coffeen Power Plant (CPP) Ash Pond No. 2 (AP2) for cobalt, the January 11, 2024 IEPA denial of the ASD, and supporting information for the ASD. I reviewed the documents submitted by IPGC independently and was not personally involved in their preparation.

5) The ASD report addresses a cobalt concentration observed in groundwater in well G401 above the Groundwater Protection Standard (GPS) during the second quarter of 2023. The ASD report relies on a multiple lines of evidence (MLE) approach that is standard practice in causal determinations in environmental

forensic analysis, risk assessment, and site investigation.[1,2,3,4,5] 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.[6,7] These independent lines of evidence are developed until sufficient confidence is achieved to either confirm or rule out a source.[8] For the CPP AP2 cobalt ASD, the independent lines of evidence are based on hydrogeological data to establish the direction of groundwater flow, chemical porewater data from wells set in the AP2 CCR to characterize source concentrations, chemical groundwater data from upgradient and compliance wells, total cobalt and cobalt distribution in aquifer solids from a boring adjacent to G401, and geochemical analysis of chemical data to evaluate whether the AP2 is the source of the cobalt exceedance at G401. The lines of evidence also rely on the principles of

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

[2] 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.

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

[4] 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.

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

[6] 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.

[7] 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.

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

geochemistry and the fundamental concept of contaminant migration: that contaminant concentrations decrease in the downgradient direction due to the successive dilution of dispersion and diffusion (i.e., downgradient concentrations cannot be higher than steady source concentrations). In a CCR surface impoundment release scenario, leachate is subject to physical processes that dilute solute concentrations including mixing, dispersion and dilution that result in lower downgradient groundwater concentrations.[9]

6) The porewater well source concentrations in the AP2 have been characterized through the collection of porewater samples. The source porewater data for the AP2 are consistent with literature values for coal ash leachate,[10,11,12] and define the maximum concentrations for groundwater impact outside of the AP2.

Lines of Evidence

7) The four lines of evidence (LOEs) presented in the December 15, 2023 ASD report for cobalt are as follows:[13]

a) LOE 1: AP2 porewater samples do not contain detectable concentrations of cobalt;

b) LOE 2: Cobalt is present in aquifer solids;

---

9 U.S. EPA Office of Solid Waste and Emergency Response, Solid Waste Disposal Criteria, Technical Manual, EPA530-R-93-017, p. 126.

10 U.S. EPA, Industrial Environmental Research Laboratory, Chemical and Biological Characterization of Leachates from Coal Solid Wastes, EPA-600/7-80-039, March 1980.

11 U.S. EPA and TVA, Effects of Coal-ash Leachate on Ground Water Quality, EPA-600/7-80-066, March 1980.

12 U.S. EPA, Office of Research and Development, Characterization of Coal Combustion Residues from Electric Utilities – Leaching and Characterization Data, EPA-600/R-09/151, December 2009.

13 Geosyntec, Alternative Source Demonstration, Coffeen Power Plant Bottom Ash Pond No. 2, December 2023

c) LOE 3: Geochemical conditions favor mobilization of cobalt from iron-bearing minerals; and

d) LOE 4: Geochemical modeling of cobalt mobilization from aquifer solids support the determination of naturally occurring cobalt.

8) The AP2 is not a source of cobalt to well G401 because all but one porewater sample have been non-detect for cobalt at a reporting limit of 0.002 mg/L, with a single sample at a reported cobalt concentration of 0.0046 mg/L.[14] In contrast, the reported second quarter 2023 cobalt concentration in G401 groundwater was 0.11 mg/L.[15] Cobalt is a redox sensitive metal and is not a key indicator analyte for CCR impact. The following table compares cobalt concentrations to boron concentrations (a key indicator analyte for CCR) and pH in wells exceeding GPS for boron and sulfate that will be addressed under Part 845.660.[16]

Well	Boron (mg/L)	Cobalt (mg/L)	pH S.U.
G401	3.9	0.11	6.2
G402	4.9	0.0035	6.6
G404	9.3	<0.00048	6.8
G405	9.5	0.00087J	6.8

[14] Geosyntec, Alternative Source Demonstration, Coffeen Power Plant Bottom Ash Pond No. 2, December 2023, p. 4.

[15] Ramboll, Groundwater Monitoring Data and Detected Exceedances Report, Quarter 2, 2023, Ash Pond No. 2, Coffeen Power Plant, Coffeen, Illinois, Table 1, p. 3.

[16] Ramboll, Groundwater Monitoring Data and Detected Exceedances Report, Quarter 2, 2023, Ash Pond No. 2, Coffeen Power Plant, Coffeen, Illinois, Table 1.

The samples with higher boron concentrations have lower cobalt concentrations. This is the opposite of what one would expect if the porewater was the source of the cobalt in G401. The apparent inverse relationship between key CCR analyte boron and cobalt is further evidence that the AP2 is not the source of the cobalt detected in G401. Note that the pH is lower in G401 than in the other compliance wells that are impacted by CCR. pH affects are discussed below.

