Illinois Power Generating Company
1500 Eastport Plaza Dr.
Collinsville, IL 62234

June 10, 2025

Illinois Environmental Protection Agency
DWPC – Permits MC #15
Attn: Part 845 Coal Combustion Residual Rule Submittal
2520 W Iles Ave
P.O. Box 19276
Springfield, IL 62794-9276

Re: Coffeen Power Plant GMF Gypsum Stack Pond; IEPA ID # W1350150004-03

Dear Mr. LeCrone:

In accordance with 35 I.A.C. § 845.200, Illinois Power Generating Company ("IPGC") is submitting a supplement to the previously submitted operating permit application for the Coffeen Power Plant GMF Gypsum Stack Pond (IEPA ID # W1350150004-03) to address the corrective action requirements of Part 845.

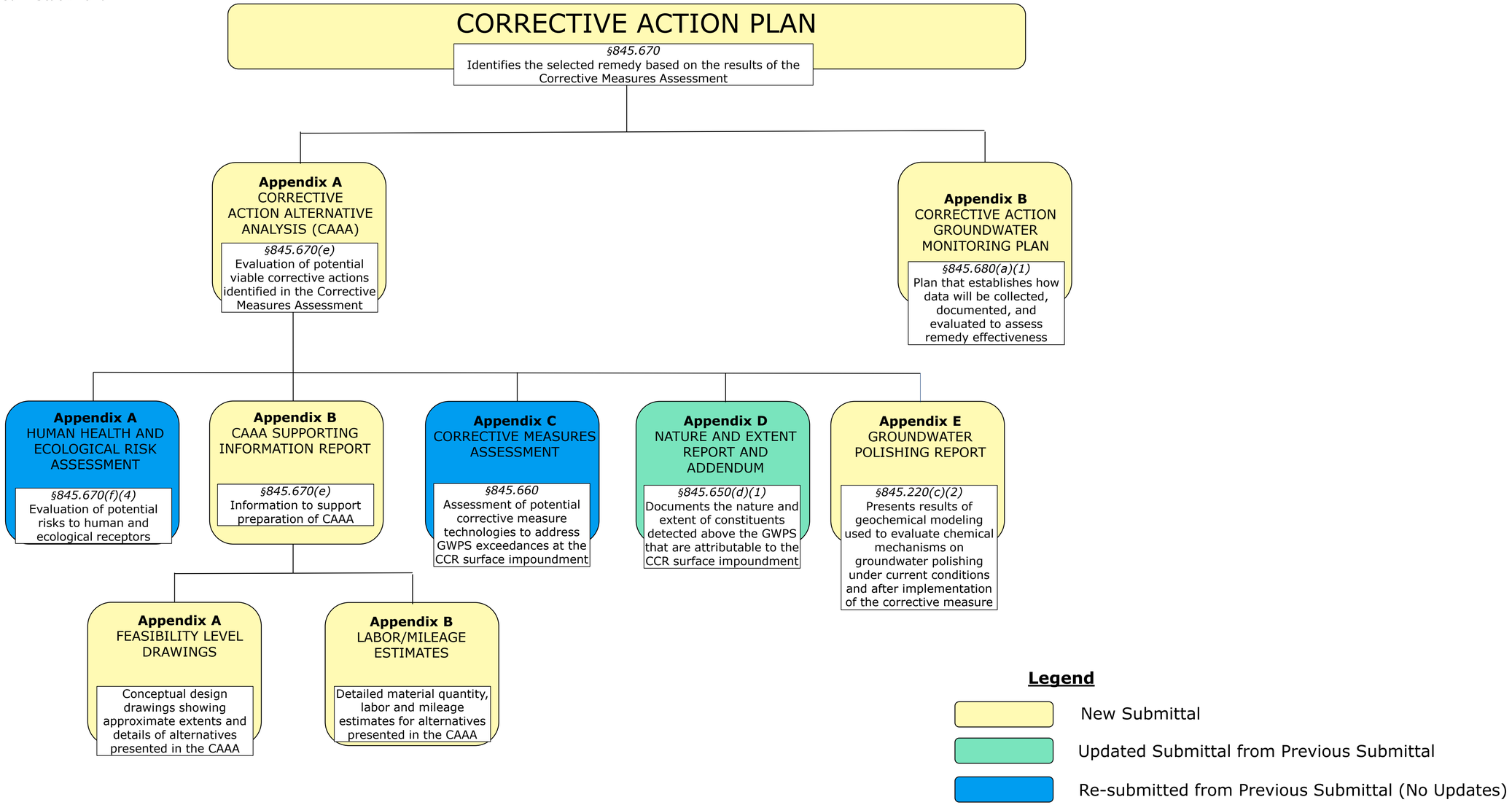
Coffeen previously submitted an operating permit application for Coffeen Power Plant GMF Gypsum Stack Pond on October 25, 2021. The enclosed supplemental information is being submitted in accordance with 35 I.A.C. § 845.200(a)(3) in order to "[modify] the facility's operating permit when the approved corrective action does not require the modification of the CCR surface impoundment." This amendment includes a corrective action plan containing corrective action alternatives analysis and corrective action groundwater monitoring program. One hardcopy is provided with this submittal.

Sincerely,

Phil Morris
Sr. Director, Environmental

Enclosures

Visual Road Map for Corrective Action
Supplement to Operating Permit Application
Coffeen Power Plant, GMF Gypsum Stack Pond
Coffeen, IL



Road Map for Corrective Action
Supplement to Operating Permit Application
Coffeen Power Plant, GMF Gypsum Stack Pond
Coffeen, IL

Section	Rule Text	Location of Information Demonstrating Compliance			Version History			Notes
		Document	Section or Appendix	PDF Page No. & Hyperlink	Submitted Previously	Updated Version	New Submittal	
Section 845.620 - Hydrogeologic Site Characterization								
845.620	Hydrogeologic Site Characterization	---	---	---	x			HCR was prepared on October 25, 2021 and was included as Appendix D to CP application submitted on July 28, 2022.
Section 845.660 - Assessment of Corrective Measures								
845.660	Assessment of Corrective Measures	CMA	---	167	x			Resubmittal with no updates. Attached as Appendix C in CAAA.
Section 845.670 - Corrective Action Plan								
845.670(a)	The owner or operator must prepare a semi-annual report describing the progress in selecting a remedy and developing a CAP. The semi-annual report must be submitted to IEPA and placed in the operating record as required by 35 I.A.C. § 845.800(d)(17).							
845.670(b)	Within one year after completing the assessment of corrective measures as specified in 35 I.A.C. § 845.660, and after completion of the public meeting in 35 I.A.C. § 845.660(d), the owner or operator of the CCR surface impoundment must submit, in a CP application [or modification to the facility's operating permit] to IEPA, a CAP that identifies the selected remedy. This requirement applies in addition to, not in place of, any applicable standards under any other State or federal law.	Supplement to Operating Permit Application	---	1			x	A corrective action CP is not required when the proposed corrective action does not require modification of the CCR SI or the installation or modification of related treatment or mitigation facilities per 845.200(a)(3)
845.670(c)	The CAP must meet the following requirements:							
845.670(c)(1)	Be based on the results of the CMA conducted under 35 I.A.C. § 845.660;	CMA	---	167	x			Resubmittal with no updates. Attached as Appendix C in CAAA.
845.670(c)(2)	Identify a selected remedy that at a minimum, meets the standards listed in subsection (d);	CAAA	Section 2	49			x	
845.670(c)(3)	Contain the corrective action alternatives analysis specified in subsection (e); and	CAAA	Section 2	49			x	
845.670(c)(4)	Contain proposed schedules for implementation, including an analysis of the factors in subsection (f).	CAP	Table 1	25			x	
845.670(d)	The selected remedy in the CAP must:							
845.670(d)(1)	Be protective of human health and the environment;	CAAA	Section 2.2.1	54			x	
845.670(d)(2)	Attain the GWPS specified in 35 I.A.C. § 845.600;	CAAA	Section 2.2.6	62			x	
845.670(d)(3)	Control the sources of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents listed in 35 I.A.C. § 845.600 into the environment;	CAAA	Section 2.2.2	55			x	
845.670(d)(4)	Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and	CAAA	Section 2.5	69			x	
845.670(d)(5)	Comply with standards for management of wastes as specified in 35 I.A.C. § 845.680(d).	CAAA	Section 2	49			x	
845.670(e)	CAAA. In selecting a remedy that meets the standards of subsection (d), the owner or operator of the CCR surface impoundment must consider the following evaluation factors:							
845.670(e)(1)	The long- and short-term effectiveness and protectiveness of each potential remedy, along with the degree of certainty that the remedy will prove successful based on consideration of the following:	CAAA	Section 2.2	54			x	
845.670(e)(1)(A)	Magnitude of reduction of existing risks;	CAAA	Section 2.2.1	54			x	
845.670(e)(1)(B)	Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;	CAAA	Section 2.2.3	56			x	
845.670(e)(1)(C)	The type and degree of long-term management required, including monitoring, operation, and maintenance;	CAAA	Section 2.2.4	56			x	
845.670(e)(1)(D)	Short-term risks that might be posed to the community or the environment during implementation of a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminants;	CAAA	Section 2.2.5	57			x	
845.670(e)(1)(E)	Time until GWPS in 35 I.A.C. § 845.600 are achieved;	CAAA	Section 2.2.6	62			x	
845.670(e)(1)(F)	The potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, containment, or changes in groundwater flow;	CAAA	Section 2.2.7	63			x	
845.670(e)(1)(G)	The long-term reliability of the engineering and institutional controls, including an analysis of any off-site, nearby destabilizing activities; and	CAAA	Section 2.2.8	64			x	
845.670(e)(1)(H)	Potential need for replacement of the remedy.	CAAA	Section 2.2.9	65			x	
845.670(e)(2)	The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of each of the following potential factors:	CAAA	Section 2.2.2	55			x	
845.670(e)(2)(A)	The extent to which containment practices will reduce further releases; and	CAAA	Section 2.2.2	55			x	
845.670(e)(2)(B)	The extent to which treatment technologies may be used.	CAAA	Section 2.2.2	55			x	
845.670(e)(3)	The ease or difficulty of implementing each potential remedy based on consideration of the following types of factors:							
845.670(e)(3)(A)	Degree of difficulty associated with constructing the technology;	CAAA	Section 2.3.1	66			x	
845.670(e)(3)(B)	Expected operational reliability of the technologies;	CAAA	Section 2.3.2	66			x	
845.670(e)(3)(C)	Need to coordinate with and obtain necessary approvals and permits from other agencies;	CAAA	Section 2.3.3	67			x	
845.670(e)(3)(D)	Availability of necessary equipment and specialists; and	CAAA	Section 2.3.4	67			x	
845.670(e)(3)(E)	Available capacity and location of needed treatment, storage, and disposal services.	CAAA	Section 2.3.5	68			x	

Road Map for Corrective Action
Supplement to Operating Permit Application
Coffeen Power Plant, GMF Gypsum Stack Pond
Coffeen, IL

Section	Rule Text	Location of Information Demonstrating Compliance			Version History			Notes
		Document	Section or Appendix	PDF Page No. & Hyperlink	Submitted Previously	Updated Version	New Submittal	
845.670(e)(4)	The degree to which community concerns are addressed by each potential remedy.	CAAA	Section 2.4	68			x	
845.670(f)	The owner or operator must specify, as part of the CAP, a schedule for implementing, of and completing, remedial activities. The schedule must require the completion of remedial activities within a reasonable time, taking into consideration the factors in this subsection (f). The owner or operator of the CCR surface impoundment must consider the following factors in determining the schedule of remedial activities:							
845.670(f)(1)	Extent and nature of contamination, as determined by the characterization required under 35 I.A.C. § 845.650(d);	CAP	Section 3.3	16			x	
845.670(f)(2)	Reasonable probabilities of remedial technologies achieving compliance with the GWPS established by 35 I.A.C. § 845.600 and other objectives of the remedy;	CAP	Section 3.3	16			x	
845.670(f)(3)	Availability of treatment or disposal capacity for CCR managed during implementation of the remedy;	CAP	Section 3.3	16			x	
845.670(f)(4)	Potential risks to human health and the environment from exposure to contamination before completion of the remedy;	CAP	Section 3.3	16			x	
845.670(f)(5)	Resource value of the aquifer, including:							
845.670(f)(5)(A)	Current and future uses, including potential residential, agricultural, commercial industrial and ecological uses;	CAP	Section 3.3	16			x	
845.670(f)(5)(B)	Proximity and withdrawal rate of users;	CAP	Section 3.3	16			x	
845.670(f)(5)(C)	Groundwater quantity and quality;	CAP	Section 3.3	16			x	
845.670(f)(5)(D)	The potential impact to the subsurface ecosystem, wildlife, other natural resources, crops, vegetation, and physical structures caused by exposure to CCR constituents;	CAP	Section 3.3	16			x	
845.670(f)(5)(E)	The hydrogeologic characteristic of the facility and surrounding land; and	CAP	Section 3.3	16			x	
845.670(f)(5)(F)	The availability of alternative water supplies; and	CAP	Section 3.3	16			x	
845.670(f)(6)	Other relevant factors.	CAP	Section 3.3.1	20			x	
Section 845.680 Implementation of the Corrective Action Plan								
845.680(a)	Within 90 days after the Agency's approval of the corrective action plan submitted under Section 845.670, the owner or operator must initiate corrective action. Based on the schedule approved by the Agency for implementation and completion of corrective action, the owner or operator must:							
845.680(a)(1)	Establish and implement a corrective action groundwater monitoring program that:							
845.680(a)(1)(A)	At a minimum, meets the requirements of the monitoring program under Section 845.650;	CA GMP	Section 2.1	1501			x	
845.680(a)(1)(B)	Documents the effectiveness of the corrective action remedy; and	CA GMP	Section 3	1505			x	
845.680(a)(1)(C)	Demonstrates compliance with the groundwater protection standard under subsection (c).	CA GMP	Section 3	1505			x	
845.680(a)(2)	Implement the corrective action remedy approved by the Agency under Section 845.670; and	CAP	Section 1.4	10			x	
845.680(a)(3)	Take any interim measures necessary to reduce the contaminants leaching from the CCR surface impoundment, and/or potential exposures to human or ecological receptors. Interim measures must, to the greatest extent feasible, be consistent with the objectives of, and contribute to the performance of, any remedy that may be required by Section 845.670. The following factors must be considered by an owner or operator in determining whether interim measures are necessary:							
845.680(a)(3)(A)	Time required to develop and implement a final remedy;	CAP	Section 3.4	21			x	
845.680(a)(3)(B)	Actual or potential exposure of nearby populations or environmental receptors to any of the constituents listed in Section 845.600;	CAP	Section 3.4	21			x	
845.680(a)(3)(C)	Actual or potential contamination of sensitive ecosystems or current or potential drinking water supplies;	CAP	Section 3.4	21			x	
845.680(a)(3)(D)	Further degradation of the groundwater that may occur if remedial action is not initiated expeditiously;	CAP	Section 3.4	21			x	
845.680(a)(3)(E)	Weather conditions that may cause any of the constituents listed in Section 845.600 to migrate or be released;	CAP	Section 3.4	21			x	
845.680(a)(3)(F)	Potential for exposure to any of the constituents listed in Section 845.600 as a result of an accident or failure of a container or handling system; and	CAP	Section 3.4	21			x	
845.680(a)(3)(G)	Other situations that may pose threats to human health and the environment.	CAP	Section 3.4	21			x	

Notes:
CAA = Closure Alternatives Analysis
CAAA = Corrective Action Alternatives Analysis
CAP = corrective action plan
CCR = coal combustion residuals
CMA = Corrective Measures Assessment
CP = Construction Permit
GMP = Groundwater Monitoring Plan
GWPS = groundwater protection standards
HCR = Hydrogeologic Site Characterization Report
IEPA = Illinois Environmental Protection Agency
SI = Surface Impoundment

Intended for
Illinois Power Generating Company
134 Cips Lane
Coffeen, Illinois, 62017

Date
June 10, 2025

Project No.
1940110241-001

CORRECTIVE ACTION PLAN

COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO. W1350150004-03

RAMBOLL Bright ideas. Sustainable change.

CORRECTIVE ACTION PLAN
COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO. W1350150004-03

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940110241-001**
Recipient	**Illinois Power Generating Company**
Document type	**Corrective Action Plan**
Revision	**FINAL**
Date	**June 10, 2025**
Prepared by	**Katlyn Nohr, Sarah Slagle-Garrett**
Checked by	**Melanie Conklin**
Approved by	**Brian Hennings, PG**
Description	**Corrective Action Plan for 35 I.A.C. § 845**

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CONTENTS

1.	**Introduction**	**3**
1.1	Plant and Site Information	3
1.2	Organization of the Corrective Action Plan	3
1.3	Permit Status	3
1.4	Selected Corrective Action Remedy	4
1.4.1	Narrative Description of Selected Corrective Action Remedy	4
1.4.1.1	Narrative Discussion of Remedy Design and Function	5
1.4.2	Narrative Description of Proposed Groundwater Monitoring	5
2.	**Corrective Action Overview**	**7**
2.1	Integration of Corrective Action with Source Control (Final Closure)	7
2.2	Corrective Measures Assessment	7
2.3	Analysis of Corrective Action Alternatives	8
2.3.1	Corrective Action Alternatives Analysis Supporting Information Report	8
2.3.2	Corrective Action Alternatives Analysis	8
3.	**Corrective Action Plan**	**9**
3.1	General Requirements	9
3.2	Remedy Selection	9
3.3	Schedule for Implementation	10
3.3.1	Other Relevant Factors	14
3.4	Necessity of Interim Measures	15
4.	**References**	**17**

TABLES

Table 1 Proposed Milestone Schedule for Implementing Corrective Action Remedy Source Control-Groundwater Polishing)

APPENDICES

Appendix A Corrective Action Alternatives Analysis (845.670(e)), including Corrective Measures Assessment (845.660)
Appendix B Corrective Action Groundwater Monitoring Plan

ACRONYMS AND ABBREVIATIONS

%	percent
35 I.A.C.	Title 35 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
CA GMP	Corrective Action Groundwater Monitoring Plan
CAA	Closure Alternatives Analysis
CAAA	Corrective Action Alternatives Analysis
CAAA-SIR	Corrective Action Alternatives Analysis Supporting Information Report
CAP	Corrective Action Plan
CCR	coal combustion residuals
CIP	closure-in-place
cm/s	centimeters per second
CMA	Corrective Measures Assessment
COC	constituent of concern
COI	constituent of interest
COF	Coffeen Power Station
CP	construction permit
CPP	Coffeen Power Plant
CY	cubic yards
DA	deep aquifer
DCU	deep confining unit
GMF GSP	Gypsum Management Facility Gypsum Stack Pond ("the site")
Gradient	Gradient Corporation
GWE	groundwater extraction
GWP	groundwater polishing
GWPS	groundwater protection standard(s)
HCR	Hydrogeologic Site Characterization Report
HDPE	high-density polyethylene
ID	identification
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generation Company
ISGS	Illinois State Geological Survey
LCU	lower confining unit
No.	number
OP	operating permit
PMP	potential migration pathway
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SI	surface impoundment
UA	uppermost aquifer
UCU	upper confining unit
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

Plant and Site Information

Illinois Power Generation Company (IPGC) is the owner of the inactive coal-fired Coffeen Power Plant (CPP), also referred to as the Coffeen Power Station (COF), in Coffeen, Illinois. IPGC intends to complete groundwater corrective action for the Gypsum Management Facility Gypsum Stack Pond (GMF GSP) coal combustion residuals (CCR) surface impoundment (SI), which is identified by Illinois Environmental Protection Agency (IEPA) identification (ID) number (No.) W1350150004-03, CCR Unit ID No. 103, and National Inventory of Dams No. IL50579. This Corrective Action Plan (CAP) has been prepared for the GMF GSP at the CPP under the requirements of the Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments [1] and requirements of the Title 40 Code of Federal Regulations (40 C.F.R.) § 257 Subpart D, herein referred to as the Federal CCR Rule [2].

Organization of the Corrective Action Plan

This CAP is organized in the following manner:

- **Section 1** includes an introduction to the GMF GSP, lists the status of other 35 I.A.C. § 845 permit applications submitted to IEPA, identifies the selected remedy, and provides a narrative of remedy construction;
- **Section 2** includes an overview of the corrective action process, including the results of the Corrective Measures Assessment (CMA) and Corrective Action Alternatives Analysis (CAAA);
- **Section 3** provides the CAP requirements, the selected remedy, an evaluation of effectiveness and an implementation schedule, as required by 35 I.A.C. § 845.670; and
- **Section 4** includes reference documents used in the development of this CAP.

This CAP was prepared as a supplement to the submitted operating permit (OP) application for the GMF GSP as required by 35 I.A.C. § 845.200(a)(3).

Permit Status

The following 35 I.A.C. § 845 permit applications have previously been submitted to IEPA by IPGC for the GMF GSP:

- An OP application, as required by 35 I.A.C. § 845.230, was submitted on October 25, 2021 [3].
- A construction permit (CP) application for final closure of the GMF GSP, as required by 35 I.A.C. § 845.220, including a CCR SI Final Closure Plan, as required by 35 I.A.C. § 845.720, was submitted on July 28, 2022 [4].
  - The Final Closure Plan selected closure-in-place (CIP) as the most appropriate closure method for the GMF GSP [5].

As of the date of this CAP, IPGC's OP and final closure CP applications for the GMF GSP are pending with IEPA.

Selected Corrective Action Remedy

Groundwater polishing (GWP) following source control (*i.e.*, consolidate-and-cap) presented within the Final Closure Plan [5] has been identified as the most appropriate remedy for the GMF GSP, based on the CAAA provided in **Appendix A**. Potential remedies evaluated in the CAAA included source control with GWP and source control with groundwater extraction (GWE).

The CAAA, which was prepared by Gradient Corporation (Gradient), was based on a CAAA Supporting Information Report (CAAA-SIR) that was prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) and is attached to the CAAA. The CAAA-SIR includes the results of groundwater modeling and feasibility-level design information for each remedy.

A Groundwater Polishing Evaluation Report is also attached to the CAAA. This report presents results from geochemical modeling of exceedance[1] parameters addressed at the GMF GSP by the CAP. Geochemical modeling supports the assessment of GWP as a component of the proposed corrective action by evaluating the potential for chemical attenuation of constituents of concern (COCs) before and after source control as a means of contextualizing the times to meet groundwater protection standards (GWPS) estimated in the flow and transport model.

1.4.1 Narrative Description of Selected Corrective Action Remedy

Corrective action will consist of the source control, as outlined in the Final Closure Plan for the GMF GSP [5]. The source control will be followed by GWP. The proposed closure exceeds the minimum Closure Performance Standards listed in 35 I.A.C. § 845.750. The closure will include removing free liquids in accordance with the performance standard in 35 I.A.C. § 845. The closure will control infiltration in accordance with the performance standard in 35 I.A.C. § 845, thus removing the hydraulic head that can force leachate into subsurface soils and is the mechanism that can drive risk (United States Environmental Protection Agency [6]):

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

The GMF GSP will be closed using a consolidate-and-cap approach consisting of excavating approximately 295,500 cubic yards (CY) of CCR and 38,000 CY of underlying clayey soil and placing it in a consolidated CCR footprint, which overlies the existing liner system comprised of geomembrane and compacted clay. The consolidated CCR will be covered with an alternate geomembrane final cover system that exceeds the 35 I.A.C. § 845.750(c)(2) minimum final cover requirements. The proposed source control is predicted to reduce water flux out of the GMF GSP and allow the GWPS to be achieved within approximately 6 years after closure completion [7]. These source control activities will serve as the primary groundwater corrective measure at the GMF GSP.

[1] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or GWPS as described in the proposed groundwater monitoring program, which was submitted to the IEPA on October 25, 2021 as part of IPGC's OP application for COF GMF GSP. That OP application, including the proposed groundwater monitoring program, remains under review by the IEPA and, therefore, IPGC has not identified any actual exceedances

1.4.1.1 Narrative Discussion of Remedy Design and Function

The USEPA has stated that source control is the most effective means of ensuring the timely attainment of remediation objectives [8]. Natural geochemical processes are appropriate as a "polishing step" for residual plume management after effective source control implementation (*i.e.*, GWP) because there are no risks to receptors and the contaminant plume is not expanding. GWP will achieve the GWPS by natural physical and chemical mechanisms within the groundwater which reduce the concentrations of COCs. Therefore, selection of the groundwater monitoring network, groundwater monitoring, and adaptive management are critical components of remedy design and function which are further described in **Section 1.4.2**.

1.4.2 Narrative Description of Proposed Groundwater Monitoring

Corrective action groundwater monitoring will be conducted during remedy operation to evaluate the effectiveness of the corrective action remedy and whether groundwater concentrations are achieving the GWPS as predicted by the groundwater model. Groundwater data collected as part of the monitoring program will be analyzed to determine if the remedy is on track to meet GWPS and to inform adaptive management decisions if performance metrics are not achieved. A Corrective Action Groundwater Monitoring Plan (CA GMP) with details on how the groundwater monitoring network will be monitored, how the data will be analyzed, and what will trigger adaptive site management directions is included as **Appendix B**. Information associated with these activities is described below.

- Regular groundwater monitoring will be conducted utilizing a corrective action groundwater monitoring network designed in accordance with 35 I.A.C. § 845.680(a)(1).
- Laboratory parameters include major ions for evaluating groundwater chemistry and COCs (*i.e.*, reported exceedances in accordance with the Operating GMP) the Corrective Action is intended to address. Sampling to evaluate corrective action effectiveness will begin the quarter after the corrective action remedy is implemented and commissioned. Samples will be collected on a quarterly basis initially and potentially reduced to a semiannual basis once five years of monitoring have occurred, in accordance with 35 I.A.C. § 845.650(b)(4). Monitoring results will be submitted to IEPA for each monitoring event, in addition to an Annual Groundwater Monitoring and Corrective Action Report, in accordance with 35 I.A.C. § 845.610(e).
- Routine maintenance of the monitoring well network will include inspecting the wells, making repairs to the wells (as needed), and rehabilitating and/or replacing wells to improve performance (as needed).
- Adaptive site management strategies will be employed as an integral part of ongoing corrective action at the GMF GSP. The adaptive site management approach will allow timely incorporation of new site information to ensure the achievement of the GWPS. The effectiveness of the remedy at each phase is evaluated using performance metrics designed to assess the goals of that phase. Performance metrics answer questions designed to evaluate multiple aspects of remedy effectiveness with the ultimate goal of holistically guiding management decisions [9]. The goals and performance metrics of each phase of remedy evaluation are presented in Section 3 of the CA GMP (**Appendix B**).
- Documentation of remedy progress metrics will be provided in the Annual Groundwater Monitoring and Corrective Action Report beginning after the second year of data collection: a

minimum of eight data points is required to complete meaningful statistical analysis required for evaluation of the remedy progress metrics, which will be available after two years of quarterly sampling. Per USEPA guidance [9], a thorough review of corrective action progress and remedy effectiveness will be conducted every five years. A Five-Year Annual Groundwater Monitoring and Corrective Action Report will evaluate the comprehensive data set and, if triggered by the results of the remedy progress evaluation metrics, evaluate whether adaptive management actions are needed. The five-year time frame allows adaptive management decisions to be based on a robust data sufficient to complete meaningful statistical analysis while remaining responsive to changing site conditions [9].

- Corrective Action Confirmation Monitoring and Completion
  - Per 35 I.A.C. § 845.680(c), corrective action is considered complete when compliance with the GWPS has been demonstrated "at all points within the plume of contamination that lies beyond the waste boundary […] for a period of three consecutive years." At that time, an attainment evaluation will be implemented. This will include monitoring each well for three additional years to confirm that GWPS have been achieved, in accordance 35 I.A.C. § 845.680(c).
  - After completion of the corrective action confirmation monitoring period, a Corrective Action Completion Report and Certification will be prepared and submitted to IEPA, in accordance with 35 I.A.C. § 845.680(e).

2. CORRECTIVE ACTION OVERVIEW

This CAP is based on the tiered assessment and analysis of alternative remedial technologies and remedies that were completed via the CMA and CAAA (**Appendix A**). The objective of these assessments was to determine the most appropriate alternative for the GMF GSP that, when coupled with the source control proposed in the Final Closure Plan [5], would remediate groundwater and provide compliance with the GWPS specified under 35 I.A.C. § 845.600.

2.1 Integration of Corrective Action with Source Control (Final Closure)

All documents, assessments, and analyses performed as part of this CAP assume that the source control presented in the Final Closure Plan [5] for the GMF GSP will also be implemented. Source control is the primary corrective action for the GMF GSP and will consist of removing free liquids from the CCR and completing CIP with a consolidate-and-cap approach. This is estimated to include moving a total of 295,500 CY of CCR and 38,000 CY of underlying clayey soil from the southern portion of the GMF GSP footprint and placing it on the north side of the GMF GSP as consolidated fill. This will result in reducing the final footprint of the GMF GSP from 43.3 to 12.4 acres. When source control is completed, the remaining CCR in the GMF GSP will be encapsulated on all sides by underlying native soils, low-permeability embankment dikes, and a low-permeability final cover system.

Source control alone, without other supplemental corrective action, has been estimated via groundwater modeling to reduce the exfiltration of liquids out the GMF GSP relative to pre-closure conditions. Groundwater modeling performed to support the Final Closure Plan estimates that source control activities are expected to result in GWPS being achieved approximately 6 years after closure completion, without implementing other forms of corrective action [7].

The remedy presented in this CAP is supplemental to the removal of free liquids, completion of source control via closure, and placing the CCR within a consolidated footprint, which when combined, are the primary remedial action that will be performed at the site. The proposed CAP remedy will address residual groundwater impacts that are expected to remain in native soils beyond the limits of the GMF GSP after source control is completed.

2.2 Corrective Measures Assessment

The CMA [10] was performed for the GMF GSP and submitted to the IEPA on June 12, 2024, after the exceedances of the GWPS were identified. The CMA considered a total of four corrective measures for the GMF GSP, including:

- Source control with GWP
- Source control with GWE
- Source control with groundwater cutoff wall
- Source control with *in-situ* chemical treatment

Based on the CMA, two corrective measures, including source control with GWP and source control with GWE, were identified as potentially viable corrective measures for the GMF GSP and were included for further evaluation, design advancement, and comparative assessment within the CAAA for the GMF GSP. The other corrective measures were determined by the CMA to be unlikely to be viable for the GMF GSP and were not evaluated further within the CAAA.

2.3 Analysis of Corrective Action Alternatives

2.3.1 Corrective Action Alternatives Analysis Supporting Information Report

The CAAA for the GMF GSP was prepared by Gradient based on a CAAA-SIR prepared by Ramboll. The CAAA-SIR, which is included as Attachment B of the CAAA provided in **Appendix A**, included additional evaluation, design advancement, and comparative assessment of the source control with GWP and source control with GWE corrective measures identified as potentially viable for the GMF GSP by the CMA. The evaluation included the completion of feasibility-level design activities for each alternative and incorporated the following tasks:

- Performing predictive groundwater modeling to evaluate the scope (*i.e.,* location and extents) of each alternative and the corresponding estimated time to achieve GWPS;
- Developing feasibility-level design drawings showing the extents in plan and elevation view of each engineered remedy;
- Estimating the time required to design, construct, and implement each remedy, in addition to ongoing operational and maintenance requirements;
- Developing conceptual plans for the storage, treatment, and discharge of extracted groundwater for applicable remedies;
- Identifying future tasks required to implement each alternative, including permitting, investigation, and design efforts; and
- Estimating relevant material quantities, labor hours, delivery miles, equipment miles, and daily commuting miles associated with constructing each remedy.

2.3.2 Corrective Action Alternatives Analysis

The CAAA (**Appendix A**) included a detailed analysis of each of the corrective action alternatives presented in the CAAA-SIR, including an evaluation of:

- Long- and short-term effectiveness and protectiveness;
- Ease or difficulty of implementation;
- Degree to which community concerns are addressed; and,
- Relative amount of contamination removed from the environment.

Based on the CAAA, source control with GWP was identified as the most appropriate corrective action for the GMF GSP and was selected for further design development as part of this CAP.

3. CORRECTIVE ACTION PLAN

The 35 I.A.C. § 845 requirements for the CAP and corresponding demonstrations that the proposed corrective measures meet these requirements are discussed individually in this section. Many of the CAP requirements are discussed within the CMA and CAAA documents that have been prepared to support the CAP. Therefore, the demonstrations will also refer to those documents.

3.1 General Requirements

35 I.A.C. § 845.670(c): The corrective action plan must meet the following requirements:

> *(1) Be based on the results of the corrective measures assessment conducted under 35 I.A.C. § 845.660;*
>
> *(2) Identify a selected remedy that at a minimum, meets the standards listed in subsection (d);*
>
> *(3) Contain the corrective action alternatives analysis specified in subsection (e); and*
>
> *(4) Contain proposed schedules for implementation, including an analysis of the factors in subsection (f).*

This CAP is based on the results of the CMA and CAAA, which are included in **Appendix A**. The proposed schedule for implementing the selected source control with GWP remedy is provided in **Table 1**.

3.2 Remedy Selection

35 I.A.C. § 845.670(d): The selected remedy in the corrective action plan must:

> *(1) Be protective of human health and the environment;*

Current conditions at the GMF GSP pose no risk to human health or environment [11]. There are also no unacceptable risks to human health and the environment under future conditions as discussed in the risk assessment provided in the CAAA (**Appendix A**). Concentrations of CCR-derived constituents are anticipated to decline once the GMF GSP is closed and the GWP remedy is in place, as presented in the CAAA (**Appendix A).**

> *(2) Attain the groundwater protection standards specified in 35 I.A.C. § 845.600;*

Groundwater modeling indicates source control with GWP (described in the Groundwater Modeling Report included in the Final Closure Plan), which is selected as the remedy of this CAP, will result in attainment of the GWPS within the current monitoring network within approximately 6 years of final closure completion [7].

> *(3) Control the sources of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents listed in 35 I.A.C. § 845.600 into the environment;*

The GMF GSP will be closed using a consolidate-and-cap approach which will act as the main control mechanism to prevent further releases of CCR-derived constituents. If the remedy is found to be unsuccessful in meeting remediation goals, adaptive site management actions will be taken as described within the CA GMP (**Appendix B**).

(4) Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and

No known releases of CCR due to a structural integrity issue have occurred at the GMF GSP.

(5) Comply with standards for management of wastes as specified in 35 I.A.C. § 845.680(d).

The CCR managed as part of the closure will be done in accordance with all 35 I.A.C. § 845 requirements and the submitted Final Closure Plan [5].

3.3 Schedule for Implementation

As presented in Section 4.1 of the CMA and in **Section 1.4.1.1** of this CAP, source control is the most effective means of ensuring the timely attainment of remediation objectives [10]. With groundwater from the GMF GSP impoundment and potential groundwater contributions to surface water posing no unacceptable risks to human health or the environment [11], GWP is an appropriate "polishing step" provided the corrective action is managed within a reasonable timeframe.

The source control with GWP remedy will successfully attain GWPS in a reasonable time [7], as discussed in the following subsections. Groundwater modeling performed to support the Final Closure Plan indicates that the timeframe to attain GWPS for all wells in the GMF GSP monitoring network is approximately 6 years following completion of source control [7].

35 I.A.C. § 845.670(f): The owner or operator must specify, as part of the corrective action plan, a schedule for implementing, of and completing, remedial activities. The schedule must require the completion of remedial activities within a reasonable time, taking into consideration the factors in this subsection (f). The owner or operator of the CCR surface impoundment must consider the following factors in determining the schedule of remedial activities:

The schedule implementing and completing the source control with GWP remedy at the GMF GSP is included in **Table 1**.

The schedule was developed considering the factors required by 35 I.A.C. §§ 845.670(f)(1) through (5), as summarized below.

35 I.A.C. § 845.670(f)(1): Extent and nature of contamination, as determined by the characterization required under 35 I.A.C. § 845.650(d);

The Nature and Extent Report [12] was submitted to the IEPA on June 12, 2024 and is included as an attachment to the CAAA (**Appendix A**). Groundwater modeling and geochemical analysis were performed by Ramboll as part of the Final Closure Plan [7] and the modeling considered the nature and extent of contamination.

35 I.A.C. § 845.670(f)(2): Reasonable probabilities of remedial technologies achieving compliance with the GWPS established by 35 I.A.C. § 845.600 and other objectives of the remedy;

Remedies were evaluated in the CAAA (**Appendix A**), and it was determined that the selected remedy (source control with GWP) is expected to achieve compliance with 35 I.A.C. § 845.600 in a reasonable timeframe. The potential for remedial technologies to achieve compliance with the GWPS was evaluated using groundwater modeling [7]. For the selected remedy, the results

indicate that groundwater will achieve compliance with the GWPS approximately 6 years after completion of source control, which is described in **Section 1.4.1**.

As documented in the CMA, source control via consolidate-and-cap approach is a proven method for addressing groundwater contamination [10]. The proposed consolidate-and-cap approach is consistent with the requirements of 40 C.F.R. § 257 and 35 I.A.C. § 845. The proposed cover has been demonstrated to be compliant by equivalency in the Final Closure Plan [5].

GWP processes include both physical and chemical mechanisms within the groundwater which reduce the concentrations of COCs in the groundwater. Physical components of GWP are described by groundwater flow and transport modeling [7]. The contribution of chemical mechanisms to GWP under current conditions and after source control implementation are evaluated using a geochemical modeling-based approach [13]. When combined with source control, GWP processes will achieve the GWPS in a reasonable timeframe.

35 I.A.C. § 845.670(f)(3): Availability of treatment or disposal capacity for CCR managed during implementation of the remedy;

The selected remedy includes source control followed by GWP. The CCR will be managed within the footprint of the existing CCR Unit as proposed in the CP for final closure [4]. GWP is not expected to result in the management of any appreciable volume of CCR. Therefore, the treatment and disposal capacity of CCR is not an applicable consideration for the selected remedy.

35 I.A.C. § 845.670(f)(4): Potential risks to human health and the environment from exposure to contamination before completion of the remedy;

A Human Health and Ecological Risk Assessment was completed and included as an attachment to the CAAA (**Appendix A**) that considers the potential risks to human health and the environment before completion of the remedy. The overall conclusion is that groundwater from the GMF GSP impoundment and potential groundwater contributions to surface water pose no unacceptable risks to human health or the environment. This conclusion was reached using methodology consistent with applicable USEPA risk assessment principles. The assessment relied on conservative assumptions meant to overestimate possible exposures and risks and provide an additional level of certainty in the conclusions [11].

35 I.A.C. § 845.670(f)(5): Resource value of the aquifer, including:

The resource value of the aquifer is discussed in the Hydrogeologic Site Characterization Report (HCR), which is included as Appendix D in the CP application for final closure [14]. The uppermost aquifer includes the sands, silty sands, and clays at the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member. This unit is absent in some locations at the CPP due to weathering. The uppermost aquifer (UA) is absent beneath the GMF GSP due to excavation during construction of the CCR unit. The underlying lower confining unit (LCU), and where present the deep aquifer (DA), have been identified as potential migration pathways (PMPs) because downward vertical gradients indicate that there is the potential for impacts to migrate toward these units. Groundwater flows east to southeast across the GMF GSP toward an unnamed tributary leading to Coffeen Lake; however, the GMF GSP is lined and water elevations within the GMF GSP do not vary coincidentally with surrounding groundwater elevations.

As set forth in 35 I.A.C. § 620.210, groundwater within the UA in the vicinity of the GMF GSP meets the definition of Class I – Potable Resource Groundwater, as geologic material with a hydraulic conductivity of 1 x 10^{-4} centimeters per second (cm/s) or greater and located 10 feet or more below the land surface. This information was also considered in the CAAA as part of the Human Health and Ecological Risk Assessment, which concluded that groundwater from the GMF GSP impoundment and potential groundwater contributions to surface water pose no unacceptable risks to human health or the environment.

Source control followed by GWP will result in the decline of concentrations of CCR-derived constituents in the UA and PMPs. No off-site migration of CCR-derived constituents is expected to occur. GWP and adaptive site management following source control will function until the GWPS is achieved in accordance with the CA GMP (**Appendix B**). Paragraphs (A) through (F) from 35 I.A.C. § 845.670(f)(5) are further addressed, as summarized below.

35 I.A.C. § 845.670(f)(5)(A): Current and future uses, including potential residential, agricultural, commercial industrial and ecological uses; and

Current uses and users of the groundwater are discussed in the HCR, Section 5.1 and attachments; and were considered in the CAAA as part of the Human Health and Ecological Risk Assessment which concluded that groundwater from the GMF GSP impoundment and potential groundwater contributions to surface water pose no unacceptable risks to human health or the environment. Exceedances of the GWPS will remain within the property boundary[2] which is controlled by IPGC. No changes in future residential, commercial, or ecological use are expected. In the absence of changes to current and future uses, there is no applicable scheduling consideration.

35 I.A.C. § 845.670(f)(5)(B): Proximity and withdrawal rate of users;

A water well inventory was completed in 2021 utilizing federal and state databases to assess nearby pumping wells, drinking water receptors, and other uses of water in the vicinity of the GMF GSP. A search of the Illinois State Geological Survey (ISGS) Illinois Water and Related Wells (ILWATER) Map identified 16 wells located within 1,000 meters of the GMF GSP. The wells that were identified included 11 monitoring wells, four farm/domestic wells, and one industrial use well. One of the four farm/domestic wells (121352283200) is located southeast of the GMF GSP, side/downgradient to the GMF GSP and on the west side of the unnamed tributary to Coffeen Lake. The well, which was installed in 1981, is located near the former location of several prior residences. The well was removed during the construction of the Gypsum Management Facility Recycle Pond (GMF RP) in 2010. Additionally, the property in this area has been purchased by IPGC and no residents are currently living or using groundwater in the area. While there is no information available on the current use of the remaining three farm/domestic wells, they are located north of the GMF GSP, *i.e.*, upgradient/side-gradient to GMF GSP, where groundwater in the vicinity flows east to southeast toward the east lobe of Coffeen Lake and on the west side of the unnamed tributary to Coffeen Lake.

The assessment concluded there are no existing off-site water wells, potable or non-potable, that could potentially be impacted by groundwater from the GMF GSP. This information was also considered in the CAAA as part of the Human Health and Ecological Risk Assessment, which concluded that groundwater from the GMF GSP impoundment and potential groundwater

[2] Based on the Nature & Extent Report attached to the CAAA with addendum as Appendix D.

contributions to surface water pose no unacceptable risks to human health or the environment. In the absence of changes in current and future uses, there is no applicable scheduling consideration for proximity and withdrawal rates of users.

35 I.A.C. § 845.670(f)(5)(C): Groundwater quantity and quality;

Per 35 I.A.C. § 620.210, groundwater within the UA at GMF GSP meets the definition of Class I – Potable Resource Groundwater [14]. The Human Health and Ecological Risk Assessment (Appendix A in the CAAA) concluded that groundwater from the GMF GSP impoundment and potential groundwater contributions to surface water pose no unacceptable risks to human health or the environment. The selected remedy includes source control followed by GWP. GWP does not include the management of any volume of groundwater.

35 I.A.C. § 845.670(f)(5)(D): The potential impact to the subsurface ecosystem, wildlife, other natural resources, crops, vegetation, and physical structures caused by exposure to CCR constituents;

Potential surface receptors are discussed in the HCR Sections 5.2 and 5.3. A survey to identify surface water features, nature preserves, and historic sites was conducted for a 1,000-meter radius around the GMF GSP. Section 3.6 of the Human Health and Ecological Risk Assessment included as Appendix A of the CAA and CMA/CAAA Report discusses the ecological risk evaluation.

1. Ecological receptors exposed to surface water include aquatic and marsh plants, amphibians, reptiles, and fish. The risk evaluation showed that none of the constituents of interest (COIs) in surface water exceeded protective screening benchmarks.
2. Ecological receptors exposed to sediment include benthic invertebrates. The modeled sediment COIs did not exceed the conservative screening benchmarks, therefore, none of the COIs evaluated in sediment are expected to pose an unacceptable risk to ecological receptors.
3. Ecological receptors were also evaluated for exposure to bioaccumulative COIs. This evaluation considered higher trophic-level wildlife with direct exposure to surface water and sediment and secondary exposure through the consumption of dietary items (*e.g.,* plants, invertebrates, small mammals, fish). Mercury was the only ecological COI identified as having potential bioaccumulative effects. However, the modeled concentrations did not exceed benchmarks protective of bioaccumulative effects. Therefore, mercury is not considered to pose an ecological risk via bioaccumulation. Overall, this evaluation demonstrated that none of the COIs evaluated are expected to pose an unacceptable risk to ecological receptors.

Overall, this evaluation demonstrated that none of the COIs evaluated are expected to pose an unacceptable risk to ecological receptors. The selected remedy will reduce the concentrations of COIs in groundwater. In the absence of unacceptable risks to ecological receptors, there is no applicable scheduling consideration.

35 I.A.C. § 845.670(f)(5)(E): The hydrogeologic characteristic of the facility and surrounding land; and

In addition to the CCR present in the GMF GSP, five hydrostratigraphic units have been identified at the GMF GSP based on stratigraphic relationships, geologic composition, and common hydrogeologic properties. The units, listed from surface downward, are summarized as follows:

- **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 to clayey silts and gravelly clay below the surficial soil. Loess Unit thickness ranges from 0 feet (absent) near the unnamed tributary to 16 feet ,and the clayey portion of the Hagarstown member is up to 6 feet thick. The Loess Unit was excavated within the footprint of the GMF GSP during construction of the impoundment.
- **Uppermost Aquifer (UA)**: The UA is the Hagarstown Member which is classified as primarily sandy to gravelly silts and clays with thin beds of sands. Where present, the sandy portion of the Hagarstown is generally 2 to 4 feet thick. Similar to the Loess Unit, the Hagarstown is absent in some locations near the unnamed tributary and was excavated within the footprint of the GMF GSP during construction of the impoundment. Hydraulic conductivity in the UA is moderate.
- **Lower Confining Unit (LCU):** Comprised of the Vandalia Member, Mulberry Grove Member, and Smithboro Member. These units include a sandy to silty till with thin, discontinuous sand lenses, a discontinuous and limited extent sandy silt which has infilled prior erosional features, and silty to clayey diamicton, respectively. The unit was encountered in all borings on the CPP. This LCU has been identified as a PMP because downward vertical gradients indicate that there is the potential for impacts to migrate within this unit despite very low permeability.
- **Deep Aquifer (DA):** 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. Where present, the DA has been identified as a potential PMP due to presence of downward gradients in the overlying LCU and the relatively greater hydraulic conductivities measured in the DA. Hydraulic conductivity in the DA is moderate.
- **Deep Confining Unit (DCU):** Comprised of the Banner Formation, and generally consists of clays, silts, and sands. The Lierle Clay Member is the upper layer of the Banner Formation which was encountered at the site. No boring locations penetrated the full thickness of the Lierle Clay.

The effects of these hydrostratigraphic units on schedule were considered by incorporating the geometry, hydraulic, and geochemical properties of these units into the groundwater modeling and GWP reports, attached to the Final Closure Plan and CAAA, respectively, included in **Appendix A**, which estimate the time to reach the GWPS for remedial alternatives.

35 I.A.C. § 845.670(f)(5)(F): The availability of alternative water supplies.

As discussed in subsection 35 I.A.C. § 845.670(f)(5)(B) above, there were potentially 16 water wells identified within 1,000 meters of GMF GSP [14]. There is currently no need for an alternative water supply well as there are no current unacceptable risks to human or ecological receptors at the site. There are no applicable schedule concerns regarding the availability of alternative water supplies.

3.3.1 Other Relevant Factors

35 I.A.C. § 845.670(f)(6): Other relevant factors.

No additional factors were identified for consideration.

3.4 Necessity of Interim Measures

Source control using the consolidate-and-cap approach is projected to be complete within four to six years after approval of the final closure CP application [4]. 35 I.A.C § 845.680(a)(3) states the owner or operator must take any interim measures necessary to reduce the contaminants leaching from the CCR surface impoundment, and/or potential exposures to human or ecological receptors. Upon completion of source control, the GMF GSP will immediately transition to GWP, therefore no interim measures are required. Further, all subsections of this requirement are discussed as follows.

35 I.A.C. § 845.680(a)(3)(A): Time required to develop and implement a final remedy.

Source control with GWP will be completed in accordance with the schedule provided in **Table 1**. The GWPS will be achieved within a reasonable time frame.

35 I.A.C. § 845.680(a)(3)(B): Actual or potential exposure of nearby populations or environmental receptors to any of the constituents listed in 35 I.A.C. § 845.600.

There are no current unacceptable risks to human or ecological receptors at the site (**Appendix A).** It was concluded that shallow groundwater and surface water are not a source of drinking water [11].

35 I.A.C. § 845.680(a)(3)(C): Actual or potential contamination of sensitive ecosystems or current or potential drinking water supplies.

The nature and extent of exceedances have been evaluated in the Nature and Extent Report [12]. Although there are exceedances of GWPS, there are no impacts to current or potential drinking water supplies. As stated above, there are no current unacceptable risks to human or ecological receptors at the site. Additionally, an ecological risk assessment was completed, and no unacceptable risks were identified for ecological receptors exposed to surface water and sediment [11]. No potential groundwater receptors are in the vicinity of the GMF GSP [11].

35 I.A.C. § 845.680(a)(3)(D): Further degradation of the groundwater that may occur if remedial action is not initiated expeditiously.

The selected remedy of source control with GWP will achieve the GWPS in a reasonable time frame and no unacceptable risks to human health or the environment have been identified. No interim measure is expected to prevent further degradation of the groundwater more expeditiously than implementation of the selected remedy.

35 I.A.C. § 845.680(a)(3)(E): Weather conditions that may cause any of the constituents listed in 35 I.A.C. § 845.600 to migrate or be released.

As stated above, the selected remedy of source control with GWP will achieve the GWPS in a reasonable timeframe and no unacceptable risks to human health or the environment have been identified. No interim measure is expected to further prevent migration of constituents more expeditiously than implementation of the selected remedy.

35 I.A.C. § 845.680(a)(3)(F): Potential for exposure to any of the constituents listed in 35 I.A.C. § 845.600 as a result of accident or failure of a container or handling system.

As stated above, GWP will be implemented immediately after source control is completed. As the GMF GSP will be closed in place within a consolidated footprint, no container or handling system will be in use.

35 I.A.C. § 845.680(a)(3)(G): *Other situations that may pose threats to human health and the environment.*

No other situations have been identified where GMF GSP CCR leachate poses threats to human health and environment.

4. REFERENCES

[1] Illinois Adminstrative Code, "Title 35, Subtitle G, Chapter I, Subchapter J, Part 845: Standards for The Disposal Of Coal Combustion Residuals In Surface Impoundments," effective April 21, 2021.

[2] Code of Federal Regulations, "Title 40, Chapter I, Subchapter I, Part 257, Subpart D, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," effective April 17, 2015.

[3] Burns & McDonnell Engineering Company, Inc., "Initial Operating Permit, Coffeen GMF Gypsum Stack Pond," Coffeen, IL, October 25, 2021.

[4] Golder Associates USA Inc., "Part 845 Construction Permit Application for the Gypsum Management Facility Gypsum Stack Pond," July 28, 2022.

[5] Golder Associates USA, Inc., "Final Closure Plan for the Gypsum Management Facility Gypsum Stack Pond," July 28, 2022.

[6] United States Environmental Protection Agency (USEPA), "40 CFR Parts 257 and 261 Hazardous and Solid Waste [EPA–HQ–RCRA–2009–0640; FRL–9919–44–OSWER]," April 17, 2015.

[7] Ramboll Americas Engineering Solutions, "Groundwater Modeling Report GMF Gypsum Stack Pond and GMF Recycle Pond," July 28, 2022.

[8] United States Environmental Protection Agency, "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Directive No. 9200.U-17P.," Office of Solid Waste and Emergency Response, Washington D.C., 1999.

[9] United States Environmental Protection Agency, "Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind," Office of Solid Waste and Emergency Response, 2014.

[10] Ramboll Americas Engineering Solutions, "35 I.A.C. § 845 Corrective Measures Assessment, GMF Gypsum Stack Pond, Coffeen Power Plant," Coffeen, IL, June 12, 2024.

[11] Gradient Corp, "Human Health and Ecological Risk Assessment, Gypsum Management Facility Gypsum Stack Pond and Gypsum Management Facility Recycle Pond, Coffeen Power Plant," Coffeen, IL, July 28, 2022.

[12] Ramboll Americas Engineering Solutions, "Nature and Extent Report, Coffeen Power Plant, GMF Gypsum Stack Pond, IEPA ID No. W1350150004-03," Coffeen, IL, June 12, 2024.

[13] Geosyntec Consultants, Inc., "Groundwater Polishing Evaluation Report Coffeen Power Station - GMF Gypsum Stack Pond (EPA ID No. 103)," Coffeen, IL, June 10, 2025.

[14] Ramboll Americas Engineering Solutions, "Hydrogeologic Site Characterization Report, Coffeen Power Plant, GMF Gypsum Stack Pond," Coffeen, IL, October 25, 2021.

TABLES

Table 1. Proposed Milestone Schedule for Implementing Corrective Action Remedy (Source Control-Groundwater Polishing)

Implementation Phase	Implementation Task	Timeframe* (Preliminary Estimates)
Source Control Pre-Implementation	Final Closure Plan Submittal	July 2022
	Corrective Action Plan Submittal	June 2025
Source Control Construction	Source Control (Closure) Construction • Complete Implementation of Source Control	4 to 6 years (after approval of closure plan and All Other Closure-Related Permits)
	Timeframe to Complete Source Control Construction[1]	**4 to 6 years** (after receipt of all permits required for closure)
Corrective Action Implementation	Corrective Action Operations (Time to Meet GWPS) • Perform groundwater monitoring and reporting per Corrective Action Groundwater Monitoring Plan	6 years (after completion of Source Control)
	Corrective Action Groundwater Confirmation Monitoring • Perform groundwater monitoring to demonstrate compliance with GWPS for 3 years, per 35 I.A.C. § 845.680(c)	3 years (after Corrective Action Operations and Maintenance)
	Corrective Action Completion • Prepare Corrective Action Completion Report, per 35 I.A.C. § 845.680(E)	3 to 6 months (after Corrective Action Confirmation Monitoring)
	Timeframe to Complete Corrective Action Implementation[1]	10 years

[1]All timeframes are preliminary and may change as the project develops. Timeframes may also be affected by regulatory review and/or permit approval processes, for both 35 I.A.C. § 845 and non-35 I.A.C. § 845 permits.

GWPS = Groundwater Protection Standard(s)

APPENDIX A
CORRECTIVE ACTION ALTERNATIVES ANALYSIS (845.670(E)), INCLUDING CORRECTIVE MEASURES ASSESSMENT (845.660)

Corrective Action Alternatives Analysis for the Gypsum Management Facility Gypsum Stack Pond Coffeen Power Plant Coffeen, Illinois

June 10, 2025

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Table of Contents

Page

Summary of Findings S-1

1 Introduction 1
- 1.1 Site Description and History 1
  - 1.1.1 Site Location and History 1
  - 1.1.2 CCR Impoundment 1
  - 1.1.3 Surface Water Hydrology 2
  - 1.1.4 Hydrogeology 3
  - 1.1.5 Site Vicinity 3
- 1.2 Part 845 Regulatory Review and Requirements 4

2 Corrective Action Alternatives Analysis 5
- 2.1 Corrective Action Alternatives Descriptions 5
  - 2.1.1 Alternative 1: Source Control-GWP 7
  - 2.1.2 Alternative 2: Source Control-GWE 8
- 2.2 Long- and Short-Term Effectiveness and Protectiveness of Corrective Action Alternative (IAC Section 845.670(e)(1)) 10
  - 2.2.1 Magnitude of Reduction of Existing Risks (IAC Section 845.670(e)(1)(A)) 10
  - 2.2.2 Effectiveness of the Remedy in Controlling the Source (IAC Section 845.670(e)(2)/IAC Section 845.670(d)(3)) 11
  - 2.2.3 Likelihood of Future Releases of CCR (IAC Section 845.670(e)(1)(B)) 12
  - 2.2.4 Type and Degree of Long-Term Management, Including Monitoring, Operation, and Maintenance (IAC Section 845.670(e)(1)(C)) 12
  - 2.2.5 Short-Term Risks to the Community or the Environment During Implementation of Remedy (IAC Section 845.670(e)(1)(D)) 13
    - 2.2.5.1 Safety Impacts 13
    - 2.2.5.2 Cross-Media Impacts to Air 15
    - 2.2.5.3 Cross-Media Impacts to Surface Water and Sediments 16
    - 2.2.5.4 Control of Exposure to Any Residual Contamination During Implementation of the Remedy 16
    - 2.2.5.5 Other Identified Impacts 17
  - 2.2.6 Time Until Groundwater Protection Standards Are Achieved/Attain the Groundwater Protection Standards Specified in Section 845.600 (IAC Section 845.670(e)(1)(E)/IAC Section 845.680(d)(2)) 18
  - 2.2.7 Potential for Exposure of Humans and Environmental Receptors to Remaining Wastes, Considering the Potential Threat to Human Health and the Environment Associated with Excavation,

Transportation, Re-disposal, Containment, or Changes in Groundwater Flow (IAC Section 845.670(e)(1)(F)) 19
2.2.8 Long-Term Reliability of the Engineering and Institutional Controls (IAC Section 845.670(e)(1)(G)) 20
2.2.9 Potential Need for Replacement of the Remedy (IAC Section 845.670(e)(1)(H)) 21
2.3 The Ease or Difficulty of Implementing a Remedy (IAC Section 845.670 (e)(3)) .. 22
2.3.1 Degree of Difficulty Associated with Constructing the Remedy (IAC Section 845.670(e)(3)(A) 22
2.3.2 Expected Operational Reliability of the Remedy (IAC Section 845.670(e)(3)(B)) 22
2.3.3 Need to Coordinate with and Obtain Necessary Approvals and Permits from Other Agencies (IAC Section 845.670(e)(3)(C)) 23
2.3.4 Availability of Necessary Equipment and Specialists (IAC Sections 845.670(e)(3)(D) and 845.660(c)(1), "Ease of Implementation") 23
2.3.5 Available Capacity and Location of Needed Treatment, Storage, and Disposal Services/Comply with Standards for Management of Wastes as Specified in Section 845.680(d) (IAC Section 845.670(e)(3)(E)/IAC Section 845.670(d)(5)) 24
2.4 The Degree to Which Community Concerns Are Addressed by the Remedy (IAC Section 845.670(e)(4)) 24
2.5 Remove from the Environment as much of the Contaminated Material that was Released from the CCR Surface Impoundment as Is Feasible, Taking into Account Factors such as Avoiding Inappropriate Disturbance of Sensitive Ecosystems (IAC Section 845.670(d)(4)) 25
2.6 Summary 26

References 27

Appendix A Human Health and Ecological Risk Assessment
Appendix B Corrective Action Alternative Analysis - Supporting Information Report
Appendix C Corrective Measures Assessment
Appendix D Nature and Extent Report
Appendix E Groundwater Polishing Evaluation Report

List of Tables

Table S.1 Comparison of Proposed Corrective Action Alternatives with Respect to Factors Specified in IAC Section 845.670(d) and IAC Section 845.670(e)

Table 2.1 Key Parameters for the Source Control-GWE Corrective Action Alternative

Table 2.2 Expected Number of On-Site Worker Accidents Under Each Corrective Action Alternative

Table 2.3 Expected Number of Off-Site Worker Accidents Related to Off-Site Car and Truck Use Under Each Corrective Action Alternative

Table 2.4 Expected Number of Community Accidents Under Each Corrective Action Alternative

Table 2.5 Estimated Timeline and Implementation Schedule Under Each Corrective Action Alternative

List of Figures

Figure 1.1 Site Location Map

Abbreviations

bgs	Below Ground Surface
BMP	Best Management Practice
CAA	Closure Alternatives Analysis
CAAA	Corrective Action Alternatives Analysis
CCR	Coal Combustion Residual
CIP	Closure-in-Place
CMA	Corrective Measures Assessment
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPP	Coffeen Power Plant
CY	Cubic Yard
DA	Deep Aquifer
DCU	Deep Confining Unit
GHG	Greenhouse Gas
GMF	Gypsum Management Facility
GMP	Groundwater Monitoring Plan
GSP	Gypsum Stack Pond
GWP	Groundwater Polishing
GWPS	Groundwater Protection Standard
HDPE	High-Density Polyethylene
IAC	Illinois Administrative Code
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ISGS	Illinois State Geological Survey
LCU	Lower Confining Unit
LLDPE	Linear Low-Density Polyethylene
N_2O	Nitrous Oxide
NID	National Inventory of Dams
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PM	Particulate Matter
RP	Recycle Pond
SFWA	State Fish and Wildlife Area
Source Control-GWE	Source Control with Groundwater Extraction
Source Control-GWP	Source Control with Groundwater Polishing
UA	Uppermost Aquifer
UCU	Upper Confining Unit
US DOT	United States Department of Transportation
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Summary of Findings

Title 35, Part 845 of the Illinois Administrative Code (IAC) (IEPA, 2021) requires that a Corrective Action Alternatives Analysis (CAAA) be performed as part of the remedy selection, prior to undertaking any corrective actions at certain coal combustion residual (CCR)-containing impoundments, where exceedances of groundwater protection standards (GWPSs) have been identified. This report presents a CAAA for the Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) at the Coffeen Power Plant (CPP) pursuant to the requirements under IAC Section 845.670. The goal of performing a CAAA is to holistically evaluate the potentially viable corrective actions identified in the Corrective Measures Assessment (CMA; Appendix C; Ramboll, 2025a) in order to remediate groundwater and achieve compliance with the GWPSs specified under IAC Section 845.600 (IEPA, 2021). These analyses assess potentially viable corrective action alternatives based on a wide range of factors, including the efficiency, reliability, and ease of implementation of a corrective action; its potential positive and negative short- and long-term impacts on human health and the environment; and its ability to address concerns raised by the community (IEPA, 2021).

It is important to note that many CCR sites are complex groundwater environments where remedial actions will inherently take many years to complete. While no formal definition of a complex groundwater environment exists, most would agree that there are a number of common characteristics at complex groundwater sites, including the following (National Research Council, 2013):

- Highly heterogeneous subsurface environments;
- Large source zones;
- Multiple, recalcitrant constituents; and
- Long timeframes over which releases occurred.

Each of these characteristics are common at CCR sites. Surface impoundments are often tens to hundreds of acres in size and many have operated for decades, leading to large source zones and prolonged releases. Furthermore, CCR impoundments are often located in alluvial geologic settings where sands are interbedded with silts and clays.[1] This results in a heterogeneous environment where constituent mass may persist for many years in low-permeability deposits. Finally, the constituents that are most common at CCR sites include metals and inorganics that do not naturally biodegrade. The combination of these factors results in a complex groundwater environment where remediation, even under the best of circumstances, may take many years to achieve GWPSs. It is for these reasons that the United States Environmental Protection Agency (US EPA) refused to specify what is a reasonable *versus* an unreasonable timeframe for groundwater corrective actions at CCR sites, stating that it "was truly unable to establish an outer limit on the necessary timeframes—including even a presumptive outer bound" (US EPA, 2015a, p. 21419).

In this CAAA, both corrective actions that have been evaluated consist of source control and residual plume management. Source control is generally considered to be one of the more effective remedial action approaches. Source control involves removing the hydraulic head from an impoundment (*i.e.*, unwatering and dewatering) and reducing the potential for further downward migration of constituents. US EPA has

[1] Note that the GMF GSP is a modern and state-permitted surface impoundment with a composite liner that consists of a 60-mil geomembrane as primary liner and 3 ft of compacted clay as the secondary liner (AECOM, 2016).

found that "releases from surface impoundments [to groundwater] drop dramatically after closure" (US EPA, 2014, pp. 5-18 to 5-19). US EPA has also stated that source control is the most effective means of ensuring the timely attainment of remediation objectives (US EPA, 2015b). As a result, the implementation of source control often has a substantial and immediate effect on groundwater quality improvements.

The specific source control method that is the central component of both corrective active alternatives evaluated in this CAAA is closure-in-place (CIP) using a consolidate-and-cap approach. Specifically, this includes the removal of free liquids, excavation and consolidation of CCR into the northern portion of the GMF GSP, and the installation of a low-permeability geomembrane final cover system. As the GMF GSP is a modern and double-lined facility; this closure would result in CCR within the GMF GSP being encapsulated with a continuous, engineered liner system on all sides. The excavation and consolidation would decrease the total CCR footprint from approximately 36 acres to 12.4 acres. The final cover system consisting of a 40-mil linear low-density polyethylene (LLDPE) geomembrane layer, nonwoven geotextile cushion, and 24 inches (in) of protective soil cover would be installed over the final footprint of the GMF GSP. These activities are designed to control, minimize, or eliminate, post-closure infiltration of liquids into the impounded CCR. This approach will remove impounded water from the impoundment, which further reduces the hydraulic flux through the CCR (Ramboll, 2022).

Two potential corrective actions are evaluated in this CAAA: Source Control with Groundwater Polishing (Source Control-GWP) and Source Control with Groundwater Extraction (Source Control-GWE). Both alternatives consist of source control and residual plume management, and both alternatives were identified as a viable approach in the CMA (Appendix C; Ramboll, 2025a). The residual plume management portions of these corrective action alternatives include groundwater polishing and a groundwater extraction trench.

Under the Source Control-GWP alternative, constituent concentrations in groundwater would attenuate over time due to physical and geochemical mechanisms. Site-specific evaluations demonstrated that GWP is appropriate at the GMF GSP because Site conditions are favorable for attenuation of inorganic contaminants *via* adsorption (Appendix E; Geosyntec Consultants, Inc., 2025). Under the Source Control-GWE alternative, a groundwater extraction trench would be constructed within the portions of the GMF GSP and extend from the ground surface to depth of 5 feet (ft) below ground surface (bgs) which is below the bottom of the uppermost aquifer (UA). The trench would be approximately 1,600 ft long and 2 to 3 ft wide (Appendix B; Ramboll, 2025b). The extraction system would include a collection pipe within the trench, which would pump extracted groundwater to a new on-Site lined settling pond to remove solids. Subsequently, extracted groundwater would be discharged under a National Pollutant Discharge Elimination System (NPDES) permit for the Site. This corrective action alternative would involve incorporating and retrofitting the existing drainage channel and would be constructed perpendicular to the groundwater flow direction at the Site. As part of both corrective action alternatives, an adaptive site management plan would be implemented in order to optimize the selected remedy based on real-time data that are collected.

Table S.1 evaluates the two potentially viable corrective actions evaluated in this CAAA (Source Control-GWP and Source Control-GWE) with regard to each of the factors specified under IAC Section 845.670(d) and IAC Section 845.670(e) (IEPA, 2021). Based on this evaluation and the details provided in Section 2 of this report, the most appropriate corrective action for this Site is Source Control-GWP. The expected impacts on workers and the environment under the Source Control-GWP alternative are lower than those under the Source Control-GWE. Additionally, there is not expected to be a significant difference between the two alternative corrective actions in the time to achieve the GWPSs. Thus, Source Control-GWP is the most appropriate corrective action alternative for the GMF GSP.

Table S.1 Comparison of Proposed Corrective Action Alternatives with Respect to Factors Specified in IAC Section 845.670(d) and IAC Section 845.670(e)

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
Magnitude of Reduction of Existing Risks (Section 2.2.1; IAC Section 845.670(e)(1)(A))	Because current conditions do not present a risk to human health or the environment at the GMF GSP, there will be no unacceptable risk to human health or the environment for future conditions when the unit has been closed and source control has been implemented. Concentrations of CCR-derived constituents will decline over time and, consequently, potential exposures to CCR-derived constituents in the environment will also decline. The magnitude of the reduction of existing risks is the same for the two potential corrective action alternatives, and both corrective action alternatives are equally protective of human health and the environment.	Because current conditions do not present a risk to human health or the environment at the GMF GSP, there will be no unacceptable risk to human health or the environment for future conditions when the unit has been closed and source control has been implemented. Concentrations of CCR-derived constituents will decline over time and, consequently, potential exposures to CCR-derived constituents in the environment will also decline. The magnitude of the reduction of existing risks is the same for the two potential corrective action alternatives, and both corrective action alternatives are equally protective of human health and the environment.
Effectiveness of the Remedy in Controlling the Source (Section 2.2.2; IAC Section 845.670(e)(2))		
Extent to Which Containment Practices Will Reduce Further Releases/Control the Sources of Releases to Reduce or Eliminate, to the Maximum Extent Feasible (IAC Section 845.670(e)(2)(A)/IAC Section 845.670(d)(3))	Both alternatives include source control (which is the primary remedial measure) and residual plume management. Source control would remove free liquids in the GMF GSP and install a final cover system over the CCR footprint within the GMF GSP. This approach would result in CCR within the unit being encapsulated with a continuous, engineered liner system on all sides. Source control is thus effective at controlling the source. Under the residual plume management for Source Control-GWP alternative, physical and geochemical attenuation mechanisms would mitigate impacts to downgradient groundwater quality and control the residual plume (Geosyntec Consultants, Inc., 2025). If necessary, remedy optimizations would be implemented under the adaptive site management program.	Both alternatives include source control (which is the primary remedial measure) and residual plume management. Source control would remove residual water in the GMF GSP and install a final cover system over the CCR footprint within the GMF GSP. This approach would result in CCR within the unit being encapsulated with a continuous, engineered liner system on all sides. Source control is thus effective at controlling the source. Under the residual plume management for Source Control-GWE alternative, groundwater extraction trench would remove impacted groundwater and control migration of impacted groundwater. If necessary, remedy optimizations would be implemented under the adaptive site management program.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
Extent to Which Treatment Technologies May Be Used (IAC Section 845.670(e)(2)(B))	Source Control-GWP would rely on physical and geochemical attenuation processes. If necessary, remedy optimizations would be implemented under the adaptive site management program.	The Source Control-GWE alternative would require construction of a new on-Site settling pond to treat extracted groundwater, prior to discharge *via* a NPDES permitted Outfall. The remedy would also rely on physical and geochemical attenuation processes. If necessary, remedy optimizations would be implemented under the adaptive site management program.
Likelihood of Future Releases of CCR (Section 2.2.3; IAC Section 845.670(e)(1)(B))	Both corrective action alternatives include source control using CIP with a consolidate-and-cap approach. A new geomembrane cover system would be installed to increase protection against berm and surface erosion, precipitation infiltration, and other adverse effects (Appendix B; Ramboll, 2025b). The composite liner present at the bottom of the GMF GSP has a low permeability (AECOM, 2016). The source control approach would result in CCR within the unit being encapsulated with a continuous, engineered liner system on all sides. There would be minimal risk of accidental CCR releases occurring post-closure under any of the alternatives.	Both corrective action alternatives include source control using CIP with a consolidate-and-cap approach. A new geomembrane cover system would be installed to increase protection against berm and surface erosion, precipitation infiltration, and other adverse effects (Appendix B; Ramboll, 2025b). The composite liner present at the bottom of the GMF GSP has a low permeability (AECOM, 2016). The source control approach would result in CCR within the unit being encapsulated with a continuous, engineered liner system on all sides. There would be minimal risk of accidental CCR releases occurring post-closure under any of the alternatives.
Type and Degree of Long-Term Management, Including Monitoring, Operation, and Maintenance (Section 2.2.4; IAC Section 845.670(e)(1)(C))	Minimal long-term operation and maintenance (O&M) efforts would be required under Source Control-GWP, because it would not require the installation, operation, or maintenance of any engineered systems or structures other than maintenance of the monitoring wells. Post-closure care groundwater monitoring would continue for a minimum of 30 years as required by IAC Section 845.780(c). Additionally, corrective action groundwater monitoring would continue for 3 years after GWPS have been achieved. Based on the adaptive site management approach, remedy optimizations might be implemented to ensure achievement of the GWPSs.	Long-term O&M efforts required under Source Control-GWE would include the maintenance of the groundwater collection trench system and discharge of extracted groundwater. Extracted groundwater would be managed and treated by a newly-constructed on-Site settling pond before discharge *via* a NPDES permitted Outfall. Post-closure care groundwater monitoring would continue for a minimum of 30 years as required by IAC Section. 845.780(c). Additionally, corrective action groundwater monitoring would continue for 3 years after GWPS have been achieved. Based on the adaptive site management approach, remedy optimizations might be implemented to ensure achievement of the GWPSs.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
Short-Term Risks to the Community or the Environment During Implementation of Remedy (Section 2.2.5; IAC Section 845.670(e)(1)(D))		
Safety Impacts	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. While appropriate controls would be established to prevent accidents and injuries from occurring, the risks of accidents and injuries occurring during source control would be the same for both corrective action alternatives. These source control risks were evaluated in the closure alternatives analysis (CAA) (Gradient, 2022a). Overall, no worker accidents or injuries would be expected under the Source Control-GWP alternative because no installation, operation, and maintenance of engineered systems or structures would be required. Similarly, no off-Site impacts on nearby residents would be expected under the Source Control-GWP alternative.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. While appropriate controls would be established to prevent accidents and injuries from occurring, the risks of accidents and injuries occurring during source control would be the same for both corrective action alternatives. These source control risks were evaluated in the CAA (Gradient, 2022a). Overall, considering both on- and off-Site activities, 8.5×10^{-2} worker injuries and 1.5×10^{-3} worker fatalities would be expected to occur under the Source Control-GWE alternative, which is higher than the Source Control-GWP alternative. An estimated 2.1×10^{-2} injuries and 2.3×10^{-4} fatalities would be expected to occur among community members due to off-Site activities under the Source Control-GWE alternative, which is higher than the Source Control-GWP alternative.
Cross-Media Impacts to Air	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both corrective action alternatives. Air impacts occurring during source control would be the same for both corrective action alternatives. These source control risks were evaluated in the CAA (Gradient, 2022a). Cross-media impacts to air can include air pollutants and GHG emissions, which are proportional to the potential impact of each alternative on other	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Air impacts occurring during source control would be the same for both corrective action alternatives. These source control risks were evaluated in the CAA (Gradient, 2022a). Cross-media impacts to air can include air pollutants and GHG emissions, which are proportional to the potential impact of each alternative on other

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
	emissions from construction vehicles and equipment. Residual plume management for the Source Control-GWP alternative would be expected to have minimal air impacts, because it would not require the construction of any engineered systems or structures.	emissions from construction vehicles and equipment. Residual plume management for the Source Control-GWE alternative would have greater air impacts than the Source Control-GWP alternative due to the construction and operation of the extraction trench system.
Cross-Media Impacts to Surface Water and Sediments	Under both corrective action alternatives, the constituent mass flux from groundwater into surface water would decline over time after source control has been completed (Ramboll, 2022). The consolidate-and-cap approach would minimize the amount of water retained within the impoundment and reduce the hydraulic flux through the CCR. Due to the reduction in the hydraulic flux out of the GMF GSP, the mass flux out of the GMF GSP would also be controlled or minimized. Under residual plume management for the Source Control-GWP alternative, minimal surface water and sediment impacts would be expected, because it would not require the construction of any engineered systems or structures.	Under both corrective action alternatives, the constituent mass flux from groundwater into surface water would decline over time after source control has been completed (Ramboll, 2022). The consolidate-and-cap approach would minimize the amount of water retained within the impoundment and reduce the hydraulic flux through the CCR. Due to the reduction in the hydraulic flux out of the GMF GSP, the mass flux out of the GMF GSP would also be controlled or minimized. Under residual plume management for the Source Control-GWE alternative, groundwater collected by the extraction trench would be treated through the on-Site settling pond and discharged to the Coffeen Lake *via* a NPDES-permitted outfall. Surface water and sediment impacts under this alternative would be higher than the Source Control-GWP alternative due to the construction of the extraction trench system. Erosion and Sediment runoff may occur due to the close proximity to the wetlands and surface water bodies during construction activities. However, the construction would be restricted inside the unit, and risks of such impacts would be addressed through best management practices (BMPs) in accordance with site land disturbance permits.
Control of Exposure to Any Residual Contamination During Implementation of the Remedy	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. While	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. While

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
	appropriate controls would be established to prevent exposures of CCR during source control, the risks of CCR exposure during source control would be the same for both corrective action alternatives. Risks to workers arising from potential contact with residual contamination would be minimal under the Source Control-GWP alternative, which would not involve exposure to any soil or groundwater waste streams.	appropriate controls would be established to prevent exposures of CCR during source control, the risks of CCR exposure during source control would be the same for both corrective action alternatives. Risks to workers arising from potential contact with residual contamination during construction, operation, and maintenance activities associated with residual plume management would be higher for the Source Control-GWE alternative than for the Source Control-GWP alternative, because Source Control-GWE would involve the production, management, and treatment of extracted groundwater, as well as on-Site disposal of excavated spoils generated during extraction trench construction.
Other Identified Impacts	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, impacts during source control would be the same for both of the corrective action alternatives (see the CAA; Gradient, 2022a). The energy demands of construction equipment and vehicles associated with residual plume management would be minimal because this alternative would not require any significant construction activity. Similarly, traffic and noise impacts associated with residual plume management would also be expected to be lower under the Source Control-GWP alternative than the Source Control-GWE alternative since no significant construction activities would be required. There would be no impacts to natural resources and habitat under the Source Control-GWP alternative because no	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, impacts during source control would be the same for both of the corrective action alternatives (see the CAA; Gradient, 2022a). The energy demands of construction equipment and vehicles associated with residual plume management would be greater under the Source Control-GWE alternative, while the energy demands under the Source Control-GWP would be lower because this alternative would not require any significant construction activity. Similarly, traffic and noise impacts associated with residual plume management would also be expected to be higher under the Source Control-GWE alternative than the Source Control-GWP alternative, due to the construction activities required to construct the extraction trench and settling pond.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
	additional construction activities would occur after implementation of source.	Under the Source Control-GWE alternative, there would be some negative impacts to natural resources and habitat, including disturbance of some existing habitat atop portions of the construction areas, habitat in the immediate vicinity of these locations by causing alarm and escape behavior in nearby wildlife (*e.g.*, due to noise disturbances). However, the construction would be restricted within the footprint of the GMF GSP, and the associated impacts would be low.
Time Until Groundwater Protection Standards Are Achieved (Section 2.2.6; IAC Section 845.670(e)(1)(E))	Groundwater modeling performed in support of the CAA (Gradient, 2022a) indicate that groundwater would attain the GWPSs for all constituents within approximately 6 years for all wells after closure under the Source Control-GWP alternative (Ramboll, 2022).	The timeframe for achieving GWPS under the Source Control-GWE alternative is expected to comparable or slightly faster than the Source Control-GWP alternative (Ramboll, 2022). Considering the short timeframe anticipated for achieving GWPS under the Source Control-GWP alternative without an active remedial action, groundwater modeling related to the extraction trench was not performed for the Source Control-GWE alternative.
Potential for Exposure of Humans and Environmental Receptors to Remaining Wastes, Considering the Potential Threat to Human Health and the Environment Associated with Excavation, Transportation, Re-disposal, Containment, or Changes in Groundwater Flow (Section 2.2.7; IAC Section 845.670(e)(1)(F))	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives, thus, potential exposures to CCR remaining in GMF GSP would be the same under both alternatives. Once source control activities have been completed, this corrective action alternative is expected to limit exposure of humans and environmental receptors to CCR remaining in GMF GSP. Furthermore, as a result of the source control, there would be minimal risks of CCR releases post-closure. The Source Control-GWP alternative would not involve exposure to any soil or groundwater waste streams and, thus, there is no potential for exposure of humans and environmental receptors to wastes.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives, thus, potential exposures to CCR remaining in GMF GSP would be the same under both alternatives. Once source control activities have been completed, this corrective action alternative is expected to limit exposure of humans and environmental receptors to CCR remaining in GMF GSP. Furthermore, as a result of the source control, there would be minimal risks of CCR releases post-closure.. Potential risks to workers that come in contact with residual contamination of CCR-derived constituents during groundwater extraction and treatment would be managed through the use of rigorous safety protocols and personal protective equipment.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
		Hydrogeological changes would also be expected under the Source Control-GWE alternative, such as lowering the groundwater table in the vicinity of the extraction trench, altering flow patterns in the Uppermost Aquifer (UA), and causing changes in hydraulic gradients. However, changes to groundwater flow would not be expected to have an effect on the potential for the exposure of humans and environmental receptors to remaining wastes.
Long-Term Reliability of the Engineering and Institutional Controls (Section 2.2.8; IAC Section 845.670(e)(1)(G))	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, long-term reliability during source control would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWP alternative would be reliable because it would rely on physical and geochemical attenuation processes and active monitoring. Site specific evaluations have shown that chemical attenuation is feasible, and remobilization is unlikely to impact the time to achieve GWPS as groundwater returns to background conditions (Appendix E; Geosyntec Consultants, Inc., 2025). If necessary, remedy optimizations would be implemented under the adaptive site management program.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, long-term reliability during source control would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWE alternative would be reliable, provided it is constructed in accordance with standard design and specifications, because it is a proven remedy that has been implemented at many sites. Routine and non-routine maintenance of the extraction system is required to ensure reliable operation of the extraction trench and pumps, as well as other system components. If necessary, remedy optimizations would be implemented under the adaptive site management program
Potential Need for Replacement of the Remedy (Section 2.2.9; IAC Section 845.670(e)(1)(H))	Replacement of the residual plume management remedy under the Source Control-GWP alternative would likely be unnecessary, because it would not require the installation, operation, and maintenance of engineered systems or structures. Adaptive site management strategies would be used to implement remedy optimizations, if necessary, to ensure that remedial goals are achieved.	Replacement of the residual plume management remedy under the Source Control-GWE alternative would likely be unnecessary as long as the extraction trench system is maintained and serviced appropriately. Adaptive site management strategies would be used to implement remedy optimizations, if necessary, to ensure that remedial goals are achieved.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
Degree of Difficulty Associated with Constructing the Remedy (Section 2.3.1; IAC Section 845.670 (e)(3)(A)	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, construction difficulties would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWP alternative would rely on physical and geochemical attenuation processes and therefore would not pose any significant construction challenges.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, construction difficulties would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWE alternative would rely on the extraction trench and a settling pond to extract and treat impacted groundwater, as well as physical and geochemical attenuation processes. Shallow groundwater trenches are commonly constructed at similar depths using conventional equipment. Therefore, while some construction is required, the degree of difficulty would be anticipated to be low.
Expected Operational Reliability of the Remedy (Section 2.3.2; IAC Section 845.670 (e)(3)(B))	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, the operational reliability of the remedy would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWP alternative would have high operational reliability because this alternative would rely on natural processes and active monitoring. Adaptive site management strategies would be used to implement remedy optimizations, if necessary.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, the operational reliability of the remedy would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWE alternative would have high operational reliability because it is an established and dependable technology, as long as the extraction trench system is maintained and operated appropriately. Adaptive site management strategies would be used to implement remedy optimizations, if necessary.
Need to Coordinate with and Obtain Necessary Approvals and Permits from Other Agencies (Section 2.3.3; IAC Section 845.670 (e)(3)(C))	Specific permits and approvals associated with source control using a consolidate-and-cap approach are the same for both corrective action alternatives and were evaluated in the CAA (Gradient, 2022a). Residual plume management under the Source Control-GWP alternative would	Specific permits and approvals associated with source control using a consolidate-and-cap approach are the same for both corrective action alternatives and were evaluated in the CAA (Gradient, 2022a). Residual plume management for the Source Control-GWE alternative would

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
	not need additional permits from other agencies, other than the approval of the Corrective Action Plan.	require regulatory approvals. Groundwater extracted from the extraction trench would require a modified NPDES permit, which would likely require renewals depending on the timeline of corrective action implementation. Permits from the IEPA for construction stormwater controls and BMPs, a joint water pollution control construction and operating permit would be required. In addition, placement of excavated spoils beneath the GMF GSP final cover system *via* an amendment to the Closure Plan and Construction Permit Application, and operating permit would be required. An Illinois Department of Natural Resources (IDNR) Dam Safety modification permit would be obtained for modifications of the embankment.
Availability of Necessary Equipment and Specialists (Section 2.3.4; IAC Section 845.670 (e)(3)(D))	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, equipment and specialist needs would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWP alternative would require standard environmental monitoring equipment and groundwater professionals. Specialists such as geologists, hydrogeologists, statisticians (*i.e.*, statistical analysis), and geochemists would be available to collect and evaluate the data.	Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, equipment and specialist needs would be the same for both corrective action alternatives (see the CAA; Gradient, 2022a). Residual plume management under the Source Control-GWE alternative would require specialists to manage the extraction system throughout its construction and operational period. • Construction of the groundwater extraction system (*i.e.*, the trench and settling pond) on the Site is not expected to require specialized contractors or equipment. Shallow collection trenches are routinely constructed by earthwork contractors in central and southern Illinois. • This alternative would necessitate the use of equipment and the expertise of specialists for tasks such as field data collection, groundwater sampling, analysis, and periodic corrective action

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
		groundwater monitoring and reporting. Similar to those in the GWP alternative, these activities are already being conducted as part of routine groundwater monitoring in accordance with IAC Section 845.220(c)(4).
Available Capacity and Location of Needed Treatment, Storage, and Disposal Services/Comply with Standards for Management of Wastes as Specified in Section 845.680(d) (Section 2.3.5; IAC Section 845.670 (e)(3)(E) /IAC Section 845.670(d)(5))	No treatment, storage, or disposal services would be required for the Source Control-GWP alternative, as GWP would not generate any significant volume of waste or wastewater.	Residual plume management for the Source Control-GWE alternative would require the construction of the extraction trench system, which would generate spoils during the construction phase, and the waste materials would be used as subgrade fill beneath the GMF GSP final cover system during the closure construction. Extracted groundwater would be treated at an on-Site settling pond. Treated water in the settling pond would be conveyed to a NPDES permitted outfall.
The Degree to Which Community Concerns Are Addressed by the Remedy (Section 2.4; IAC Section 845.670(e)(4))	The combination of source control (*i.e.*, CIP using a consolidate-and-cap approach) with residual plume management would cause groundwater concentrations to decline over time under both of the corrective action alternatives, as suggested by the groundwater modeling (Ramboll, 2022), thus addressing community concerns. A public meeting was held on May 1, 2025, pursuant to requirements under IAC Section 845.660(d). Questions raised by attendees were addressed at the meeting; a written summary of the questions and responses were prepared.	The combination of source control (*i.e.*, CIP using a consolidate-and-cap approach) with residual plume management would cause groundwater concentrations to decline over time under both of the corrective action alternatives, as suggested by the groundwater modeling (Ramboll, 2022), thus addressing community concerns. A public meeting was held on May 1, 2025, pursuant to requirements under IAC Section 845.660(d). Questions raised by attendees were addressed at the meeting; a written summary of the questions and responses were prepared.
Remove from the Environment as Much of the Contaminated Material That Was Released from the CCR Surface Impoundment as Is Feasible, Taking into Account Factors Such as Avoiding Inappropriate Disturbance of Sensitive Ecosystems (Section 2.5;	There have been no known releases of CCR at the GMF GSP. Both potential corrective action alternatives would have source control and residual plume management efforts. The source control would include a consolidate-and-cap approach to limit the infiltration of precipitation into the impounded CCR.	There have been no known releases of CCR at the GMF GSP. Both potential corrective action alternatives would have source control and residual plume management efforts. The source control would include a consolidate-and-cap approach to limit the infiltration of precipitation into the impounded CCR.

Evaluation Factor (Report Section; Part 845 Section)	Source Control-GWP	Source Control-GWE
IAC Section 845.670(d)(4))	Additionally, residual plume management under the Source Control-GWP alternative would address impacted groundwater by relying on physical and geochemical attenuation processes to reduce the residual concentrations of CCR-derived constituents in groundwater. Site specific evaluations demonstrate that attenuation via sorption onto mineral surfaces should remain stable under post-closure conditions, and remobilization is unlikely to impact the time to achieve GWPS (Geosyntec Consultants, Inc., 2025). No ecosystems would be disturbed because no construction activities are expected under the Source Control-GWP alternative.	Additionally, residual plume management under the Source Control-GWE alternative would rely on the extraction trench to reduce or prevent migration of impacted groundwater. The construction activities would likely result in some negative impacts to the ecosystem, including disturbance of some existing habitat atop and near the construction areas. However, the construction would be restricted within the footprint of the GMF GSP and the associated risks would be low.

Notes:
CCR = Coal Combustion Residual; CIP = Closure-in-Place; GHG = Greenhouse Gas; GMF = Gypsum Management Facility; GSP = Gypsum Stack Pond; GWPS = Groundwater Protection Standard; IAC = Illinois Administrative Code; IEPA = Illinois Environmental Protection Agency; NPDES = National Pollutant Discharge Elimination System; Source Control-GWP = Source Control with Groundwater Polishing; Source Control-GWE = Source Control with Groundwater Extraction.

1 Introduction

1.1 Site Description and History

1.1.1 Site Location and History

Illinois Power Generating Company's (IPGC) Coffeen Power Plant (CPP) is located about two miles south of the City of Coffeen, Illinois. The plant is an electric power generating facility with coal-fired units situated approximately between two lobes of Coffeen Lake. Historically, three room and pillar coal mines operated within the boundaries of the Site. From south to north, they are the Hillsboro Mine, which operated from 1964 to 1983; the Clover Leaf No. 1 Mine, which operated from 1889 to 1901; and the Clover Leaf No. 4 Mine, which operated from 1906 to 1924 (Ramboll, 2021a; ISGS and University of Illinois at Urbana-Champaign, 2011). The CPP operated from 1964 to November 2019 when it was retired (Ramboll, 2021a,b).

1.1.2 CCR Impoundment

The CPP produced and stored coal combustion residuals (CCRs) as a part of its historical operations. There are two gypsum management facility (GMF) units at this facility: (1) the GMF Gypsum Stack Pond (GSP); Vistra ID No. CCR Unit 103, Illinois Environmental Protection Agency (IEPA) ID No. W1350150004-03, and National Inventory of Dams (NID) ID No. IL50579, and (2) the GMF Recycle Pond (RP); Vistra ID No. CCR Unit 104, IEPA ID No. W1350150004-04, and NID ID No. IL50578). The subject of this report is the GMF GSP.

The GMF GSP (Figure 1.1) is a 36-acre surface impoundment constructed in 2010 to manage synthetic gypsum generated by the wet scrubber system and recycled process water from the plant (Ramboll, 2021a,b). It operated from 2010 until 2021 (Ramboll, 2021a,b). The GMF GSP received effluent from the CPP. Clear water discharge from the GMF GSP flowed south to the GMF RP *via* a 580 ft lined transfer channel and a low-flow high-density polyethylene (HDPE) pipe beneath the transfer channel (Golder Associates USA, Inc., 2022). The GMF GSP is a modern, double-lined, and state-permitted CCR surface impoundment (AECOM, 2016). The basal liner system of the GMF GSP is composed of a composite 60-mil HDPE geomembrane primary liner system, a granular leak detection/leachate collection system with internal piping and drains to collect contact water seeping through the primary liner, and a 36 in layer of compacted clay secondary liner system (AECOM, 2016; Ramboll, 2021a,b, Appendix B).

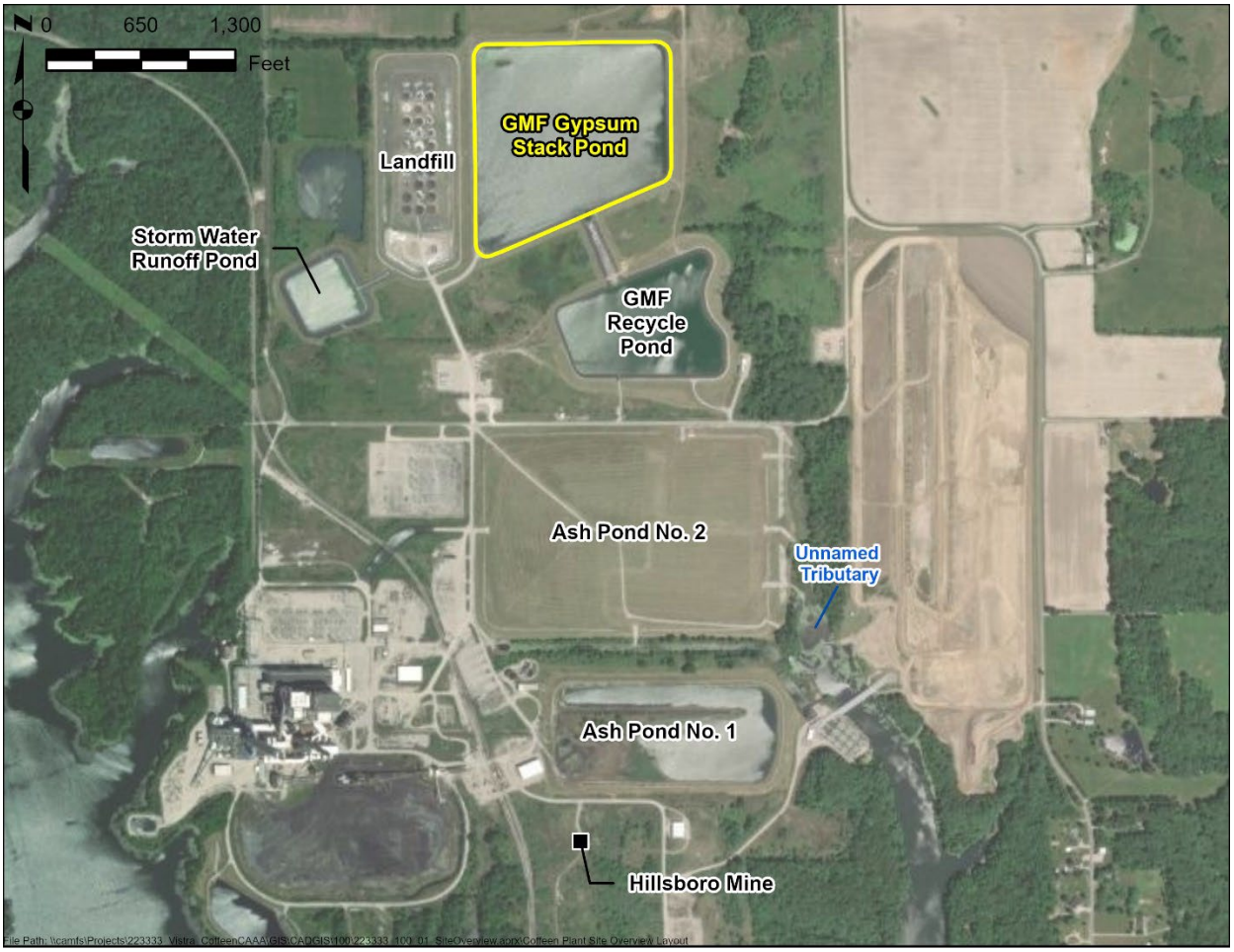

Figure 1.1 Site Location Map. Adapted from Ramboll (2021a).