The ASD demonstrated that the AP2 is not the source of cobalt observed in well G401 based on the relative absence of cobalt in porewater wells. Cobalt concentrations in an impacted well would be lower, rather than higher, than the source concentrations due to the dilution caused by the migration processes of mixing, dispersion and diffusion. The concentrations of cobalt observed in exceedance wells G401, G402, G404, and G405 are not correlated with key CCR indicator parameter boron as one would expect if they shared a common source. This in an independent line of evidence supporting the conclusion that the AP2 is not the source of cobalt observed in well G05.

9) Aquifer solids from a boring adjacent to G401 at a depth similar to its screened interval were collected in 2021 and analyzed for total cobalt and cobalt distribution within the soil by the sequential extraction procedure (SEP) and X-ray diffraction (XRD). The results indicated that cobalt is present within the aquifer

solids in forms correlated with non-crystalline metal oxide and iron/manganese oxides.[17]

10) Cobalt does not behave like a conservative tracer in the environment as it associates strongly with solid phase iron and manganese oxides, the solubility of which are controlled by local pH and redox conditions. Therefore, changes in redox conditions that affect iron and manganese can cause cobalt to be released into solution from aquifer solids (thereby increasing observed concentrations), or to be removed from solution (decreasing observed concentrations). As a result, observed concentrations of cobalt in groundwater exhibit natural variation due to local geochemistry. The ASD compared groundwater data from G401 to the iron Eh-pH phase stability diagram to conclude that cobalt concentrations in the G401 groundwater are sensitive to subtle shifts in pH or redox conditions that could mobilize iron and associated cobalt to groundwater. The ASD also presented results of geochemical modeling of cobalt-iron bearing minerals under the local groundwater chemical conditions near the AP2 and found that the aqueous concentrations of cobalt are expected to be elevated at the pH observed at G401 relative to the other compliance wells due to dissolution of aquifer solid materials.[18]

[17] Geosyntec, Alternative Source Demonstration, Coffeen Power Plant Bottom Ash Pond No. 2, December 2023, p. 7.

[18] Geosyntec, Alternative Source Demonstration, Coffeen Power Plant Bottom Ash Pond No. 2, December 2023, p. 8.

11) The four lines of evidence based on groundwater chemistry are sufficient to eliminate the AP2 as the source of cobalt concentrations in well G05 and indicate that the cobalt is from an alternative source. As porewater cobalt concentrations are mostly non-detect or below its GPS, the AP2 is not contributing to the cobalt exceedance. The ASD identified the likely source as dissolution of iron bearing minerals in the aquifer solids at pH observed in G401.

IEPA Denial and Stated Data Gaps

12) In its January 11, 2024 letter, the IEPA denied the ASD due to perceived "data gaps" that included the following:

a) Source characterization of the CCR at Ash Pond No. 2 to include total solids sampling in accordance with SW846. The ASD should include the factual and evidentiary basis to conclude that the CCRSI did not cause or contribute to the contamination. The CCR must be characterized adequately horizontally and vertically within the CCRSI.

b) Research on porewater characterization of CCR does not come from an independent peer reviewed publication. IEPA accepts government publications, textbooks, and independent peer-reviewed scientific and engineering publications.

13) If the IEPA is requesting "total" constituent analysis of CCR in mg/kg (mass of constituent per mass of CCR on a dry weight basis), that

information would not be more appropriate for a source impact analysis than the porewater data used for the ASD. In a land disposal scenario, groundwater would be impacted if leachate (or porewater) from the solid waste (rather than the solid waste itself) travels to and mixes with (and is diluted by) groundwater, then the impacted groundwater travels downgradient where dispersion and diffusion processes further dilute solid waste component concentrations. The most critical data needed for a groundwater impact analysis is the leachate quality, not the total amount of constituent in a solid sample of CCR, because leachate is the material that potentially mixes with groundwater. Similarly, if the IEPA is requesting laboratory leach testing of solid CCR samples either by TCLP, SPLP, or LEAF, that information would also not be more appropriate for a source impact analysis than the actual porewater data collected from the CCR presented in the Coffeen ASD. All of the synthetic laboratory leach tests on a solid sample aim to simulate a landfill environment in order to predict leachate quality from a solid sample, but actual field conditions such as redox conditions and liquid to solid ratios are very difficult to simulate accurately in a laboratory. Synthetic leach test results are compared to actual field leachate data for fly ash and slag in order to evaluate the representativeness of their results, i.e., field verification.[19] U.S. EPA advises that

[19] Tiwari, M.K., et al, Suitability of Leaching Test Methods for Fly Ash and Slag: A Review, Journal of Radiation Research and Applied Sciences, Vol.8, 2015. pp. 523-537. Also, Wang, X. et al, Leaching and Geochemical Evaluation of Oxyanion Partitioning within an Active Coal Ash Management Unit, Chemical Engineering Journal, Vol. 454, 2023 p. 2.

these “batch” one-day laboratory tests on a relatively small sample do not account for the long-term climatic and meteorological influences on a full-scale landfill operation.[20] These tests often yield high initial concentrations that are not typical of a full-scale operation.[21] Other researchers evaluating the utility of the synthetic precipitation leaching procedure (SPLP) to assess the risk of groundwater contamination posed by the land application of granular solid waste report that the use of a total pollutant concentration (mg/kg) in conjunction with SPLP concentrations (mg/L) to estimate pore water concentration was unreliable as this method underestimates the measured porewater concentrations.[22] Clearly, directly measuring CCR analyte chemistry in actual porewater samples from the actual disposal environment is a more accurate basis for an impact analysis than using laboratory predictions of those values.