1.1.3 Surface Water Hydrology

The CPP is bordered by Coffeen Lake to the west, south, and east. Additionally, to the east, the CPP is also bordered by the Unnamed Tributary, which flows south into the eastern lobe of Coffeen Lake. The facility is permitted to discharge to Coffeen Lake under NPDES Permit No. IL 0000108 and an emergency spillway is located in the northeast corner of the GMF RP (Ramboll, 2021b). The GMF GSP is located within the Shoal Creek Watershed (Hydrologic Unit Code [HUC] 07140203) and the outer perimeters of the impoundments is located 400 ft west of the Unnamed Tributary (Ramboll, 2021a,b). There are several unnamed freshwater ponds and wetlands in the vicinity of the GMF GSP (Ramboll, 2021a,b).

The 1,100-acre Coffeen Lake was built by damming the McDavid Branch of the East Fork of Shoal Creek to aid with cooling for the facility (Ramboll, 2021a,b). The IEPA classifies Coffeen Lake as a General Use Water (IEPA, 2007), meaning that it is designated for aquatic life and use in primary contact recreation; however, it is not designated for use in food processing or as a public water supply. Coffeen Lake (Assessment Unit ID IL_ROG) is listed on the 2018 Illinois Section 303(d) List as being impaired for fish consumption due to mercury (IEPA, 2019; US EPA, 2022). In addition, in 2007, US EPA approved a Total Maximum Daily Load (TMDL) for phosphorus to address aesthetic quality impairments in Coffeen Lake due to excess algae and total suspended solids (IEPA, 2007).

1.1.4 Hydrogeology

The geology underlying the Site in the vicinity of the GMF GSP consists of several distinct layers (Ramboll, 2021a,b).

- **Upper Confining Unit (UCU):** The UCU underlies the GMF GSP. It consists of the Loess Unit and the upper portion of the Hagarstown Member which has low permeability clays and silts with generally greater than 60 percent fines. The UCU was encountered across most of the CPP Site, except near the Unnamed Tributary, where the unit was eroded, or where it has been excavated for construction.
- **Uppermost Aquifer (UA):** The UA is composed of moderately permeable sands, silty sand, and clayey gravel of the Hagarstown Member and, in some portions of the Site, the upper weathered portion of the Vandalia Member. The UA unit is missing in several locations due to both excavation and weathering.
- **Lower Confining Unit (LCU):** The LCU underlies the UA. It consists of three low hydraulic conductivity soils: the sandy clay till of the Vandalia Member, the silt of the Mulberry Grove Formation, and the compacted clay till of the Smithboro Member.
- **Deep Aquifer (DA):** The DA is a thin (generally less than 5 ft thick), discontinuous unit composed of sands and silty sands.
- **Deep Confining Unit (DCU):** The DCU underlies the DA. It consists of the Lierle Clay of the Banner Formation and acts as an aquitard due to its low hydraulic conductivity.

There is a groundwater flow divide within the UA in the center of the CPP property between the two lobes of Coffeen Lake. Groundwater in the UA flows from the center of the CPP property west toward Coffeen Lake and east toward the Unnamed Tributary. Groundwater predominantly flows east/southeast across the GMF GSP to the Unnamed Tributary; however, the western side of the GMF GSP aligns with the groundwater divide and groundwater in this area flows west toward Coffeen Lake. The Unnamed Tributary serves as a regional sink for shallow groundwater discharge and shallow groundwater migration beneath or beyond the tributary is unlikely (Ramboll, 2021a). Groundwater flow within the UA is mostly in the horizontal direction because the UA is underlain by the low-permeability LCU (Ramboll, 2021a).

During groundwater interaction with surface water, CCR-derived constituents may partition between sediments and the surface water column. It should be noted that many CCR-derived constituents occur naturally in sediments and surface water (and can also arise from other industrial sources). As a result, their presence in the sediments and/or surface water of the Coffeen Lake and the Unnamed Tributary does not necessarily signify contributions from the GMF GSP.

1.1.5 Site Vicinity

The CPP property is bordered by Coffeen Lake to the west and south, by the Unnamed Tributary and Coffeen Lake to the east, and by agricultural land to the north (Ramboll, 2021a, Figure 1.1). Coal mining operations occurred in the vicinity of the GMF GSP from 1906 until 1983. Three mines were identified within a 1,000-meter (m) radius of the GMF GSP. From north to south, they are the Clover Leaf No. 1 Mine (Illinois State Geological Survey [ISGS] Mine No. 3001), which operated from 1889 to 1901; the Clover Lead No. 4 Mine (ISGS Mine No. 442), which operated from 1906 to 1924; and the Hillsboro Mine (ISGS Mine No. 871), which operated from 1964 to 1983 (Ramboll, 2021a,b; ISGS and University of

Illinois at Urbana-Champaign, 2011). The GMF GSP partially overlies the southern extent of the Clover Leaf No. 4 Mine.

Although the area surrounding the CPP is predominantly agricultural, Coffeen Lake and the surrounding land are used for recreational activities. Since 1986, Coffeen Lake State Fish and Wildlife Area (SFWA) has been open to the public under a lease and management agreement between the Illinois Department of Natural Resources (IDNR) and Illinois Power Generating Company (IPGC) (IDNR, 1999). To the north of the CPP, there are walking and hiking trails and bank fishing. Coffeen Lake is also used for fishing and picnicking on the western shore. Based on a review of the IDNR Historic Preservation Division database and the Illinois State Archaeological Survey database, there are no historic sites located within 1,000 m of the GMF GSP (Ramboll, 2021a,b).

1.2 Part 845 Regulatory Review and Requirements

Title 35, Part 845 of the Illinois Administrative Code (IAC) (IEPA, 2021) requires that a Corrective Action Alternatives Analysis (CAAA) be performed as part of the remedy selection, prior to undertaking any corrective actions at certain CCR-containing impoundments where exceedances of GWPSs have been identified. Because exceedances[2] of GWPSs in groundwater associated with the GMF GSP have been identified for sulfate (Appendix D, Ramboll, 2024), this report presents a CAAA for the GMF GSP pursuant to the requirements under IAC Section 845.670. The goal of a CAAA is to holistically evaluate a range of factors for the various corrective actions being considered at an impoundment, including the efficiency, reliability, and ease of implementation of the corrective action; its potential positive and negative short- and long-term impacts on human health and the environment; and its ability to address concerns raised by the community (IEPA, 2021). A CAAA is a decision-making tool that is designed to aid in the selection of a corrective action alternative.

[2] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or Groundwater Protection Standards (GWPS) as described in the proposed groundwater monitoring program, which was submitted to IEPA on October 25, 2021, as part of IPRG's operating permit application for the AP (Burns & McDonnell, 2021). That operating permit application, including the proposed groundwater monitoring program, remains under review by IEPA and therefore IPRG has not identified any actual exceedances.

2 Corrective Action Alternatives Analysis

This section presents the CAAA pursuant to requirements under IAC Section 845.670 (IEPA, 2021). The goal of a CAAA is to fully evaluate proposed viable corrective measures that were identified in the CMA. The CAAA evaluates potential corrective actions with respect to a wide range of factors, including the performance, reliability, and ease of implementation of the corrective action; its potential impacts on human health and the environment; and its ability to address concerns raised by the community (IEPA, 2021).

Per IAC Section 845.670(d) (IEPA, 2021), any corrective actions selected under a Corrective Action Plan must:

1. Be protective of human health and the environment;
2. Attain the groundwater protection standards specified in Section 845.600;
3. Control the sources of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents listed in Section 845.600 into the environment;
4. Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, considering factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
5. Comply with standards for management of wastes as specified in Section 845.680(d).

At the GMF GSP, a CAAA is required because groundwater monitoring associated with the GMF GSP identified exceedances of the GWPSs. Groundwater monitoring was conducted in accordance with the proposed groundwater monitoring plan (GMP) between 2015 and 2023 (Appendix D, Ramboll 2024). The groundwater samples collected from groundwater compliance monitoring wells were used to monitor groundwater quality and evaluate compliance with the groundwater quality standards listed in IAC Section 845.600(a). As of the date of this report, sulfate was identified as a constituent detected in groundwater at a concentration in excess of its GWPS (Appendix D, Ramboll 2024).

Two potentially viable corrective actions for the GMF GSP were selected in the CMA for further consideration in this CAAA. The corrective actions alternatives that are considered in this CAAA are Source Control with Groundwater Polishing (Source Control-GWP) and Source Control with Groundwater Extraction (Source Control-GWE). Both of these corrective action alternatives are described below in Section 2.1.

2.1 Corrective Action Alternatives Descriptions

For both corrective actions evaluated in this CAAA, source control is the primary remedy. US EPA has stated that source control is the most effective means of ensuring the timely attainment of remediation objectives (US EPA, 2015b). The source control for the GMF GSP consists of closure-in-place (CIP) using a consolidate-and-cap approach. Specific elements of this approach include:

- Unwatering and dewatering of the impoundment *via* pumping and the construction of drilled sumps, engineered trenches, and/or horizontal wells. If needed, perimeter drains would be used to

pump and lower the groundwater level beneath the GMF GSP. Pumped water would be sent to the existing drainage system to the east of the GMF GSP and managed in accordance with the NPDES permit for the facility.

- Excavation and consolidation of approximately 296,000 cubic yards (CY) of CCR and 38,000 CY of clayey soil from the southern portion of the GMF GSP and relocation of it into the northern portion of the GMF GSP.
- Construction of a berm with a composite liner system consisting of a 60-mil HDPE geomembrane overlying a compacted clay layer that would be oriented east-west on the south end of the consolidated footprint.
- Removal and disposal of the existing liner system, components of the process water recovery system, and subsoil with CCR staining (up to 1 ft) within the consolidated footprint.
- Construction of an alternative cover system consisting of a 40-mil low-density polyethylene (LLDPE) geomembrane layer, a nonwoven geotextile cushion, and 24 in of protective soil cover suitable for supporting vegetative growth.
- Contouring and grading to manage stormwater.

These source control activities would result in a reduction of the final impoundment footprint from 36 acres to approximately 12.4 acres (Appendix B; Ramboll, 2025b). A low permeability final geomembrane cover system consisting of a 40-mil LLDPE geomembrane layer, a geocomposite drainage layer, a nonwoven geotextile cushion, and 24 in of protective soil cover would be installed over the closed portion of the GMF GSP. This approach results in CCR within the GMF GSP being contained with a modern, engineered liner on all sides. These measures (installation of a geosynthetic cap and consolidation of CCR) will control to the maximum extent feasible the migration of CCR constituents to groundwater, thus facilitating the achievement of the GWPSs in accordance with IAC Section 845.600. As demonstrated by the groundwater modeling in support of the CAA (Gradient, 2022a), the time to achieve GWPSs would be approximately 6 years in all wells within the existing GMF GSP monitoring well network after source control is complete (Appendix B, Ramboll, 2025b).

In addition to source control, the corrective actions evaluated in this CAAA include residual plume management. Two potential corrective actions, identified as viable in the CMA, are evaluated in this CAAA for the GMF GSP:

- **Alternative 1:** Source Control with Groundwater Polishing (Source Control-GWP)
- **Alternative 2:** Source Control with Groundwater Extraction (Source Control-GWE)

For both potential corrective action alternatives, adaptive site management strategies would be integrated into residual plume management. This approach ensures the timely incorporation of new Site information throughout the corrective action process in order to optimize the remediation and expedite achievement of the GWPSs. As part of the adaptive site management approach, system performance and residual plume conditions would be monitored throughout the implementation of the selected corrective action. If groundwater concentrations do not respond as expected to the corrective action, the adaptive site management approach would enable prompt adjustments, optimizations, or replacement of the remedy to ensure overall effectiveness.

2.1.1 Alternative 1: Source Control-GWP

The first corrective action alternative is Source Control-GWP. This remedy includes source control combined with residual plume management based on natural physical and geochemical processes that would reduce groundwater concentrations downgradient of the GMF GSP. GWP mechanisms were evaluated using geochemical speciation and reaction models. The primary objective of the geochemical model was to support the evaluation of GWP as a potential remedy for the Site. The model focused on evaluating the dominant geochemical reactions that may occur at time scales relevant to groundwater flow, including adsorption and mineral dissolution/precipitation reactions (*i.e.*, iron and aluminum hydroxides, carbonates, and some sulfates) (Appendix E; Geosyntec Consultants, Inc., 2025). Model inputs included geochemically reactive solid mineral phases, downgradient groundwater composition, and background groundwater composition derived from Site-specific data. Speciation models analyzed the distribution of chemical constituents between solid and aqueous phases, while reaction models assessed how these distributions may shift in response to changing Site conditions (US EPA, 2015b).

Components of residual plume management for this Source Control-GWP alternative include:

- Groundwater concentrations would be reduced in the downgradient plume as a result of physical and geochemical attenuation processes. Site-specific evaluations have shown that GWP would reduce the groundwater concentrations and mobility of inorganic contaminants under post-closure conditions. Specifically, chemical attenuation of contaminants is feasible *via* sorption to aquifer solids, particularly iron and aluminum oxides. Attenuation *via* sorption onto mineral surfaces should remain stable under future conditions, and remobilization is unlikely to impact the time to achieve GWPS as groundwater returns to background conditions for sulfate. (Appendix E; Geosyntec Consultants, Inc., 2025).
- Corrective action groundwater monitoring using a groundwater monitoring system designed in accordance with IAC Section 845.680(c), which would be installed within the groundwater plume;
- Adaptive site management strategies for this alternative would include geochemical modeling. Groundwater monitoring results would be evaluated and compared to the model-predicted concentrations. In situations in which observed groundwater concentrations deviate significantly from modeled conditions, alternative methods or techniques would be evaluated, and if viable, incorporated as per IAC Section 845.680(b).
- Corrective action confirmation groundwater sampling would be performed for 3 years after GWPSs have been achieved.
- Following the completion of the corrective action confirmation monitoring period, a report and certification for Corrective Action Completion would be prepared and submitted to IEPA as per IAC Section 845.680(e).

The overall corrective action implementation duration for this alternative is approximately 9.5 years after source control is complete and a corrective action permit has been issued by IEPA, whichever is later (Appendix B; Ramboll, 2025b), including:

- Approximately 6 years (72 months) of corrective action monitoring (*i.e.*, time to meet GWPSs);
- At least 3 years (36 months) of corrective action confirmation monitoring;[3] and

[3] It should be noted that post-closure care groundwater monitoring would continue for a minimum of 30 years as required by IAC Section 845.780(c).

- Approximately 6 months associated with post-closure reporting.

Although source control (*i.e.*, CIP) is a primary component of the corrective action, the labor time, equipment usage, and mileage linked to source control were previously estimated in the Closure Alternative Analysis (CAA) (Gradient, 2022a) and are not repeated in this analysis. Moreover, there is no labor and mileage incurred with the residual plume management under the Source Control-GWP alternative, because no construction would be required under this alternative. Mileage and labor associated with corrective action monitoring was not included in this analysis (Appendix B; Ramboll, 2025b).

2.1.2 Alternative 2: Source Control-GWE

The second corrective action alternative is Source Control-GWE. This remedy includes source control (*i.e.*, CIP using a consolidate-and-cap approach) with a groundwater extraction trench as the residual plume management approach. This residual plume management approach would include the construction of an extraction trench extending along the interior toe of the former perimeter dikes of the GMF GSP, installation of collection pipe in the trench, backfilling with clean fill, and placement of a compacted clay cap to reduce infiltration (Appendix B, Ramboll, 2025b). The groundwater extraction trench would be located in portions of the GMF GSP that would be excavated. The trench would extend from the ground surface to a depth of approximately 5 ft bgs, so that the trench would extend just below the bottom of the UA (approximately an elevation of 605 ft).[4] The total length of the trench would be about 1,600 ft, and the width of the trench would be about 2 to 3 ft. This corrective action alternative would also integrate and upgrade the existing drainage channel located east of the GMF GSP. Construction would involve excavating subgrade soils, installing a collection pipe within the trench, backfilling the trench with clean fill, and placing a clay cap on top of the trench to minimize infiltration into the trench. Groundwater that is captured would be pumped to a new on-Site lined settling pond and discharged through a outfall to Coffeen Lake and would be managed by a National Pollutant Discharge Elimination System (NPDES) permit for the Site (IEPA, 2023).

Implementation of the Source Control-GWE is expected to include various tasks across three major phases: pre-construction activities (Phase 1), corrective action construction (Phase 2), and corrective action operations, maintenance, and closeout (Phase 3). The activities associated with each of these phases are summarized below:

- **Phase 1:** Pre-construction activities including obtaining permits from agencies, and completing Site investigations and engineering designs;
- **Phase 2:** Construction of the extraction trench, settling pond, and minor Site restoration of disturbed areas;
    - Mobilization of equipment and materials to the Site, and preparation for Site construction, such as installation of stormwater best management practices (BMPs), construction of a staging area and a level working platform, and/or temporary access roads;
    - The extraction trench would be constructed using conventional trenching methods by excavating subgrade soils, placing collection piping and pumps, and backfilling the trench. Excavated spoils would be used as contouring fill beneath the final GMF GSP cover system;
    - The 1-acre, geomembrane-lined settling pond would be constructed to manage extracted groundwater using conventional construction equipment; although other groundwater treatment and management technologies may be evaluated during a later phase of design.

[4] All elevations in this report are in the North American Vertical Datum of 1988 (NA_VD88), unless otherwise noted. The actual elevation may be variable based on the thickness of UA at the particular location (Appendix B).

Underground trenches with HDPE piping would be constructed to convey extracted groundwater from the trench to the settling pond and ultimately to an appropriate NPDES outfall. This would require installation of electrical, mechanical, and pneumatic infrastructure to operate the conveyance piping system;

- Site restoration would be completed following the construction of the extraction trench and settling pond.

- **Phase 3:** Operations, Maintenance (O&M), and Closeout of the groundwater extraction system. Details pertaining to each of these activities are outlined below.
  - Continuous operation of the GWE system;
  - Corrective action O&M would involve routine maintenance of extraction pumps, air compressor, and other system components; non-routine maintenance would include repair or replacement of the system components, flushing or jetting of water conveyance lines to remove accumulated organic or inorganic solids from the interior walls;
  - Monitoring of extracted groundwater under the NPDES permit;
  - Adaptive site management strategies would be employed to track remediation progress and incorporate new Site information to assure the achievement of the GWPSs;
  - Corrective action monitoring would be performed using a corrective action groundwater monitoring network designed in accordance with IAC Section 845.680(c), which would be installed within the plume that lies beyond the facility boundary;
  - Following the completion of the corrective action confirmation monitoring period, a report and certification for Corrective Action Completion would be prepared and submitted to IEPA as per IAC Section 845.680(e).

The overall corrective action implementation duration is approximately 12 to 14 years (Appendix B; Ramboll, 2025b) including:

- Approximately 2.5 to 3.5 years (30 to 42 months) of pre-construction activities (Phase 1; assumed to occur concurrently with source control),
- Approximately 4 to 8 months of corrective action construction (Phase 2; assumed to occur concurrently with source control), and
- Approximately 10 years (114 months) of O&M and closeout (Phase 3; assumed to start after completion of the source control or a corrective action construction permit application has been issued by IEPA, whichever is longer):
  - It is estimated to include 6 years (72 months) of corrective action monitoring (*i.e.*, time to meet GWPSs), at least 3 years (36 months) of corrective action confirmation monitoring,[5] and 6 months associated with post-closure reporting.

[5] It should be noted that post-closure care groundwater monitoring would continue for a minimum of 30 years or until such time as GWPSs are achieved, whichever is longer, as required by IAC Section 845.780(c).

Key parameters for the Source Control-GWE corrective action alternative are shown in Table 2.1, below.

Table 2.1 Key Parameters for the Source Control-GWE Corrective Action Alternative[a]

Parameter[b]	Value[c]
Labor Hours	
Total On-Site Labor	5,110 hours
Total Off-Site Labor	0 hours
40% Contingency	2,040 hours
Total Labor Hours:	7,150 hours
Vehicle and Equipment Travel Miles	
Vehicles On-Site	3,340 miles
On-Site Haul Trucks (Unloaded + Loaded)	3,320 miles
Labor Mobilization	38,100 miles
Equipment Mobilization (Unloaded + Loaded)	19,000 miles
Off-Site Haul Trucks (Unloaded + Loaded)	10,400 miles
Material Deliveries (Unloaded + Loaded)	15,200 miles
Total On-Site Vehicle and Equipment Travel Miles:	6,660 miles
Total Off-Site Vehicle and Equipment Travel Miles:	82,700 miles
Total Vehicle and Equipment Travel Miles:	89,300 miles

Notes:
Source Control-GWE = Source Control with Groundwater Extraction.
(a) Although source control (*i.e.*, closure-in-place [CIP]) is a primary component of the corrective action, the labor time, equipment usage, and mileage linked to source control were previously estimated in the Closure Alternative Analysis (CAA) and are not repeated in this analysis.
(b) Site activities are expected to occur during the corrective action construction and operation and maintenance phases for this alternative.
(c) Values reported in this table were rounded to reflect 3 significant figures.
Source: Appendix B, Ramboll, 2025b.

2.2 Long- and Short-Term Effectiveness and Protectiveness of Corrective Action Alternative (IAC Section 845.670(e)(1))

2.2.1 Magnitude of Reduction of Existing Risks (IAC Section 845.670(e)(1)(A))

There are no current unacceptable risks to human or ecological receptors at this Site associated with the GMF GSP (Appendix A; Gradient, 2022b). Because current conditions do not present a risk to human health or the environment at the GMF GSP, there will be no unacceptable risk to human health or the environment for future conditions when the unit has been closed and source control has been implemented. Concentrations of CCR-derived constituents will decline over time and, consequently, potential exposures to CCR-derived constituents in the environment will also decline. As a result of this, the magnitude of the reduction of existing risks is the same for the two potential corrective action alternatives (IAC Section 845.670(e)(1)(A)), and both corrective action alternatives are equally protective of human health and the environment (IAC Section 84.670(d)(1)).

2.2.2 Effectiveness of the Remedy in Controlling the Source (IAC Section 845.670(e)(2)/IAC Section 845.670(d)(3))

Extent to Which Containment Practices Will Reduce Further Releases/Control the Sources of Releases to Reduce or Eliminate, to the Maximum Extent Feasible (IAC Section 845.670(e)(2)(A)/IAC Section 845.670(d)(3))

Source control (*i.e.*, CIP using a consolidate-and-cap approach), which includes removal of free liquids, consolidation of CCR in the GMF GSP into the northern portion of the impoundment and the installation of a low-permeability final cover system designed to limit the infiltration of precipitation into the impounded CCR, would be implemented for both corrective action alternatives. This approach would remove water currently retained within the impoundment and result in the CCR being encapsulated on all sites by modern, engineered liner systems. This would further reduce the hydraulic flux through the CCR (Ramboll, 2022). Because source control would be undertaken at the Site prior to the implementation of any residual plume management, both corrective action alternatives would remove the potential for CCR within the impoundment to impact groundwater. Both corrective action alternatives would therefore be equally and fully protective with regard to source control. The effectiveness of the corrective action alternatives with respect to residual source control are summarized as follows:

- Under the Source Control-GWP alternative, the attenuation of dissolved constituent concentrations remaining after source control would be achieved through natural physical and geochemical processes. Site-specific evaluations have shown that GWP would reduce the groundwater concentrations and mobility of inorganic contaminants under post-closure conditions. Specifically, chemical attenuation of contaminants is feasible *via* sorption to aquifer solids, particularly iron and aluminum oxides under current conditions. Attenuation *via* sorption onto mineral surfaces should remain stable as groundwater returns to background conditions, and remobilization is unlikely to impact the time to achieve GWPS for sulfate (Appendix E; Geosyntec Consultants, Inc., 2025). In cases in which observed groundwater concentrations deviate significantly from modeled conditions, alternative methods or techniques would be evaluated under the adaptive site management program, and if viable, incorporated as per IAC Section 845.680(b).
- Under the Source Control-GWE alternative, residual contamination control would be achieved by extracting impacted groundwater and preventing downgradient migration through installation of an extraction trench along the interior toe of the former perimeter dikes of the GMF GSP. GWE is a widely used corrective measure that has been effectively implemented at many sites to contain and capture dissolved-phase groundwater plumes. Physical and geochemical attenuation would also help control secondary sources and prevent downgradient migration. In cases in which observed groundwater concentrations deviate significantly from modeled conditions, alternative methods or techniques would be evaluated under the adaptive site management plan, and if viable, incorporated as per IAC Section 845.680(b).

Both corrective action alternatives include source control and residual plume management. Thus, both potential corrective action alternatives would be effective at reducing releases from both primary and residual sources IAC Section 845.670(e)(2)(A)/IAC Section 845.670(d)(3)).

Extent to Which Treatment Technologies May Be Used (IAC Section 845.670(e)(2)(B))

Because Source Control-GWP would rely on physical and geochemical processes, no additional treatment technologies would be required. For the Source Control-GWE alternative, extracted groundwater would

be managed and treated by a newly constructed on-Site settling pond to remove solids, prior to discharge *via* a NPDES-permitted outfall to Coffeen Lake. For both corrective action alternatives, remedy optimizations would be implemented, if necessary, under the adaptive site management program.

2.2.3 Likelihood of Future Releases of CCR (IAC Section 845.670(e)(1)(B))

Both corrective action alternatives include source control using CIP with a consolidate-and-cap approach. Free liquids would be removed, a new cover system would be installed, which consists of a 40-mil linear low-density polyethylene (LLDPE) geomembrane layer, a nonwoven geotextile cushion, and 24 in of protective soil cover. The new cover system would tie into the existing basal liner system, which includes a geomembrane primary liner, a leachate collection/leak detection system, and a compacted clay secondary liner system (AECOM, 2016). Non-contact stormwater would be directed to flow off Site *via* a drainage channel. Relative to current conditions, this cover system would provide increased protection against berm and surface erosion, precipitation infiltration, and other adverse effects that could potentially trigger a release of CCR. There would be minimal risk of accidental CCR releases occurring post-closure under any of the corrective action alternatives.

2.2.4 Type and Degree of Long-Term Management, Including Monitoring, Operation, and Maintenance (IAC Section 845.670(e)(1)(C))

The type and degree of long-term residual groundwater plume management associated with both corrective action alternatives are summarized as follows:

- The Source Control-GWP alternative would not require the installation, operation, or maintenance of any engineered systems or structures. The only long-term management activity required under this alternative would be regular groundwater monitoring and routine maintenance of the monitoring wells, which would continue at least 3 years after GWPSs have been achieved for all wells, in accordance with IAC Section 845.680(c)(2). Post-closure care groundwater monitoring would continue for a minimum of 30 years as required by IAC Section 845.780(c). Based on the adaptive site management approach, remedy optimization (additional methods or techniques) may be implemented to ensure the achievement of the GWPSs.
- The Source Control-GWE alternative would require the construction of the groundwater extraction trench. Multiple tasks would be completed over three phases: pre-construction activities (Phase 1), corrective action construction (Phase 2), and corrective action O&M, and closeout (Phase 3). Once pre-construction activities are completed, construction of the extraction trench would occur during the latter stages of the GMF GSP closure. This approach allows for the spoils generated from the extraction trench construction to be disposed beneath the final cover system of the GMF GSP. Corrective action O&M would require regular inspection and maintenance of the extraction trench system, such as extraction pumps, filter system, and other system components. Extracted groundwater would be managed and treated by a newly-constructed on-Site settling pond before discharge *via* a NPDES outfall to Coffeen Lake. Additionally, corrective action groundwater sampling and routine maintenance of the monitoring well network would continue for at least 3 years after GWPSs have been achieved at all wells, in accordance with IAC Section 845.680(c)(2). Post-closure care groundwater monitoring would continue for a minimum of 30 years as required by IAC Section 845.780(c). Based on the adaptive site management approach, remedy optimization (additional methods or techniques) may be implemented to ensure the achievement of the GWPSs.

2.2.5 Short-Term Risks to the Community or the Environment During Implementation of Remedy (IAC Section 845.670(e)(1)(D))

2.2.5.1 Safety Impacts

Best practices would be employed during construction in order to ensure worker safety and comply with all relevant regulations, permit requirements, and safety plans. However, it is impossible to completely eliminate risks to workers during construction and/or other corrective action activities. For example, injuries and fatalities can occur due to truck accidents or equipment malfunctions. Truck accidents that occur off-Site can also result in injuries or fatalities to community members. The safety impacts associated with source control, which were evaluated in the CAA (Gradient, 2022a), are the same for both corrective action alternatives. The safety impacts associated with residual plume management (*i.e.*, construction and O&M) for each corrective action alternative are described below.

- The Source Control-GWP alternative would not require the construction and maintenance of any engineered systems or structures, and therefore no safety impacts are expected.
- The Source Control-GWE alternative would include the construction of a groundwater extraction trench system to collect and extract CCR-impacted groundwater downgradient. Potential safety concerns would be related to the construction and O&M of the extraction trench and settling pond.

Worker Risks

On-Site accidents include injuries and deaths arising from the use of heavy equipment and/or earthmoving operations during Site activities. Off-Site accidents include injuries and deaths due to vehicle accidents during labor and equipment mobilization/demobilization, as well as materials/supplies hauling and deliveries.

As discussed in section 2.1.1, there are no construction activities or operational requirements associated with residual plume management for the Source Control-GWP alternative. As shown in Tables 2.1, Ramboll estimates that residual plume management for the Source Control-GWE corrective action alternative would require 5,110 on-Site labor hours (Appendix B; Ramboll, 2025b). The US Bureau of Labor Statistics (US DOL, 2020a, b) provides an estimate of the hourly fatality and injury rates for construction workers. Based on the accident rates reported by the US Bureau of Labor Statistics and the on-Site labor hours reported in Appendix B, we estimate that approximately 5.3×10^{-2} worker injuries and 4.6×10^{-4} worker fatalities would occur on-Site under the Source Control-GWE corrective action alternative (Table 2.2). No worker accidents would be expected under the Source Control-GWP alternative. The number of on-Site worker accidents is therefore expected to be higher under the Source Control-GWE alternative.

Table 2.2 Expected Number of On-Site Worker Accidents Under Each Corrective Action Alternative[a,b]

Corrective Action Alternative	Injuries	Fatalities
Source Control-GWP	0	0
Source Control-GWE	5.3×10^{-2}	4.6×10^{-4}

Notes:
Source Control-GWE = Source Control with Groundwater Extraction; Source Control-GWP = Source Control with Groundwater Polishing.
(a) Although source control (*i.e.*, control-in-place [CIP]) is a primary component of the corrective action, the worker accidents associated with source control were previously estimated in the Closure Alternative Analysis (CAA) and are not repeated in this analysis.
(b) Worker accidents associated with groundwater sampling and monitoring are not included in this analysis for any of the alternatives.

Off-Site, a greater number of haul truck miles, labor and equipment mobilization/demobilization miles, and material delivery miles would be required under the Source Control-GWE (Tables 2.1). For residual plume management under the Source Control-GWE corrective action alternative, 82,700 total off-Site vehicle and equipment travel miles would be required. No off-Site travel miles would be expected under the Source Control-GWP alternative (Appendix B; Ramboll, 2025b). The United States Department of Transportation (US DOT) provides estimates of the expected number of fatalities and injuries "per vehicle mile driven" for drivers and passengers of large trucks and passenger vehicles (US DOT, 2023). Table 2.3 shows the expected number of off-Site accidents under each corrective action alternative due to all categories of off-Site vehicle usage. For these calculations, it was assumed that labor mobilization/demobilization would rely upon passenger vehicles (cars or light trucks, including pickups, vans, and sport utility vehicles) and that hauling, equipment mobilization/demobilization, and material deliveries would rely upon large trucks. Based on US DOT's accident statistics and the mileage estimates in Appendix B, an estimated 3.2×10^{-2} worker injuries and 1.1×10^{-3} worker fatalities would be expected to occur due to off-Site activities under the Source Control-GWE alternative. No worker accidents would be expected under the Source Control-GWP alternative.

Table 2.3 Expected Number of Off-Site Worker Accidents Related to Off-Site Car and Truck Use Under Each Corrective Action Alternative[a]

Off-Site Vehicle Use Category	Source Control-GWP		Source Control-GWE	
	Injuries	Fatalities	Injuries	Fatalities
Hauling	0	0	2.2×10^{-3}	1.6×10^{-4}
Labor Mobilization/Demobilization	0	0	2.3×10^{-2}	3.6×10^{-4}
Equipment Mobilization/Demobilization	0	0	4.0×10^{-3}	3.0×10^{-4}
Material Deliveries	0	0	3.2×10^{-3}	2.4×10^{-4}
Total:	0	0	3.2×10^{-2}	1.1×10^{-3}

Notes:
Source Control-GWE = Source Control with Groundwater Extraction; Source Control-GWP = Source Control with Groundwater Polishing.
(a) Although source control (*i.e.*, closure-in-place [CIP]) is a primary component of the corrective action, the worker accidents associated with source control were previously estimated in the Closure Alternative Analysis (CAA) and are not repeated in this analysis.

Overall, considering accidents occurring both on- and off-Site, no worker injuries and worker fatalities would be expected to occur for residual plume management under the Source Control and GWP alternative; 8.5×10^{-2} worker injuries and 1.5×10^{-3} worker fatalities would be expected to occur for residual plume

management under the Source Control-GWE alternative. Thus, overall risks to workers would be higher under the Source Control-GWE alternative.

Community Risks

Vehicle accidents that occur off-Site can result in injuries or fatalities among community members as well as workers. Based on the accident statistics reported by US DOT (2023) and the off-Site travel mileages reported in Appendix B (and summarized in Tables 2.1), off-Site vehicle accidents could result in an estimated 2.1×10^{-2} injuries and 2.3×10^{-4} fatalities among community members (*e.g.*, people involved in haul truck accidents that are neither haul truck drivers nor passengers, including pedestrians, drivers of other vehicles) for residual plume management under the Source Control-GWE alternative (Table 2.4). No community risks are expected under the Source Control-GWP alternative. Therefore, off-Site impacts on nearby residents, including injuries or fatalities, would be the higher under the Source Control-GWE alternative.

Table 2.4 Expected Number of Community Accidents Under Each Corrective Action Alternative[a]

Off-Site Vehicle Use Category	Source Control-GWP		Source Control-GWE	
	Injuries	Fatalities	Injuries	Fatalities
Hauling	0	0	2.7×10^{-3}	2.0×10^{-5}
Labor Mobilization/Demobilization	0	0	9.2×10^{-3}	1.5×10^{-4}
Equipment Mobilization/Demobilization	0	0	5.0×10^{-3}	3.7×10^{-5}
Material Deliveries	0	0	4.0×10^{-3}	2.9×10^{-5}
Total:	0	0	2.1×10^{-2}	2.3×10^{-4}

Notes:
Source Control-GWE = Source Control with Groundwater Extraction; Source Control-GWP = Source Control with Groundwater Polishing.
(a) Although source control (*i.e.*, closure-in-place [CIP]) is a primary component of the corrective action, the community accidents associated with source control were previously estimated in the Closure Alternative Analysis (CAA) and are not repeated in this analysis.

2.2.5.2 Cross-Media Impacts to Air

Air pollution can occur both on-Site (*e.g.*, construction activities) and off-Site (*e.g.*, along transportation routes), potentially impacting workers as well as community members. Diesel emissions are a major source of air pollutants and greenhouse gas (GHG) emissions at construction sites. Diesel exhaust contains air pollutants, including nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOCs) (Hesterberg *et al*., 2009; Mauderly and Garshick, 2009). Construction equipment also emits GHGs, including carbon dioxide (CO_2) and possibly nitrous oxide (N_2O). The potential impact of each corrective action alternative on GHG emissions is proportional to the potential impact of each alternative on other emissions from construction vehicles and equipment.

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Air impacts occurring during source control would be the same for both corrective action alternatives. Impacts associated with CIP using a consolidate-and-cap approach were evaluated in the CAA (Gradient, 2022a). On-Site emissions would be higher for residual plume management under the Source Control-GWE alternative due to the greater amount of on-Site vehicle travel miles required under this corrective action (6,660 total on-Site travel miles under the Source Control-GWE and no on-Site travel miles under the Source Control-GWP alternative; Section 2.1.1; Table 2.1). Off-Site

emissions would similarly be higher for residual plume management under the Source Control-GWE alternative due to the greater amount of off-Site vehicle and equipment travel miles required under this alternative (82,700 total off-Site travel miles under the Source Control-GWE and no off-Site travel miles under the Source Control-GWP alternative; Section 2.1.1; Table 2.1). In summary, air impacts would be higher for the Source Control-GWE alternative due to greater vehicle travel miles, and minimal under for the Source Control-GWP alternative, because no construction activities would be expected under this alternative.

2.2.5.3 Cross-Media Impacts to Surface Water and Sediments

Under both action alternatives, the constituent mass flux from groundwater into surface water would decline over time after source control has been completed (Ramboll, 2022). Source control would include removal of free liquids, excavation and consolidation of CCR in the GMF GSP into the northern portion of the impoundment and the installation of a low-permeability final cover system to limit the precipitation infiltration into the impounded CCR. This approach would minimize the amount of water retained within the impoundment, which further reduces the hydraulic flux through the CCR. Due to the reduction in the hydraulic flux out of the GMF GSP, the mass flux out of the GMF GSP would be controlled or minimized.

Under the Source Control-GWP alternative, minimal surface water and sediment impacts would be expected associated with residual plume management because it would not require the construction of any engineered systems or structures (other than utilizing existing monitoring wells).

Under the Source Control-GWE alternative, surface water and sediment impacts would be higher than the Source Control-GWP alternative due to the construction of the extraction trench system. Construction can increase the risk of short-term negative impacts on surface water and sediment quality immediately adjacent to a site due to erosion and sediment runoff. Extracted groundwater would be discharged to a NPDES permitted outfall. Any associated impacts would be addressed through BMPs in accordance with site land disturbance permits.

2.2.5.4 Control of Exposure to Any Residual Contamination During Implementation of the Remedy

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. While appropriate controls would be established to prevent exposures of CCR during source control, the risks of CCR exposure during source control would be the same for both corrective action alternatives. For each of the corrective action components for the two potential alternatives, no residual CCR exposures would be expected to occur. However, impacted soils and groundwater can be a source of CCR-derived constituent exposure for workers. Risks to workers arising from potential contact with residual contamination during construction, operation, and maintenance activities associated with residual plume management would be higher for the Source Control-GWE than for the Source Control-GWP alternative; the Source Control-GWE would involve the production, management, and treatment of extracted groundwater, as well as on-Site disposal of excavated spoils generated during extraction trench construction. The Source Control-GWP alternative would not involve exposure to either of these soil or groundwater waste streams. Any potential CCR-exposures during the Source Control-GWE alternative would be managed through the use of rigorous safety protocols and personal protective equipment.

2.2.5.5 Other Identified Impacts

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, impacts during source control would be the same for both of the corrective action alternatives (see the CAA; Gradient, 2022a).

In addition to safety impacts, cross-media impacts, and the potential for workers to be exposed to residual contamination, construction activities and remedial operations can have significant energy demands and can cause nuisance impacts such as traffic and noise. Energy consumption at a construction site is synonymous with fossil fuel consumption because the energy to power construction vehicles and equipment comes from the burning of fossil fuels. Fossil fuel demands considered here include the burning of diesel fuel during construction equipment and vehicle travel miles. Because GHG emission impacts and energy consumption impacts both arise from the same sources at construction sites, the trends discussed in Section 2.2.5.2 with respect to GHG emissions also apply to the evaluation of energy demands. Specifically, the energy demands of construction equipment and vehicles associated with residual plume management would be greater under the Source Control-GWE, while the energy demands under the Source Control-GWP alternative associated with residual plume management are expected to be lower, because the latter alternative would not require any significant construction activity. In addition, energy would be required for the operation of the extraction trench system under the Source Control-GWE alternative; there is no operational energy required under the Source Control-GWP alternative because it would rely on physical and geochemical processes.

Similarly, traffic and noise impacts associated with residual plume management are also expected to be higher under the Source Control-GWE alternative than the Source Control-GWP alternative, due to the construction activities required to construct the extraction trench system. Traffic may increase temporarily around the Site under the Source Control-GWE alternative due to the daily arrival and departure of the workforce, equipment mobilization/demobilization, and material deliveries. However, these impacts would be expected to largely occur at the beginning or end of each work day (for the arrival/departure of the work force), at the beginning or end of the construction period (for equipment mobilization/demobilization), and at specific times throughout the construction period (for material deliveries). Traffic and noise impacts associated with residual plume management from the Source Control-GWP alternative are expected to be significantly less than those associated with the Source Control-GWE alternative.

Construction activities can negatively impact natural resources and habitat near the Site, as well as scenic, historical, and recreational value. Based on a review of the IDNR Historic Preservation Division database and the Illinois State Archaeological Survey database, there are no historic sites located within 1,000 m of the GMF GSP (Ramboll, 2021a,b). There would be no impact under the Source Control-GWP alternative because no additional construction activities would occur after implementation of source control. However, the Source Control-GWE alternative would require construction of an extraction trench and a 1-acre on-Site settling pond, which would occur during the latter phase of the GMF GSP closure construction. These impacts would include disturbance of some existing habitat atop portions of the construction areas, and habitat in the immediate vicinity of these locations by causing alarm and escape behavior in nearby wildlife (*e.g.*, due to noise disturbances). However, the construction would be restricted within the footprint of the GMF GSP and the associated impacts would be low.

2.2.6 Time Until Groundwater Protection Standards Are Achieved/Attain the Groundwater Protection Standards Specified in Section 845.600 (IAC Section 845.670(e)(1)(E)/IAC Section 845.680(d)(2))

This section of the report evaluates the time required to achieve GWPSs, pursuant to requirements under IAC Section 845.670(e)(1)(E) (IEPA, 2021) and under IAC Section 845.680(d)(2).

Groundwater and dissolved constituents move downward through the UCU in the vicinity of the GMF GSP until they reach the UA. Further downward migration is limited by the LCU. Within the UA, groundwater flows generally in a southern and eastern direction towards the unnamed tributary. Coffeen Lake is the primary receiving water body in the vicinity of the Site (Ramboll, 2022). Although groundwater elevations may vary seasonally, groundwater flow direction in the UA remains consistent due to the proximity of Coffeen Lake (Ramboll, 2022).

Groundwater elevations near the GMF GSP are primarily controlled by surface topography, geologic unit topography and surface water elevations in Coffeen Lake and the Unnamed Tributary (Ramboll, 2022). Water elevations within the surface impoundment have been found to remain relatively consistent and do not fluctuate with groundwater elevations, meaning limited hydraulic connection with the surface impoundment is likely (Ramboll, 2022).

Groundwater modeling was performed in support of the CAA (Ramboll, 2022). The modeling concluded that groundwater concentrations would meet the GWPSs for all of the constituents[6] identified as having potential groundwater exceedances in monitoring wells in the UA within approximately 6 years under the Source Control-GWP alternative (Ramboll, 2022). Considering the short timeframe anticipated for achieving GWPS under the Source Control-GWP alternative without an active remedial action, groundwater modeling related to the extraction trench was not performed for the Source Control-GWE alternative. The timeframe for achieving GWPS under the Source Control-GWE alternative is expected to be comparable or slightly faster than the Source Control-GWP alternative (Table 2.5).

[6] Sulfate was selected as a surrogate for the contaminant fate and transport for modeling source control for the Final Closure Plan. Sulfate is the constituent of concern (COC) at the GMF GSP and it is expected to take the longest time to achieve GWPS. Modeling all constituents that exceed GWPS or have been detected at lower concentrations relative to their GWPSs is unnecessary, as these constituents will likely achieve their GWPSs more quickly (Appendix B Ramboll, 2025b).

Table 2.5 Estimated Timeline and Implementation Schedule Under Each Corrective Action Alternative

Implementation Phase	Implementation Task	Timeframe	
		Source Control-GWP[a]	Source Control-GWE[b]
1: Pre-Construction Activities	Agency Coordination, Approvals, and Permitting	NA	18 to 24 months
	Final Design and Bid Process		12 to 18 months
	Total Timeframe to Complete Pre-Construction Activities		30 to 42 months (2.5 to 3.5 years)
2: Corrective Action Construction	Corrective Action Construction	NA	4 to 8 months
	Total Timeframe to Complete Corrective Action Construction		4 to 8 months
3: Corrective Action O&M and Closeout[a]	Corrective Action Operation (Time to Meet GWPS)	72 months (6 years)	72 months (6 years)
	Corrective Action Confirmation Monitoring	36 months	36 months
	Corrective Action Completion Reporting	6 months	6 months
	Total Timeframe to Complete Corrective Action O&M and Closeout	114 months (9.5 years)	114 months (9.5 years)
Total Timeline to Complete Corrective Action (all phases)		114 months (9.5 years)	148 to 164 months (12 to 13.5 years)

Notes:
Source Control-GWP = Source Control with Groundwater Polishing; Source Control- GWE= Source Control with Groundwater Extraction.
(a) All timelines are assumed to occur after completion of source control (*e.g.*, final closure of the SI) and a corrective action permit has been issued by IEPA, whichever is longer, for the Source Control-GWP Alternative.
(b) Pre-construction and construction activities are assumed to occur concurrently with source control, and corrective action O&M tasks are assumed to occur after completion of source control (*e.g.*, final closure of the SI) and a corrective action construction permit application has been issued by IEPA, whichever is longer, for the Source Control-GWE alternative.
Source: Appendix B; Ramboll, 2025b.

2.2.7 Potential for Exposure of Humans and Environmental Receptors to Remaining Wastes, Considering the Potential Threat to Human Health and the Environment Associated with Excavation, Transportation, Re-disposal, Containment, or Changes in Groundwater Flow (IAC Section 845.670(e)(1)(F))

Section 2.2.1 describes the magnitude of reduction of existing risks under each corrective action alternative. Section 2.2.2 describes the effectiveness of the remedy in controlling the source, including the extent to which containment practices would reduce further releases. Section 2.2.3 describes the likelihood of future

releases of CCR occurring under each corrective action alternative, and Section 2.2.5 describes the short-term risks to workers, the community, and the environment during implementation of the remedy, including safety impacts and control of exposure to any residual contamination. In summary, source control measures (*i.e.*, CIP using a consolidate-and-cap approach) would be undertaken at the Site. Thus, both corrective action alternatives would essentially eliminate the potential for a sudden CCR release to occur post-closure (due, *e.g.*, to flooding or a dike failure event). Similarly, due to the source control common to both of the corrective action alternatives, the two alternatives would both involve installing a new cover system over the GMF GSP that ties into the existing basal liner system, and no future exposure to residual CCR would be expected to occur for either of the alternatives. Both corrective action alternatives would therefore be equally and fully protective with regard to exposure to residual CCR. There are no current or future risks to any human or ecological receptors at the Site, and there would be minimal risk of CCR releases post-closure.

For construction workers, risks arising from potential contact with residual contamination during construction, operation, and maintenance activities associated with residual plume management would be higher for the Source Control-GWE alternative than for the Source Control-GWP alternative, because the Source Control-GWE would involve the production, management, and potential treatment of extracted groundwater. The Source Control-GWP alternative would not involve exposure to either of these soil or groundwater waste streams. Any potential CCR exposures occurring under Source Control-GWE during groundwater extraction and treatment would be managed through the use of rigorous safety protocols, personal protective equipment, and appropriate disposal practices.

Some changes in groundwater flow (*i.e.*, potential controlled discharge of extracted groundwater) may occur under the Source Control-GWE alternative, due to the operation of the extraction system. Hydrogeological changes would be expected under the Source Control-GWE alternative, such as lowering groundwater table in the vicinity of the extraction trench, altering flow patterns in the UA, and causing changes in hydraulic gradients. However, changes to groundwater flow would not be expected to have an effect on the potential for the exposure of humans and environmental receptors to remaining wastes.

2.2.8 Long-Term Reliability of the Engineering and Institutional Controls (IAC Section 845.670(e)(1)(G))

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, the long-term reliability during source control would be the same for both corrective action alternatives (See CAA, Gradient, 2022a). The long-term reliability of the engineering and institutional controls associated with residual plume management of both corrective alternatives are summarized below.

- Residual plume management under the Source Control-GWP alternative would be reliable, because it would rely on physical and geochemical processes, rather than the installation, operation, and maintenance of engineered systems or structures. Site specific evaluations have shown that chemical attenuation is feasible, and attenuation should remain generally stable under post-closoure conditions. Remobilization is unlikely to impact the time to achieve GWPS as groundwater returns to background conditions (Appendix E; Geosyntec Consultants, Inc., 2025). Under this alternative, engineering failure would not occur, and no O&M activities would be required to ensure the success of the alternative (other than those required for groundwater monitoring). Active groundwater monitoring would be in place to track the remediation progress. Should the predicted decrease in groundwater concentrations not occur, the adaptive site management approach would enable prompt adjustments or enhancements to the corrective action in accordance with IAC Section 845.680(b). This strategy would allow continuous improvement of the GMF GSP groundwater

remediation in response to new Site information and/or the performance of the corrective action alternative.

- GWE is a proven remedy that has been implemented at many sites. Thus, residual plume management under the Source Control-GWE alternative would be expected to be reliable, provided it is constructed and operated in accordance with standard design and specifications. Under this alternative, the extraction trench system and settling pond would require engineering design and installation for groundwater extraction and treatment. Routine and non-routine maintenance of the extraction system is required to ensure reliable operation of the extraction trench and pumps, as well as other system components. Active groundwater monitoring would be in place, similar to those required under the Source Control-GWP alternative.
- For both corrective action alternatives, remedy optimizations would be implemented if necessary under the adaptive site management program.

2.2.9 Potential Need for Replacement of the Remedy (IAC Section 845.670(e)(1)(H))

The potential need for the eventual replacement of the residual plume management remedy under each corrective action alternative is summarized as follows:

- Source Control-GWP would rely on natural physical geochemical processes to achieve reductions in groundwater concentrations to below the GWPSs. Because no installation, operation, and maintenance of engineered systems or structures would be required, it would be unlikely that the residual plume management remedy under the Source Control-GWP alternative would need to be replaced. Adaptive site management strategies would be used to implement remedy optimizations or replacement, as necessary based on data that are collected, to ensure that remedial goals are achieved.
- Source Control-GWE would utilize an extraction trench and settling pond to extract and treat impacted groundwater to achieve reductions in groundwater concentrations to below GWPSs. While the extraction system would need ongoing maintenance and potential replacement of system components over time, it is unlikely that the residual plume management remedy under the Source Control-GWE alternative would need to be replaced. Adaptive site management strategies would be used to implement remedy optimizations or replacement, as necessary based on data that are collected, to ensure that remedial goals are achieved.

2.3 The Ease or Difficulty of Implementing a Remedy (IAC Section 845.670 (e)(3))

2.3.1 Degree of Difficulty Associated with Constructing the Remedy (IAC Section 845.670(e)(3)(A)

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, construction difficulties regarding source control would be the same for both corrective action alternatives. Difficulties associated with implementing CIP using a consolidate-and-cap approach were evaluated in the CAA (Gradient, 2022a). The expected degree of difficulty associated with residual plume management for each of the corrective action alternatives is summarized below.

- Residual plume management under the Source Control-GWP alternative would rely on physical and geochemical attenuation processes and therefore would not pose any significant construction challenges. Therefore, there would be minimal difficulty in constructing the Source Control-GWP remedy.
- Residual plume management under the Source Control-GWE would involve the construction of an extraction trench, settling pond and conveyance system to extract and treat impacted groundwater. The shallow groundwater trench required by this alternative is commonly constructed at similar depths and can be performed using conventional construction equipment. Therefore, while some construction is necessary, the degree of difficulty is expected to be low (Appendix B, Ramboll, 2025b). Groundwater monitoring would be conducted using a groundwater monitoring network designed in accordance with IAC Section 845.680(c).

2.3.2 Expected Operational Reliability of the Remedy (IAC Section 845.670(e)(3)(B))

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, the operational reliability of the remedy would be the same for both corrective action alternatives (Gradient, 2022a). Both corrective action alternatives would likely be highly reliable with respect to operational controls associated with residual plume management; specific details for each corrective action alternative are discussed below.

- Residual plume management under the Source Control-GWP alternative would have high operational reliability because it would rely on natural processes and active monitoring, rather than the installation, operation, and maintenance of engineered systems or structures (other than monitoring wells). Under the Source Control-GWP alternative, engineering failure would not occur and no O&M activities would be required to ensure the success of the alternative.
- Residual plume management under the Source Control-GWE alternative would also have high operational reliability because it is an established and commonly used remedial technique, as long as the extraction trench system is constructed in accordance with appropriate design specifications. In addition, the remedy operates as a mechanical system and would require routine and non-routine maintenance of the extraction system to ensure reliable operation (in addition to those required for groundwater monitoring).

2.3.3 Need to Coordinate with and Obtain Necessary Approvals and Permits from Other Agencies (IAC Section 845.670(e)(3)(C))

Both corrective action alternatives would require regulatory approvals. Specific permits and approvals associated with source control (*i.e.*, CIP using a consolidate-and-cap-approach) are the same for both corrective action alternatives and are discussed in the CAA (Gradient, 2022a). The specific approvals and permits associated with residual plume management for both corrective action alternatives are discussed below.

- The Source Control-GWP alternative would not need additional permits from other agencies, other than the permits issued by IEPA for source control (*i.e.*, Closure Plan and Construction Permit Application) and approval of the Corrective Action Plan.
- The Source Control-GWE alternative would require approvals and permits. Groundwater extracted from the extraction trench would require a modified NPDES permit. The NPDES permit would likely require renewals depending on the timeline of corrective action implementation. In addition, permits from the IEPA for construction stormwater controls and BMPs, placement of excavated spoils beneath the GMF GSP final cover system, a joint water pollution control construction, and operating permit would be required. An IDNR Dam Safety modification permit may be required for modifications of the embankment. These permits and plans typically take 18 to 24 months to obtain, although some may be obtained during the GMF GSP final closure (Appendix B, Ramboll, 2025b).

2.3.4 Availability of Necessary Equipment and Specialists (IAC Sections 845.670(e)(3)(D) and 845.660(c)(1), "Ease of Implementation")

Source control (*i.e.*, CIP using a consolidate-and-cap approach) would be implemented for both potential corrective action alternatives. Thus, equipment and specialist needs would be the same for both corrective action alternatives. An assessment of necessary equipment and specialists associated with implementing CIP using a consolidate-and-cap approach was evaluated in the CAA (see the CAA; Gradient, 2022a). Specialized equipment and personnel are essential for field data collection and groundwater sampling for residual plume management under both potential corrective action alternatives. Additionally, the assessment of groundwater concentrations for Site constituents would necessitate laboratory equipment and specialists for both alternatives. The availability of equipment and specialists for each corrective action alternative is summarized below.

- Residual plume management under the Source Control-GWP alternative would require groundwater professionals, such as geologists, hydrogeologists, statisticians (*i.e.*, statistical analysis), and geochemists to evaluate all monitoring data, ensuring that physical and geochemical processes function as anticipated for this alternative. The equipment and specialists needed for Site groundwater monitoring and analysis are currently engaged in these tasks as part of the routine groundwater monitoring program outlined in accordance with IAC Section 845.220(c)(4).
- Residual plume management under the Source Control-GWE alternative would require specialists to manage the extraction system throughout its construction and operational period.
    - Construction of the groundwater extraction system (*i.e.*, the trench and settling pond) on the Site is not expected to require specialized contractors or equipment. Shallow collection trenches are routinely constructed by earthwork contractors in central and southern Illinois.

- This alternative would necessitate the use of equipment and the expertise of specialists for tasks such as field data collection, groundwater sampling, analysis, and periodic corrective action groundwater monitoring and reporting. Similar to those in the GWP alternative, these activities are already being conducted as part of routine groundwater monitoring in accordance with IAC Section 845.220(c)(4).

2.3.5 Available Capacity and Location of Needed Treatment, Storage, and Disposal Services/Comply with Standards for Management of Wastes as Specified in Section 845.680(d) (IAC Section 845.670(e)(3)(E)/IAC Section 845.670(d)(5))

The available capacity and location of needed treatment, storage, and disposal services associated with residual plume management under each corrective action alternative is summarized below. All the practices employed in both alternatives would comply with standards for the management of wastes as specified in IAC Section 845.670(e)(3)(E) and IAC Section 845.680(d)(5).

- Residual plume management for the Source Control-GWP remedy would not require any treatment, storage, or disposal services, because GWP is not anticipated to produce a substantial amount of waste or wastewater, aside from minor purge water volumes generated during routine groundwater sampling activities for residual plume management. This could be managed by a standard waste management contractor.
- Residual plume management for the Source Control-GWE alternative would require the construction of the extraction trench system and a new settling pond on-Site:
  - The construction of the extraction trench would generate spoils, and the waste materials would be used as subgrade fill beneath the GMF GSP final cover system during the closure construction. Completing the GWE system construction at the same time as the GMF GSP closure would provide sufficient on-Site capacity for the disposal of generated spoils.
  - The extraction trench system would send extracted groundwater to an on-Site settling pond, which collects solids removed during groundwater recovery *via* the pneumatic extraction pumps and transfer piping. The settling pond would need to be sited, designed, constructed and maintained properly. The siting of the settling pond would need to consider limiting impacts to existing Site infrastructure and other surface impoundments at CPP.
  - Discharge from the settling pond would be conveyed to a NPDES permitted outfall. Renewal of the NPDES permit may be necessary to continue operations, depending on the timeline of the corrective action implementation in relation to the source control completion.

2.4 The Degree to Which Community Concerns Are Addressed by the Remedy (IAC Section 845.670(e)(4))

Several nonprofits raised concerns regarding the potential impacts of the coal ash impoundments on groundwater and surface water quality including Earthjustice, the Prairie Rivers Network, and the Sierra Club (Earthjustice *et al*., 2018; Lydersen, 2017; Sierra Club and CIHCA, 2014; Sierra Club, 2021). The combination of source control (*i.e*., CIP using a consolidate-and-cap approach) and residual plume management would cause groundwater concentrations to decline over time, as suggested by the groundwater modeling (Ramboll, 2022), thus addressing community concerns.

A public meeting was held on May 1, 2025, pursuant to requirements under IAC Section 845.660(d). Questions raised by attendees were addressed at the meeting; a written summary of the questions and responses were prepared.

2.5 Remove from the Environment as much of the Contaminated Material that was Released from the CCR Surface Impoundment as Is Feasible, Taking into Account Factors such as Avoiding Inappropriate Disturbance of Sensitive Ecosystems (IAC Section 845.670(d)(4))

There have been no documented releases of CCR from the unit (Ramboll, 2025c). Both potential corrective action alternatives would have source control and residual plume management efforts. The source control would include the excavation and consolidation of CCR in the GMF GSP into the northern portion of the impoundment and the installation of a low-permeability final cover system designed to limit the infiltration of precipitation into the impounded CCR and tie into the existing basal liner system. As the GMF GSP is a modern and double-lined facility; this closure would result in CCR within the GMF GSP being encapsulated with a continuous, engineered liner system on all sides. Additionally, there is not expected to be a significant difference between the two alternative corrective actions in the time to achieve the GWPSs. (Ramboll, 2022). Therefore, this approach would prevent releases of contaminated material from the GMF GSP.

Moreover, residual plume management under each corrective action alternative will further result in the removal of contaminated material from the environment and/or the improvement of downgradient groundwater quality. Groundwater modeling has predicted that GWPSs would be achieved in all monitoring wells within approximately 6 years under both the Source Control-GWP and the Source Control GWE alternatives (Ramboll, 2022, 2025b). Specific considerations for residual plume management for each alternative are provided below.

- Residual plume management under the Source Control-GWP alternative would address impacted groundwater by relying on natural physical and geochemical attenuation processes to reduce the residual concentrations of CCR. Site-specific evaluations demonstrated conditions are favorable for the attenuation of inorganic contaminants *via* adsorption. Attenuation *via* sorption onto mineral surfaces should remain stable under post-closure conditions, and remobilization is unlikely to impact the time to achieve GWPS (Appendix E; Geosyntec Consultants, Inc., 2025). In cases in which observed groundwater concentrations deviate significantly from modeled conditions, alternative methods or techniques would be evaluated under the adaptive site management program, and if viable, incorporated as per IAC Section 845.680(b). No ecosystems would be disturbed, because no construction activities would be expected under the Source Control-GWP alternative.
- Residual plume management under the Source Control-GWE alternative would rely on the groundwater extraction trench to reduce or prevent migration of impacted groundwater off-Site. Groundwater quality would also be improved as a result of physical and geochemical attenuation processes. The construction activities would likely to result some negative impacts to the ecosystem, including disturbance of some existing habitat atop portions of the construction areas, and habitat in the immediate vicinity of these locations by causing alarm and escape behavior in nearby wildlife (*e.g.*, due to noise disturbances). In addition, it is also possible that limited negative short-term impacts could occur to sensitive aquatic and wetland species in the discontinuous wetland areas in the immediate vicinity of the AP (see Section 1.1.3). However, the construction would be restricted within the footprint of the GMF GSP and the associated impacts would be low.

2.6 Summary

This CAAA evaluates both corrective action alternatives identified as potentially viable in the CMA with regard to each of the factors specified in IAC Section 845.670(d) and 845.670(e) (IEPA, 2021). Based on this evaluation, the most appropriate corrective action for this Site is Source Control-GWP. The expected impacts on workers, nearby communities, and the environment under the Source Control-GWP alternative are lower than those under the Source Control-GWE alternative. Additionally, there is not expected to be a significant difference between the two alternative corrective actions in the time to achieve the GWPSs under the two alternatives. Thus, Source Control-GWP is the most appropriate corrective action alternative for the GMF GSP.

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Appendix A

Human Health and Ecological Risk Assessment

Human Health and Ecological Risk Assessment Gypsum Management Facility Gypsum Stack Pond and Gypsum Management Facility Recycle Pond Coffeen Power Plant Coffeen, Illinois

July 28, 2022

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Table of Contents

Page

1 Introduction 1

2 Site Overview 3
- 2.1 Site Description 3
- 2.2 Geology/Hydrogeology 5
- 2.3 Conceptual Site Model 5
- 2.4 Groundwater Monitoring 8
- 2.5 Surface Water Monitoring 11

3 Risk Evaluation 13
- 3.1 Risk Evaluation Process 13
- 3.2 Human and Ecological Conceptual Exposure Models 14
  - 3.2.1 Human Conceptual Exposure Model 14
    - 3.2.1.1 Groundwater or Surface Water as a Drinking Water/Irrigation Source 16
    - 3.2.1.2 Recreational Exposures 19
  - 3.2.2 Ecological Conceptual Exposure Model 19
- 3.3 Identification of Constituents of Interest 20
  - 3.3.1 Human Health Constituents of Interest 20
  - 3.3.2 Ecological Constituents of Interest 22
- 3.4 Surface Water and Sediment Modeling 26
- 3.5 Human Health Risk Evaluation 30
  - 3.5.1 Recreators Exposed to Surface Water 30
  - 3.5.2 Recreators Exposed to Sediment 32
- 3.6 Ecological Risk Evaluation 34
  - 3.6.1 Ecological Receptors Exposed to Surface Water 34
  - 3.6.2 Ecological Receptors Exposed to Sediment 35
  - 3.6.3 Ecological Receptors Exposed to Bioaccumulative Constituents of Interest 36
- 3.7 Uncertainties and Conservatisms 37

4 Summary and Conclusions 39

References 41

Appendix A Surface Water and Sediment Modeling
Appendix B Screening Benchmarks

List of Tables

Table 2.1 Groundwater Monitoring Wells Related to the GMF GSP and the GMF RP

Table 2.2 Groundwater Data Summary

Table 2.3 Surface Water Data Summary

Table 3.1 Human Health Constituents of Interest for the Unnamed Tributary

Table 3.2 Human Health Constituents of Interest for the Western Branch of Coffeen Lake

Table 3.3 Ecological Constituents of Interest for the Unnamed Tributary

Table 3.4 Ecological Constituents of Interest for the Western Branch of Coffeen Lake

Table 3.5 Groundwater and Surface Water Properties Used in Modeling for the Unnamed Tributary

Table 3.6 Sediment Properties Used in Modeling for the Unnamed Tributary

Table 3.7 Surface Water and Sediment Modeling Results for the Unnamed Tributary

Table 3.8 Groundwater and Surface Water Properties Used in Modeling for the Western Branch of Coffeen Lake

Table 3.9 Sediment Properties Used in Modeling for the Western Branch of Coffeen Lake

Table 3.10 Surface Water and Sediment Modeling Results for the Western Branch of Coffeen Lake

Table 3.11 Risk Evaluation for Recreators Exposed to Surface Water in the Unnamed Tributary

Table 3.12 Risk Evaluation for Recreators Exposed to Surface Water in the Western Branch of Coffeen Lake

Table 3.13 Risk Evaluation for Recreators Exposed to Sediment in the Unnamed Tributary

Table 3.14 Risk Evaluation for Recreators Exposed to Sediment in the Western Branch of Coffeen Lake

Table 3.15 Risk Evaluation for Ecological Receptors Exposed to Surface Water in the Unnamed Tributary

Table 3.16 Risk Evaluation for Ecological Receptors Exposed to Surface Water in the Western Branch of Coffeen Lake

Table 3.17 Risk Evaluation for Ecological Receptors Exposed to Sediment in the Unnamed Tributary

Table 3.18 Risk Evaluation for Ecological Receptors Exposed to Sediment in the Western Branch of Coffeen Lake

List of Figures

Figure 2.1 Site Location Map

Figure 2.2 Groundwater Flow Direction

Figure 2.3 Monitoring Well Locations

Figure 2.4 Surface Water Sampling Locations

Figure 3.1 Overview of Risk Evaluation Methodology

Figure 3.2 Human Conceptual Exposure Model

Figure 3.3 Water Wells Within 1,000 Meters of the GMF GSP and the GMF RP

Figure 3.4 Historic Property Use In the Vicinity of Well 32

Figure 3.5 Ecological Conceptual Exposure Model

Abbreviations

ADI	Acceptable Daily Intake
BCF	Bioconcentration Factor
BCG	Biota Concentration Guide
CAA	Closure Alternatives Assessment
CCR	Coal Combustion Residuals
CEM	Conceptual Exposure Model
COI	Constituent of Interest
COPC	Constituent of Potential Concern
CPP	Coffeen Power Plant
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CWS	Community Water Supply Well
DA	Deep Aquifer
DCU	Deep Confining Unit
ESV	Ecological Screening Value
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	Groundwater Protection Standards
GWQS	Groundwater Quality Standards
HTC	Human Threshold Criteria
IAC	Illinois Administrative Code
ID	Identification
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ILWATER	Illinois Water and Related Wells
IPGC	Illinois Power Generating Company
ISGS	Illinois State Geological Survey
LCU	Lower Confining Unit
MCL	Maximum Contaminant Level
NID	National Inventory of Dams
NRWQC	National Recommended Water Quality Criteria
ORNL RAIS	Oak Ridge National Laboratory's Risk Assessment Information System
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RP	Recycle Pond
RSL	Regional Screening Level
SI	Surface Impoundment
SWQC	Surface Water Quality Criteria
SWQS	Surface Water Quality Standards
TEC	Threshold Effect Concentration
UA	Uppermost Aquifer
UCU	Upper Confining Unit
US DOE	United States Department of Energy

US EPA	United States Environmental Protection Agency
USGS	US Geological Survey

1 Introduction

Illinois Power Generating Company's (IPGC) Coffeen Power Plant (CPP, or "the Site") is an electric power generating facility with coal-fired units located approximately two miles south of Coffeen, Illinois. The CPP operated as a coal-fired power plant from 1964 until November 2019 and has five coal combustion residuals (CCR) management units (Ramboll, 2021a). The CCR units that are the subjects of this report are two gypsum management facility (GMF) ponds: the GMF gypsum stack pond (GMF GSP, Vistra Identification [ID] Number [No.] 103, Illinois Environmental Protection Agency [IEPA] ID No. W1350150004-03, and National Inventory of Dams [NID] No. IL50579) and the GMF recycle pond (GMF RP, Vistra ID No. 104, IEPA ID No. W1350150004-04, and NID No. IL50578) (Ramboll, 2021a,b). The GMF GSP is a 77-acre lined surface impoundment (SI) and the GMF RP is a 17-acre lined SI; they were used to manage CCR and non-CCR waste streams at the CPP (Ramboll, 2021a,b).

This report presents the results of an evaluation that characterizes potential risk to human and ecological receptors that may be exposed to CCR constituents in environmental media originating from the GMF GSP and RP. This risk evaluation was performed to support the Closure Alternatives Assessment (CAA) for the GMF GSP and the GMF RP in accordance with requirements in Title 35 Part 845 of the Illinois Administrative Code (IAC) (IEPA, 2021). Human and ecological risks were evaluated for Site-specific constituents of interest (COIs). The conceptual site model (CSM) assumed that Site-related COIs in groundwater may migrate to the adjacent Coffeen Lake and affect surface water and sediment in the vicinity of the Site.

Consistent with United States Environmental Protection Agency (US EPA) guidance (US EPA, 1989), this report used a tiered approach to evaluate potential risks, which included the following steps:

1. Identify complete exposure pathways and develop a conceptual exposure model (CEM).
2. Identify Site-related COIs: Constituents detected in groundwater were considered COIs if their maximum detected concentration over the period from 2015 to 2021 exceeded a groundwater protection standard (GWPS) identified in Part 845.600 (IEPA, 2021), or a relevant surface water quality standard (SWQS) (IEPA, 2019; US EPA Region IV, 2018).
3. Perform screening-level risk analysis: Compare maximum measured or modeled COI concentrations in surface water and sediment to conservative, health-protective benchmarks to determine constituents of potential concern (COPCs).
4. Perform refined risk analysis: If COPCs are identified, perform a refined analysis to evaluate potential risks associated with the COPCs.
5. Formulate risk conclusions and discuss any associated uncertainties.

This assessment relies on a conservative (*i.e.*, health-protective) approach and is consistent with the risk approaches outlined in US EPA guidance. Specifically, we considered evaluation criteria detailed in IEPA guidance documents (*e.g.*, IEPA, 2013, 2019), incorporating principles and assumptions consistent with the Federal CCR Rule (US EPA, 2015a) and US EPA's "Human and Ecological Risk Assessment of Coal Combustion Residuals" (US EPA, 2014a).

US EPA has established acceptable risk metrics. Risks above these US EPA-defined metrics are termed potentially "unacceptable risks." Based on the evaluation presented in this report, no unacceptable risks to human or ecological receptors resulting from CCR exposures associated with the GMF GSP or GMF RP were identified. This means that the risks from the site are likely indistinguishable from normal background risks. Specific risk assessment results include the following:

- No completed exposure pathways were identified for any groundwater receptors; consequently, no risks were identified relating to the use of groundwater.
- No unacceptable risks were identified for recreators boating in Coffeen Lake adjacent to the Site.
- No unacceptable risks were identified for recreators exposed to sediment in Coffeen Lake adjacent to the Site.
- No unacceptable risks were identified for anglers consuming locally caught fish.
- No unacceptable risks were identified for ecological receptors exposed to surface water or sediment.
- No bioaccumulative ecological risks were identified.

It should be noted that this evaluation incorporates a number of conservative assumptions that tend to overestimate exposure and risk. Moreover, it should be noted that because current conditions do not present a risk to human health or the environment, there will also be no unacceptable risk to human health or the environment for future conditions when the GMF GSP and the GMF RP are closed. For all future closure scenarios, potential releases of CCR-related constituents will decline over time and consequently potential exposures to CCR-related constituents in the environment will also decline.

2 Site Overview

2.1 Site Description

The CPP is located in Montgomery County, Illinois, approximately two miles south of the city of Coffeen and about eight miles southeast of the city of Hillsboro, Illinois. The CPP operated as a coal-fired power plant from 1964 until November 2019 (Ramboll, 2021a). Five CCR units are present on the CPP property: Ash Pond 1, Ash Pond 2, GMF RP, GMF GSP, and Landfill (Ramboll, 2021a). The GMF GSP and the GMF RP are the subjects of this report. The GMF GSP is a 77-acre lined SI, identified by Vistra ID No. 103, IEPA ID No. W1350150004-03, and NID No. IL50579. The GMF RP is a 17-acre lined SI identified by Vistra ID No. 104, IEPA ID No. W1350150004-04, and NID No. IL50578 (Ramboll, 2021a,b). Both units were put into operation in 2010, and stopped receiving waste prior to April 11, 2021 (Ramboll, 2021a).

The CPP is bordered by Coffeen Lake to the west, east, and south, and is bordered by agricultural land to the north. An unnamed tributary, located east of the GMF GSP, flows south into Coffeen Lake (Figure 2.1) (Ramboll, 2021a). Coffeen Lake (approximately 1,100-acres) was formed in 1963 for use as an artificial cooling lake for the CPP, by damming the McDavid Branch of the East Fork of Shoal Creek (Ramboll, 2021a).

Figure 2.1 Site Location Map. Source: Ramboll (2021a).

2.2 Geology/Hydrogeology

The geology underlying the CPP Site in the vicinity of the GMF GSP and the GMF RP primarily consists of unlithified deposits (Ramboll, 2021a,b). The unlithified deposits were categorized into the following hydrostratigraphic units (from the surface downward): the Upper Confining Unit (UCU), composed of Roxana and Peoria Silts (Loess Unit); the Uppermost Aquifer (UA), primarily composed of sandy to gravelly silts and clays of the Hagarstown Member; the Lower Confining Unit (LCU), comprised of the Vandalia Member, the Mulberry Grove Member, and the Smithboro Member; the Deep Aquifer (DA), comprised of sand and sandy silts/clays of the Yarmouth Soil; and the Deep Confining Unit (DCU), comprised of clays, silts, and sands of the Banner Formation (Ramboll, 2021a).

The Hagarstown Member is separated into two units: a gravelly clay till unit on top of a sandy unit (Ramboll, 2021a,b). The sandy unit at the base of the Hagarstown Member was identified as the UA. However, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member was also identified as the UA (Ramboll, 2021a). The UA (*i.e.*, sandy portion of the Hagarstown Member) is generally less than 3 feet (ft) thick but is absent at several locations due to weathering or construction-related excavation (Ramboll, 2021a,b). The UA is not present beneath the entire footprint of the GMF GSP or the GMF RP (Ramboll, 2021a,b). The top of the UA is separated from the overlying CCR materials in the GMF GSP and the GMF RP by the low permeability Loess (UCU) and the gravelly clay till portions of the Hagarstown Member. The bottom of the UA is separated from the DA by low-permeability tills of the LCU (Ramboll, 2021a,b). The UA has moderate permeability with a geometric mean horizontal hydraulic conductivity of 1.4×10^{-3} cm/s near the GMF GSP (Ramboll, 2021a) and a geometric mean horizontal hydraulic conductivity of 1.2×10^{-3} cm/s near the GMF RP (Ramboll, 2021b).

In the vicinity of the GMF RP, groundwater within the UA generally flows southeast towards an unnamed tributary (Ramboll, 2021b). In the vicinity of the GMF GSP, groundwater within the UA flows southeast/east towards the unnamed tributary and southwest/west towards the western branch of Coffeen Lake (Ramboll, 2021a). For the southeastern/eastern flow component, the horizontal hydraulic gradients within the UA range from 0.003 to 0.01 ft/ft (Ramboll, 2021a,b). For the southwestern/western flow component, the average horizontal hydraulic gradient in the UA is about 0.018 ft/ft (Ramboll, 2021a).

2.3 Conceptual Site Model

A CSM describes sources of contamination, the hydrogeological units, and the physical processes that control the transport of water and solutes. In this case, the CSM describes how groundwater underlying the GMF GSP and the GMF RP migrates and interacts with surface water and sediment in the adjacent unnamed tributary and Coffeen Lake. The CSM was developed using available hydrogeologic data specific to the GMF GSP and the GMF RP, including information on groundwater flow and surface water characteristics (Ramboll, 2021a).

Due to the presence of a groundwater divide on the Site, groundwater in the UA flows both toward the eastern and western branches of Coffeen Lake (Figure 2.2). On the east side of the groundwater divide, groundwater flows east and southeast into an unnamed tributary that flows south into the eastern branch of Coffeen Lake. On the west side of the divide, groundwater flows west and southwest into the western branch of Coffeen Lake.

All groundwater originating from the GMF RP ultimately flows into the unnamed tributary, whereas a component of groundwater originating from the GMF GSP flows into the unnamed tributary, and the rest flows into the western branch of Coffeen Lake (Figure 2.2). The GMF RP and much of the GMF GSP are

located to the east side of the groundwater divide, thus groundwater (and any CCR-related constituents) originating from these SIs may migrate vertically downward through the UCU into the UA and eventually flow into the unnamed tributary (Ramboll, 2021a,b). The western edge of the GMF GSP is on the west side of the groundwater divide; therefore, groundwater (and any CCR-related constituents) originating from this portion of the SI may migrate vertically downward through the UCU into the UA and eventually flow into the western branch of Coffeen Lake. Groundwater flow within the UA is mostly in the horizontal direction because the UA is underlain by the LCU, which is a low-permeability till unit inhibiting vertical flow of groundwater. Groundwater near the GMF ponds may mix with surface water in the unnamed tributary to the east and with surface water in the western branch of Coffeen Lake to the west. The dissolved constituents in groundwater may partition between sediments and surface water.

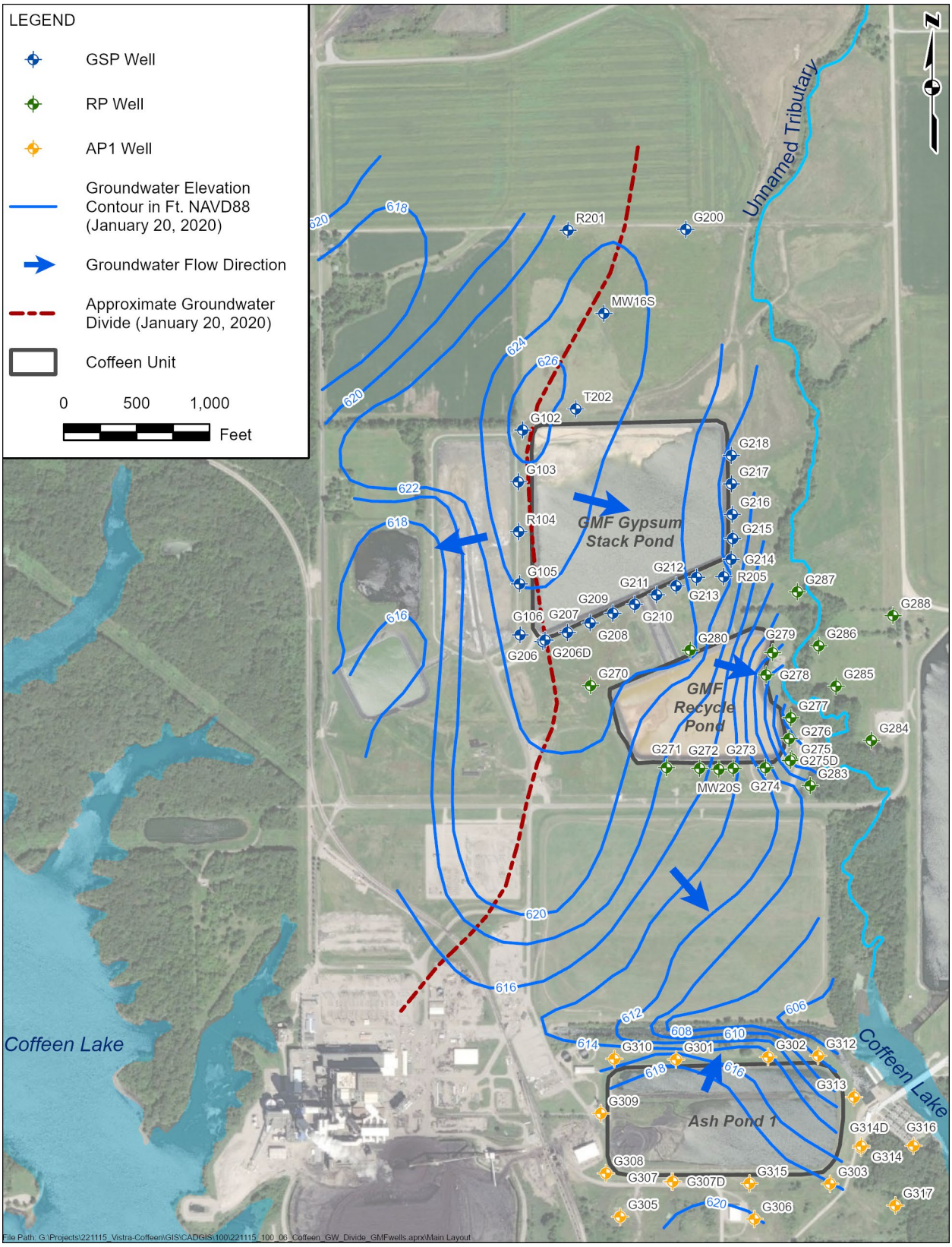

Figure 2.2 Groundwater Flow Direction. Source: Ramboll (2021a).

2.4 Groundwater Monitoring

A total of 43 wells have been used to monitor the groundwater quality near and downgradient of the GMF GSP and the GMF RP; 24 wells are associated with the GMF GSP and 19 wells are associated with the GMF RP. Of the 24 wells associated with the GMF GSP, 23 wells are screened in the UA and 1 well is screened in the DA (Table 2.1). Of the 19 wells associated with the GMF RP, 16 wells are screened in the UA, 2 wells are screened in the LCU, and 1 well is screened in the DA (Table 2.1). The analyses presented in this report conservatively relied on all available data from the 43 wells collected between 2015 and 2021, which is the period subsequent to the promulgation of the Federal CCR Rule. Groundwater samples were analyzed for a suite of total metals, specified in Illinois CCR Rule Part 845.600 (IEPA, 2021).[1] A summary of the groundwater data for the 43 wells used in this risk evaluation is presented in Table 2.2. The GMF GSP and the GMF RP well locations used in this risk evaluation are shown in Figure 2.3. Note that the groundwater data were split into two groups to model surface water concentrations for the unnamed tributary (19 GMF RP and 16 GMF RP wells on the east side of the groundwater divide) and the western branch of Coffeen Lake (8 GMF GSP wells on the west side of the groundwater divide). The use of groundwater data in this risk evaluation does not imply that detected constituents are associated with the GMF GSP or the GMF RP or that they have been identified as potential groundwater exceedances.

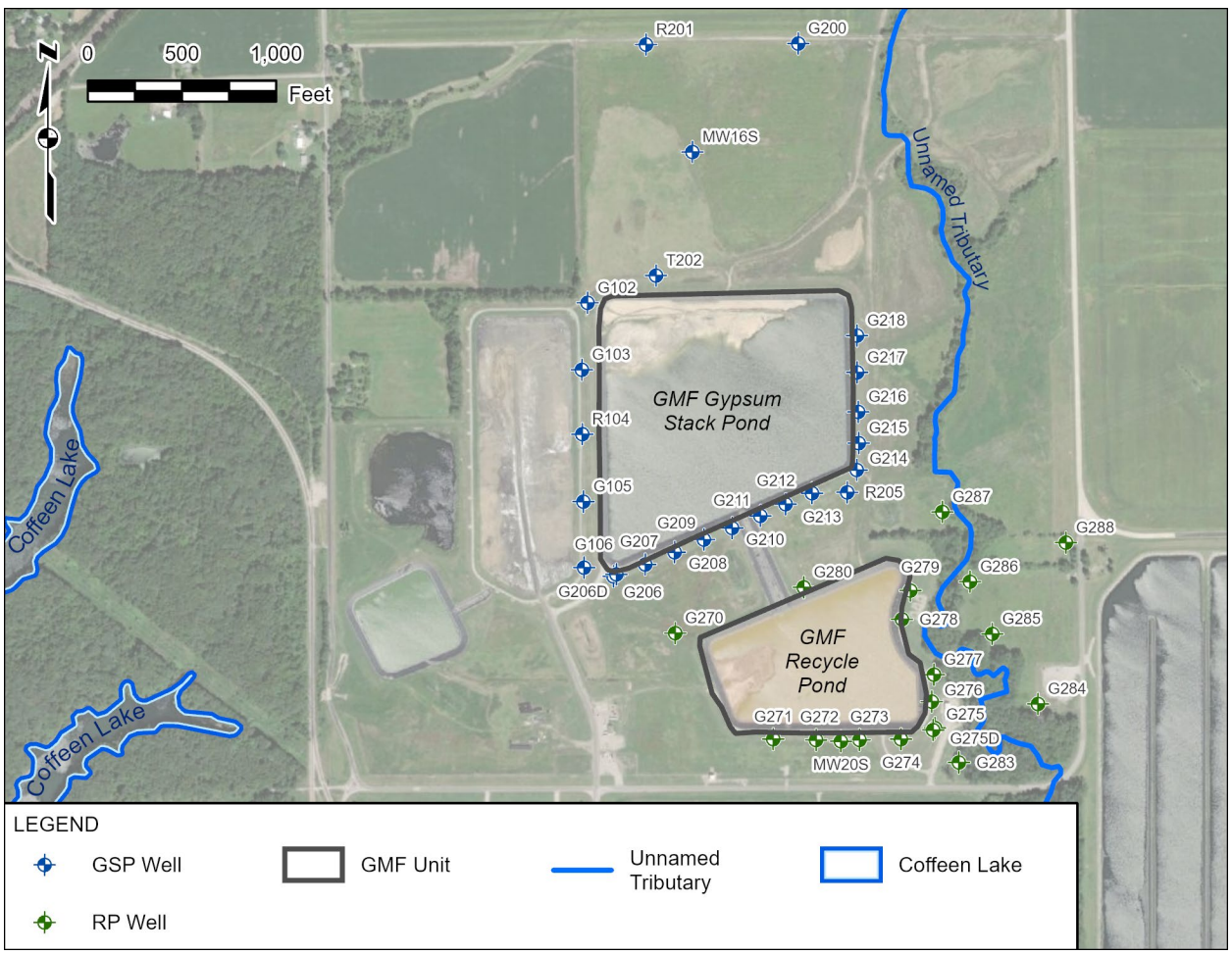

Figure 2.3 Monitoring Well Locations. Source: Ramboll (2021a).

[1] Samples were analyzed for a longer list of inorganic constituents and general water quality parameters (chloride, fluoride, sulfate, and total dissolved solids), but these constituents were not evaluated in the risk evaluation.

Table 2.1 Groundwater Monitoring Wells Related to the GMF GSP and the GMF RP

Associated GMF Pond	Side of Groundwater Divide	Well	Hydrogeologic Unit	Date Constructed	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Well Depth (ft bgs)
GMF GSP	East	G200	UA	2/25/2008	12.19	16.98	17.36
GMF GSP	East	G207	UA	10/8/2010	18.24	22.77	23.30
GMF GSP	East	G208	UA	10/7/2010	17.53	22.06	22.60
GMF GSP	East	G209	UA	10/7/2010	17.74	22.28	22.81
GMF GSP	East	G210	UA	10/6/2010	19.39	23.93	24.46
GMF GSP	East	G211	UA	10/11/2010	17.34	21.88	22.41
GMF GSP	East	G212	UA	10/11/2010	16.74	21.29	21.81
GMF GSP	East	G213	UA	10/12/2010	16.75	21.29	21.82
GMF GSP	East	G214	UA	10/14/2010	17.75	22.14	22.65
GMF GSP	East	G215	UA	10/13/2010	19.41	23.80	24.31
GMF GSP	East	G216	UA	10/13/2010	20.04	24.42	24.93
GMF GSP	East	G217	UA	10/12/2010	20.49	24.88	25.38
GMF GSP	East	G218	UA	10/12/2010	20.33	24.77	25.27
GMF GSP	East	MW16S	UA	4/25/2006	14.59	19.41	19.76
GMF GSP	East	R205	UA	3/20/2017	11.32	16.01	16.42
GMF GSP	East	T202	UA	10/15/2010	12.27	16.65	17.21
GMF GSP	West	G206D	DA	1/25/2021	49.20	59.00	59.39
GMF GSP	West	G102	UA	4/28/2006	12.02	16.78	17.15
GMF GSP	West	G103	UA	2/15/2010	15.88	20.67	21.09
GMF GSP	West	G105	UA	2/16/2010	16.11	20.90	21.37
GMF GSP	West	G106	UA	2/16/2010	14.37	18.96	19.44
GMF GSP	West	G206	UA	10/14/2010	17.51	21.92	22.42
GMF GSP	West	R104	UA	10/8/2010	14.59	19.32	19.85
GMF GSP	West	R201	UA	10/8/2010	14.59	19.32	19.85
GMF RP	East	G275D	DA	1/14/2021	49.76	59.55	59.89
GMF RP	East	G283	LCU	1/14/2021	8.39	18.17	18.36
GMF RP	East	G285	LCU	1/25/2021	13.68	23.45	23.83
GMF RP	East	G270	UA	2/26/2008	13.13	17.92	18.27
GMF RP	East	G271	UA	9/10/2009	9.96	14.31	14.79
GMF RP	East	G272	UA	9/10/2009	9.11	13.98	14.32
GMF RP	East	G273	UA	9/10/2009	9.08	14.56	15.10

Associated GMF Pond	Side of Groundwater Divide	Well	Hydrogeologic Unit	Date Constructed	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Well Depth (ft bgs)
GMF RP	East	G274	UA	9/16/2009	12.90	17.67	18.06
GMF RP	East	G275	UA	9/16/2009	8.22	12.62	13.19
GMF RP	East	G276	UA	9/16/2009	22.41	27.22	27.65
GMF RP	East	G277	UA	9/14/2009	14.29	18.77	19.24
GMF RP	East	G278	UA	9/11/2009	18.93	23.70	24.06
GMF RP	East	G279	UA	9/10/2009	22.40	26.79	27.30
GMF RP	East	G280	UA	2/26/2008	12.79	17.63	17.98
GMF RP	East	G284	UA	2/3/2021	8.08	12.85	13.23
GMF RP	East	G286	UA	1/18/2021	3.37	8.16	8.50
GMF RP	East	G287	UA	1/20/2021	5.43	10.25	10.59
GMF RP	East	G288	UA	1/19/2021	7.59	12.26	12.75
GMF RP	East	MW20S	UA	5/1/2007	8.41	13.22	13.67

Notes:
Source: Ramboll (2021a).
bgs = Below Ground Surface; DA = Deep Aquifer; ft = Feet; LCU = Lower Confining Unit; UA = Uppermost Aquifer.

Table 2.2 Groundwater Data Summary

Constituent	Samples with Constituent Detected	Samples Analyzed	Minimum Detected Value	Maximum Detected Value	Maximum Laboratory Detection Limit
Total Metals (mg/L)					
Antimony	2	434	0.0040	0.0045	0.0030
Arsenic	158	477	0.0010	0.11	0.0010
Barium	452	452	0.018	0.78	0.0010
Beryllium	9	436	0.0013	0.0067	0.0010
Boron	336	549	0.010	4.6	0.015
Cadmium	8	462	0.0012	0.0041	0.0010
Chromium	65	447	0.0040	0.086	0.0040
Cobalt	46	447	0.0021	0.053	0.0020
Lead	85	477	0.0010	0.082	0.0010
Lithium	25	265	0.011	0.030	0.020
Mercury	8	434	0.00024	0.0014	0.00020
Molybdenum	184	422	0.0010	0.044	0.0010
Selenium	189	451	0.0010	0.020	0.0010
Thallium	9	440	0.0010	0.0035	0.0010
Radionuclides (pCi/L)					
Radium-226 + 228	268	268	0	4.2	5.0
Other (mg/L, unless otherwise noted)					
Chloride	552	552	1.7	440	250
Fluoride	480	530	0.25	0.99	0.25
Sulfate	549	549	9.8	1,800	500
Total Dissolved Solids	555	555	230	3,400	26

Note:
pCi/L = PicoCuries Per Liter.

2.5 Surface Water Monitoring

Geosyntec Consultants collected a total of six surface water samples from Coffeen Lake (south of the GMF GSP and the GMF RP) in August 2021 (Geosyntec Consultants, 2021). The sample locations are shown in Figure 2.4, and the sampling results are summarized in Table 2.3.

Figure 2.4 Surface Water Sampling Locations. Source: Geosyntec Consultants (2021).