14) The numerous references cited above that support the hierarchical preference for field-measured porewater concentrations over laboratory simulations on solid samples for estimating the field potential of leaching and migration from CCR surface impoundments are from U.S. EPA reports and peer-

[20] U.S. EPA Office of Solid Waste and Emergency Response, Solid Waste Disposal Criteria, Technical Manual, EPA530-R-93-017, p. 125.

[21] U.S. EPA Office of Solid Waste and Emergency Response, Solid Waste Disposal Criteria, Technical Manual, EPA530-R-93-017, p. 125.

[22] Townsend, T, et al, Interpretation of Synthetic Precipitation Leaching Procedure (SPLP) Results for Assessing Risk to Groundwater from Land-Applied Granular Waste, Environmental Engineering Science, Vol. 23, No. 1, 2005.

reviewed professional journals. The AP2 CCR porewater and adjacent groundwater quality have been adequately characterized for performing an alternative source demonstration. Collection of additional CCR source characterization data referenced in IEPA's January 11 letter is not required for the ASD by Part 845 or Part 257 and would not change the conclusion of the ASD.

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

Dated: February 20, 2024

Melinda W. Hahn, PhD

ATTACHMENT 1

Curriculum Vitae of Melinda Hahn, PhD

ENVIRONMENT & HEALTH

RAMBOLL

MELINDA W. HAHN, PH.D.

Senior Managing Consultant

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 environmental liability and cost allocation. Regulatory areas include RCRA, CERCLA, TSCA, 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.

EDUCATION

1995
PhD, Environmental Engineering
The Johns Hopkins University

1990
BS, Physics
The University of Texas at Austin

1990
BS, Mathematics
The University of Texas at Austin

ACADEMIC HONORS

1992-1995
Graduate Fellow, National Science Foundation

1995
Most Distinguished Environmental Engineering Dissertation, Association of Environmental Engineering Professors

CAREER

1998-Present
Senior Managing Consultant, ENVIRON/Ramboll

1997-1998
Consultant, Roy Ball, PC

1995-1997
Senior Project Engineer, Environmental Resources Management-North Central, Inc.

CONTACT INFORMATION

Melinda W. Hahn, PhD

mhahn@ramboll.com
+1 (512) 239-9883

Ramboll Environ
11782 Jollyville Road
Suite 211
Austin, TX 78759
United States of America

PROJECTS

- Provided technical litigation support for over 50 matters regarding extent, severity, timing, and source of soil and ground water contamination and vapor intrusion, necessity for and costs of remediation, human health risk assessment, 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. 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.
- Retained as an expert witness and provided litigation/mediation support for a number of cost allocation cases involving remediation of contaminated soil, groundwater, and sediment.
- 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.
- 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.
- 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 entering the Superfund Site from sources on 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.
- Utilized 3-D geostatistical interpolation techniques to visualize environmental data, to estimate excavation volumes for remediation, and to identify and distinguish source areas and potential preferential pathways of migration for a number of contaminated sites.
- 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
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Exhibit D

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 Illinois Power Generating Company, LLC (hereinafter "IPGC"). I am Senior Vice President, Environmental Health and Safety at Vistra Corp., the indirect corporate parent of IPGC. As part of my duties, I oversee permitting, regulatory development, compliance (air, water, and waste issues), and health and safety at the Company, including IPGC's Coffeen Power Plant in Montgomery County, 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 IPGC'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. IPGC received IEPA's letter dated January 11, 2024, notifying IPGC of IEPA's nonconcurrence with the Coffeen Power Plant Ash Pond 2 ("AP2") Alternative Source Demonstration for cobalt via U.S. Mail on January 16, 2024. This letter is attached as Exhibit A of the Petition.

3. Conducting an analysis of leachable metals from CCR in the AP2 using leach tests would involve drilling into the AP2, through the engineered (geomembrane) cover, with up to 3 borings using specialized equipment to collect 6 samples. It would further require laboratory analysis, data evaluation and reporting for those samples. Assuming a driller is readily available, which is not always the case, this process, including repair of the newly damaged (from drilling) engineered cover, would likely take approximately 26 weeks, and would likely cost approximately $196,000.

4. Completing an assessment of corrective measures for the cobalt exceedance identified in the ASD in accordance with the requirements and deadlines of 35 Ill. Adm. Code § 845.660 would likely cost approximately $35,000. 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 cobalt exceedance would likely cost approximately $225,000. 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 cobalt, 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: February 19, 2024