Table 2.3 Surface Water Data Summary

Constituent	Samples with Constituent Detected	Samples Analyzed	Minimum Detected Value	Maximum Detected Value	Maximum Laboratory Detection Limit
Total Metals (mg/L)					
Boron	5	5	0.086	0.33	0.05
Calcium	5	5	21	53	0.2
Cobalt	0	5	ND	ND	0.005
Iron	5	5	0.23	0.38	0.2
Lithium	0	5	ND	ND	0.01
Magnesium	5	5	10	16	0.1
Manganese	5	5	0.03	0.2	0.01
Potassium	5	5	2.5	4.9	0.5
Sodium	5	5	11	19	1
Other (mg/L)					
Chloride	5	5	7.2	11	0.4
Phosphorus	5	5	0.095	0.24	0.15
Sulfate	5	5	31	110	2
Total Dissolved Solids	5	5	120	240	10

Notes:
ND = Not Detected.
Source: Geosyntec Consultants (2021).
The background sample (BKG-1 on Figure 2.4) was not included in the summary statistics.
Surface water was analyzed for both total and dissolved metals; only the total metals are reported here, because they are generally higher concentrations than dissolved metals. The only exception was iron, which had a maximum dissolved concentration 1.8 times higher than the maximum total concentration. However, iron was not measured in groundwater, therefore, was not identified as a COI.

3 Risk Evaluation

3.1 Risk Evaluation Process

A risk evaluation was conducted to determine whether constituents present in groundwater underlying and downgradient of the GMF GSP and the GMF RP have the potential to pose adverse health effects to human and ecological receptors. The risk evaluation is consistent with the principles of risk assessment established by US EPA and has considered evaluation criteria detailed in Illinois guidance documents (*e.g.*, IEPA, 2013, 2019).

The general risk evaluation approach is summarized in Figure 3.1 and discussed below.

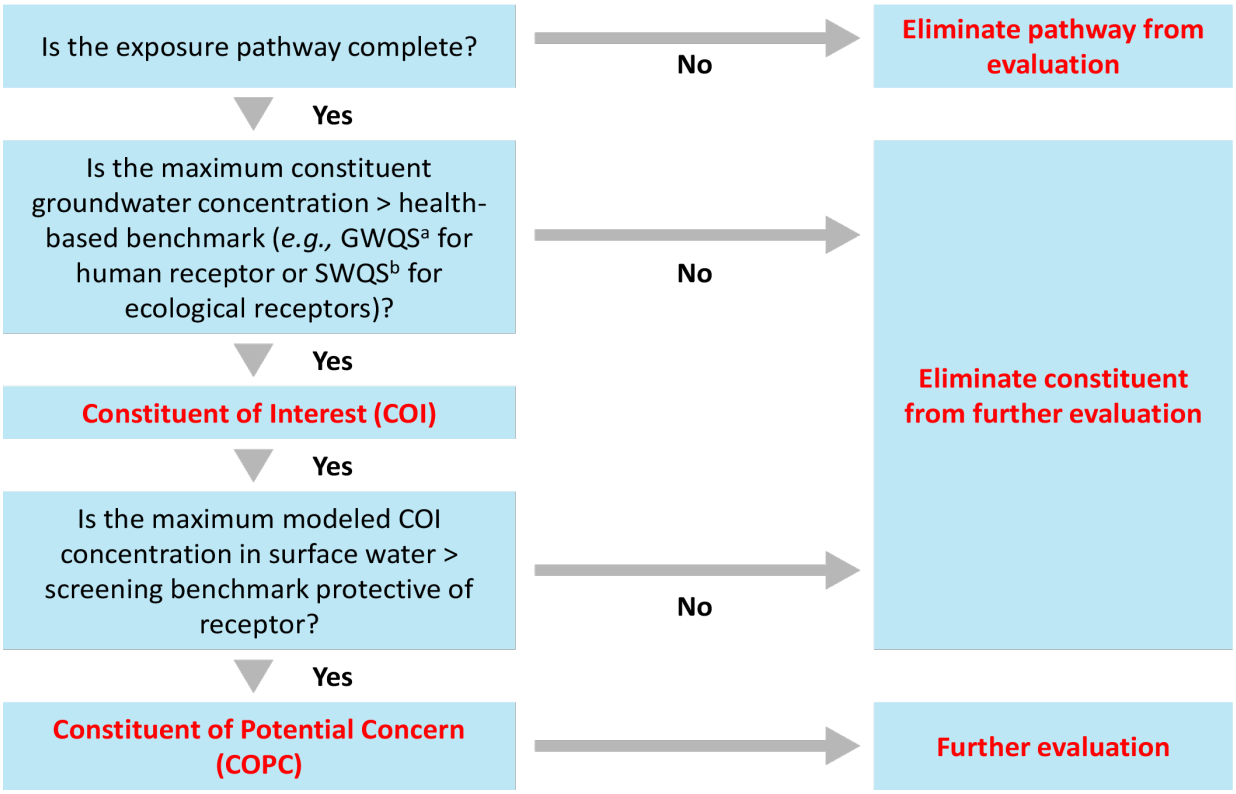

Figure 3.1 Overview of Risk Evaluation Methodology. GWQS = Groundwater Quality Standards; IEPA = Illinois Environmental Protection Agency; SWQS = Surface Water Quality Standards. (a) The IEPA Part 845 groundwater protection standards were used to identify COIs. (b) IEPA SWQS protective of chronic exposures to aquatic organisms were used to identify ecological COIs. In the absence of an SWQS, US EPA Region IV ecological screening values were used.

The first step in the risk evaluation was to develop the CEMs and identify complete exposure pathways. All potential receptors and exposure pathways based on groundwater use and surface water use in the vicinity of the Site were considered. Exposure pathways that were incomplete were excluded from the evaluation.

Groundwater data were used to identify COIs. COIs were identified as constituents with maximum concentrations in groundwater in excess of groundwater quality standards (GWQS)[2] for human receptors and SWQS for ecological receptors. Based on the CSM (Section 2.2), some groundwater underlying the GMF GSP and the GMF RP has the potential to interact with surface water in the unnamed tributary and Coffeen Lake. Therefore, constituents in groundwater potentially related to the GMF GSP and the GMF RP may potentially flow into the unnamed tributary and subsequently into surface water in Coffeen Lake.

Surface water samples have been collected from Coffeen Lake adjacent to the Site; however, sediment samples have not been collected from the lake. Gradient modeled the potential migration of COIs from groundwater to surface water and sediment to evaluate potential risks to receptors (see Section 3.3.3).

Gradient modeled the COI concentrations in surface water and sediment based on the groundwater data from the wells related to the GMF GSP and the GMF RP. The measured and modeled COI concentrations in surface water and sediment were compared to conservative, generic risk-based screening benchmarks for human health and ecological receptors. These generic screening benchmarks rely on default assumptions with limited consideration of site-specific characteristics. Human health benchmarks are receptor-specific values calculated for each pathway and environmental medium that are designed to be protective of human health. Ecological benchmarks are medium-specific values designed to be protective of all potential ecological receptors exposed to surface water. Ecological and human health screening benchmarks are inherently conservative because they are intended to screen out chemicals that are of no concern with a high level of confidence. Therefore, a measured or modeled COI concentration exceeding a screening benchmark does not indicate an unacceptable risk, but only that further risk evaluation is warranted. COIs with maximum concentrations exceeding a conservative screening benchmark are identified as COPCs requiring further evaluation.

As described in more detail below, this evaluation relied on the screening assessment to demonstrate that constituents present in groundwater underlying the GMF GSP and the GMF RP do not pose an unacceptable human health or ecological risk. That is, after the screening step, no COPCs were identified and further assessment was not warranted.

3.2 Human and Ecological Conceptual Exposure Models

A CEM provides an overview of the receptors and exposure pathways requiring risk evaluation. The CEM describes the source of the contamination, the mechanism that may lead to a release of contamination, the environmental media to which a receptor may be exposed, the route of exposure (exposure pathway), and the types of receptors that may be exposed to these environmental media.

3.2.1 Human Conceptual Exposure Model

The human CEM for the Site depicts the relationships between the off-Site environmental media potentially impacted by constituents in groundwater and human receptors that could be exposed to these media. Figure 3.2 presents a human CEM for the Site. It considers a human receptor who could be exposed to COIs hypothetically released from the GMF GSP and the GMF RP into groundwater, surface water, sediment, and fish. The following human receptors and exposure pathways were evaluated for inclusion in the Site-specific CEM.

[2] As discussed further in Section 3.3.2, GWQS are protective of human health and not necessarily of ecological receptors. While ecological receptors are not exposed to groundwater, groundwater can potentially enter into the adjacent surface water and impact ecological receptors. Therefore, two sets of COIs were identified: one for humans and another for ecological receptors.

- Residents – exposure to groundwater/surface water as drinking water;
- Residents – exposure to groundwater/surface water used for irrigation;
- Recreators in the lake adjacent to the Site:
  - Boaters – exposure to surface water and sediment while boating;
  - Swimmers – exposure to surface water and sediment while swimming;
  - Anglers – exposure to surface water and sediment and consumption of locally caught fish.

All of these exposure pathways were considered to be complete, except for residential exposure to groundwater or surface water used for drinking water or irrigation, and swimming. Section 3.2.1.1 explains why the residential drinking water and irrigation pathways are incomplete, and Section 3.2.1.2 provides additional description of the recreational exposures. While a recreator's potential exposure to surface water in Coffeen Lake was evaluated, swimming is prohibited in Coffeen Lake and thus was not evaluated (IDNR, 2014). Although swimming and boating are unlikely to occur in the unnamed tributary due to its shallow depth (flow depth of 2.1 feet) (Golder Associates Inc., 2020), the unnamed tributary was evaluated for recreator exposure due to its potential use by recreational anglers.

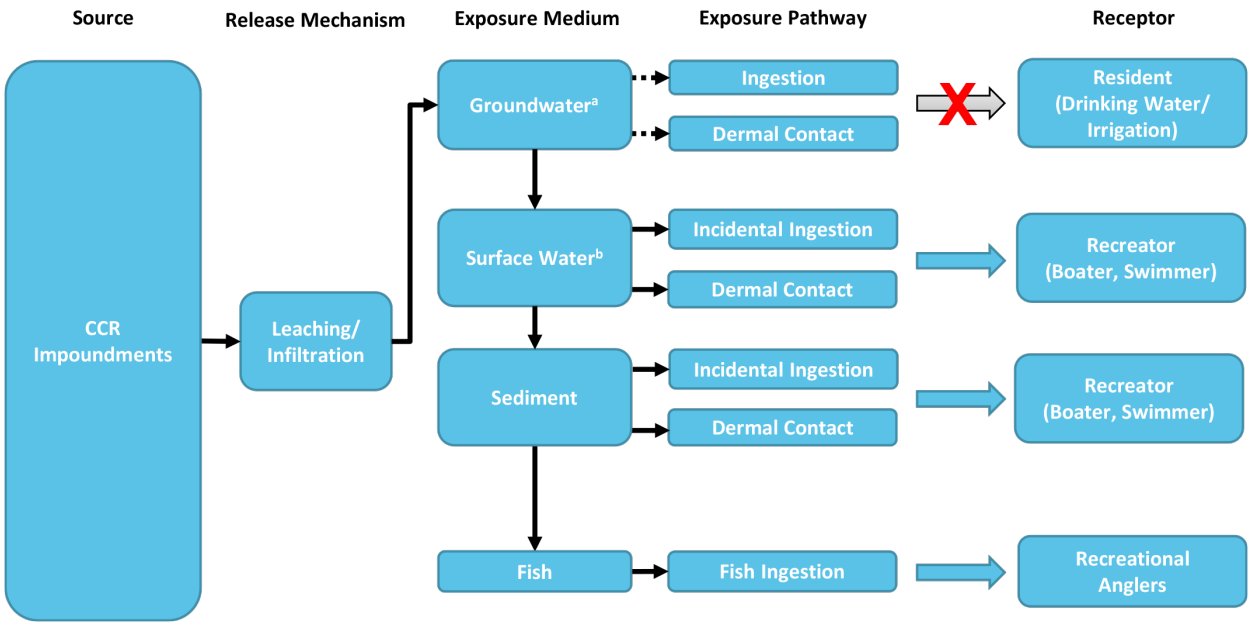

Figure 3.2 Human Conceptual Exposure Model. CCR = Coal Combustion Residuals. Dashed line/Red X = Incomplete or insignificant exposure pathway. (a) Groundwater in the vicinity of the Site is not used as a drinking water or irrigation source. (b) Surface water is not used as a drinking water source.

3.2.1.1 Groundwater or Surface Water as a Drinking Water/Irrigation Source

Using groundwater as a source of drinking water and/or irrigation water is not a complete exposure pathway for CCR-related constituents originating from the GMF GSP or the GMF RP. Specifically, there are no users of shallow groundwater from the UA in the vicinity of the GMF GSP or the GMF RP; thus, no receptors can be exposed to any CCR-related constituents in groundwater originating from either of the GMF ponds.

Relying on State databases, Ramboll completed a water well survey in 2021 (Ramboll, 2021a). A total of 18 water wells were identified within a 1,000-meter radius of the GMF ponds during a comprehensive search of the Illinois State Geological Survey's (ISGS) Illinois Water and Related Wells (ILWATER) Map (Ramboll, 2021a,b). These included 12 monitoring wells, 5 farm/domestic wells,[3] and 1 industrial use well (Ramboll, 2021a,b) (Figure 3.3). There is no information available about the current use of these wells. However, site-specific groundwater flow conditions support the conclusion that none of the farm/domestic wells are or can ever be affected by potential CCR-related constituents originating from the GMF GSP/GMF RP.

- **There is no off-Site migration of CCR-related constituents in groundwater**. All groundwater originating from the GMF RP ultimately flows into the unnamed tributary, whereas a component of groundwater originating from the GMF GSP flows into the unnamed tributary, and the rest flows into the western branch of Coffeen Lake. Groundwater from the UA flows southeast/east before flowing into the unnamed tributary, and flows southwest/west before flowing into the western branch of Coffeen Lake (Ramboll, 2021a,b). Three (3) of the 5 farm/domestic wells (*i.e.*, Well IDs 73, 25, and 28) and one industrial well (*i.e.*, 08) located within the 1,000 m buffer area are upgradient of both the GMF GSP and the GMF RP (Figure 3.3). Therefore, there is no plausible mechanism by which those 4 wells (*i.e.*, 73, 08, 25, and 28) could be impacted by any potential constituents in groundwater associated with the GMF GSP and the GMF RP.

  Two (2) water wells (73 and 02) are located on the northeast and southeast side of the unnamed tributary, *i.e.*, the opposite side of the tributary from GMF GSP and the GMF RP (Figure 3.3). The surface water bodies in the vicinity of the GMF ponds are hydraulic boundaries that prevent shallow groundwater from flowing past or underneath them. Furthermore, the surface waters are regional "sinks," which means that groundwater flows into the surface water bodies both from the east and the west, but cannot flow past. Thus, because the eastern branch of Coffeen Lake and the unnamed tributary separate those two farm/domestic wells (*i.e.*, 73 and 02) from the GMF GSP and the GMF RP (Figure 3.3), there is no plausible mechanism by which the wells could be impacted by any potential constituents in groundwater associated with the GMF GSP and the GMF RP.

  There is one domestic/farm well located southeast of the GMF GSP and the GMF RP (Well ID 32 on Figure 3.3), on the west side of the unnamed tributary. It is likely that this well is not in use and not in existence. The well, which was installed in 1981, is located near the former location of several prior residents (Figure 3.4). However, the property in this area has been purchased by IPGC.

- **Coffeen Lake is not used as a public water supply.** Coffeen Lake is a cooling water pond owned and maintained by IPGC, and IPGC restricts the use of the lake as a source of drinking water. Therefore, the human exposure pathway of surface water ingestion (as potable water) adjacent to the GMF GSP is not a complete pathway and was not evaluated further.

[3] The Ramboll 2021 GMF GSP Hydrogeologic Characterization Report states there are four farm/domestic wells, but Figure 3.3 in that report shows that there are five wells (Ramboll, 2021a).

- **The GMF GSP and the GMF RP have a limited hydraulic connection to underlying groundwater**. The LCU underlying the UA forms a hydraulic barrier between the GMF ponds and deeper groundwater resources. Due to the very low hydraulic conductivity of the LCU, downward migration of shallow groundwater is expected to be limited. Therefore, the likelihood of GMF pond-related impacts to deep groundwater is minimal.

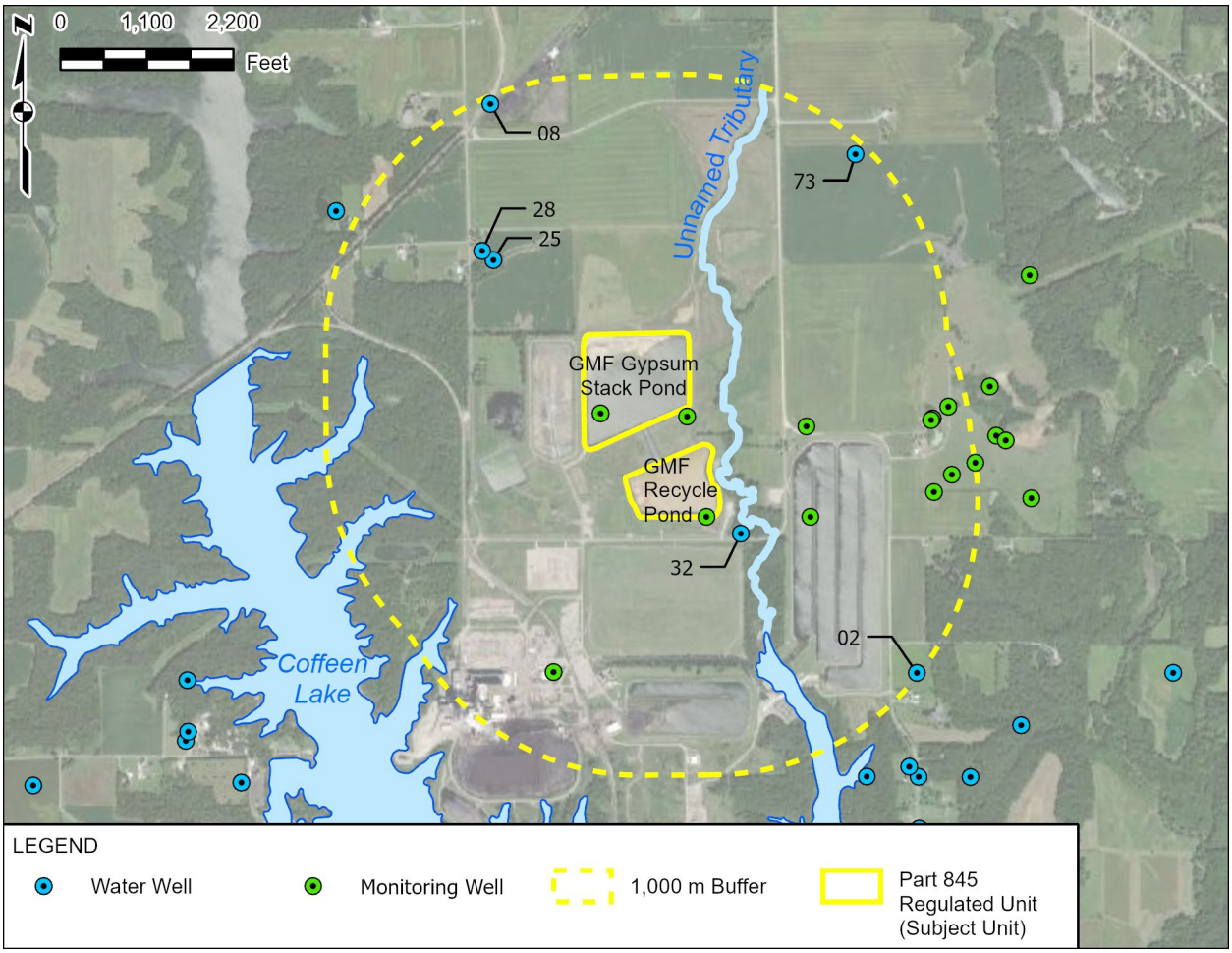

Figure 3.3 Water Wells Within 1,000 Meters of the GMF GSP and the GMF RP. GMF = Gypsum Manufacturing Facility; GSP = Gypsum Stack Pond; RP = Recycle Pond. The industrial well is shown as "08" in the northwest corner of the buffer zone. Sources: Ramboll (2021a,b).

Figure 3.4 Historic Property Use In the Vicinity of Well 32. (a) 1998; (b) 2005; (c) 2009. Sources: USGS (1998a,b, 2005a,b); USDA (2009a,b).

3.2.1.2 Recreational Exposures

Coffeen Lake is located adjacent to the Site, and is owned by IPGC. Property along the lake has been leased to Illinois Department of Natural Resources (IDNR) for use as a State Fish and Wildlife Area (Ramboll, 2021a), and the lake is used for recreational fishing (IDNR, 2022). Recreational exposure to surface water and sediment may occur during activities such as boating or fishing in the lake. Recreational anglers may also consume locally caught fish from Coffeen Lake. While a recreator's potential exposure to surface water in Coffeen Lake was evaluated, swimming is prohibited in Coffeen Lake and thus was not evaluated (IDNR, 2014). Although swimming and boating are unlikely to occur in the unnamed tributary due to its shallow depth (flow depth of 2.1 feet) (Golder Associates Inc., 2020), the unnamed tributary was evaluated for recreator exposure due to its potential use by recreational anglers.

3.2.2 Ecological Conceptual Exposure Model

The ecological CEM for the Site depicts the relationships between off-Site environmental media (surface water and sediment) potentially impacted by COIs in groundwater and ecological receptors that may be exposed to these media. The ecological risk evaluation considered both direct toxicity as well as secondary toxicity *via* bioaccumulation. Figure 3.4 presents the ecological CEM for the Site. The following ecological receptor groups and exposure pathways were considered:

- **Ecological Receptors Exposed to Surface Water:**
  - Aquatic plants, amphibians, reptiles, and fish.
- **Ecological Receptors Exposed to Sediment:**
  - Benthic invertebrates (*e.g.*, insects, crayfish, mussels).
- **Ecological Receptors Exposed to Bioaccumulative COIs:**
  - Higher trophic-level wildlife (avian and mammalian) *via* direct exposures (surface water and sediment exposure) and secondary exposures through the consumption of prey (*e.g.*, plants, invertebrates, small mammals, fish).

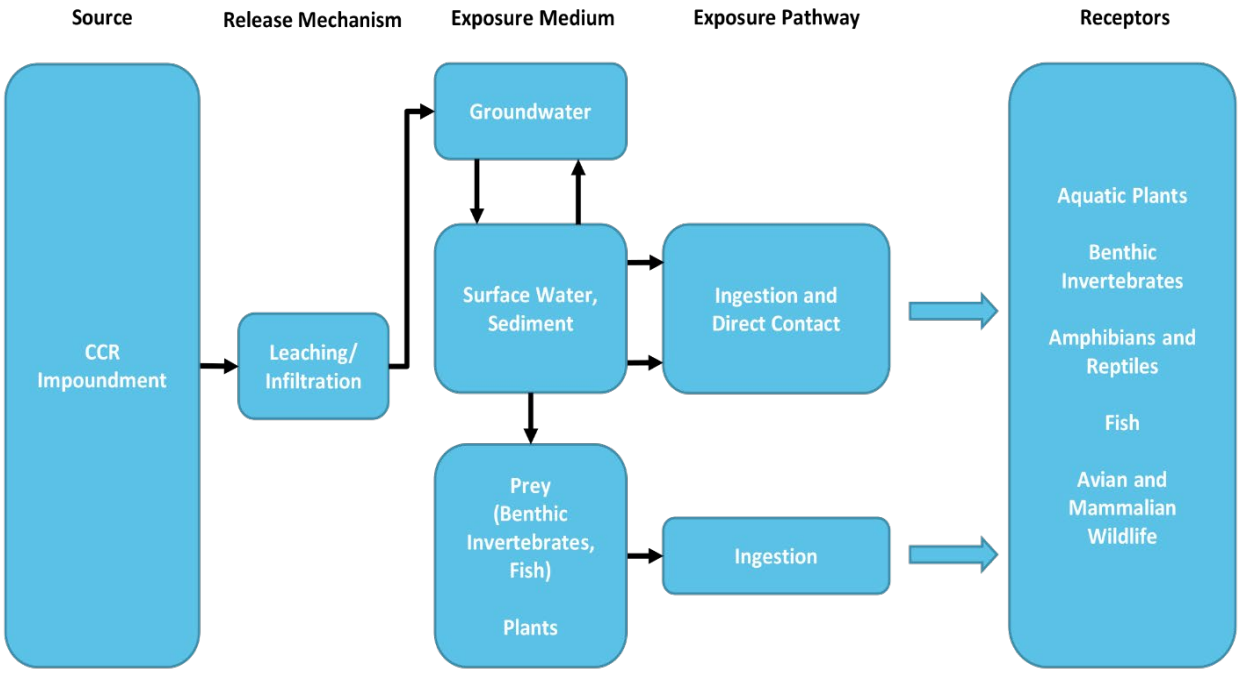

Figure 3.5 Ecological Conceptual Exposure Model. CCR = Coal Combustion Residuals.

3.3 Identification of Constituents of Interest

Risks were evaluated for COIs. A constituent was considered a COI if the maximum detected constituent concentration in groundwater exceeded a health-based benchmark. According to US EPA risk assessment guidance (US EPA, 1989), this screening step is designed to reduce the number of constituents carried through the risk evaluation that are anticipated to have a minimal contribution to the overall risk. Identified COIs are the constituents that are most likely to pose a risk concern in the surface water adjacent to the Site.

3.3.1 Human Health Constituents of Interest

For the human health risk evaluation, COIs were conservatively identified as constituents with maximum concentrations in groundwater above the GWPS listed in the Illinois CCR Rule Part 845.600 (IEPA, 2021). Gradient used the maximum detected concentrations from groundwater samples collected from all of the wells associated with the GMF GSP and the GMF RP, regardless of hydrostratigraphic unit. The use of groundwater data in this risk evaluation does not imply that detected constituents are associated with the GMF GSP or the GMF RP or that they have been identified as potential groundwater exceedances. Using this approach, six COIs (arsenic, beryllium, boron, cobalt, lead, and thallium) were identified for the human health risk evaluation *via* the surface water pathway for the unnamed tributary (Table 3.1) and two COIs (beryllium and lead) were identified for the western branch of Coffeen Lake (Table 3.2).

The water quality parameters that exceeded the GWPS included chloride, sulfate, and total dissolved solids; however, these constituents were not included in the risk evaluation because the GWPS are based on aesthetic quality. The US EPA secondary maximum contaminant levels (MCLs) for chloride, sulfate, and total dissolved solids are based on aesthetic quality. The secondary MCLs for chloride and sulfate (250 mg/L) are based on salty taste (US EPA, 2021a). The secondary MCL for total dissolved solids (500 mg/L) is based on hardness, deposits, colored water, staining, and salty taste (US EPA, 2021a). Given that these

parameters are not likely to pose a human health risk concern in the event of exposure, they were not considered to be human health COIs.

Table 3.1 Human Health Constituents of Interest for the Unnamed Tributary

Constituent[a]	Maximum Concentration	GWPS[b]	Human Health COI[c]
Total Metals (mg/L)			
Antimony	0.0045	0.0060	No
Arsenic	0.11	0.010	Yes
Barium	0.78	2.0	No
Beryllium	0.0042	0.0040	Yes
Boron	4.6	2.0	Yes
Cadmium	0.0041	0.0050	No
Chromium	0.086	0.10	No
Cobalt	0.053	0.0060	Yes
Lead	0.082	0.0075	Yes
Lithium	0.030	0.040	No
Mercury	0.0014	0.0020	No
Molybdenum	0.043	0.10	No
Selenium	0.020	0.050	No
Thallium	0.0035	0.0020	Yes
Radionuclides (pCi/L)			
Radium-226 + 228	4.2	5.0	No
Other (mg/L, unless otherwise noted)			
Chloride	440	200	No[d]
Fluoride	0.73	4.0	No
Sulfate	1,800	400	No[d]
Total Dissolved Solids	3,400	1,200	No[d]

Notes:
COI = Constituent of Interest; GMF = Gypsum Manufacturing Facility; GSP = Gypsum Stack Pond; GWPS = Groundwater Protection Standards; IEPA = Illinois Environmental Protection Agency; MCL = Maximum Contaminant Level; pCi/L = PicoCuries Per Liter; RP = Recycle Pond.
Shaded = Compound identified as a COI.
(a) The constituents are those listed in the Illinois Part 845.600 GWPS (IEPA, 2021). This table presents the maximum concentration from all wells from the GMF GSP and the GMF RP combined.
(b) The Illinois Part 845.600 GWPS (IEPA, 2021) were used to identify COIs.
(c) COIs are constituents for which the maximum concentration exceeds the groundwater standard.
(d) This constituent is not likely to pose a human health risk concern due to the absence of studies regarding toxicity to human health. Therefore, this constituent is not considered a COI.

Table 3.2 Human Health Constituents of Interest for the Western Branch of Coffeen Lake

Constituent[a]	Maximum Concentration	GWPS[b]	Human Health COI[c]
Total Metals (mg/L)			
Antimony	ND	0.0060	No
Arsenic	0.010	0.010	No
Barium	0.17	2.0	No
Beryllium	0.0067	0.0040	Yes
Boron	0.13	2.0	No
Cadmium	0.0012	0.0050	No
Chromium	0.032	0.10	No
Cobalt	0.0058	0.0060	No
Lead	0.0097	0.0075	Yes
Lithium	0.016	0.040	No
Mercury	0.0011	0.0020	No
Molybdenum	0.044	0.10	No
Selenium	0.0091	0.050	No
Thallium	ND	0.0020	No
Radionuclides (pCi/L)			
Radium-226 + 228	2.8	5.0	No
Other (mg/L, unless otherwise noted)			
Chloride	88	200	No[d]
Fluoride	0.99	4.0	No
Sulfate	600	400	No[d]
Total Dissolved Solids	1,300	1,200	No[e]

Notes:
COI = Constituent of Interest; GMF = Gypsum Manufacturing Facility; GSP = Gypsum Stack Pond; GWPS = Groundwater Protection Standards; IEPA = Illinois Environmental Protection Agency; MCL = Maximum Contaminant Level; pCi/L = PicoCuries Per Liter; RP = Recycle Pond.
Shaded = Compound identified as a COI.
(a) The constituents are those listed in the Illinois Part 845.600 GWPS (IEPA, 2021). This table presents the maximum concentration from all wells from the GMF GSP and the GMF RP combined.
(b) The Illinois Part 845.600 GWPS (IEPA, 2021) were used to identify COIs.
(c) COIs are constituents for which the maximum concentration exceeds the groundwater standard.
(d) This constituent is not likely to pose a human health risk concern due to the absence of studies regarding toxicity to human health. Therefore, this constituent is not considered a COI.
(e) Total dissolved solids are not considered a COI because the MCL is based on aesthetic quality.

3.3.2 Ecological Constituents of Interest

The Illinois GWPS, as defined in IEPA's guidance, were developed to protect human health but not necessarily ecological receptors. While ecological receptors are not exposed to groundwater, groundwater can potentially migrate into the adjacent surface water and impact ecological receptors. Therefore, to identify ecological COIs, the maximum concentrations of constituents detected in groundwater were compared to ecological surface water benchmarks protective of aquatic life.

The surface water screening benchmarks for freshwater organisms were obtained from the following hierarchy of sources:

- IEPA (2019) SWQS. IEPA SWQS are health-protective benchmarks for aquatic life exposed to surface water on a long-term basis (*i.e.*, chronic exposure). The SWQS for several metals are hardness-dependent (cadmium, chromium, copper, lead, manganese, nickel, and zinc). Screening benchmarks for these constituents were calculated assuming US EPA's default hardness of 100 mg/L (US EPA, 2022).[4]
- US EPA Region IV (2018) surface water Ecological Screening Values (ESVs) for hazardous waste sites.

Benchmarks from the United States Department of Energy's (US DOE) guidance document ("A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota") were used for radium (US DOE, 2019). US DOE presents benchmarks for radium-226 and radium-228 (4 and 3 picoCuries per liter [pCi/L], respectively). Given that radium concentrations are expressed as total radium (radium-226+228, *i.e.*, the sum of radium-226 and radium-228), Gradient used the lower of the two benchmarks (3 pCi/L for radium-228) to evaluate total radium concentrations.

Consistent with the human health risk evaluation, Gradient used the maximum detected concentrations from groundwater samples collected from all of the wells associated with the GMF GSP and the GMF RP, (regardless of hydrostratigraphic unit) without considering spatial or temporal representativeness for ecological receptor exposures. The use of the maximum constituent concentrations in this evaluation is designed to conservatively identify COIs that warrant further investigation. Cadmium, cobalt, lead, mercury, and radium-226+228 were identified as COIs for ecological receptors at the unnamed tributary (Table 3.3), and cadmium was identified as a COI for the western branch of Coffeen Lake (Table 3.4).

[4] Hardness data are not available for Coffeen Lake or the unnamed tributary adjacent to the Site; therefore, the US EPA (2022) default hardness of 100 mg/L was used. Use of a higher hardness value would result in less stringent screening values; thus, use of the US EPA default hardness is conservative.

Table 3.3 Ecological Constituents of Interest for the Unnamed Tributary

Constituents[a]	Maximum Groundwater Concentration	Ecological Benchmark[b]	Basis	Ecological COI[c]
Total Metals (mg/L)				
Antimony	0.0045	0.19	US EPA R4 ESV	No
Arsenic	0.11	0.19	IEPA SWQC	No
Barium	0.78	5.0	IEPA SWQC	No
Beryllium	0.0042	0.064	US EPA R4 ESV	No
Boron	4.6	7.6	IEPA SWQC	No
Cadmium	0.0041	0.0011	IEPA SWQC	Yes
Chromium	0.086	0.21	IEPA SWQC	No
Cobalt	0.053	0.019	US EPA R4 ESV	Yes
Lead	0.082	0.020	IEPA SWQC	Yes
Lithium	0.030	0.44	US EPA R4 ESV	No
Mercury	0.0014	0.0011	IEPA SWQC	Yes
Molybdenum	0.043	7.2	US EPA R4 ESV	No
Selenium	0.020	1.0	IEPA SWQC	No
Thallium	0.0035	0.0060	US EPA R4 ESV	No
Radionuclides (pCi/L)				
Radium-226 + 228	4.2	3.0	US DOE	Yes
Other (mg/L, unless otherwise noted)				
Chloride	440	500	IEPA SWQC	No
Fluoride	0.73	4.0	IEPA SWQC	No
Sulfate	1,800	NA	NA	No
Total Dissolved Solids	3,400	NA	NA	No

Notes:
COI = Constituent of Interest; ESV = Ecological Screening Value; GWPS = Groundwater Protection Standards; IEPA = Illinois Environmental Protection Agency; SWQC = Surface Water Quality Criteria; NA = Not Available; pCi/L = PicoCuries Per Liter; US DOE = United States Department of Energy; US EPA R4 = United States Environmental Protection Agency Region IV.
Shaded = Compound identified as a COI.
(a) The constituents are those listed in the Illinois Part 845.600 GWPS (IEPA, 2021). This table presents the maximum concentration from all wells from the GMF GSP and the GMF RP combined.
(b) Ecological benchmarks are from the hierarchy of sources discussed in Section 3.3.2: IEPA SWQS (IEPA, 2019); US EPA R4 "Ecological Risk Assessment Supplemental Guidance" (US EPA Region IV, 2018); and US DOE's guidance document "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (US DOE, 2019).
(c) Constituents with maximum detected concentrations exceeding a benchmark protective of surface water exposure are considered ecological COIs.

Table 3.4 Ecological Constituents of Interest for the Western Branch of Coffeen Lake

Constituents[a]	Maximum Groundwater Concentration	Ecological Benchmark[b]	Basis	Ecological COI[c]
Total Metals (mg/L)				
Antimony	ND	0.19	US EPA R4 ESV	No
Arsenic	0.010	0.19	IEPA SWQC	No
Barium	0.17	5.0	IEPA SWQC	No
Beryllium	0.0067	0.064	US EPA R4 ESV	No
Boron	0.13	7.6	IEPA SWQC	No
Cadmium	0.0012	0.0011	IEPA SWQC	Yes
Chromium	0.032	0.21	IEPA SWQC	No
Cobalt	0.0058	0.019	US EPA R4 ESV	No
Lead	0.0097	0.020	IEPA SWQC	No
Lithium	0.016	0.44	US EPA R4 ESV	No
Mercury	0.0011	0.0011	IEPA SWQC	No
Molybdenum	0.044	7.2	US EPA R4 ESV	No
Selenium	0.0091	1.0	IEPA SWQC	No
Thallium	ND	0.0060	US EPA R4 ESV	No
Radionuclides (pCi/L)				
Radium-226 + 228	2.8	3.0	US DOE	No
Other (mg/L, unless otherwise noted)				
Chloride	88	500	IEPA SWQC	No
Fluoride	0.99	4.0	IEPA SWQC	No
Sulfate	600	0	NA	No
Total Dissolved Solids	1,300	0	NA	No

Notes:

COI = Constituent of Interest; ESV = Ecological Screening Value; GWPS = Groundwater Protection Standards; IEPA = Illinois Environmental Protection Agency; NA = Not Available; pCi/L = PicoCuries Per Liter; SWQC = Surface Water Quality Criteria; US DOE = United States Department of Energy; US EPA R4 = United States Environmental Protection Agency Region IV.

Shaded = Compound identified as a COI.

(a) The constituents are those listed in the Illinois Part 845.600 GWPS (IEPA, 2021). This table presents the maximum concentration from all wells from the GMF GSP and the GMF RP combined.

(b) Ecological benchmarks are from the hierarchy of sources discussed in Section 3.3.2: IEPA SWQS (IEPA, 2019); US EPA R4 "Ecological Risk Assessment Supplemental Guidance" (US EPA Region IV, 2018); and US DOE's guidance document "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (US DOE, 2019).

(c) Constituents with maximum detected concentrations exceeding a benchmark protective of surface water exposure are considered ecological COIs.

3.4 Surface Water and Sediment Modeling

Surface water sampling has been conducted in Coffeen Lake adjacent to the Site. To estimate the potential contribution to surface water (and sediment) from groundwater specifically associated with the GMF GSP and the GMF RP, Gradient modeled concentrations in surface water and sediment from two water bodies (the unnamed tributary and western branch of Coffeen Lake) for the human and ecological COIs in groundwater. This is because the constituents detected in groundwater above an ecological or health-based benchmark are most likely to pose a risk concern in the adjacent surface waters. Gradient modeled human health and ecological COI concentrations in the surface water and sediment using a mass balance calculation based on the surface water and groundwater mixing. The model assumes a well-mixed groundwater-surface water location. The maximum detected concentrations in groundwater (regardless of well location) from 2015 to 2021 were conservatively used to model COI concentrations in surface water and sediment.

Groundwater data from the east side of the groundwater divide were used for modeling surface water concentrations in the unnamed tributary. Groundwater data from the west side of the groundwater divide were used for modeling surface water concentrations in the western branch of Coffeen Lake. All of the GMF RP wells (n = 19) and a subset of the GMF GSP wells (n = 16), located on the east side of the divide, were used to model surface water concentrations in the unnamed tributary. Eight (8) of the GMF GSP wells, located on the west side of the divide, were used to model surface water concentrations in the western branch of Coffeen Lake (Figure 2.1). Due to the fact that different sets of wells were used to model surface water concentrations to the east and west, the list of COIs differs on the east and west sides of the groundwater divide. The surface water modeling for the unnamed tributary and the western branch of Coffeen Lake included only the COIs relevant for the east and west sides of the groundwater divide, respectively. The human health and/or ecological COIs on the east side of the divide included arsenic, beryllium, boron, cadmium, cobalt, lead, mercury, thallium, and radium-226+228. The human health and/or ecological COIs on the west side of the divide included beryllium, cadmium, and lead.

The groundwater data were measured as total metals. Use of the total metals concentration for these COIs may overestimate surface water concentrations because dissolved concentrations, which are lower than total concentrations, represent the mobile fractions of constituents that could likely flow into and mix with surface water.

The modeling approach does not account for geochemical transformations that may occur during groundwater mixing with surface water. Gradient assumed that predicted surface water concentrations were influenced only by the physical mixing of groundwater as it enters the surface water and were not further influenced by the geochemical reactions in the water and sediment, such as precipitation. In addition, the model only predicts surface water and sediment concentrations as a result of the potential migration of COI concentrations in groundwater related to the GMF GSP and the GMF RP and does not account for background concentrations in surface water or sediment.

For this evaluation, Gradient adapted a simplified and conservative form of US EPA's indirect exposure assessment methodology (US EPA, 1998) that was used in US EPA's coal combustion waste risk assessment (US EPA, 2014a). The model is a mass balance calculation based on surface water and groundwater mixing and the concept that the dissolved and sorbed concentrations can be related through an equilibrium partitioning coefficient (K_d). The model assumes a well-mixed groundwater-surface water location, with partitioning among total suspended solids, dissolved water column, sediment pore water, and solid sediments.

Sorption to soil and sediment is highly dependent on the surrounding geochemical conditions. To be conservative, we ignored the natural attenuation capacity of soil and sediment and estimated the surface water concentration based only on the physical mixing of groundwater and surface water (*i.e.*, dilution) at the point of entry of groundwater to the surface water.

The aquifer and surface water properties used to estimate the volume of groundwater flowing into the unnamed tributary and surface water concentrations are presented in Table 3.5. The COI concentrations in sediment in the unnamed tributary were modeled using the COI-specific sediment-to-water partitioning coefficients and the sediment properties presented in Table 3.6. In the absence of Site-specific information, Gradient used default assumptions (*e.g.*, depth of the upper benthic layer and bed sediment porosity) to model sediment concentrations. The modeled surface water and sediment concentrations for the unnamed tributary are presented in Table 3.7. These modeled concentrations reflect conservative contributions from groundwater flow.

The groundwater and surface water properties used in modeling for the western branch of Coffeen Lake are presented in Table 3.8. The sediment properties used in modeling for the western branch of Coffeen Lake are presented in Table 3.9. The modeled surface water and sediment concentrations for the western branch of Coffeen Lake are presented in Table 3.10. A description of the modeling and the detailed results are presented in Appendix A.

Table 3.5 Groundwater and Surface Water Properties Used in Modeling for the Unnamed Tributary

Parameter	Unit	Values	Notes/Source
Groundwater			
COI Concentration	mg/L	Constituent-specific	Maximum detected concentration in groundwater
Cross Section Area for the Uppermost Aquifer[a]	m^2	664	The average thickness of the UA near the GMF ponds (*i.e.*, approximately 3 ft) multiplied by the total length of the GMF ponds near the unnamed tributary (*i.e.*, ~726 m) (Ramboll, 2021b).
Hydraulic Gradient	m/m	0.0075	The average hydraulic gradient determined for the UA towards the unnamed tributary (Ramboll, 2021b).
Hydraulic Conductivity of the Uppermost Aquifer	cm/s	0.0013	The average of the geometric mean horizontal hydraulic conductivities measured for the UA (Ramboll, 2021b).
Surface Water			
Surface Water Flow Rate in the Unnamed Tributary	L/yr	8.04×10^{10}	There are no flow records available for the unnamed tributary that flows from north to south into the eastern branch of Coffeen Lake. According to Golder Associates Inc. (2020), the flow rate was assumed to be 90 cfs.
Total Suspended Solids	mg/L	3.2	Average Coffeen Lake concentration (Hanson, 2020).
Depth of the Water Column	m	0.64	Flow depth of the unnamed tributary (Golder Associates Inc., 2020).
Suspended Sediment to Water Partition Coefficient	mg/L	Constituent-specific	Values based on US EPA (2014a).

Notes:
cfs = Cubic Feet per Second; cm/s = Centimeter Per Second; COI = Constituent of Interest; ft = feet; GMF = Gypsum Management Facility; UA = Uppermost Aquifer; US EPA = United States Environmental Protection Agency.
(a) Cross-sectional area represents the area through which groundwater flows from the UA into the unnamed tributary.

Table 3.6 Sediment Properties Used in Modeling for the Unnamed Tributary

Parameter	Unit	Value	Notes/Source
Sediment			
Depth of Upper Benthic Layer	m	0.03	Default (US EPA, 2014a)
Depth of Water Body	m	0.67	Flow depth of the unnamed tributary (Golder Associates Inc., 2020) plus the depth of the upper benthic layer
Bed Sediment Particle Concentration	g/cm^3	1	Default (US EPA, 2014a)
Bed Sediment Porosity	-	0.6	Default (US EPA, 2014a)
TSS Mass Per Unit Area	kg/m^2	0.0038	Depth of water column × TSS × conversion factors (10^{-6} kg/mg and 1,000 L/m^3)
Sediment Mass Per Unit Area	kg/m^2	30	Depth of upper benthic layer × bed sediment particulate concentration × conversion factors (0.001 kg/g, 10^6 cm^3/m^3)
Sediment to Water Partition Coefficients	mg/L	Constituent specific	Values based on US EPA (2014a)

Notes:
TSS = Total Suspended Solids; US EPA = United States Environmental Protection Agency.

Table 3.7 Surface Water and Sediment Modeling Results for the Unnamed Tributary

COI	Groundwater Concentration (mg/L or pCi/L)	Mass Discharge Rate (mg/year or pCi/year)	Total Water Column Concentration (mg/L or pCi/L)	Concentration Sorbed to Bottom Sediments (mg/kg or pCi/kg)
Total Metals				
Arsenic	0.11	2.2E+05	2.9E-06	7.0E-04
Beryllium	0.0042	8.6E+03	1.1E-07	6.4E-05
Boron	4.6	9.4E+06	1.2E-04	7.4E-04
Cadmium	0.0041	8.4E+03	1.1E-07	1.5E-04
Cobalt	0.053	1.1E+05	1.4E-06	1.3E-03
Lead	0.082	1.7E+05	2.2E-06	2.2E-02
Mercury	0.0014	2.9E+03	3.7E-08	1.3E-03
Thallium	0.0035	7.1E+03	9.3E-08	1.7E-06
Radionuclides				
Radium-226 + 228	4.2	8.6E+06	1.1E-04	7.9E-01

Notes:
COI = Constituent of Concern; K_d = Equilibrium Partition Coefficient; pCi/L = PicoCuries Per Liter; pCi/kg = PicoCuries Per Kilogram.

Table 3.8 Groundwater and Surface Water Properties Used in Modeling for the Western Branch of Coffeen Lake

Parameter	Unit	Values	Notes/Source
Groundwater			
COI Concentration	mg/L	Constituent-specific	Maximum detected concentration in groundwater
Cross Section Area for the Uppermost Aquifer[a]	m^2	427	The average thickness of the UA near the GMF GSP (*i.e.*, approximately 3 ft) multiplied by the length of the GMF GSP on the west side of the divide (*i.e.*, about 467 m) (Ramboll, 2021a).
Hydraulic Gradient	m/m	0.018	The average hydraulic gradient for the UA from the GMF GSP towards the western branch of Coffeen Lake (Ramboll, 2021a).
Hydraulic Conductivity of the Uppermost Aquifer	cm/s	0.0014	The geometric mean horizontal hydraulic conductivity measured for the UA near the GMF GSP (Ramboll, 2021a).
Surface Water			
Surface Water Flow Rate in the western branch of Coffeen Lake	L/yr	9.02×10^{11}	There are no flow records available for the western branch of Coffeen Lake. According to the USGS (2022) Streamstats program, the western branch of Coffeen Lake has a two-year flow peak flow prediction of 1,010 cfs.
Total Suspended Solids	mg/L	3.2	Average Coffeen Lake concentration (Hanson, 2020).
Depth of the Water Column	m	5.7	Mean depth of Coffeen Lake (Austen *et al*., 1993).
Suspended Sediment to Water Partition Coefficient	mg/L	Constituent-specific	Values based on US EPA (2014a)

Notes:

cfs = Cubic Feet Per Second; cm/s = Centimeter Per Second; COI = Constituent of Interest; ft = feet; GMF = Gypsum Management Facility; GSP = Gypsum Stack Pond; UA = Uppermost Aquifer; US EPA = United States Environmental Protection Agency; USGS = United States Geological Survey; yr = Year.

(a) Cross-sectional area represents the area through which groundwater flows from the UA into Coffeen Lake (*i.e.*, the groundwater flow area that intersects with Coffeen Lake).

Table 3.9 Sediment Properties Used in Modeling for the Western Branch of Coffeen Lake

Parameter	Unit	Value	Notes/Source
Sediment			
Depth of Upper Benthic Layer	m	0.03	Default (US EPA, 2014a)
Depth of Water Body	m	5.73	Depth of water column (5.7 m, depth of Coffeen Lake) (Austen *et al.*, 1993) plus depth of upper benthic layer (0.03 m) (US EPA, 2014a)
Bed Sediment Particle Concentration	g/cm^3	1	Default (US EPA, 2014a)
Bed Sediment Porosity	-	0.6	Default (US EPA, 2014a)
TSS Mass per Unit Area	kg/m^2	0.0342	Depth of water column × TSS × conversion factors (10^{-6} kg/mg and 1,000 L/m^3)
Sediment Mass per Unit Area	kg/m^2	30	Depth of upper benthic layer × bed sediment particulate concentration × conversion factors (0.001 kg/g, 10^6 cm^3/m^3)
Sediment to Water Partition Coefficients	mg/L	Constituent-specific	Values based on US EPA (2014a)

Notes:
TSS = Total Suspended Solids; US EPA = United States Environmental Protection Agency.

Table 3.10 Surface Water and Sediment Modeling Results for the Western Branch of Coffeen Lake

COI	Groundwater Concentration (mg/L)	Mass Discharge Rate (mg/year)	Total Water Column Concentration (mg/L)	Concentration Sorbed to Bottom Sediments (mg/kg)
Total Metals				
Beryllium	0.01	2.3E+04	2.6E-08	1.5E-05
Cadmium	0.0012	4.1E+03	4.6E-09	6.2E-06
Lead	0.010	3.3E+04	3.7E-08	3.7E-04

Note:
COI = Constituent of Concern.

3.5 Human Health Risk Evaluation

The section below presents the results of the human health risk evaluation for recreators in Coffeen Lake and the unnamed tributary adjacent to the Site. Risks were assessed using the maximum measured or modeled COIs in surface water.

3.5.1 Recreators Exposed to Surface Water

Screening Exposures: Recreators could be exposed to surface water *via* incidental ingestion and dermal contact while boating. In addition, anglers could consume fish caught in Coffeen Lake or the unnamed tributary. The maximum measured or modeled COI concentrations in surface water were used as conservative upper-end estimates of the COI concentrations to which a recreator might be exposed directly (incidental ingestion of COIs in surface water while boating) and indirectly (consumption of locally caught fish exposed to COIs in surface water).

Screening Benchmarks: Illinois surface water criteria (IEPA, 2019), known as human threshold criteria (HTC), are based on incidental exposure through contact or ingestion of small volumes of water while swimming or during other recreational activities, as well as the consumption of fish. The HTC values were calculated from the following equation (IEPA, 2019):

$$\mathrm{HTC} = \frac{\mathrm{ADI}}{\mathrm{W} + (\mathrm{F} \times \mathrm{BCF})}$$

where:

HTC = Human health protection criterion in milligrams per liter (mg/L)
ADI = Acceptable daily intake (mg/day)
W = Water consumption rate (L/day)
F = Fish consumption rate (kg/day)
BCF = Bioconcentration factor (L/kg-tissue)

Illinois defines the acceptable daily intake (ADI) as the "maximum amount of a substance which, if ingested daily for a lifetime, results in no adverse effects to humans" (IEPA, 2019). US EPA defines its chronic reference dose (RfD) as an "estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure for a chronic duration (up to a lifetime) to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (US EPA, 2011a). Illinois lists methods to derive an ADI from the primary literature (IEPA, 2019). In accordance with Illinois guidance, Gradient derived an ADI by multiplying the MCL by the default water ingestion rate of 2 L/day (IEPA, 2019). In the absence of an MCL, Gradient applied the RfD used by US EPA to derive its Regional Screening Levels (RSLs) (US EPA, 2021b) as a conservative estimate of the ADI. The RfDs are given in mg/kg-day, while the ADIs are given in mg/day; thus, Gradient multiplied the RfD by a standard body weight of 70 kg to obtain the ADI in mg/day. The calculation of the HTC values is shown in Appendix B, Table B.1.

Gradient used bioconcentration factors (BCFs) from a hierarchy of sources. The primary BCFs were those that US EPA used to calculate the National Recommended Water Quality Criteria (NRWQC) for human health (US EPA, 2002). Other sources included BCFs used in the US EPA coal combustion ash risk assessment (US EPA, 2014a) and BCFs reported by Oak Ridge National Laboratory's Risk Assessment Information System (ORNL RAIS) (ORNL, 2020).[5] Lithium did not have a BCF value available from any authoritative source; therefore, the water quality criterion for lithium was calculated assuming a BCF of 1. This is a conservative assumption, as lithium does not readily bioaccumulate in the aquatic environment (ECHA, 2020).

Illinois recommends a fish consumption rate of 0.020 kg/day (20 g/day) for an adult weighing 70 kg (IEPA, 2019). Illinois recommends a water consumption rate of 0.01 L/day for "incidental exposure through contact or ingestion of small volumes of water while swimming or during other recreational activities" (IEPA, 2019). Appendix B, Table B.1 presents the calculated HTC for fish and water and for fish consumption only.

Screening Risk Evaluation: The maximum modeled and measured COI concentrations in surface water were compared to the calculated Illinois HTC values for the unnamed tributary and the western branch of Coffeen Lake in Tables 3.11 and 3.12, respectively. Surface water samples were collected from Coffeen Lake, but not the unnamed tributary. All surface water concentrations were below their respective

[5] Although recommended by US EPA (2015b), US EPA EpiSuite 4.1 (US EPA, 2019) was not used as a source of BCFs because inorganic compounds are outside the estimation domain of the program.

benchmarks. The HTC values are protective of recreational exposure *via* water and/or fish ingestion and do not account for dermal exposures to COIs in surface water while boating. However, given that the measured and modeled COI surface water concentrations are orders of magnitude below HTC protective of water and/or fish ingestion, dermal exposures to COIs are not expected to be a risk concern. Moreover, the dermal uptake of metals is considered to be minimal and only a small proportion of ingestion exposures. Thus, none of the COIs evaluated would be expected to pose an unacceptable risk to recreators exposed to surface water while boating in Coffeen Lake and anglers consuming fish caught in Coffeen Lake or the unnamed tributary.

Table 3.11 Risk Evaluation for Recreators Exposed to Surface Water in the Unnamed Tributary

COI	Modeled Surface Water Concentration[a]	HTC for Water and Fish	HTC for Water Only	HTC for Fish Only	COPC
Total Metals (mg/L)					
Arsenic	2.9E-06	0.022	2.0	0.023	No
Beryllium	1.1E-07	0.021	0.80	0.021	No
Boron	1.2E-04	467	1,400	700	No
Cobalt	1.4E-06	0.0035	2.1	0.0035	No
Lead	2.2E-06	0.015	0.015	0.015	No
Thallium	9.3E-08	0.0017	0.40	0.0017	No

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; HTC = Human Threshold Criteria.
(a) Surface water samples were not collected from the unnamed tributary.

Table 3.12 Risk Evaluation for Recreators Exposed to Surface Water in the Western Branch of Coffeen Lake

COI	Maximum Surface Water Concentration		HTC for Water and Fish	HTC for Water Only	HTC for Fish Only	COPC	
	Modeled	Measured				Based on Modeled Concentration	Based on Measured Concentration
Total Metals (mg/L)							
Beryllium	2.6E-08	NA	0.021	0.80	0.021	No	NA
Lead	3.7E-08	NA	0.015	0.015	0.015	No	NA

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; HTC = Human Threshold Criteria.
NA = Not Applicable; COI was not measured in surface water collected from Coffeen Lake.

3.5.2 Recreators Exposed to Sediment

Recreational exposure to sediment may occur during boating activity in Coffeen Lake or while angling in the unnamed tributary; exposure to sediment may occur through incidental ingestion and dermal contact.

Screening Exposures: COIs in impacted groundwater flowing into the river can sorb to sediments. In the absence of sediment data, sediment concentrations were modeled using maximum detected groundwater concentrations.

Screening Benchmarks: There are no established recreator RSLs that are protective of recreational exposures to sediment (US EPA, 2021c). Therefore, benchmarks that are protective of recreational exposures to sediment *via* incidental ingestion and dermal contact were calculated using US EPA's RSL

guidance (US EPA, 2021c). These benchmarks were calculated using the recommended assumptions (*i.e.*, oral bioavailability, body weights, averaging time) and toxicity reference values (*i.e.*, RfD and cancer slope factor [CSF]), with the following changes: Recreators were assumed to be exposed to sediment while recreating 60 days a year (or two weekend days per week for 30 weeks a year, from April to October). The exposure duration was assumed for a child 6 years of age and an adult 20 years of age, per US EPA guidance (US EPA, 2014b). The daily recommended residential soil ingestion rates of 200 mg/day for a child and 100 mg/day for an adult are based on an all-day exposure to residential soils (US EPA, 2011b, 2014b). Since recreational exposures to sediment are assumed to occur for less than four hours per day, one-third of the daily residential soil ingestion (67 mg/day for a child and 33 mg/day for an adult) was used as a conservative assumption. For dermal exposures, recreators were assumed to be exposed to sediment on their lower legs and feet (1,026 cm^2 for the child and 3,026 cm^2 for the adult, based on the age-weighted surface areas reported in US EPA (2011b). While other body parts may be exposed to sediment, the contact time will likely be very short, as the sediment would wash off in the surface water. Gradient used US EPA's recommended adherence factor of 0.2 mg/cm^2 based on child exposure to wet soil (US EPA, 2004, 2014b), which was used in the US EPA RSL User's Guide for a child recreator exposed to soil or sediment (US EPA, 2021c). The sediment screening benchmarks were calculated based on a target hazard quotient of 1, or a target cancer risk of 1×10^{-5}. Appendix B, Table B.2 presents the calculation of screening benchmarks protective of recreational exposures to sediment.

Screening Risk Evaluation: The modeled sediment concentrations at the unnamed tributary and the western branch of Coffeen Lake were well below the recreational sediment screening benchmarks (Tables 3.13 and 3.14, respectively). Therefore, exposure to sediment is not expected to pose an unacceptable risk to recreators while angling in the unnamed tributary or boating in Coffeen Lake.

Table 3.13 Risk Evaluation for Recreators Exposed to Sediment in the Unnamed Tributary

COI	Modeled Sediment Concentration (mg/kg)	Recreator Sediment Screening Benchmark (mg/kg)	COPC
Total Metals (mg/kg)			
Arsenic	7.0E-04	6.8E+01	No
Beryllium	6.4E-05	2.7E+03	No
Boron	7.4E-04	2.7E+05	No
Cobalt	1.3E-03	4.1E+02	No
Lead	2.2E-02	4.0E+02	No
Thallium	1.7E-06	1.4E+01	No

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern.

Table 3.14 Risk Evaluation for Recreators Exposed to Sediment in the Western Branch of Coffeen Lake

COI	Modeled Sediment Concentration (mg/kg)	Recreator Sediment Screening Benchmark (mg/kg)	COPC
Total Metals (mg/kg)			
Beryllium	1.5E-05	2.7E+03	No
Lead	3.7E-04	4.0E+02	No

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern.

3.6 Ecological Risk Evaluation

Based on the ecological CEM (Figure 3.4), ecological receptors could be exposed to surface water and dietary items (*i.e.*, prey and plants) potentially impacted by identified COIs (cadmium, cobalt, lead, mercury, and radium-226+228).

3.6.1 Ecological Receptors Exposed to Surface Water

Screening Exposures: The ecological evaluation considered aquatic communities in Coffeen Lake and the unnamed tributary potentially impacted by identified ecological COIs. Measured and modeled surface water concentrations were compared to risk-based ecological screening benchmarks.

Screening Benchmarks: Surface water screening benchmarks protective of aquatic life were obtained from the following hierarchy of sources:

- IEPA SWQS (IEPA, 2019), regulatory standards that are intended to protect aquatic life exposed to surface water on a long-term basis (*i.e.*, chronic exposure). For cadmium, the surface water benchmark is hardness dependent and calculated using a default hardness of 100 mg/L (US EPA, 2022)[6];
- US EPA Region IV (2018) surface water ESVs for hazardous waste sites; and
- US DOE benchmarks from the guidance document, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (US DOE, 2019).

Risk Evaluation: The maximum modeled COI concentrations in surface water in the unnamed tributary were compared to the benchmarks protective of aquatic life (Table 3.15). The maximum measured COI concentrations in Coffeen Lake, and modeled COI concentrations in the western branch of Coffeen Lake, were compared to the benchmarks protective of aquatic life (Table 3.16). The measured and modeled surface water concentrations for the COIs were below their respective benchmarks. Thus, none of the COIs evaluated are expected to pose an unacceptable risk to aquatic life in the unnamed tributary or Coffeen Lake.

[6] Conservatisms associated with using a default hardness value are discussed in Section 3.6.

Table 3.15 Risk Evaluation for Ecological Receptors Exposed to Surface Water in the Unnamed Tributary

COI	Modeled Surface Water Concentration[a]	Ecological Freshwater Benchmark	Basis	COPC
Total Metals (mg/L)				
Cadmium	1.1E-07	0.0011	IEPA SWQC	No
Cobalt	1.4E-06	0.019	US EPA R4 ESV	No
Lead	2.2E-06	0.020	IEPA SWQC	No
Mercury	3.7E-08	0.0011	IEPA SWQC	No
Radionuclides (pCi/L)				
Radium-226 + 228	1.1E-04	3.0	US DOE	No

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; ESV = Ecological Screening Value; IEPA = Illinois Environmental Protection Agency; pCi/L = PicoCuries Per Liter; SWQC = Surface Water Quality Criteria; US DOE = United States Department of Energy; US EPA R4 = United States Environmental Protection Agency Region IV.
(a) Surface water samples were not collected from the unnamed tributary.

Table 3.16 Risk Evaluation for Ecological Receptors Exposed to Surface Water in the Western Branch of Coffeen Lake

COI	Maximum Surface Water Concentration		Ecological Freshwater Benchmark	Basis	COPC	
	Modeled	Measured			Based on Modeled Concentration	Based on Measured Concentration
Total Metals (mg/L)						
Cadmium	4.6E-09	NA	0.0011	IEPA SWQC	No	NA

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; IEPA = Illinois Environmental Protection Agency; SWQC = Surface Water Quality Criteria.
NA = Not Applicable; COI was not measured in surface water collected from Coffeen Lake.

3.6.2 Ecological Receptors Exposed to Sediment

Screening Exposures: COIs in impacted groundwater discharging into Coffeen Lake or the unnamed tributary can sorb to sediments *via* chemical partitioning. In the absence of sediment data, sediment concentrations were modeled using maximum detected groundwater concentrations. Therefore, the modeled COI sediment concentrations reflect the potential maximum Site-related sediment concentration from groundwater discharge.

Screening Benchmarks: Sediment screening benchmarks were obtained from US EPA Region IV (2018). The majority of the sediment ESVs are based on threshold effect concentrations (TECs) from MacDonald *et al.* (2000), which provide consensus values that identify concentrations below which harmful effects on sediment-dwelling organisms are unlikely to be observed. In the absence of an ESV for radium-226+228, a sediment screening value of 90,000 pCi/kg was used, based on the biota concentration guide (BCG) for

radium-228 (US DOE, 2019).[7] The benchmarks used in this evaluation are listed in Table 3.17 for the unnamed tributary, and Table 3.18 for the western branch of Coffeen Lake.

Screening Risk Results: The maximum modeled COI sediment concentrations for the unnamed tributary and the western branch of Coffeen Lake were below their respective sediment screening benchmarks (Tables 3.17 and 3.18, respectively). The modeled sediment concentrations attributed to potential contributions from Site groundwater for all COIs were less than or equal to 1% of the sediment screening benchmark. Therefore, the modeled sediment concentrations attributed to potential contributions from Site groundwater are not expected to significantly contribute to ecological exposures in the unnamed tributary or Coffeen Lake adjacent to the Site.

Table 3.17 Risk Evaluation for Ecological Receptors Exposed to Sediment in the Unnamed Tributary

COI	Modeled Sediment Concentration	ESV[a]	COPC	Percentage of Benchmark
Total Metals (mg/kg)				
Cadmium	1.5E-04	0.99	No	0.01%
Cobalt	1.3E-03	50	No	0.003%
Lead	2.2E-02	35.8	No	0.06%
Mercury	1.3E-03	0.18	No	0.7%
Radionuclides (pCi/kg)				
Radium-226 + 228	7.9E-01	90,000[b]	No	0.001%

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; ESV = Ecological Screening Value; pCi/g = PicoCuries Per Gram; pCi/kg = PicoCuries Per Kilogram; US DOE = United States Department of Energy; US EPA = United States Environmental Protection Agency.
(a) ESV from US EPA Region IV (2018).
(b) ESV from US DOE (2019); value converted from 90 pCi/g to 90,000 pCi/kg.

Table 3.18 Risk Evaluation for Ecological Receptors Exposed to Sediment in the Western Branch of Coffeen Lake

COI	Modeled Sediment Concentration	ESV[a]	COPC	Percentage of Benchmark
Total Metals (mg/kg)				
Cadmium	6.2E-06	0.99	No	0.00063%

Notes:
COI = Constituent of Interest; COPC = Constituent of Potential Concern; ESV = Ecological Screening Value; US EPA = United States Environmental Protection Agency.
(a) ESV from US EPA Region IV (2018).

3.6.3 Ecological Receptors Exposed to Bioaccumulative Constituents of Interest

Screening Exposures: COIs with bioaccumulative properties can impact higher-trophic-level wildlife exposed to these COIs *via* direct exposures (surface water and sediment exposure) and secondary exposures through the consumption of dietary items (*e.g.*, plants, invertebrates, small mammals, and fish).

[7] The BCG for sediment is 90 pCi/g for Ra-228 and 100 pCi/g for Ra-226; the lower of the two values was used for Ra-226+228, and converted to pCi/kg (US DOE, 2019).

Screening Benchmark: US EPA Region IV (2018) guidance and IEPA SWQS (IEPA, 2019) guidance were used to identify constituents with potential bioaccumulative effects.

Risk Evaluation: With the exception of mercury, the ecological COIs (cadmium, cobalt, lead, and radium-226+228) were not identified as having potential bioaccumulative effects. Therefore, these COIs are not considered to pose an ecological risk *via* bioaccumulation. IEPA (2019) identifies mercury as the only metal with bioaccumulative properties. US EPA Region IV (2018) also identifies mercury (including methyl mercury) as having potential bioaccumulative effects.[8]

The modeled mercury concentration in surface water in the unnamed tributary (3.7×10^{-8} mg/L) was below the mercury surface water ESV for wildlife (1.3×10^{-6} mg/L), and the modeled mercury concentration in sediment at the unnamed tributary (1.3×10^{-3} mg/kg) was below the sediment ESV for wildlife (0.18 mg/kg) (US EPA Region IV, 2018).[9] Both the modeled surface water and sediment concentrations were below benchmarks protective of receptors accounting for bioaccumulative properties. Therefore, in addition to not posing an ecological risk from direct toxicity, mercury does not pose a risk from bioaccumulation exposures.

3.7 Uncertainties and Conservatisms

A number of uncertainties and their potential impacts on the risk evaluation are discussed below. Wherever possible, conservative assumptions were used in an effort to minimize uncertainties and overestimate rather than underestimate risks.

Exposure Estimates:

- The risk evaluation included the Illinois Part 845.600 constituents detected in groundwater samples (above GWPS) collected from wells associated with the GMF GSP and the GMF RP. However, it is possible that not all of the detected constituents are related specifically to the GMF GSP and the GMF RP.
- The human health and ecological risk characterizations were based on the maximum measured or modeled COI concentrations, rather than on averages. Thus, the variability in exposure concentrations was not considered. Assuming continuous exposure to the maximum concentration overestimates human and ecological exposures, given that receptors are mobile and concentrations change over time. For example, US EPA guidance states that risks should be estimated using average exposure concentrations as represented by the 95% upper confidence limit on the mean (US EPA, 1992). Given that exposure estimates based on the maximum concentrations did not exceed risk benchmarks, Gradient has greater confidence that there is no risk concern.
- Only constituents detected in groundwater were used to identify COIs and model COI concentrations in surface water and sediment. For the constituents that were not detected in the GMF GSP and the GMF RP groundwater, the detection limits were below the Illinois Part 845.600 GWPS and thus do not require further evaluation.
- COI concentrations in surface water were modeled using the maximum detected total COI concentrations in groundwater. Modeling surface water concentrations using total metal concentrations may overestimate surface water concentrations because dissolved concentrations,

[8] US EPA Region IV (2018) identifies selenium as having potential bioaccumulative effects. Although selenium was detected in groundwater, it was not considered an ecological COI.
[9] Mercury was not an ecological COI on the west side of the groundwater divide; thus, it was not evaluated for the western branch of Coffeen Lake.

which are lower than total concentrations, represent the mobile fractions of constituents that could likely flow into and mix with surface water.

- The COIs identified in this evaluation also occur naturally in the environment. Contributions to exposure from natural sources or other sources unrelated to the GMF GSP and the GMF RP were not considered in the evaluation of modeled concentrations; only exposure contributions potentially attributable to Site groundwater mixing with surface water were evaluated. While not quantified, exposures from potential groundwater contributions related to the GMF GSP and the GMF RP are likely to represent only a small fraction of the overall human and ecological exposure to COIs that also have natural sources or sources unrelated to the GMF GSP and the GMF RP.
- Screening benchmarks for human health were developed using exposure inputs based on US EPA's recommended values for reasonable maximum exposure (RME) assessments (US EPA, 2014b). RME is defined as "the highest exposure that is reasonably expected to occur at a site but that is still within the range of possible exposures" (US EPA, 2004). US EPA states the "intent of the RME is to estimate a conservative exposure case (*i.e.*, well above the average case) that is still within the range of possible exposures" (US EPA, 1989). US EPA also notes that this high-end exposure "is the highest dose estimated to be experienced by some individuals, commonly stated as approximately equal to the 90th percentile exposure category for individuals" (US EPA, 2015c). Thus, most individuals will have lower exposures than those presented in this risk assessment.

Toxicity Benchmarks:

- Screening-level ecological benchmarks were compiled from IEPA and US EPA guidance and designed to be protective of the majority of Site conditions, leaving the option for Site-specific refinement. In some cases, these benchmarks may not be representative of the Site-specific conditions or receptors found at the Site, or may not accurately reflect concentration-response relationships encountered at the Site. For example, the ecological benchmark for cadmium is hardness-dependent. However, hardness data are not available for Coffeen Lake or the unnamed tributary; therefore, Gradient relied on US EPA's default hardness of 100 mg/L. Use of a higher hardness value would increase the cadmium SWQS because benchmarks become less stringent with higher levels of hardness. Regardless of the hardness, the maximum modeled cadmium concentration is orders of magnitude below the SWQS.
- In addition, for the ecological evaluation, Gradient conservatively assumed all constituents to be 100% bioavailable. Modeled COI concentrations in surface water are considered total COI concentrations. In addition, the measured surface water data used in this report represent total concentrations. US EPA recommends using dissolved metals as a measure of exposure to ecological receptors because it represents the bioavailable fraction of metal in water (US EPA, 1993). Therefore, the modeled surface water COI concentrations may be an overestimation of exposure concentrations to ecological receptors.
- In general, it is important to appreciate that the human health toxicity factors used in this risk evaluation are developed to account for uncertainties, such that safe exposure levels used as benchmarks are often many times lower (even orders of magnitude lower) than the levels that cause effects that have been observed in human or animal studies. For example, toxicity factors incorporate a 10-fold safety factor to protect sensitive subpopulations. This means that a risk exceedance does not necessarily equate to actual harm.

4 Summary and Conclusions

A screening-level risk evaluation was performed for potential Site-related constituents in groundwater at the CPP in Coffeen, Illinois. The CSM developed for the Site indicates that groundwater beneath the GMF GSP and the GMF RP flows into Coffeen Lake and the unnamed tributary adjacent to the Site and may potentially impact surface water and sediment.

CEMs were developed for human and ecological receptors. The complete exposure pathways for humans include anglers who consume locally caught fish from Coffeen Lake or the unnamed tributary, and recreators (boaters) in Coffeen Lake, groups which could be exposed to surface water and sediment. Based on the local hydrogeology, residential exposure to groundwater used for drinking water or irrigation is not a complete pathway and was not evaluated. The complete exposure pathways for ecological receptors include aquatic life (including aquatic and marsh plants, amphibians, reptiles, and fish) exposed to surface water; benthic invertebrates exposed to sediment; and avian and mammalian wildlife exposed to bioaccumulative COIs in surface water, sediment, and dietary items.

Groundwater data collected from 2015 to 2021 were used to estimate exposures. Surface water data collected from Coffeen Lake were also evaluated. For groundwater constituents retained as COIs, surface water and sediment concentrations were modeled using the maximum detected groundwater concentration. Surface water and sediment exposure estimates were screened against benchmarks protective of human health and ecological receptors for this risk evaluation.

US EPA has established acceptable risk metrics. Risks above these US EPA-defined metrics are termed potentially "unacceptable risks." Based on the evaluation presented in this report, no unacceptable risks to human or ecological receptors resulting from CCR exposures associated with the GMF GSP or GMF RP were identified. This means that the risks from the site are likely indistinguishable from normal background risks. Specific risk assessment results include the following:

- For recreators exposed to surface water, all COIs were below the conservative risk-based screening benchmarks. Therefore, none of the COIs evaluated in surface water are expected to pose an unacceptable risk to recreators in Coffeen Lake or the unnamed tributary adjacent to the Site.
- For recreators exposed to sediment *via* incidental ingestion and dermal contact, the modeled sediment concentrations were below health-protective sediment benchmarks. Therefore, the modeled sediment concentrations are not expected to pose an unacceptable risk to recreators exposed to sediment in Coffeen Lake or the unnamed tributary adjacent to the Site.
- For anglers consuming locally caught fish, the modeled concentrations of all COIs in surface water were below conservative benchmarks protective of fish consumption. Therefore, none of the COIs evaluated are expected to pose an unacceptable risk to recreators consuming fish caught in Coffeen Lake or the unnamed tributary.
- Ecological receptors exposed to surface water include aquatic and marsh plants, amphibians, reptiles, and fish. The risk evaluation showed that none of the modeled or measured COIs in surface water exceeded protective screening benchmarks. Ecological receptors exposed to sediment include benthic invertebrates. The modeled sediment COIs did not exceed the conservative screening benchmarks; therefore, none of the COIs evaluated in sediment are expected to pose an unacceptable risk to ecological receptors.

- Ecological receptors were also evaluated for exposure to bioaccumulative COIs. This evaluation considered higher-trophic-level wildlife with direct exposure to surface water and sediment and secondary exposure through the consumption of dietary items (*e.g.*, plants, invertebrates, small mammals, fish). Mercury was the only ecological COI identified as having potential bioaccumulative effects. However, the modeled concentrations did not exceed benchmarks protective of bioaccumulative effects. Therefore, mercury is not considered to pose an ecological risk *via* bioaccumulation. Overall, this evaluation demonstrated that none of the COIs evaluated are expected to pose an unacceptable risk to ecological receptors.

It should be noted that this evaluation incorporates a number of conservative assumptions which tend to overestimate exposure and risk. While the risk evaluation was based on the maximum detected COI concentration, US EPA guidance states that risks should be based on a representative average concentration such as the 95% upper confidence limit on the mean; thus, using the maximum concentration tends to overestimate exposure. Although the COIs identified in this evaluation also occur naturally in the environment, the contributions to exposure from natural background sources and nearby industry were not considered; thus, CCR-related exposures were likely overestimated. Exposure estimates assumed 100% metal bioavailability, which likely results in overestimates of exposure and risks. Exposure estimates were based on inputs to evaluate the "reasonable maximum exposure"; thus, most individuals will have lower exposures than those estimated in this risk assessment.

Finally, it should be noted that because current conditions do not present a risk to human health or the environment, there will also be no unacceptable risk to human health or the environment for future conditions when the GMF GSP and the GMF RP are closed. For all future closure scenarios, potential releases of CCR-related constituents will decline over time and, consequently, potential exposures to CCR-related constituents in the environment will also decline.

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Appendix A

Surface Water and Sediment Modeling

Gradient modeled surface water concentrations in the unnamed tributary and the western branch of Coffeen Lake and associated sediments based on available groundwater data. First, Gradient estimated the flow rate of constituents of interest (COIs) that may flow into these waterbodies *via* groundwater. Then, Gradient adapted United States Environmental Protection Agency's (US EPA's) indirect exposure assessment methodology (US EPA, 1998) in order to model surface water and sediment water concentrations in the unnamed tributary and the western branch of Coffeen Lake.

Model Overview

Two separate surface water models were carried out: one for the unnamed tributary, located to the east of a groundwater divide, and one for the western branch of Coffeen Lake, located to the west of a groundwater divide (see Section 2). Groundwater flow into these waterbodies is represented by a one-dimensional steady-state model. In this model, the groundwater plume migrates horizontally in the Uppermost Aquifer (UA) before flowing into surface water. The groundwater flow entering the surface water is the flow going through a cross-sectional area with a length equal to the length of the surface water bodies adjacent to the GMF ponds (*i.e.*, the GMF Gypsum Stack Pond [GSP] and the GMF Recycle Pond [RP]) with potential CCR-related impacts and a height equal to the average saturated thickness of the UA. It was assumed that all groundwater originating from the GMF RP ultimately flows into the unnamed tributary, whereas a component of groundwater originating from the GMF GSP flows into the unnamed tributary, and the rest flows into the western branch of Coffeen Lake.

Groundwater flow into the unnamed tributary mixes with the surface water in the tributary whereas groundwater flow into the western branch of Coffeen Lake mixes with the surface water in the lake. The COIs entering the unnamed tributary as well as the western branch of Coffeen Lake *via* groundwater can dissolve into the water column, sorb to suspended sediments, or sorb to benthic sediments. Using US EPA's indirect exposure assessment methodology (US EPA, 1998), the model evaluates the surface water and sediment concentrations at a location downstream of the groundwater discharge, assuming a well-mixed water column.

Groundwater Flow Rate

The groundwater flow rate was evaluated using conservative assumptions. Gradient conservatively assumed that the groundwater concentrations were uniformly equal to the maximum detected concentration for each individual COI. Gradient ignored adsorption by subsurface soil and assumed that groundwater flowing through the UA was discharged into surface water.

For each groundwater unit, the groundwater flow rate into surface water was derived using Darcy's Law:

$$Q = K \times i \times A$$

where:

Q = Groundwater flow rate (m^3/s)
K = Hydraulic conductivity (m/s)
i = Hydraulic gradient (m/m)
A = Cross-sectional area (m^2)

For each COI, the mass discharge rate into surface water was then calculated from the following equation:

$$m_c = C_c \times Q \times CF$$

where:

m_c = Mass discharge rate of the COI (mg/year)
C_c = Maximum groundwater concentration of the COI (mg/L)
Q = Groundwater flow rate (m^3/s)
CF = Conversion factors: 1,000 L/m^3; 31,557,600 s/year

The values of the aquifer parameters used for these calculations for the unnamed tributary are provided in Table A.1 and for the western branch of Coffeen Lake are provided in Table A.2. The calculated mass discharge rates were then used as inputs for the surface water and sediment partitioning model.

The cross-sectional area for the UA was approximately 664 m^2 for the unnamed tributary and approximately 427 m^2 for the western branch of Coffeen Lake. The length of the water bodies through which groundwater flows was estimated to be approximately 726 m for the unnamed tributary and about 467 m for the western branch of Coffeen Lake. In both cases, the height of the UA was approximately 3 feet (ft) (*i.e.*, 0.91 m) (Ramboll, 2021a,b).

Towards the unnamed tributary, the average hydraulic gradient within the UA was estimated to be 0.0075 m/m (Ramboll, 2021a,b). Towards the western branch of Coffeen Lake, the mean hydraulic gradient determined for the UA was 0.018 m/m (Ramboll, 2021a).

To model surface water concentrations in the unnamed tributary, we used the average of the geometric mean horizontal hydraulic conductivities (*i.e.*, 0.0013 cm/sec) measured for the UA near the GMF GSP and the GMF RP (Ramboll, 2021a,b). To model surface water concentrations in the western branch of Coffeen Lake, we used the geometric mean horizontal hydraulic conductivity (*i.e.*, 0.0014 cm/sec) determined for the UA near the GMF GSP (Ramboll, 2021a).

Surface Water and Sediment Concentration

Groundwater flowing into the lake will be diluted in the surface water flow. Constituents transported by groundwater into the surface water migrate into the water column and the bed sediments. The surface water model Gradient used to estimate the surface water and sediment concentrations is a steady-state model described in US EPA's indirect exposure assessment methodology (US EPA, 1998), and also used in US EPA's "Human and Ecological Risk Assessment of Coal Combustion Residuals" (US EPA, 2014). This model describes the partitioning of constituents between surface water, suspended sediments, and benthic sediments based on equilibrium partition coefficients. It estimates the concentrations of constituents in surface water, suspended sediments, and benthic sediments at steady-state equilibrium at a theoretical location downstream of the discharge point after complete mixing of the water column. In the analysis, Gradient used the partitioning coefficients given in Table J-1 of the US EPA CCR Risk Assessment for all COIs (US EPA, 2014). These coefficients are presented in Table A.3.

To be conservative, Gradient assumed that the constituents were not affected by dissipation or degradation once they entered the water body. The total water body concentration of the COI was calculated as (US EPA, 1998):

$$C_{wtot} = \frac{m_c}{V_f \times f_{water}}$$

where:

C_{wtot}	=	Total water body concentration of the constituent (mg/L)
m_c	=	Mass discharge rate of the COI (mg/year)
V_f	=	Water body annual flow (L/year)
f_{water}	=	Fraction of COI in the water column (unitless)

There are no flow records available for the unnamed tributary and the western branch of Coffeen Lake. According to Golder Associates, the flow rate in the unnamed tributary was assumed to be 90 cubic feet per second (cfs) (Golder Associates, Inc., 2020). According to the US Geological Survey (USGS) Streamstats program, the western branch of Coffeen Lake has a two-year flow peak flow prediction of 1,010 cfs (USGS, 2022). The surface water parameters for the unnamed tributary are presented in Table A.4 and the surface water parameters for the western branch of the Coffeen Lake are presented in Table A.5.

The fraction of COI in the water column was calculated for each COI (11 COIs determined for the unnamed tributary and 4 COIs determined for the western branch of Coffeen Lake) using the sediment/water and suspended solids/water partition coefficients (US EPA, 2014, Table J-1). The fraction of COIs in the water column is defined as (US EPA, 2014):

$$f_{water} = \frac{(1 + [K_{dsw} \times TSS \times 0.000001]) \times \frac{d_w}{d_z}}{\left([1 + (K_{dsw} \times TSS \times 0.000001)] \times \frac{d_w}{d_z}\right) + ([bsp + K_{dbs} \times bsc] \times \frac{d_b}{d_z})}$$

where:

K_{dsw}	=	Suspended sediment-water partition coefficient (mL/g)
K_{dbs}	=	Sediment-water partition coefficient (mL/g)
TSS	=	Total suspended solids in the surface water body (mg/L), set equal to the average Coffeen Lake concentration of 3.2 mg/L (Hanson, 2020)
0.000001	=	Units conversion factor
d_w	=	Depth of the water column (m). The mean depth of the surface water column for the western branch of Coffeen Lake was estimated as 5.7 m (Austen *et al.*, 1993), whereas the flow depth of the unnamed tributary was estimated as 0.6 m (Golder Associates, Inc., 2020).
d_b	=	Depth of the upper benthic layer (m), set equal to 0.03 m (US EPA, 2014)
$d_z = d_w + d_b$	=	Depth of the water body (m) = 5.73 m for the western branch of Coffeen Lake and 0.67 m for the unnamed tributary.
bsp	=	Bed sediment porosity (unitless), set equal to 0.6 (US EPA, 2014)
bsc	=	Bed sediment particle concentration (g/cm^3), set equal to 1.0 g/cm^3 (US EPA, 2014)

The fraction of COIs dissolved in the water column (f_d) is calculated as (US EPA, 2014):

$$f_d = \frac{1}{1 + K_{dsw} \times TSS \times 0.000001}$$

The values of the fraction of COIs in the water column and other calculated parameters for the unnamed tributary are presented in Table A.6 and for the western branch of Coffeen Lake are presented in Table A.7.

The total water column concentration (C_{wcTot}) of the COIs, comprising both the dissolved and suspended sediment phases, is then calculated as (US EPA, 2014):

$$C_{wcTot} = C_{wtot} \times f_{water} \times \frac{d_z}{d_w}$$

Finally, the dissolved water column concentration (C_{dw}) for the COIs is calculated as (US EPA, 2014):

$$C_{dw} = f_d \times C_{wcTot}$$

The dissolved water column concentration was then used to calculate the concentration of COIs sorbed to suspended solids in the water column (US EPA, 1998):

$$C_{sw} = C_{dw} \times K_{dsw}$$

where:

C_{sw}	=	Concentration sorbed to suspended solids (mg/kg)
C_{dw}	=	Concentration dissolved in the water column (mg/L)
K_{dsw}	=	Suspended solids/water partition coefficient (mL/g)

In the same way, using the total water body concentration and the fraction of COIs in the benthic sediments, the model derives the total concentration in benthic sediments (US EPA, 2014):

$$C_{bstot} = f_{benth} \times C_{wtot} \times \frac{d_z}{d_b}$$

where:

C_{bstot}	=	Total concentration in bed sediment (mg/L or g/m^3)
C_{wtot}	=	Total water body concentration of the constituent (mg/L)
f_{benth}	=	Fraction of contaminant in benthic sediments (unitless)
d_b	=	Depth of the upper benthic layer (m)
$d_z = d_w + d_b$	=	Depth of the water body (m)

This value can be used to calculate dry weight sediment concentration as follows:

$$C_{sed-dw} = \frac{C_{bstot}}{bsc}$$

where:

C_{sed-dw}	=	Dry weight sediment concentration (mg/kg)
C_{bstot}	=	Total sediment concentration (mg/L)
bsc	=	Bed sediment bulk density (default value of 1 g/cm^3 from US EPA, 2014)

The total sediment concentration is composed of the concentration dissolved in the bed sediment pore water (equal to the concentration dissolved in the water column) and the concentration sorbed to benthic sediments (US EPA, 1998).

The concentration sorbed to benthic sediments was calculated from US EPA (1998):

$$C_{sb} = C_{dbs} \times K_{dbs}$$

where:

C_{sb}	=	Concentration sorbed to bottom sediments (mg/kg)
C_{dbs}	=	Concentration dissolved in the sediment pore water (mg/L)
K_{dbs}	=	Sediments/water partition coefficient (mL/kg)

For each COI, the modeled total water column concentration, the modeled dry weight sediment concentration, and the modeled concentration sorbed to sediment for the unnamed tributary are presented in Table A.8 and for the western branch of Coffeen Lake are presented in Table A.9.

Table A.1 Parameters Used to Estimate Groundwater Flow to the Surface Water of the Unnamed Tributary

Groundwater Unit	Parameter	Name	Value	Unit
Uppermost Aquifer	A	Cross-Sectional Area	664	m^2
Uppermost Aquifer	i	Hydraulic Gradient	0.0075	m/m
Uppermost Aquifer	K	Hydraulic Conductivity	0.0013	cm/s

Note:
Sources: Hydraulic gradient and hydraulic conductivity values from Ramboll (2021a,b).

Table A.2 Parameters Used to Estimate Groundwater Flow to the Surface Water of the Western Branch of Coffeen Lake

Groundwater Unit	Parameter	Name	Value	Unit
Uppermost Aquifer	A	Cross-Sectional Area	427	m^2
Uppermost Aquifer	i	Hydraulic Gradient	0.018	m/m
Uppermost Aquifer	K	Hydraulic Conductivity	0.0014	cm/s

Note:
Source: Hydraulic gradient and hydraulic conductivity values from Ramboll (2021a).

Table A.3 Partition Coefficients

Constituent	Sediment-Water, Mean, K_{dbs}		Suspended Sediment-Water, Mean, K_{dsw}	
	Value (log_{10}) (mL/g)	Value (mL/g)	Value (log_{10}) (mL/g)	Value (mL/g)
Metals				
Arsenic	2.4	2.51E+02	3.9	7.94E+03
Boron	0.8	6.31E+00	3.9	7.94E+03
Beryllium	2.8	6.31E+02	4.2	1.58E+04
Cadmium	3.3	2.00E+03	4.9	7.94E+04
Cobalt	3.1	1.26E+03	4.8	6.31E+04
Lead	4.6	3.98E+04	5.7	5.01E+05
Mercury	4.9	7.94E+04	5.3	2.00E+05
Thallium	1.3	2.00E+01	4.1	1.26E+04
Radionuclides				
Radium-226+228	-	7.40E+03	-	7.40E+03

Note:
Source: US EPA (2014).

Table A.4 Surface Water Parameters for the Unnamed Tributary

Parameter	Name	Value	Unit
TSS	Total Suspended Solids	6	mg/L
V_{fx}	Surface Water Flow Rate	8.04×10^{10}	L/yr
d_b	Depth of Upper Benthic Layer (default)	0.03	m
d_w	Depth of Water Column	0.64	m
d_z	Depth of Water Body	0.67	m
bsc	Bed Sediment Bulk Density (default)	1	g/cm^3
bsp	Bed Sediment Porosity (default)	0.6	-
M_{TSS}	TSS Mass per Unit Area[a]	0.00384	kg/m^2
M_S	Sediment Mass per Unit Area[b]	30	kg/m^2

Notes:
L/yr = Liter Per Year.
Source of default values: US EPA (2014).
(a) Determined by multiplying total suspended solids, TSS by the depth of water column, d_w.
(b) Determined by multiplying depth of the upper benthic layer, d_b, by sediment bed particle concentration of 1 g/cc.

Table A.5 Surface Water Parameters for the Western Branch of Coffeen Lake

Parameter	Name	Value	Unit
TSS	Total Suspended Solids	6	mg/L
V_{fx}	Surface Water Flow Rate	9.02×10^{11}	L/yr
d_b	Depth of Upper Benthic Layer (default)	0.03	m
d_w	Depth of Water Column	5.70	m
d_z	Depth of Water Body	5.73	m
bsc	Bed Sediment Bulk Density (default)	1	g/cm^3
bsp	Bed Sediment Porosity (default)	0.6	-
M_{TSS}	TSS Mass per Unit Area[a]	0.0342	kg/m^2
M_S	Sediment Mass per Unit Area[b]	30	kg/m^2

Notes:
L/yr = Liter Per Year.
Source of default values: US EPA (2014).
(a) Determined by multiplying total suspended solids, TSS by the depth of water column, d_w.
(b) Determined by multiplying depth of the upper benthic layer, d_b, by the default sediment bed particle concentration of 1 g/cc.

Table A.6 Calculated Parameters for the Unnamed Tributary

COI	Fraction of Constituent in the Water Column f_{water}	Fraction of Constituent in the Benthic Sediments $f_{benthic}$	Fraction of Constituent Dissolved in the Water Column $f_{dissolved}$
Arsenic	0.082	0.918	0.955
Beryllium	0.0357	0.9643	0.9132
Boron	0.7639	0.2361	0.9545
Cadmium	0.0155	0.9845	0.6772
Cobalt	0.023	0.977	0.725
Lead	0.002	0.998	0.250
Mercury	0.001	0.999	0.455
Thallium	0.528	0.472	0.930
Radium-226+228	0.003	0.997	0.957

Note:
COI = Constituent of Interest.

Table A.7 Calculated Parameters for the Western Branch of Coffeen Lake

COI	Fraction of Constituent in the Water Column f_{water}	Fraction of Constituent in the Benthic Sediments $f_{benthic}$	Fraction of Constituent Dissolved in the Water Column $f_{dissolved}$
Beryllium	0.248	0.752	0.913
Cadmium	0.1232	0.8768	0.6772
Lead	0.019	0.981	0.250

Note:
COI = Constituent of Interest.

Table A.8 Surface Water and Sediment Modeling Results for the Unnamed Tributary

COI	Groundwater Concentration (mg/L or pCi/L)	Mass Discharge Rate (mg/year or pCi/year)	Total Water Column Concentration (mg/L or pCi/L)	Concentration Sorbed to Bottom Sediments (mg/kg or pCi/kg)
Arsenic	0.11	2.2E+05	2.9E-06	7.0E-04
Beryllium	0.0042	8.6E+03	1.1E-07	6.4E-05
Boron	4.6	9.4E+06	1.2E-04	7.4E-04
Cadmium	0.0041	8.4E+03	1.1E-07	1.5E-04
Cobalt	0.053	1.1E+05	1.4E-06	1.3E-03
Lead	0.082	1.7E+05	2.2E-06	2.2E-02
Mercury	0.0014	2.9E+03	3.7E-08	1.3E-03
Thallium	0.0035	7.1E+03	9.3E-08	1.7E-06
Radium-226 + 228	4.2	8.6E+06	1.1E-04	7.9E-01

Notes:
COI = Constituent of Concern; K_d = Equilibrium Partition Coefficient; pCi/kg = PicoCuries Per Kilogram; pCi/L = PicoCuries Per Liter; pCi/year = PicoCuries Per Year.

Table A.9 Surface Water and Sediment Modeling Results for the Western Branch of Coffeen Lake

COI	Groundwater Concentration (mg/L)	Mass Discharge Rate (mg/year)	Total Water Column Concentration (mg/L)	Concentration Sorbed to Bottom Sediments (mg/kg)
Beryllium	0.01	2.3E+04	2.6E-08	1.5E-05
Cadmium	0.0012	4.1E+03	4.6E-09	6.2E-06
Lead	0.010	3.3E+04	3.7E-08	3.7E-04

Notes:
COI = Constituent of Concern; K_d = Equilibrium Partition Coefficient.

Appendix A References

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Appendix B

Screening Benchmarks

Table B.1 Calculated Water Quality Standards Protective of Incidental Ingestion and Fish Consumption

Human Health COI	BCF[a] (L/kg-tissue)	Basis	MCL (mg/L)	RfD (mg/kg-day)	ADI[b] (mg/day)	Human Threshold Criteria		
						Water & Fish (mg/L)	Water Only (mg/L)	Fish Only (mg/L)
Arsenic	44	NRWQC (2002)	0.010	0.00030	0.020	0.022	2.0	0.023
Beryllium	19	NRWQC (2002)	0.0040	0.0020	0.0080	0.021	0.80	0.021
Boron	1	(c)	NC	0.20	14	467	1,400	700
Cobalt	300	ORNL (2020)	NC	0.00030	0.021	0.0035	2.1	0.0035
Lead	46	US EPA (2014)	0.015	NC	0.030	0.015	0.015	0.015
Thallium	116	NRWQC (2002)	0.0020	0.000010	0.0040	0.0017	0.40	0.0017

Notes:

ADI = Acceptable Daily Intake; BCF = Bioconcentration Factor; MCL = Maximum Contaminant Level; NC = No Criterion Available; NRWQC = National Recommended Water Quality Criteria; ORNL = Oak Ridge National Laboratory; RAIS = Risk Assessment Information System; RfD = Reference Dose; US EPA = United States Environmental Protection Agency.

(a) BCFs from the following hierarchy of sources:

NRWQC (US EPA, 2002). National Recommended Water Quality Criteria: 2002. Human Health Criteria Calculation Matrix.

US EPA (2014a). Human and Ecological Risk Assessment of Coal Combustion Residuals.

ORNL RAIS (ORNL, 2020). Risk Assessment Information System (RAIS) Toxicity Values and Chemical Parameters.

(b) ADI based on the MCL is calculated as the MCL (mg/L) multiplied by a water ingestion rate of 2 L/day. In the absence of an MCL, the ADI was calculated as the RfD (mg/kg-day) multiplied by the body weight (70 kg).

(c) BCF of 1 was used as a conservative assumption, due to a lack of a published BCF.

Equations from IEPA (2019):

Consumption of Water and Fish

$$HTC = \frac{ADI}{W + (F \times BCF)}$$

Incidental Consumption of Water Only

$$HTC = \frac{ADI}{W}$$

Consumption of Fish Only

$$HTC = \frac{ADI}{F \times BCF}$$

Where:

Human Threshold Criteria (HTC)	Chemical-specific	mg/L
Acceptable Daily Intake (ADI)	Chemical-specific	mg/day
Fish Consumption Rate (F)	0.02	kg/day
Bioconcentration Factor (BCF)	Chemical-specific	L/kg-tissue
Water Consumption Rate (W)	0.01	L/day
Body Weight	70	kg

Table B.2 Recreator Exposure to Sediment

COI	Relative Bioavailability (unitless)	Dermal Absorption Fraction (unitless)	Cancer TRV CSF (mg/kg-day)$^{-1}$	Cancer TRV Dermal CSF (mg/kg-day)$^{-1}$	Cancer Child + Adult Incidental Ingestion SL (mg/kg)	Cancer Child + Adult Dermal Contact SL (mg/kg)	Cancer SL (mg/kg)	Non-Cancer TRV RfD (mg/kg-day)	Non-Cancer TRV Dermal RfD (mg/kg-day)	Non-Cancer Child Incidental Ingestion SL (mg/kg)	Non-Cancer Child Dermal Contact SL (mg/kg)	Non-Cancer Adult Incidental Ingestion SL (mg/kg)	Non-Cancer Adult Dermal Contact SL (mg/kg)	Non-Cancer SL (mg/kg) Child	Non-Cancer SL (mg/kg) Adult	Recreator RSL Sediment (mg/kg)	Basis[a]
Total Metals																	
Arsenic	1	3.0E-02	1.5E+00	1.5E+00	8.1E+01	4.1E+02	6.8E+01	3.0E-04	3.0E-04	4.1E+02	4.4E+03	4.4E+03	8.0E+03	3.8E+02	2.8E+03	6.8E+01	c
Beryllium	1	NA	NC	NC	NC	NC	NC	2.0E-03	1.4E-05	2.7E+03	NA	2.9E+04	NA	2.7E+03	2.9E+04	2.7E+03	nc
Boron	1	NA	NC	NC	NC	NC	NC	2.0E-01	2.0E-01	2.7E+05	NA	2.9E+06	NA	2.7E+05	2.9E+06	2.7E+05	nc
Cobalt	1	NA	NC	NC	NC	NC	NC	3.0E-04	3.0E-04	4.1E+02	NA	4.4E+03	NA	4.1E+02	4.4E+03	4.1E+02	nc
Lead	1	NA	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4.0E+02	L
Thallium	1	NA	NC	NC	NC	NC	NC	1.0E-05	1.0E-05	1.4E+01	NA	1.5E+02	NA	1.4E+01	1.5E+02	1.4E+01	nc

Notes:

ABS = Dermal Absorption Fraction; COI = Constituent of Interest; CSF = Cancer Slope Factor; NC = No Criterion Available; RfD = Reference Dose; RSL = Regional Screening Level; SL = Screening Level; TRV = Toxicity Reference Value; US EPA = United States Environmental Protection Agency.

(a) Screening benchmark defined as the lower of the Screening Levels for cancer and non-cancer. The basis of the benchmark presented as c = based on cancer endpoint, nc = based on non-cancer endpoint, or L = based on blood lead levels.

Equations for Screening Benchmark and Screening Levels:

$$\text{Screening Benchmark} = \frac{1}{\frac{1}{SL_{ing}} + \frac{1}{SL_{derm}}}$$

$$\text{Non-cancer } SL_{ing} = \frac{THQ * RfD}{Intake} \qquad \text{Cancer } SL_{ing} = \frac{TR}{Intake * CSF}$$

$$\text{Non-cancer } SL_{derm} = \frac{THQ * RfD}{Intake * ABS} \qquad \text{Cancer } SL_{derm} = \frac{TR}{Intake * ABS * CSF}$$

Where:

Target Risk (TR)	1E-05	
Target Hazard Quotient (THQ)	1	
Reference Dose (RfD)	Chemical-specific	mg/kg-day
Dermal Absorption Fraction (ABS)	Chemical-specific	
Cancer Slope Factor (CSF)	Chemical-specific	mg/kg
Incidental Ingestions Screening Level (SL_{ing})	Chemical-specific	mg/kg
Dermal Contact Screening Level (SL_{derm})	Chemical-specific	mg/kg

Sediment – Ingestion (Chemical)

Intake Factor (IF) = $\frac{IR \times EF \times ED \times CF}{BW \times AT}$		=	Non-Cancer 7.3E-07 Child	Non-Cancer 6.8E-08 Adult	Cancer 6.3E-08 Child	Cancer 2.0E-08 Adult	Basis
IR	Ingestion Rate (mg/day)		67	33	67	33	One-third of US EPA residential soil ingestion rate (Professional Judgment)
EF	Sediment Exposure Frequency (days/year)		60	60	60	60	2 days/week between April and October when air temperature >70°F (Professional Judgment)
ED	Exposure Duration (years)		6	20	6	20	Default value for Resident (US EPA, 2021b)
CF	Conversion Factor (kg/mg)		0.000001	0.000001	0.000001	0.000001	
BW	Body Weight (kg)		15	80	15	80	Default value for Resident (US EPA, 2021b)
AT	Averaging Time (days)		2,190	7,300	25,550	25,550	Default value for Resident (US EPA, 2021b)

Sediment – Dermal Contact (Chemical)

Intake Factor (IF) = $\frac{SA \times AF \times EF \times ED \times CF}{BW \times AT}$		=	Non-Cancer 2.2E-06 Child	Non-Cancer 1.2E-06 Adult	Cancer 1.9E-07 Child	Cancer 3.6E-07 Adult	Basis
SA	Surface Area Exposed to Sediment (cm^2/day)		1,026	3,026	1,026	3,026	Age-weighted SA for lower legs and feet (US EPA, 2011b)
AF	Sediment Skin Adherence Factor (mg/cm^2)		0.2	0.2	0.2	0.2	Age-weighted AF for children exposed to sediment (US EPA, 2011b)
EF	Sediment Exposure Frequency (days/year)		60	60	60	60	2 days/week between April and October when air temperature >70°F (Professional Judgment)
ED	Exposure Duration (years)		6	20	6	20	Default value for Resident (US EPA, 2021b)
CF	Conversion Factor (kg/mg)		0.000001	0.000001	0.000001	0.000001	
BW	Body Weight (kg)		15	80	15	80	Default value for Resident (US EPA, 2021b)
AT	Averaging Time (days)		2,190	7,300	25,550	25,550	Default value for Resident (US EPA, 2021b)

Appendix B

Corrective Action Alternative Analysis - Supporting Information Report

Intended for
Illinois Power Generating Company
134 Cips Lane
Coffeen, IL 62017

Date
June 10, 2025

Project No.
1940110241-001

CORRECTIVE ACTION ALTERNATIVES ANALYSIS SUPPORTING INFORMATION REPORT

GMF GYPSUM STACK POND
COFFEEN POWER PLANT
IEPA ID NO. W1350150004-03

RAMBOLL Bright ideas. Sustainable change.

CORRECTIVE ACTION ALTERNATIVES ANALYSIS SUPPORTING INFORMATION REPORT IEPA ID NO. W1350150004-03

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940110241-001**
Recipient	**Illinois Power Generating Company**
Document type	**Corrective Action Plan**
Revision	**FINAL**
Date	**June 10, 2025**
Prepared by	**Katlyn Nohr, Sarah Slagle-Garrett**
Checked by	**J. Austin Bond, PE**
Approved by	**Brian G. Hennings, PG**
Description	**Corrective Action Alternatives Analysis Supporting Information Report**

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I, J. Austin Bond, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this report has been prepared in accordance with the accepted practice of engineering. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

J. Austin Bond, PE
Qualified Professional Engineer

062-075181	IL	11/30/2025
License Number	**State**	**Exp. Date**

Affix Seal

CONTENTS

1.	**Introduction and Background**	**3**
1.1	Plant and Site Information	3
1.2	CAAA-SIR Background and Scope	3
1.2.1	Identified Corrective Action Alternatives	3
1.2.2	Scope of CAAA-SIR	4
1.2.3	Criterion for Estimating Time to Achieve GWPS	4
1.3	Report Contents	4
2.	**Alternative 1 Remedy: Source Control with Groundwater Polishing**	**6**
2.1	Supporting Groundwater Modeling and Time to Reach GWPS	6
2.2	Remedy Implementation	6
2.2.1	Remedy Implementation Schedule	7
2.2.2	Management of Extracted Groundwater	8
2.2.3	35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) Information	8
3.	**Alternative 2 Remedy: Source Control with Groundwater Extraction**	**10**
3.1	Remedy Scoping and Groundwater Modeling Results	10
3.2	Remedy Implementation	11
3.2.1	Phase 1: Pre-Construction Activities	11
3.2.2	Phase 2: Corrective Action Construction	11
3.2.3	Phase 3: Corrective Action Operations, Maintenance, and Closeout	13
3.2.4	Remedy Implementation Schedule	14
3.2.5	Management of Extracted Groundwater	15
3.2.6	35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) Information	15
4.	**Material Quantity, Labor, and Mileage Estimates**	**18**
5.	**References**	**19**

TABLES (WITHIN TEXT)

Table A	Feasibility-Level Implementation Schedule – Alternative 1 Source Control with GWP
Table B	Feasibility-Level Implementation Schedule – Alternative 2 Source Control with GWE

APPENDICES

Appendix A	Feasibility-Level Design Drawing for Alternative 2 Remedy
Appendix B	Material Quantity, Labor, and Mileage Estimates for Alternative 2 Remedy

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
bgs	below ground surface
BMP	best management practices
CAAA	Corrective Action Alternatives Analysis
CAAA-SIR	Corrective Action Alternatives Analysis Supporting Information Report
CAP	Corrective Action Plan
CBR	closure-by-removal
CCR	coal combustion residuals
CCR Rule	40 C.F.R. § 257 Subpart D
CIP	closure-in-place
CMA	Corrective Measures Assessment
COC	constituent of concern
COF	Coffeen Power Station
CPP	Coffeen Power Plant
CY	cubic yards
GMF GSP	Gypsum Management Facility Gypsum Stack Pond ("the site")
GMF RP	Gypsum Management Facility Recycle Pond
gpm	gallons per minute
Gradient	Gradient Corporation
GWE	groundwater extraction
GWP	groundwater polishing
GWPS	groundwater protection standard(s)
HDPE	high-density polyethylene
ID	identification
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
Kd	soil adsorption coefficient
mL/g	milliliters per gram
NAVD88	North American Vertical Datum of 1988
NID	National Inventory of Dams
No.	number
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RS Means	RS Means Heavy Construction Cost Data
SI	surface impoundment
TDS	total dissolved solids
UA	uppermost aquifer
USEPA	United States Environmental Protection Agency

1. INTRODUCTION AND BACKGROUND

1.1 Plant and Site Information

Illinois Power Generating Company (IPGC) is the owner of the inactive coal-fired Coffeen Power Plant (CPP), also referred to as the Coffeen Power Station (COF), in Coffeen, Montgomery County, Illinois. IPGC intends to complete groundwater corrective action at the coal combustion residuals (CCR) surface impoundment (SI) Gypsum Management Facility Gypsum Stack Pond (GMF GSP), which is identified by Illinois Environmental Protection Agency (IEPA) identification (ID) number (No.) W1350150004-03, CCR Unit ID 103, and National Inventory of Dams (NID) No. IL50579. Groundwater corrective action for the GMF GSP will be performed under the requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments [1] and the requirements of Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257, herein referred to as the Federal CCR Rule [2].

1.2 CAAA-SIR Background and Scope

35 I.A.C. § 845 requires a Corrective Action Alternatives Analysis (CAAA) to be completed as part of remedy selection, pursuant to the requirements of 35 I.A.C. § 845.670(e). The CAAA for the GMF GSP was prepared by Gradient Corporation (Gradient). Ramboll Americas Engineering Solutions, Inc. (Ramboll) has prepared this Corrective Action Alternatives Analysis Supporting Information Report (CAAA-SIR) to provide information requested by Gradient to support the CAAA for the GMF GSP.

This CAAA-SIR is a feasibility-level assessment utilized to evaluate multiple groundwater corrective action alternatives. The remedy that is ultimately selected within the CAAA, to which this CAAA-SIR is attached, was then further developed into a permit-level remedy within the Corrective Action Plan (CAP), to which the CAAA is attached. Therefore, there may be minor differences in information presented for the selected remedy between this CAAA-SIR and the CAP. Information that may be different includes, but is not limited to, groundwater quality data, groundwater modeling inputs and results, implementation schedules, time to reach GWPS, the physical dimensions and scope of the remedy, and engineering design parameters. These differences are due to the further remedy refinement that is inherent with advancing the selected alternative into the permit-level remedy that is included within the CAP.

1.2.1 Identified Corrective Action Alternatives

Corrective action remedies selected for evaluation within this CAAA-SIR were identified as potentially feasible for the GMF GSP in the Corrective Measures Assessment (CMA), prepared by Ramboll and attached to the CAAA prepared by Gradient. The remedies identified as potentially feasible included:

- Alternative 1: Source control with groundwater polishing (GWP); and
- Alternative 2: Source control with groundwater extraction (GWE).

Other remedies, including source control with groundwater cutoff wall and source control with in-situ treatment (permeable reactive barrier or in-situ chemical treatment), were determined to be infeasible for the site during the CMA process.

1.2.2 Scope of CAAA-SIR

Ramboll completed the following tasks and documented the tasks within this CAAA-SIR, for each of the corrective action alternative remedies listed in **Section 1.2.1**:

- A feasibility-level design drawing (**Appendix A**) was developed to show the approximate extents and typical sections/details of the Alternative 2 remedy (source control with GWE). Drawings were not prepared for the Alternative 1 remedy as it does not involve construction at the site.
- Narratives describing the implementation of each remedy were developed, including the pre-design, design, construction, operations and maintenance (O&M), and closeout phases.
- Feasibility-level schedules providing the estimated time to implement the remedy were developed, including design, permitting, construction, and post-construction O&M.
- Feasibility-level plans for the management of extracted groundwater were developed for alternatives where groundwater extraction is a component of the potential corrective action.
- Information required to evaluate specific portions of 35 I.A.C. § 845.670(e) requirements were prepared, as requested by Gradient, including 35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3).
- Estimates of implementation-based equipment mileage, vehicle delivery mileage, labor hour, and labor commuting mileage, were developed for each remedy alternative where physical construction and/or O&M activities are expected to occur.

All remedies presented within this CAAA-SIR assume that the source control presented in the Final Closure Plan [3] for the GMF GSP would also be implemented. Source control is the primary corrective action for the GMF GSP and will include removing free liquids from the CCR and completing closure-in-place (CIP) by consolidating approximately 296,000 cubic yards (CY) of CCR and 38,000 CY of underlying clayey soil from the southern portion of the GMF GSP footprint into the northern portion of the current GMF GSP footprint, decreasing the overall footprint from 43.3 acres down to 12.4 acres, and installing a geomembrane final cover on the northern consolidated area.

Groundwater modeling performed in 2022 estimates that source control alone would result in GWPS being achieved approximately 6 years after closure completion [4] without implementing other forms of corrective action. The potential remedies evaluated in this CAAA-SIR are intended to work in conjunction with the primary remedy, which is source control.

1.2.3 Criterion for Estimating Time to Achieve GWPS

Times to achieve GWPS for each of the remedial alternative remedies were estimated for the wells within the existing GMF GSP compliance monitoring network. This approach was utilized to provide a consistent comparison of the estimated the time to reach GWPS for each remedy, as required by 35 I.A.C. § 845.670(e)(f).

1.3 Report Contents

The following information is included within this report:

- **Section 1** includes the introduction and background;
- **Section 2** includes information for the Alternative 1 remedy: source control with GWP;

- **Section 3** includes information for the Alternative 2 remedy: source control with GWE;
- **Section 4** includes information used to develop estimates of material quantities, labor hours, and mileage; and
- **Section 5** includes reference documents used in the development of this CAAA-SIR.

2. ALTERNATIVE 1 REMEDY: SOURCE CONTROL WITH GROUNDWATER POLISHING

The Alternative 1 remedy, source control with GWP, would include a consolidate-and-cap approach for source control, after which GWP would be implemented. GWP is a remedial alternative that relies on natural geochemical processes and may be appropriate as recognized by the United States Environmental Protection Agency (USEPA) in a final policy directive for groundwater remediation [5].

2.1 Supporting Groundwater Modeling and Time to Reach GWPS

The constituents of concern (COCs) exceeding the GWPS at compliance groundwater monitoring wells as of the 2024 Annual Report [6] are sulfate and TDS. Sulfate was selected for modeling source control presented in the Final Closure Plan and was identified as a surrogate for the other exceedances[1] of GWPS, as described in the Groundwater Modeling Report [4]. For modeling purposes, it was assumed that sulfate would not significantly sorb or chemically react with aquifer solids (soil adsorption coefficient [Kd] was set to 0 milliliters per gram [mL/g]) which is a conservative estimate for predicting contaminant transport times in the model. Sulfate transport is likely to be affected by both chemical and physical attenuation mechanisms (*i.e.,* adsorption and/or precipitation reactions as well as dilution and dispersion) [4]. Physical attenuation (dilution and dispersion) of contaminants in groundwater is simulated in the groundwater computer models. Chemical attenuation mechanisms and their effect on modeled times for exceedances to reach the GWPS are discussed in the Groundwater Polishing Evaluation Report [7] and discussed herein.

Groundwater modeling performed to support the closure plan for the GMF GSP estimated that GWPS would be met approximately 6 years after the implementation of source control for all wells within the existing GMF GSP monitoring well network. This was described in the 2022 modeling report attached to the closure plan that was submitted to IEPA [4].

2.2 Remedy Implementation

Implementation of this portion of the remedy would be initiated after source control (*e.g.,* final closure of the GMF GSP) is completed. Implementation would include performing corrective action groundwater monitoring, enacting an adaptive management strategy, and, after GWPS have been met, performing corrective action closure and completion activities. Information associated with each of these activities is described below.

- Corrective Action Groundwater Monitoring
  - Regular corrective action groundwater monitoring would be conducted utilizing a corrective action groundwater monitoring network designed in accordance with 35 I.A.C. § 845.680(c), which specifies that wells must be installed in the plume of contamination that lies beyond the waste boundary.

[1] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or GWPSs as described in the proposed groundwater monitoring program, which was submitted to the IEPA on October 25, 2021 as part of IPGC's operating permit application for COF GMF GSP. That operating permit application, including the proposed groundwater monitoring program, remains under review by the IEPA and, therefore, IPGC has not identified any actual exceedances

    - Samples would be collected for COCs required by 35 I.A.C. § 845.600(a)(1). Samples would be collected on a quarterly basis initially and potentially reduced to a semiannual basis once five years of monitoring have occurred, in accordance with 35 I.A.C. § 845.650(b)(4).
    - Monitoring results would be submitted to IEPA for each monitoring event, in addition to an annual groundwater monitoring and corrective action report, in accordance with 35 I.A.C. § 845.610(e).
    - Routine maintenance of the monitoring well network would occur during the monitoring period. This would include inspecting the wells, making repairs to the wells (as and if needed), and rehabilitating and/or replacing wells to improve performance (as and if needed).
- Adaptive Management during Monitoring
  - Groundwater monitoring results would be evaluated and documented in in the monitoring reports submitted to IEPA, in accordance with 35 I.A.C. § 845.610(e).
  - If remedy progress does not correspond with expectations, additional methods or techniques to achieve compliance with GWPS would be evaluated and, if feasible, implemented in accordance with 35 I.A.C. § 845.680(b).
- Corrective Action Confirmation Modeling and Completion
  - After GWPS have been met for all corrective action monitoring wells, corrective action confirmation groundwater monitoring would be implemented. This would include monitoring each well for three additional years to confirm that GWPS have been achieved, in accordance 35 I.A.C. § 845.680(c).
    - It should be noted that post-closure care groundwater monitoring required for a 30-year period by 35 I.A.C. § 845.780(c) would continue to occur after corrective action groundwater monitoring is expected to be completed.
  - After completion of the corrective action confirmation monitoring period, a Corrective Action Completion Report and Certification would be prepared and submitted to IEPA, in accordance with 35 I.A.C. § 845.680(e).

2.2.1 Remedy Implementation Schedule

A feasibility-level implementation schedule for the Alternative 1 source control with GWP remedy is provided in **Table A** below.

Table A. Feasibility-Level Implementation Schedule – Alternative 1: Source Control with GWP

Implementation Phase	Implementation Task	Timeframe* (Preliminary Estimates)
Corrective Action Implementation	Corrective Action Monitoring (Time to Meet GWPS)	72 months
	Corrective Action Confirmation Monitoring	36 months
	Corrective Action Completion	6 months
	Timeframe to Complete Corrective Action Implementation	114 months
	Total Timeline to Complete Corrective Action (after completion of source control)	114 months (10 years)

*All timeframes are assumed to start after source control (*e.g.,* final closure of the SI) is complete and a corrective action permit has been issued by IEPA, whichever is later.

2.2.2 Management of Extracted Groundwater

No groundwater extraction would occur under this remedy.

2.2.3 35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) Information

As requested by Gradient, the following information required by 35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) has been developed for the remedy. The information was developed based on preliminary-level information contained within the CMA for the GMF GSP and then refined based on additional feasibility-level design activities performed as part of the development of this CAAA-SIR.

- Potential Need for Replacement of the Remedy – 35 I.A.C. § 845.670(e)(1)(H)
  - No replacement of the remedy would be required for source control with GWP, as a physical remedy would not be constructed.
- Degree of Difficulty Associated with Constructing the Remedy – 35 I.A.C. § 845.670(e)(3)(A)
  - No construction would be required with the source control with GWP remedy; therefore, there is no difficulty in construction of the remedy.
- Expected Operational Reliability of the Remedy – 35 I.A.C. § 845.670(e)(3)(B)
  - As documented in the Groundwater Polishing Evaluation Report [7], groundwater geochemical processes anticipated to occur as downgradient groundwater approaches ambient background conditions are not expected to alter the chemical mechanisms of GWP and are not expected to delay the modeled time to achieve GWPS compliance.
  - GWP would begin once source control has been completed without delays and continuously function during the corrective action period.
- Need to Coordinate with and Obtain Necessary Approvals and Permits from Other Agencies - 35 I.A.C. § 845.670(e)(3)(C)
  - No permits from other agencies would be required outside of permits issued by IEPA for source control (Closure Plan and Construction Permit Application, submitted to IEPA in 2022 [8]).
- Availability of Necessary Equipment and Specialists - 35 I.A.C. § 845.670(e)(3)(D)

  - Equipment and specialists for field data collection and groundwater sampling are required for the GWP alternative. Laboratory equipment and specialists would also be required to assess groundwater concentrations of site constituents. Groundwater professionals (*i.e.,* geologists, hydrogeologists, statisticians, geochemists) would be required to perform statistical analysis and other assessments to confirm that GWP is functioning as intended and prepare corrective-action related groundwater monitoring and progress reports.
  - The equipment and specialists required for site groundwater monitoring and analysis are currently performing this work as part of the routine groundwater monitoring program in accordance with 35 I.A.C. § 845.220(c)(4). Therefore, no new equipment or specialists are required for groundwater monitoring for this alternative.

- Available Capacity and Location of Needed Treatment, Storage, and Disposal Services – 35 I.A.C. § 845.670(e)(3)(E)
  - No treatment, storage, or disposal services would be required with the source control with GWP remedy, as GWP would not generate an appreciable volume of waste or wastewater.

3. ALTERNATIVE 2 REMEDY: SOURCE CONTROL WITH GROUNDWATER EXTRACTION

The Alternative 2 remedy, source control with GWE, would include the construction of a downgradient GWE trench that would be located within the portions of the GMF GSP that were closed by the removal of CCR. The trench would extend from grade surface down to approximately 5 feet below ground surface (bgs) in order to extend just below the bottom of the uppermost aquifer (UA). This would correspond to a typical elevation of 605 feet but would be variable based on actual UA elevations[2]. The total length of the GWE trench would be approximately 1,600 feet, extending along the interior toe of the former perimeter dikes of the GMF GSP and, incorporating and retrofitting the existing drainage channel east of the GMF GSP. The constructed width of the trench is expected to be on the order of 2 to 3 feet. The purpose of the extraction trench would be to provide active removal of the impacted groundwater to accelerate achieving GWPS.

The GWE trench would be constructed by excavation of existing subgrade soils, installation of collection pipe in the trench, backfilling with clean granular fill, and placement of a compacted clay cap over the trench to reduce surface water infiltration. The collection pipe would drain to sumps spaced throughout the trench with an extraction pump within each sump. Extracted groundwater would be collected and routed via pneumatic pumps and air compressors to a new on-site lined settling pond and discharged through Outfall 023, where it would be managed in accordance with the National Pollutant Discharge Elimination System (NPDES) permit for the site [9].

A feasibility-level drawing of the source control with GWE remedy is provided as **Figure 1** in **Appendix A.**

3.1 Remedy Scoping and Groundwater Modeling Results

The location of the GWE trench was selected by reviewing physical constraints around the GMF GSP and designating locations on IPGC property where the trench could feasibly be constructed with limited impacts to other site features. The location was additionally selected to avoid sensitive areas such as wetlands and regulatory floodplains [10, 11], while limiting adverse impacts or conflicts with the GMF GSP final closure construction and future solar redevelopment, and incorporating existing and new site drainage features (*i.e.,* drainage channel allowing stormwater to drain away from the GMF GSP after closure).

Assessment of physical constraints resulted in the GWE trench being located within the footprint of the closure-by-removal (CBR) area of the GSP, along the southern and eastern perimeter, which is not within regulatory floodplains or known wetlands, provides generally straight and level alignment for the construction of the trench, and would reduce conflicts with the GMF GSP final closure. The location of the extraction trench is generally perpendicular to existing groundwater flow patterns. The depth of the extraction trench was selected based on interception with the existing groundwater table and the base of the UA. The UA was generally removed within the footprint of the unit as part of the initial unit construction activities, so the trench was located around the interior edge of the unit to intercept any portions of the UA that may be remaining. The low surface elevation at the base of the GSP CBR berm (approximately 610 feet)

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

limits trench depth to approximately 5 feet bgs to terminate at the bottom of the UA (approximately 605 feet).

Groundwater modeling of source control and GWP described in Alternative 1 estimates the time to reach the GWPS for all wells would be approximately 6 years after source control implementation [4]. Given such a short timeframe estimated to reach the GWPS in the absence of an active remedial option, groundwater modeling specific to the GWE trench remedy was not performed. Time to reach the GWPS for the GWE trench remedy is expected to be similar or slightly faster than source control with GWP.

3.2 Remedy Implementation

Implementation of the Alternative 2 source control with GWE is expected to include multiple tasks spread out over three phases, including pre-construction activities (Phase 1), corrective action construction (Phase 2), and corrective action operations, maintenance, and closeout (Phase 3). Information for each phase is described in this section.

3.2.1 Phase 1: Pre-Construction Activities

Pre-construction activities would include further pre-design investigation, obtaining permits from other agencies, completing the final design of the remedy, and selecting a remedy implementation contractor via a bidding process. Information associated with each of these activities is described below.

- Completing pre-design investigation, final design and bid activities, including:
  - Completion of final pre-design subsurface investigations, laboratory soil testing, engineering calculations, design drawings, specifications, and a construction quality assurance plan.
  - Bidding and selection of the GWE system construction contractor.
- Obtaining permits from other agencies including:
  - A general stormwater permit for construction site activities though IEPA, including construction of stormwater controls and other best management practices (BMPs) such as silt fences and other measures.
  - An amendment to the submitted GMF GSP Closure Plan and Construction Permit Application to allow for the disposal of the trench spoils beneath the GMF GSP final cover system.
  - An Illinois Department of Natural Resources (IDNR) Office of Water Resources, Dam Safety modification permit may need to be obtained for modification of the embankment.
  - A modification to the site's NPDES permit would be obtained to accept discharge of extracted groundwater for the operational lifetime of the GWE trench.

3.2.2 Phase 2: Corrective Action Construction

Corrective action construction would be initiated after pre-construction activities are complete. It would include mobilizing construction equipment to the site, preparing the site for construction activities, construction of the GWE trench (which would include removal or partial replacement of existing subgrade soils), and performing post-construction and site restoration activities.

Extraction trench construction is assumed to occur within the latter phases of the GMF GSP closure construction, so all spoils generated during extraction trench construction could be placed beneath the final cover system within the GMF GSP. This would likely mean that the extraction trench would be constructed after CCR has been removed from the CBR portions of the GMF GSP, but before the final cover system has been completed. It was assumed that a construction contractor independent from the closure construction contractor would complete installation of the extraction trench.

Information associated with each of these activities is described below.

- The contractor would mobilize equipment and materials to the site, and, if needed, install stormwater BMPs around the construction area, construct a staging and laydown area, and construct a level working pad and/or temporary construction access roads along the extraction trench alignment.
- The 1,600-foot extraction trench would be constructed using conventional construction equipment.
  - Due to the relatively shallow depth of the trench, the use of specialized trenching equipment (*i.e.,* one-pass equipment) was assumed to be unnecessary, and conventional excavation and backfill techniques were assumed to be used. However, specialized methods may be considered during later phases of design.
  - The trench would be excavated along the design alignment on the inner side of the containment berm. Excavation would be conducted to an approximate depth of 5 feet bgs, terminating just below the bottom of the UA. Perforated groundwater collection pipe would be laid on the base of the trench at a 0.5 to 2 percent grade to slope towards the sump locations. The trench would be on the order of 2 to 3 feet wide.
  - Sump locations would be installed along the trench. Sumps would consist of a pit to collect water, a discharge line, a pneumatic pump to pump water to the discharge line, and an air compressor.
  - The trench would be backfilled with clean granular material and capped with low-permeability clay and topsoil at the surface, or a more erosion-resistant material (*i.e.,* a turf-reinforced mat or gravel), if needed to prevent stormwater erosion and infiltration of the trench.
  - Excavated soils (*e.g.,* spoils) from trench excavation would be placed into off-road dump trucks and hauled to the GMF GSP for use as subgrade fill beneath the final cover system. The material would be moisture-conditioned by spreading it in thin lifts and compacting in accordance with the subgrade fill specifications for the GMF GSP final closure.
- An approximately 1-acre settling pond for management of extracted groundwater would be constructed using conventional construction equipment. The temporary wastewater treatment plant that is being constructed on-site, to allow existing contact stormwater in the GMF GSP and adjacent GMF Recycle Pond to be treated prior to discharge, is not expected to operate post-closure and therefore was assumed to be unavailable for treating extracted groundwater.
  - The location of the settling pond would be sited to limit adverse impacts or conflicts with the GMF GSP final closure construction, future solar redevelopment, and other existing and future site infrastructure. The precise location of the pond would be evaluated during later phases of design.

  - The settling pond would be approximately 1-acre in size and 2 feet deep. Soils would be mechanically excavated from the settling pond and used to create 10-foot-wide berms around the perimeter of the settling pond to contain extracted groundwater. All excavated soils from the settling pond would be managed within the settling pond footprint.
  - A geomembrane liner system would be installed in the settling pond to reduce the potential for release of extracted groundwater.
  - Underground trenches with high-density polyethylene (HDPE) piping would be excavated to convey extracted groundwater from the extraction trench to the settling pond and from the settling pond to Outfall 023. This would include the installation of electrical, mechanical, and pneumatic infrastructure to operate the conveyance piping system.
- Site restoration would be completed following the installation of the extraction trench. This would include minor regrading and seeding of disturbed areas.
  - Temporary BMPs would also be installed during the site restoration period, if required in accordance with site land disturbance permits. The BMPs would be removed once vegetation is established.

3.2.3 Phase 3: Corrective Action Operations, Maintenance, and Closeout

Corrective action operations, maintenance, and closure would be initiated after corrective action construction is completed. It would include performing corrective action groundwater monitoring, and, after GWPS have been met, performing corrective action closeout and completion activities. Information associated with each of these activities is described below.

- Corrective Action O&M
  - Continued operation of the trench extraction system would require routine scheduled inspections and associated maintenance including, but not limited to, totalizer data collection and maintenance of extraction pumps, as well as other system components.
  - Non-routine maintenance that may occur during extended operation of the GWE trench may include tasks such as repair or replacement of the extraction pumps, repair or replacement of the system air compressor, and flushing or jetting of water conveyance lines in the event organic or inorganic solids accumulate on the interior walls.
  - Routine monitoring and compliance activities associated with the treatment and discharge of extracted water via the site's NPDES permit.
- Corrective Action Monitoring
  - Regular corrective action groundwater monitoring would be conducted using a corrective action groundwater monitoring well network designed in accordance with 35 I.A.C. § 845.680(c), which specified that wells must be installed within the plume of contamination that lies beyond the waste boundary.
    - Samples would be collected for major ions for evaluating groundwater chemistry and COCs. Samples would be collected on a quarterly basis initially and potentially reduced to a semiannual basis once five years of monitoring have occurred, in accordance with 35 I.A.C. § 845.650(b)(4).
    - Monitoring results would be submitted to IEPA after each monitoring event, in addition to an annual groundwater monitoring and corrective action report, in accordance with

35 I.A.C. § 845.640(e). The annual corrective action report would include an evaluation of the actual performance of the remedy relative to the remedy's expected performance.

    - Routine maintenance of the monitoring well network would be conducted during the monitoring period. This would include inspecting the wells, making repairs to the wells (as and if needed), and rehabilitation and/or replacing the wells to improve performance (as and if needed).

  - If the remedy does not achieve its expected performance, additional methods or techniques to achieve compliance with GWPS would be evaluated and, if feasible, implemented in accordance with 35 I.A.C. § 845.680(b).

- Adaptive Management during Monitoring
  - Groundwater monitoring results would be evaluated and documented in in the monitoring reports submitted to IEPA, in accordance with 35 I.A.C. § 845.610(e).
  - Remedy progress evaluation as part of adaptive site management may include additional investigation to inform updates to the conceptual site, groundwater, and geochemical models.
  - If remedy progress does not correspond with expectations, additional methods or techniques to achieve compliance with GWPS would be evaluated and, if feasible, implemented in accordance with 35 I.A.C. § 845.680(b).
- Corrective Action Completion
  - After GWPS have been met for all compliance wells for a period of three years, corrective action would be considered complete per 35 I.A.C. § 845.680(c).
    - It should be noted that post-closure care groundwater monitoring required for a 30-year period by 35 I.A.C. § 845.780(c) would continue to occur after corrective action groundwater monitoring is expected to be completed.
  - After completion of the corrective action confirmation monitoring period, a Corrective Action Completion Report and Certification would then be submitted to IEPA, in accordance with 35 I.A.C. § 845.680(e).

3.2.4 Remedy Implementation Schedule

A feasibility-level implementation schedule for the Alternative 2 source control with GWE remedy is provided in **Table B** below.

Table B. Feasibility-Level Implementation Schedule – Alternative 2: Source Control with GWE

Implementation Phase	Implementation Task	Timeframe (Preliminary Estimates)
1: Pre-Construction Activities	Agency Coordination, Approvals, and Permitting	18 to 24 months
	Final Design and Bid Process	12 to 18 months
	Timeframe to Complete Corrective Pre-Construction Activities	30 to 42 months after CAP Approval
2: Corrective Action Construction	Corrective Action Construction	4 to 8 months
	Timeframe to Complete Corrective Action Construction	4 to 8 months after completion of pre-construction activities
3: Corrective Action O&M and Closeout	Corrective Action Monitoring (Time to Meet GWPS)	72 months*
	Corrective Action Confirmation Monitoring	36 months*
	Corrective Action Completion	6 months*
	Timeframe to Complete Corrective Action O&M and Closeout	114 months* after completion of O&M and closeout activities
	Total Timeline to Complete Corrective Action	148 to 164 months (12 to 14 years)
	Timeline to Complete Corrective Action (after completion of source control)	114 months* (10 years*)

*Denotes a timeframe that is assumed to start after source control (*e.g.,* final closure of the SI) is complete and a corrective action construction permit application has been issued by IEPA, whichever is longer.

It should be noted that Phases 1 and 2 were assumed to occur concurrently with closure construction, to allow spoils to be disposed of beneath the GMF GSP final cover system. Therefore, the start of Phase 3 (Corrective Action O&M and closeout) was assumed to begin at the completion of source control (final closure of the GMF GSP). In the event that Phases 1 and 2 could not be completed concurrently with source control due to a delay in receiving permits or construction-related conflicts, the total schedule would likely increase.

3.2.5 Management of Extracted Groundwater

Extracted groundwater from the trench was assumed to be managed and treated by a newly constructed on-site settling pond. The settling pond would need to be sited to avoid conflict with planned solar redevelopment, other site infrastructure, and closure activities related to the GMF GSP and other surface impoundments at CPP. An approximately 1-acre settling pond was assumed to be sufficient to allow sediments to settle from extracted groundwater prior to discharge. Groundwater collected from the GWE trench would be sent to the settling pond via the pneumatic extraction pumps and transfer piping. Treated water would be discharged via NPDES Outfall 023 to Coffeen Lake. All groundwater would be discharged in accordance with site-specific NPDES permit requirements [9].

3.2.6 35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) Information

As requested by Gradient, the following information required by 35 I.A.C. § 845.670(e)(1)(H) and 35 I.A.C. § 845.670(e)(3) has been developed for the remedy. The information was

developed based on preliminary-level information contained within the CMA for the GMF GSP and then refined based on additional feasibility-level design activities performed as part of the development of this CAAA-SIR.

- Potential Need for Replacement of the Remedy – 35 I.A.C. § 845.670(e)(1)(H)
  - No replacement of the remedy is expected to be required during the relatively short design life, although the remedy would require ongoing monitoring and maintenance to retain its effectiveness.
- Degree of Difficulty Associated with Constructing the Remedy – 35 I.A.C. § 845.670(e)(3)(A)
  - Shallow GWE trenches are commonly constructed to similar elevations using conventional construction equipment by regional contractors. Therefore, the degree of difficulty is expected to be low.
- Expected Operational Reliability of the Remedy - 35 I.A.C. § 845.670(e)(3)(B)
  - The extraction trench is expected to have high operational reliability if it is constructed in accordance with the design and specifications.
  - However, the extraction trench system is a mechanical system that would require routine maintenance to reliably operate, as outlined in **Section 3.2.3**.
- Need to Coordinate with and Obtain Necessary Approvals and Permits from Other Agencies - 35 I.A.C. § 845.670(e)(3)(C)
  - Agency permits would need to be obtained from IEPA for discharge of extracted groundwater, construction stormwater controls and BMPs, placement of excavation spoils beneath the GMF GSP final cover system, in addition to a joint water pollution control construction and operating permit and IDNR Dam Safety modification permit. These permits typically take 18 to 24 months to obtain, with the NPDES permit modification taking longer to obtain than the other permits.
    - While some of these permits may also be obtained for the GMF GSP final closure, it is uncertain at this time of the schedule for approval of both the final closure plan and the eventual CAP; therefore, it has been assumed that separate permit applications for both the closure and corrective action construction would be submitted.
- Availability of Necessary Equipment and Specialists - 35 I.A.C. § 845.670(e)(3)(D)
  - Construction of the GWE system is not expected to require specialized contractors or equipment, as similar shallow collection trenches (*i.e.,* French drains) are routinely constructed by earthwork contractors in Central and Southern Illinois.
  - Equipment and specialists for field data collection and groundwater sampling are required for the remedy. Laboratory equipment and specialists would also be required to assess groundwater concentrations of site COCs. Groundwater professionals (*i.e.,* geologists, hydrogeologists, statisticians, geochemists) would be required to perform statistical analysis and other assessments to confirm that the remedy is functioning as intended and prepare corrective action-related groundwater monitoring and progress reports.
    - The equipment and specialists required for site groundwater monitoring and analysis are currently performing this work in accordance with 35 I.A.C. § 845.220(c)(4).

Therefore, no new equipment or specialists are required for groundwater monitoring for this alternative.

- Available Capacity and Location of Needed Treatment, Storage, and Disposal Services - 35 I.A.C. § 845.670(e)(3)(E)
  - Wastes generated during GWE system construction would be limited to spoils; these would be disposed of on-site in the GMF GSP during closure construction as compacted contouring fill beneath the final cover system. Completing the GWE system construction at the same time as the GMF GSP closure would provide sufficient on-site capacity for the disposal of generated spoils.
  - The GWE system would send extracted groundwater to an on-site settling pond to settle solids extracted during groundwater recovery via the pneumatic extraction pumps and transfer piping. This settling pond would be new construction that would need to be sited, designed, constructed, and maintained.
    - The settling pond would need to be sited to not conflict with planned solar redevelopment, wetlands, floodplains, or other site infrastructure.
  - Continued NPDES permit renewals may be required, depending on the timeline of corrective action implementation relative to completion of source control activities.

4. MATERIAL QUANTITY, LABOR, AND MILEAGE ESTIMATES

Estimates of material quantities, total labor hours, and mileage were prepared for Alternative 2 source control with GWE, to support Gradient in preparing a CAAA. Estimates were prepared for the construction and O&M of the remedy. Estimates were not prepared for Alternative 1 source control with GWP as the alternative does not require remedial construction or O&M of a physical remedy.

The estimates were prepared utilizing the following approach:

- Major implementation (*e.g.,* construction) components and line items were identified, in accordance with the remedy implementation narratives contained within this CAAA-SIR.
- Construction quantities were estimated based on quantity estimates for volumes, areas, and units, as obtained from the feasibility-level engineering drawings and schedules included within this CAAA-SIR.
- RS Means Heavy Construction Cost Data (RS Means) [12] was utilized to estimate the crew size, equipment description, and daily output associated with each line item.
- For line items where RS Means data was not available, the crew size, equipment description, and daily output were estimated based on Ramboll's experience, information from contractors, and/or information from material suppliers.
- For the Alternative 2 source control with GWE active remedy, daily construction and O&M labor mobilization miles were estimated assuming a weekly mobilization/demobilization from Chicago (500 miles round trip) and a local commute of 40 miles round trip per day. The number of working days and hours per week were estimated from the construction schedule developed for each remedy.
- Estimates of material delivery miles were prepared based on Ramboll's experience.

The detailed material quantity, labor, and mileage estimates are provided in **Appendix B**.

5. REFERENCES

[1] "Illinois Administrative Code, Title 35, Subtitle G, Chapter I, Subchapter J, Part 845: Standards for The Disposal Of Coal Combustion Residuals In Surface Impoundment," effective April 21, 2021.

[2] Code of Federal Regulations, "Title 40, Chapter I, Subchapter I, Part 257, Subpart D, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," April 17, 2015.

[3] Golder Associates USA, Inc., "Final Closure Plan for the Gypsum Management Facility Gypsum Stack Pond," July 28, 2022.

[4] Ramboll, "Groundwater Modeling Report GMF Gypsum Stack Pond and GMF Recycle Pond," Ramboll, Coffeen, Illinois, July 28, 2022.

[5] United States Environmental Protection Agency, "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites," OSWER Directive Number 9200.4-17P, April 21, 1999.

[6] Ramboll Americas Engineering Solutions, "2024 35 I.A.C. S 845 Annual Groundwater Monitoring and Corrective Action Report, GMF Gypsum Stack Pond, Coffeen Power Station, IEPA ID No. W1350150004-03," Coffeen, IL, 2025.

[7] Geosyntec Consultants, Inc., "Groundwater Polishing Evaluation Report Coffeen Power Station - GMF Gypsum Stack Pond (EPA ID No. 103)," Coffeen, IL, 2024.

[8] Golder Associates USA Inc., "Part 845 Construction Permit Application for the Gypsum Management Facility Gypsum Stack Pond," July 28, 2022.

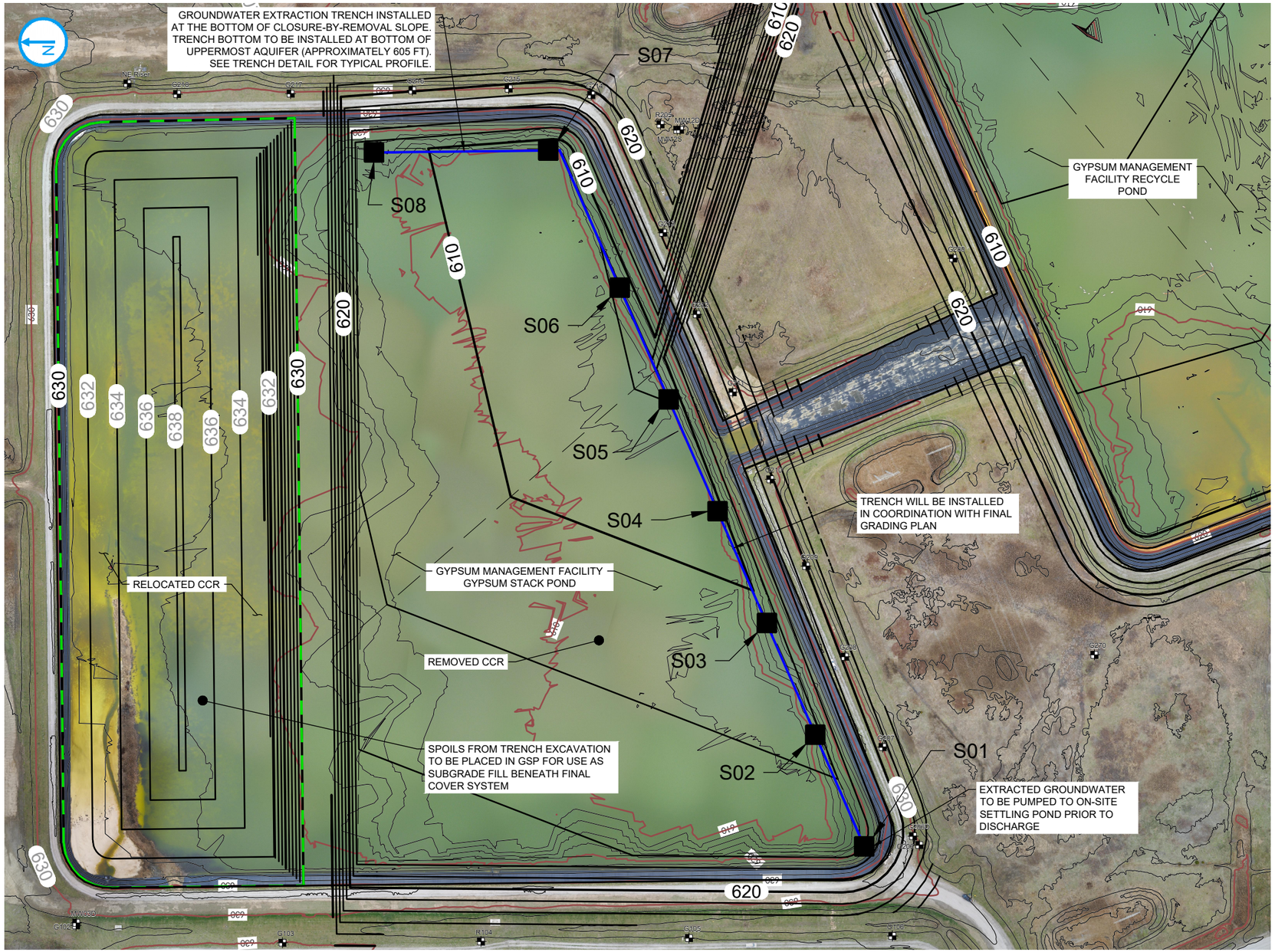
[9] Illinois Environmental Protection Agency, "NPDES Permit No. IL0000108," Illinois Environmental Protection Agency, Coffeen, Illinois, 2023.

[10] U.S. Fish and Wildlife Service,, "National Wetlands Inventory, Surface Waters and Wetlands," [Online]. Available: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

[11] National Flood Insurance Program, *Flood Hazard Boundary Map, Montgomery County, Illinois, Unincorporated Areas,* Federal Emergency Management Agency, 1981.

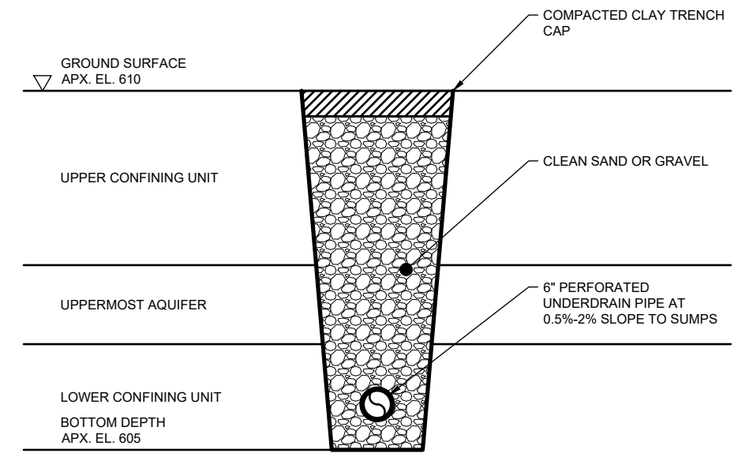
[12] Gordian, RS Means Data version 8.7, Springfield, IL: Gordian, 2023.

APPENDIX A
FEASIBILITY-LEVEL DESIGN DRAWING FOR ALTERNATIVE 2 REMEDY



SITE PLAN

0 200 Feet



TRENCH DETAIL

NOT TO SCALE

NOTE:

1. EXISTING CONTOURS ARE A COMPOSITE OF AN AERIAL SURVEY COMPLETED BY DRAGONFLY AEROSOLUTIONS DATED 12/3/2020, TOPOGRAPHIC/BATHYMETRIC SURVEYS COMPLETED BY INGENAE DATED 12/3/2020 & 12/4/2020.
2. POST-CLOSURE GRADING REPRESENTED PER COFFEEN POWER PLANT GYPSUM MANAGEMENT FACILITY CONSTRUCTION PERMIT APPLICATION DRAWINGS COMPLETED BY GOLDER, JULY 2022.

GROUNDWATER EXTRACTION TRENCH

SUMP PUMP

EXTENTS OF RELOCATED CCR

GROUNDWATER EXTRACTION TRENCH
FEASABILITY-LEVEL DESIGN

GMF GSP
Coffeen Power Plant 134 CIPS Lane Coffeen, IL 62017

FIGURE 1

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

PROJECT: 1940075591 DATED: 6/3/2025 DESIGNER: LEMMONDS

APPENDIX B
MATERIAL QUANTITY, LABOR, AND MILEAGE ESTIMATES FOR ALTERNATIVE 2 REMEDY

ILLINOIS POWER GENERATING COMPANY - COFFEEN POWER PLANT
CORRECTIVE ACTION ALTERNATIVES ANALYSIS SUPPORTING INFORMATION REPORT (CAAA-SIR)
ALTERNATIVE 2 - SOURCE CONTROL WITH GROUNDWATER EXTRACTION TRENCH[1]

ITEM NO.	ENGINEERING, PRE-CONSTRUCTION, AND CONSTRUCTION SUPPORT TASKS	Units	Quantity	Crew	Output	Labor Hours	Equipment Hours	Notes
1	Engineering Support and CQA During Construction	LS	1	Eng	60	1,440	0	Assumed labor and equipment hours based on Ramboll project experience.
	ENGINEERING, PRE-CONSTRUCTION, AND CONSTRUCTION SUPPORT TASK ESTIMATED SUBTOTAL					**1440**	**0**	
ITEM NO.	**SITE PREPARATION**	**Units**	**Quantity**	**Crew**	**Daily Output**	**Labor Hours**	**Equipment Hours**	**Notes**
2	Staging Area & Temporary Roads Preparation	-	-	-	-	422	130	Assumes some work general preparation of temporary access roads along the trench alignment will be needed specific to extraction trench construction.
	Subsurface Stabilization Nonwoven Geotextile	SY	5,000	2 Clab	2500	32	0	313219161550: Geosynthetic soil stabilization, geotextile fabric, non-woven, 120 lb tensile strength includes scarifying and compaction. Assumes 0.5 acre staging area and approximately 2,000 ft of temporary access road.
	Construct Staging Area & Temporary Roads	SY	5,000	B14	615	390	130	015523500100: Temporary, roads, gravel fill, 8" gravel depth, excluding surfacing. Assumes 0.5 acre staging area and approximately 2,000 ft of temporary access road.
3	Construction Soil Erosion & Sediment Controls	-	-	-	-	217	72	Assumes soil erosion and sediment controls will be implemented only during the groundwater extraction trench construction.
	Silt Fence	LF	3,200	B62	650	118	39	312514161000: Synthetic erosion control, silt fence, install and remove, 3' high. Assumes silt fence is installed down both sides of the extraction trench alignment (3,200 ft total).
	Sediment Log, Filter Sock	LF	4,100	A2	1000	98	33	312514160705: Sediment Log, Filter Sock, 9". Assume sediment log is needed along alignment of extraction trench (3,200 LF total) and settling pond perimeter (~900 LF).
4	Temporary Electrical Installation	EA	1	R1B	-	144	0	Electrical installation based on Ramboll experience to install two power drops for low-voltage (120V) power for the pneumatic extraction pumps along the extraction trench, and for the pneumatic transfer pump at the settling pond for discharge of water to outfall.
5	Construction of Compressor Shed	-	-	-	-	180	60	Based on Ramboll experience for construction of housing unit for air compressor shed.
	Construct Compressor Shed	EA	1	B6	-	180	60	Assumes pre-fabricated air compressor shelter, installed primarily by hand with light equipment assistance. Hours are based on Ramboll experience.
	SITE PREPARATION ESTIMATED SUBTOTAL					**963**	**262**	
ITEM NO.	**GROUNDWATER EXTRACTION TRENCH CONSTRUCTION**	**Units**	**Quantity**	**Crew**	**Daily Output**	**Labor Hours**	**Equipment Hours**	**Notes**
6	Installation of Groundwater Extraction Trench	-	-	-	-	449	161	Groundwater extraction trench and components
	Trench Excavation	CY	750	B13D	376	32	16	312316131358: Excavating, trench; 4' to 6' deep, 1/2 C.Y. excavator w/ trench box (1 C.Y. excavator). Volume estimate based on 2.5 ft wide by 5 ft deep trench over 1,600 LF.
	Install 6" HDPE Collection Pipe	LF	1,600	B14	300	256	85	334116302110: Perforated PVC, 6" diameter for underdrains along trench alignment.
	Install Sump Pits	EA	8	Q1	1.8	71	0	221429132010: Wet-pit-mounted, vertical sump pump, single stage, 25 GPM, 1 HP, 1-1/2" discharge.
	Backfill with Granular Trench Backfill	LCY	750	B10R	100	90	60	312316133060: Backfill trench, F.E. loader, wheel mtd., 1 C.Y. bucket, 200' haul. Trench cap volume is included with general granular trench backfill.
7	Groundwater Extraction Trench Mechanical Installation	-	-	-	-	656	220	Groundwater extraction system mechanical and electrical components
	Excavate Utility Trench for Lines to Compressors and Extraction Pumps	LF	2,000	B54	860	19	19	312316142750: Utility trench excavating, chain trencher, 40 HP operator riding, 12" wide trench and backfill, 18" deep. Trench installed from power drop/compressor shed to extraction trench to supply compressed air and power to sump pits.
	Install Mechanical Elements and Piping	EA	1	R30	-	260	0	Assumes furnishing all mechanical elements (air compressors, pneumatic extraction pumps, transfer pumps) and associated HDPE housing piping for distribution of power and housing of mechanical elements throughout the extraction trench system. Assumes approximately 10 days of work.
	Excavate Utility Trench for Conveyance to Settling Pond	LF	1,500	B10R	100	180	120	312316142750: Utility trench excavating, chain trencher, 40 HP operator riding, 12" wide trench and backfill, 18" deep. Trench installed from groundwater extraction trench to convey extracted water to the settling pond.
	Install 8" HDPE Conveyance Pipe to Settling Pond	LF	1,500	B22A	320	188	75	331413350300: Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 8" diameter, SDR 21. Includes labor, materials, and machine for installation and welding of HDPE pipe for conveying extracted water from trench to settling pond.
	Backfill with Granular Trench Backfill	LCY	85	B10R	100	10	7	312316133060: Backfill trench, F.E. loader, wheel mtd., 1 C.Y. bucket, 200' haul. Backfill with granular trench backfill. Quantity based on trench dimensions 12" wide, 18" deep, 1,500 ft long.
8	Installation of Settling Pond	-	-	-	-	226	89	Quantity based on 1-acre pond, 2 feet deep. Assume all excavated material is reused for berm construction.
	Excavation and Loading of Settling Pond Material	CY	3,300	B12D	2080	25	13	312316420300: Excavating, bulk bank measure, hydraulic, crawler mtd., 3 C.Y. cap (300 CY/hr).
	Hauling and Placement of Settling Pond Material	CY	3,300	B34G	3287	8	8	312323206130: Hauling; no loading equipment, including hauling, waiting, loading/dumping; 34 C.Y. off-road, 15 min wait/ld./uld., 15 MPH, cycle 2,000 ft. Daily output extrapolated down to 600 ft cycle.
	Spreading/Drying Material in Berm	CY	3,300	B10B	1000	40	26	312323170020: Spread dumped material, no compaction, by dozer. Daily output edited to match excavation based on experience.
	Compaction of Material in Berm	CY	3,300	B10F	2600	15	10	312323235060: Compaction; Riding, vibrating roller, 12" lifts, 2 passes. RS Means Crew is B10Y; altered to B10F based on experience.
	Fine Grading of Berm	MSF	36	B11L	30	19	10	312216103600: Fine grading, tops of lagoon banks for compaction. Assumes 10 ft-wide berm around perimeter of 1-acre settling pond.
	Subsurface Stabilization Nonwoven Geotextile	SY	5,000	2 Clab	2500	32	0	313219161550: Geosynthetic soil stabilization, geotextile fabric, non-woven, 120 lb tensile strength includes scarifying and compaction. Assumes 1 acre settling pond.
	Settling Pond Liner	SY	5,000	B63B	1850	86	22	310519531100: Reservoir liners, membrane lining, 40 mil, LLDPE.
9	Extracted Water Discharge Management	-	-	-	-	475	192	Based on approximate 3,000 ft distance from settling pond to discharge outfall.
	Install Transfer Pump and Controller	EA	1	R30	1	52	0	Installation of transfer pump and pump controller to convey water from settling pond to discharge outfall based on Ramboll project experience. Assumes inclusion of housing structure. Assume 2 days for installation.
	Excavate Utility Trench for Conveyance to Discharge	LF	3,000	B54	860	28	28	312316142750: Utility trench excavating, chain trencher, 40 HP operator riding, 12" wide trench and backfill, 18" deep. Trench installed from settling pond to convey settled water to outfall for discharge.
	Install 8" HDPE Conveyance Pipe to Discharge	LF	3,000	B22A	320	375	150	331413350300: Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 8" diameter, SDR 21. Includes labor, materials, and machine for installation and welding of HDPE pipe for conveying water from settling pond to discharge point.
	Backfill with Granular Trench Backfill	LCY	170	B10R	100	20	14	312316133060: Backfill trench, F.E. loader, wheel mtd., 1 C.Y. bucket, 200' haul. Backfill with granular trench backfill. Quantity based on trench dimensions 12" wide, 18" deep, 3,000 ft long.
10	Trench Spoils Management	-	-	-	-	33	23	Quantity based on average area of trench excavation 2.5 ft wide by 5 ft deep over 1,600 ft extraction trench alignment, plus dewatering basin spoils (1 acre large by 2 feet deep).
	Loading	CY - as excavated	750	B12C	1320	9	5	312316420260: Excavating, bulk bank measure, hydraulic, crawler mtd, 2 C.Y. cap (165 CY/hr).
	Hauling and Placement within Consolidated GSP CIP Footprint	CY - as excavated	750	B34G	850	7	7	312323206170: Hauling; no loading equipment, including hauling, waiting, loading/dumping; 34 C.Y. off-road, 15 min wait/ld./uld., 15 MPH, cycle 1 mile.
	Spreading/Drying Moisture Conditioning	CY - as excavated	375	B10B	1000	5	3	312323170020: Spread dumped material, no compaction, by dozer. Daily output edited to match excavation based on experience. Quantity assumes 50% of volume requires moisture conditioning.
	Spreading Lifts	CY - as excavated	750	B10B	1000	9	6	312323170020: Spread dumped material, no compaction, by dozer. Daily output edited to match excavation based on experience.
	Compaction of Material	CY - in place	750	B10F	2600	3	2	312323235060: Compaction; Riding, vibrating roller, 12" lifts, 2 passes. RS Means Crew is B10Y; altered to B10F based on experience.
	GROUNDWATER EXTRACTION TRENCH CONSTRUCTION					**1,840**	**685**	
ITEM NO.	**SITE RESTORATION**	**Units**	**Quantity**	**Crew**	**Daily Output**	**Labor Hours**	**Equipment Hours**	**Notes**
11	Infrastructure Restoration	-	-	-	-	86	9	Assumes restoration of grade surface following extraction trench installation.
	Erosion Control Blanket	SF	8,000	B1	2500	77	0	312514160100: Rolled erosion control mats and blankets, plastic netting stapled, 2" x 1" mesh, 20 mil. Assumes erosion control blanket installed over settling pond berm.
	Lime	MSF	21.8	B66	700	0.2	0.2	329113234250: Soil preparation, structural soil mixing, spread soil conditioners, ground limestone, 1#/S.Y., tractor spreader. Assumes soils possibly being void of nutrients. Quantity disturbed areas including staging area and temporary roads (~1 acre total) excluding settling pond.
	Fertilizer	MSF	43.5	B66	700	0.5	0.5	329113234150: Soil preparation, structural soil mixing, spread soil conditioners, fertilizer, 0.2#/S.Y., tractor spreader. Assumes soils possibly being void of nutrients. Quantity all disturbed areas including staging area and temporary roads (~1 acre total) and new settling pond (1 acre).
	Grassland Mix	MSF	43.5	B66	52	7	7	329219142300: Seeding athletic fields, seeding fescue, tall, 5.5 lb. per M.S.F., tractor spreader. Quantity all disturbed areas including staging area and temporary roads (~1 acre total) and new settling pond (1 acre).
	Mulch	MSF	43.5	B65	530	1	1	329113160350: Mulching, Hay, 1" deep, power mulcher, large.
	SITE RESTORATION ESTIMATED SUBTOTAL					**86**	**9**	
ITEM NO.	**Corrective Action Operation and Maintenance**	**Units**	**Quantity**	**Crew**	**Daily Output**	**Labor Hours**	**Equipment Hours**	**Notes**
12	Groundwater Extraction Trench Operation & Maintenance	-	-	-	-	960	-	Routine operation and maintenance of groundwater extraction trench
	Field Maintenance	Event	24	TM	-	960	0	Assumes quarterly maintenance on pneumatic pumps and air compressors over 6 years of operation. Each maintenance event assumes 2 staff for 3 days to check, clean, and service all mechanical parts. Assumes all labor, equipment, mobilization over 3 days.
	CORRECTIVE ACTION OPERATION AND MAINTENANCE SUBTOTAL					**960**	**-**	

	Total Labor Hours	Total Equipment Hours
ENGINEERING AND CONSTRUCTION SUBTOTAL	**4,328**	**956**
CORRECTIVE ACTION OPERATION AND MAINTENANCE SUBTOTAL	**960**	**-**
ENGINEER'S ESTIMATE OF TOTAL CONSTRUCTION AND ENGINEERING HOURS	**5,300**	**1,000**

NOTES:
1. Alternative 2: Source Control with groundwater extraction trench is estimated to take approximately 6 years to achieve groundwater protection standards (GWPS-35 I.A.C Section 845.600) at all perimeter wells associated with the Gypsum Stack Pond (GSP) following GSP closure in place (CIP).
2. RS Means refers to the 2023 online edition of RS Means Commercial New Construction.
3. See crew tab (Alt 2 - Crews) for assumptions regarding crew size, total labor hours and required construction equipment, as needed, for each task.
4. See mileage tab (Alt 2 - Mileage) for assumptions regarding total mileage for tasks outlined in this alternative.

ACRONYMS:
AC = Acre
CIP = closure in place
CY = Cubic Yard
Loose: Material swelled when removed from compacted state
DMM = Deep mixing method
GSP = Gypsum Stack Pond
EA = Each
GWPS = groundwater protection standards
IRM = interim remedial measure
LCY = Loose Cubic Yards
LF = Linear Foot
LS = Lump Sum
MSF = square feet divided by 1000
MO = Month
OMM = Operation, Monitoring, Maintenance
SF = Square Feet
SY = Square Yard

CREW CODES
ILLINOIS POWER GENERATING COMPANY - COFFEEN POWER PLANT
CORRECTIVE ACTION ALTERNATIVES ANALYSIS SUPPORTING INFORMATION REPORT (CAAA-SIR)
ALTERNATIVE 2 - SOURCE CONTROL WITH GROUNDWATER EXTRACTION TRENCH

Item No.	Crew Code	Labor	Daily Labor Hours	Equipment	Daily Equipment Hours	Crew Size	Onsite Labor Hours	Onsite Heavy Equipment Hours
Construction								
2,8	2 Clab	Laborer x2	16	None	0	2	64	0
3	A2	Laborer x2 Truck Driver x1	24	Flatbed Truck, Gas, 1.5 ton	8	3	98	33
11	B1	Labor Foremanx1 Laborer x2	24	None	0	3	77	0
5	B6	Laborer x 2 Operator (light) x 1	24	Backhoe Loader, 48 H.P.	8	3	180	60
8,10	B10B	Operator x1 Laborer x0.5	12	Dozer, 200 H.P.	8	1.5	53	35
8,10	B10F	Operator (med) x1 Laborer x0.5	12	Tandem Roller, 10, Ton	8	1.5	19	12
6,7,9	B10R	Operator (med) x 1 Laborer x 0.5	12	Frontend loader, W.M., 1 C.Y.	8	1.5	301	200
8	B11L	Operator (med) x 1 Laborer x 1	16	Grader, 30,000lb	8	2	19	10
9	B12C	Operator (crane) x 1 Laborer x 1	16	Hydraulic excavator, 2 C.Y.	8	2	9	5
8	B12D	Operator (crane) x 1 Laborer x 1	16	Hydraulic excavator, 3.5 C.Y.	8	2	25	13
6	B13D	Operator (crane) x 1 Laborer x 1	16	Hydraulic excavator, 1 C.Y. Trench Box	8	2	32	16
2,6	B14	Labor Foreman x 1 Operator (light) x1 Laborer x 4	48	Hyd. Excavator, 4.5 C.Y. Backhoe Loader, 48 H.P.	16	6	646	215
7,9	B22A	Labor Foreman x1 Skilled Worker x1 Laborer x2 Operator (crane) x1	40	S.P. Crane, 4x4, 5 ton Butt Fusion Machine, 4-12" diam.	16	5	563	225
8,10	B34G	Truck Driver x1	8	Dump Truck, Off Hwy., 50 ton	8	1	15	15
7,9	B54	Operator (light) x1	8	Trencher, Chain, 40 H.P.	8	1	47	47
3	B62	Laborer x2 Operator x 1	24	Loader, Skid Steer, 30 H.P.	8	3	118	39
8	B63B	Labor Foreman x1 Laborer x2 Operator (light) x1	32	Loader, Skid Steer, 78 H.P.	8	4	86	22
11	B65	Laborer x1 Truck Driver (light) x1	16	Power Mulcher (large) Flatbed Truck, Gas, 1.5 ton	16	2	1	1
11	B66	Operator (light) x1	8	Loader-Backhoe, 40 H.P.	8	1	7	7
6	Q1	Plumber x1 Plumber Apprentice x1	16	None	0	2	71	0
4	R1B	Electrician x1 Electrician Apprentice x2	24	None	0	3	144	0
9	R30	Electrician Foreman x0.25 Electrician x1 Laborer (Semi-Skilled) x2	26	None	0	3.25	312	0
1	Eng	Engineering Staff x1.2	10	Rental Vehicle x1	0	1.2	1,440	0
				Construction Subtotals			4,300	1,000
Corrective Action Operation & Maintenance								
12	TM	Maintenance Crew x2	20	Service Truck x2 Hand Tools	0	2	960	0
				O&M Subtotals			960	0
						Totals	**5,300**	**1,000**

Note: Blue shaded crew codes were created by Ramboll based on experience (not pulled from RS Means).

CONSTRUCTION MILEAGE AND LABOR ESTIMATES
ILLINOIS POWER GENERATING COMPANY - COFFEEN POWER PLANT
CORRECTIVE ACTION ALTERNATIVES ANALYSIS SUPPORTING INFORMATION REPORT (CAAA-SIR)
ALTERNATIVE 2 - SOURCE CONTROL WITH GROUNDWATER EXTRACTION TRENCH

Construction Mileage and Labor Estimates - Alternative 2: Groundwater Extraction Trench

Item	Quantity	Assumptions
Labor Total Hours	4,328	Per projected Construction total in cost estimate (does not include contingency)
Duration of Onsite Construction Days	114	Total Days
Average Daily Crew Size	3.3	Assumes multiple crew sizes and a 10 hour work day Assumes 1 Ramboll personnel daily for construction oversight
Daily Labor Mobilization Miles	26,539	Includes light and medium commercial vehicles Average of 70 miles round trip per day, as proposed in construction permit for GMF GSP Closure
Vehicles Miles Onsite	1,896	Includes light and medium commercial vehicles 5 miles per day for onsite miles No contingency Included
Equipment Mobilization Miles - Unloaded	9,478	Average of 500 miles round trip for equipment hauling (from Chicago, IL) Average 1 load of equipment per working week
Equipment Mobilization Miles - Loaded	9,478	Average of 500 miles round trip for equipment hauling (from Chicago, IL) Average 1 load of equipment per working week
Onsite Haul Truck Miles - Unloaded	1,661	34 CY Off Road Dump Truck 1 mile round trip per load
Onsite Haul Truck Miles - Loaded	1,661	34 CY Off Road Dump Truck 1 mile round trip per load
Offsite Haul Truck Miles - Unloaded	5,208	Assumes 16 CY loads of gravel are delivered to the site from a regional supplier located within 100 miles of the site
Offsite Haul Truck Miles - Loaded	5,208	Assumes truck is returning to the regional supplier located within 50 miles of the site
Material Delivery Miles - Unloaded	7,583	Misc. construction materials (erosion controls, piping, geotextile) Assumes 200 mile round trip, average 2 trips per working week
Material Delivery Miles - Loaded	7,583	Misc. construction materials (erosion controls, piping, geotextile) Assumes 200 mile round trip, average 2 trips per working week

OMM Mileage and Labor Estimates - Alternative 2: Groundwater Extraction Trench

Item	Quantity	Assumptions
Labor Total Hours	960	Per projected CM total in cost estimate (does not include contingency)
Duration of Onsite OMM Days	48	Total Days
Average Daily Crew Size	2	Assumes multiple crew sizes and a 10 hour work day
Daily Labor Mobilization Miles	11,520	Includes mob/demob from Chicago (260 miles round trip) and local daily commute mileage (40 round trip miles per day).
Vehicles Miles Onsite	1,440	Includes light and medium commercial vehicles 15 miles per day for onsite miles No contingency Included
Equipment Mobilization Miles - Unloaded	0	Normal work vehicles only for this alternative & phase No heavy equipment to mobilize
Equipment Mobilization Miles - Loaded	0	Normal work vehicles only for this alternative & phase No heavy equipment to mobilize
Onsite Haul Truck Miles - Unloaded	0	-
Onsite Haul Truck Miles - Loaded	0	-
Offsite Haul Truck Miles - Unloaded	0	-
Offsite Haul Truck Miles - Loaded	0	-
Material Delivery Miles - Unloaded	0	-
Material Delivery Miles - Loaded	0	-

CAGM = Corrective Action Groundwater Monitoring
MNA = monitored natural attenuation

Appendix C

Corrective Measures Assessment

Intended for
Illinois Power Generating Company

Date
June 12, 2024

Project No.
1940103584-002

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

GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS
IEPA ID: W135015004-03

RAMBOLL Bright ideas. Sustainable change.

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT COFFEEN POWER PLANT GMF GYPSUM STACK POND

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940103584-002**
Recipient	**Illinois Power Generating Company**
Document type	**35 I.A.C. § 845 Corrective Measures Assessment**
Revision	**FINAL**
Date	**June 12, 2024**
Prepared by	**A. Frances Ackerman, RG, PE**
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CONTENTS

1.	**Introduction**	**3**
1.1	Source Control and Residual Plume Management	3
1.2	Adaptive Site Management	4
2.	**Site Information**	**6**
2.1	Conceptual Site Model	6
2.2	Groundwater Quality	7
3.	**Corrective Measures Assessment Methodology**	**9**
4.	**Description of Potential Corrective Measure Technologies**	**10**
4.1	Source Control with Groundwater Polishing	10
4.2	Source Control with Groundwater Extraction	11
4.3	Source Control with a Cutoff Wall	12
4.4	Source Control with In-Situ Treatment	12
5.	**Assessment of Corrective Measure Technologies**	**14**
5.1	Requirements	14
5.2	Groundwater Corrective Technology Assessment	14
5.2.1	Source Control with Groundwater Polishing	14
5.2.2	Source Control with Groundwater Extraction	15
5.2.3	Source Control with Groundwater Cutoff Wall	16
5.2.4	Source Control with In-Situ Treatment (Permeable Reactive Barrier [PRB] or In-Situ Chemical Treatment)	17
5.3	Technologies Advanced to CAAA	18
6.	**References**	**19**

TABLES

Table 5-1 Corrective Measures Assessment Matrix

FIGURES

Figure 2-1 Site Location Map
Figure 2-2 Site Map
Figure 2-3 Uppermost Aquifer Potentiometric Surface Map - April 30, 2023
Figure 2-4 Monitoring Well Location Map

ATTACHMENTS

Attachment A Selected Construction Permit Application Plans

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
AP1	Ash Pond No. 1
AP2	Ash Pond No. 2
ASD	alternative source demonstration
CAAA	Corrective Action Alternatives Analysis
CAP	Corrective Action Plan
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
cm/s	centimeters per second
CPP	Coffeen Power Plant
CSM	conceptual site model
DA	deep aquifer
DCU	deep confining unit
EPRI	Electric Power Research Institute
E001	Event 1
GMF	Gypsum Management Facility
GMF GSP	GMF Gypsum Stack Pond
GMF RP	GMF Recycle Pond
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard(s)
HCR	Hydrogeologic Site Characterization Report
HDPE	high-density polyethylene
ID	identification
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
ITRC	National Research Council, Interstate Technology & Regulatory Council
IX	ion exchange
LCU	lower confining unit
NID	National Inventory of Dams
No.	number
NPDES	National Pollutant Discharge Elimination System
NRT/OBG	Natural Resource Technology, an OBG Company
PMP	potential migration pathway
PRB	Permeable Reactive Barrier
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SI	surface impoundment
Site	Coffeen Power Plant
UA	uppermost aquifer
UCU	upper confining unit
USEPA	United States Environmental Protection Agency
ZVI	zero-valent iron

1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll) has developed this assessment of groundwater corrective measures on behalf of Illinois Power Generating Company (IPGC) to assist in the compliance with the requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments. This assessment applies specifically to the coal combustion residuals (CCR) unit referred to as the Gypsum Management Facility (GMF) Gypsum Stack Pond (GMF GSP) at the Coffeen Power Plant (CPP), also referred to as CCR Unit identification (ID) number (No.) 103, Illinois Environmental Protection Agency (IEPA) ID No. W1350150004-03, and National Inventory of Dams (NID) No. IL50579. This report addresses content requirements specific to 35 I.A.C. § 845.660 (Assessment of Corrective Measures) for exceedances of sulfate at the GMF GSP.

1.1 Source Control and Residual Plume Management

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

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

The GMF GSP will be closed using a hybrid closure-by-removal and consolidate-and-cap approach that was developed to reduce the waste footprint at closure. Approximately 295,500 cubic yards of CCR from the GMF GSP will be contained within the consolidated footprint in the northern portion of the surface impoundment (SI). Under this hybrid approach, approximately 63 percent of the current CCR footprint within the SI will be removed. The consolidated CCR will be covered with an alternate geomembrane final cover system having performance that exceeds the 35 I.A.C § 845.750I(2) minimum final cover requirements. The proposed source control is predicted to allow the groundwater protection standards (GWPS) to be achieved within approximately 7 years after the completion of closure (Ramboll, 2022). These source control activities will serve as the primary groundwater corrective measure at the GMF GSP. The potentially feasible corrective measures presented herein are intended to be supplementary to the primary groundwater corrective measure (*i.e.,* source control) and are intended to serve as management measures to address any residual plume(s) that remain after completion of source control.

Attachment A includes select figures from the Construction Permit Application that show the proposed final source control and primary corrective action, including the extents of CCR removal and consolidation.

1.2 Adaptive Site Management

Adaptive site management strategies will be employed as an integral part of ongoing corrective action at the GMF GSP. The adaptive site management approach will allow timely incorporation of new site information over the closure and post-closure life cycle of the GMF GSP to ensure the achievement of the GWPS. The adaptive site management approach is proposed to expedite progress toward meeting the GWPS while acknowledging uncertainties, such as the persistence of current groundwater flow directions and flux quantities and potential related changes in geochemical conditions. A structured decision-making process and explicitly planned iterations between the implemented corrective measures and monitoring results will ensure that remediation is occurring. System performance and the condition of the residual plume will be monitored as the corrective measure(s) selected through the 35 I.A.C. § 845.710 Corrective Action Plan (CAP) process are implemented to supplement the source control measures described above. If the groundwater concentrations do not decrease consistent with the modeling prediction, the adaptive site management approach will facilitate timely modifications or enhancements to the corrective measure(s), as needed in accordance with 35 I.A.C. § 845.680(b). This approach will be employed in response to new site information and/or the performance of the selected corrective measure(s).

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

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

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

3. Ongoing groundwater monitoring at the GMF GSP will continue throughout the implementation of source control and residual plume management activities. Post-closure monitoring will continue for a period of at least 30 years, in accordance with

35 I.A.C. § 845.780(c). A comprehensive groundwater monitoring plan (GMP) will be developed as part of the CAP process in accordance with 35 I.A.C. § 845.670 and 35 I.A.C. § 845.220(c)(4). The GMP will include the functional goals and proposed action levels.

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

2. SITE INFORMATION

The CPP is located in Montgomery County in central Illinois, approximately two miles south of the city of Coffeen and about eight miles southeast of the city of Hillsboro, Illinois. The GMF GSP is located between the two lobes of Coffeen Lake (identified as "Coffeen Lake" and "Unnamed Tributary" on **Figures 2-1** and **2-2**) to the west, east, and south, and is bordered by agricultural land to the north. **Figure 2-2** is a site map showing the location of Ash Pond No. 1 (AP1), Ash Pond No. 2 (AP2), the GMF GSP (35 I.A.C. § 845 regulated CCR Unit and subject of this CMA), the GMF Recycle Pond (GMF RP), and the Landfill. The GMF GSP will hereinafter be referred to as the Site.

The GMF GSP received blowdown from the air emission scrubbers and was put into operation in 2010. Construction of the GMF GSP was in accordance with Water Pollution Control Permit 2008-EA-4661 and features a composite 60-mil high density polyethylene (HDPE) liner with 3 feet of recompacted soil having a hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s), with internal piping and drains to collect contact water. Construction of the unit included installation of a groundwater underdrain system to eliminate uplift pressures on the liner prior to placement of CCR. The GMF GSP underdrain was actively pumped during construction but is not currently operational. Receipt of waste to the GMF GSP ceased prior to April 11, 2021.

2.1 Conceptual Site Model

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

In addition to the CCR present at the GMF GSP, there are five principal layers of unlithified material present above the bedrock, which are categorized into hydrostratigraphic units below (from surface downward) based on stratigraphic relationships and common 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 to clayey silts and gravelly clay below the surficial soil. Construction of the GMF GSP required the excavation and removal of this layer within the unit footprint and the UCU has been eroded east of the GMF GSP, near the Unnamed Tributary.
- **Uppermost Aquifer (UA):** The UA is the Hagarstown Member which is classified as primarily sandy to gravelly silts and clays with thin beds of sands. Similar to the Loess Unit and upper Hagarstown, the lower Hagarstown Member was excavated to facilitate construction of the GMF GSP and the lower Hagarstown is also absent in some locations near the Unnamed Tributary. Hydraulic conductivities near the GMF GSP ranged from 2.5×10^{-4} to 4.0×10^{-3} cm/s (geometric mean of 1.4×10^{-3} cm/s).
- **Lower Confining Unit (LCU):** Comprised of the Vandalia Member, Mulberry Grove Member, and Smithboro Member. These units include a sandy to silty till with thin, discontinuous sand

lenses, a discontinuous and limited extent sandy silt which has infilled prior erosional features, and silty to clayey diamicton, respectively. The Vandalia Member typically ranged in thickness from 11.7 feet in the northern portion of the CPP, to 31.0 feet between the GMF GSP and the GMF RP; the Mulberry Grove Member is represented by pockets (generally less than 2 feet thick); and the Smithboro Member ranges in thickness from 6.7 to 21.2 feet northwest of the landfill. This LCU has been identified as a potential migration pathway (PMP) because downward vertical gradients indicate that there is the potential for impacts to migrate through this unit. Hydraulic conductivities ranged from 1.2×10^{-4} to 4.5×10^{-3} cm/s (geometric mean of 7.2×10^{-4} cm/s).

- **Deep Aquifer (DA):** 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 CCP. Where present, the DA has been identified as a PMP due to presence of downward gradients in the overlying LCU and the relatively greater hydraulic conductivities measured in the DA. Hydraulic conductivity in the DA ranged from 1.3×10^{-4} to 1.7×10^{-3} cm/s (geometric mean of 4.4×10^{-4} cm/s).
- **Deep Confining Unit (DCU):** Comprised of the Banner Formation, generally consists of clays, silts, and sands. The Lierle Clay Member is the upper layer of the Banner Formation which was encountered at the Site. No monitoring wells are screened only within the DCU, and no field hydraulic conductivity tests were conducted for the DCU

Groundwater elevations at CPP, including within the UA, are primarily controlled by surface topography, geologic unit topography, and water levels within Coffeen Lake and the Unnamed Tributary. Groundwater flows east to southeast across the GMF GSP toward the Unnamed Tributary. Based on the elevations of the tributary and groundwater elevations measured east of the tributary, the tributary is a hydraulic barrier and prevents groundwater migration east of the Unnamed Tributary. Although elevations vary seasonally, the groundwater flow direction in the uppermost aquifer is consistent and likely controlled by the proximity and hydraulic connection to Coffeen Lake. (**Figure 2-3**). Phreatic surfaces or water elevations within the SIs are generally consistent and have not been observed to fluctuate with groundwater elevations indicating limited hydraulic connection with the SIs. Groundwater elevations and contours for the quarter 2 groundwater monitoring event (Event 1 [E001] are presented in **Figure 2-3**.

2.2 Groundwater Quality

Groundwater monitoring in accordance with the proposed GMP and sampling methodologies provided in the construction permit application for the GMF GSP began in the second quarter of 2023. The 35 I.A.C § 845 groundwater monitoring system is displayed on **Figure 2-4** and consists of nine wells screened in the UA (two background and seven compliance), one compliance well screened in the DA, one temporary water level only well, and one temporary water level only surface water staff gage. The groundwater samples collected from the ten wells are used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards listed in 35 I.A.C. § 845.600(a). The proposed monitoring wells yield groundwater samples that represent the quality of downgradient groundwater at the CCR boundary (as required in 35 I.A.C. § 845.630(a)(2)).

The E001 groundwater monitoring event was completed on June 9, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C), statistically derived values were compared with the GWPSs summarized in 35 I.A.C. § 845.600 to determine exceedances of the GWPS. The statistical

determination identified the following GWPS exceedances at compliance groundwater monitoring wells (Ramboll, 2023):

- Sulfate in UA well G215

Pursuant to 35 I.A.C. § 845.650(e), the following were evaluated as potential alternative sources for each GWPS exceedance:

- Sources other than the CCR SI
- Error in sampling and analysis protocol
- Error in statistical analysis
- Natural variation in groundwater quality
- Change in the potentiometric surface and groundwater flow direction.

These evaluations were not conclusive in demonstrating an alternative source for the GWPS exceedance. Consequently, and in accordance with 35 I.A.C. § 845.660 the sulfate exceedance is addressed in this CMA.

3. CORRECTIVE MEASURES ASSESSMENT METHODOLOGY

This section describes the CMA methodology initiated in response to the identification of exceedances of the GWPSs for 35 I.A.C. § 845.600 constituents at the downgradient waste boundary of the GMF GSP during the E001 groundwater monitoring event (Ramboll, 2023). The CMA was initiated on January 14, 2024, within 90 days after the detection of exceedance(s) of GWPS. Under 35 I.A.C. § 845, owners and operators of existing CCR SIs must initiate the assessment of corrective measures in accordance with 35 I.A.C. § 845.660 if one or more constituents are detected, and confirmed by an immediate resample, to be in exceedance of a GWPS in 35 I.A.C. § 845.600, and the owner or operator has not demonstrated that: a source other than the CCR SI caused the exceedance, or; that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality or a change in the potentiometric surface and groundwater flow direction (*i.e.,* an alternative source demonstration [ASD]).

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

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

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

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

4. DESCRIPTION OF POTENTIAL CORRECTIVE MEASURE TECHNOLOGIES

The potential groundwater corrective measures summarized below are applicable to the GMF GSP and were included in the CMA development and analysis. Site-specific considerations provided in **Section 2** were used to evaluate potential groundwater corrective measures. Each of the corrective measures evaluated may be capable of satisfying the requirements and objectives, listed in **Section 3**, to varying degrees of effectiveness. The corrective measure review process was intended to yield a set of applicable corrective measures that could be used to supplement the primary corrective action, which will be the source control activities described in **Section 1.1** (hybrid consolidate-and-cap approach with a geomembrane final cover system). The source control is expected to reduce downgradient concentrations in the UA to less than the GWPS via naturally occurring physical and chemical processes within approximately 7 years. Ongoing monitoring will be an integral part of all corrective measures to verify and document the remedial process. The corrective measures ultimately advanced to the CAAA and selected in the CAP will be used to enhance the effectiveness of the source control and may be used independently or combined into specific remedial alternatives to leverage the advantages of multiple corrective measures to attain GWPSs.

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

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

4.1 Source Control with Groundwater Polishing

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

> *"The reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. The 'natural attenuation processes' that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants."*

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

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

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

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

4.2 Source Control with Groundwater Extraction

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

- Designing and constructing a groundwater extraction system consisting of one or more extraction wells and operating at a rate to allow capture of CCR impacted groundwater within the UA.

- Management of extracted groundwater, which may include modification to the existing National Pollutant Discharge Elimination System (NPDES) permit.
- Ongoing inspection and maintenance of the groundwater extraction system.

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

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

4.3 Source Control with a Cutoff Wall

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

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

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

4.4 Source Control with In-Situ Treatment

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

Chemical treatment could consist of injection of reactive materials into the subsurface to treat contaminants at specific, targeted locations. Alternately, treatment could be accomplished via PRB, where reactive materials are placed in the subsurface at locations designed to direct the contaminant plume along a flow path through the reactive media. In either system, the contaminants are transformed or otherwise rendered into environmentally acceptable forms to attain remediation concentration goals downgradient of the barrier (Electric Power Research Institute [EPRI], 2006).

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

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

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

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

5. ASSESSMENT OF CORRECTIVE MEASURE TECHNOLOGIES

This CMA was initiated to address exceedances of the 35 I.A.C. § 845.600 GWPS for sulfate at the downgradient waste boundary of the GMF GSP identified during the E001 groundwater monitoring event (**Section 2.2**).

5.1 Requirements

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

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

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

5.2 Groundwater Corrective Technology Assessment

Source control, consisting of a hybrid closure-by-removal and consolidate-and-cap with a final cover system, will be the primary groundwater corrective measure for the GMF GSP. Closure is expected to be completed by November 2026 and each of the potential groundwater corrective measure technologies would supplement the positive impact of the closure activities. The following sections evaluate groundwater corrective measure technologies that, when combined with site closure, may be viable to address the sulfate GWPS exceedances. Technologies that are not viable for addressing the GWPS exceedances at the GMF GSP will be eliminated from further evaluation and viable technologies will be advanced for further evaluation as part of the CAAA process per 35 I.A.C. § 845.600.

5.2.1 Source Control with Groundwater Polishing

Source control corrective measures (**Section 1.1**) will reduce the mass loading to the groundwater system and the groundwater polishing process could decrease the timeframe for attainment of GWPS in the UA. Groundwater flow and fate and transport modeling incorporating only physical processes indicate that source control would meet GWPS within approximately 7 years post-closure at all locations. Physical processes are expected to perform well in the UA, as discussed below.

Groundwater polishing by natural geochemical processes is a widely accepted component of groundwater remediation and is routinely approved by the IEPA when paired with source control.

The performance of groundwater polishing as a groundwater corrective measure varies based on site-specific conditions and additional data collection may be needed to support the design and regulatory approval. Sandier portions of the UA suggest good performance by physical processes in addressing the sulfate exceedances at the GMF GSP. The chemical processes in the fine-grained UCU require further evaluation.

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

Following characterization and approval of the CAP, monitoring of the groundwater polishing processes and comparison to functional goals established to monitor progress toward the remedial objective could begin prior to, or concurrently with, site closure activities. Installing additional monitoring wells could begin as quickly as within a few months of CAP approval. The time required could be reduced if existing groundwater monitoring well systems could be utilized for monitoring.

No potential safety impacts or exposure to human health or environmental receptors are expected to result from the groundwater polishing processes. Timeframes to achieve GWPS are dependent on site-specific conditions, which require detailed technical analysis which are ongoing and will be evaluated in connection with the CAAA. Selecting groundwater polishing as a corrective measure for the GMF GSP will require approval of the closure and CAP permits by the IEPA.

Monitoring the groundwater polishing to track progress toward achievement of the GWPS, in conjunction with source control at the GMF GSP, would require long-term maintenance and monitoring of the groundwater monitoring system to confirm source control and verify the effectiveness in reducing groundwater concentrations to levels below the GWPS. System design could begin immediately after approval of the CAP permit. Additional investigations to characterize site conditions and installation of the final monitoring system could be performed concurrently with the source control (unit closure) activities, which are currently expected to be completed in 2026.

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

5.2.2 Source Control with Groundwater Extraction

Source control will reduce the mass loading to the groundwater system and implementing a groundwater extraction system may reduce the time required to attain the GWPS in the UA.

However, the heterogeneous and varied nature of the UA may not significantly improve attainment of the GWPS.

Groundwater extraction is a widely accepted corrective measure with a long track record of performance and reliability. It is routinely approved by the IEPA. For a corrective measure using groundwater extraction to effectively control off-site flow and/or to remove potentially contaminated groundwater, horizontal and vertical capture zone(s) must be created. However, the heterogeneous, varied nature of the UA may result in variable performance of pumping wells. Use of an extraction trench could potentially be used as an alternative to pumping wells, possibly in conjunction with cutoff walls (**Section 4.3**).

Implementation of a groundwater extraction system presents design challenges due to heterogeneous, varied nature of the UA. Extracted groundwater would require management, possibly including treatment, which may require specialized equipment and/or contractors.

There could be some impacts associated with constructing and operating a groundwater extraction system, including altering of the groundwater flow system and some limited exposure to extracted groundwater. Groundwater extraction may also induce settlement, which could cause structural impacts to adjacent structures. Additional data collection and analyses would be required to design an extraction system. Construction could be completed within 1 year following completion of a final design. Time of implementation is approximately 3 to 4 years after approval of the CAP permit, including characterization, design, permitting, and construction. Timeframes to achieve GWPS are dependent on site-specific conditions. However, an extraction system may not reduce the time to attain GWPS in the UA relative to the post-closure timeframe predicted by the groundwater model due to the low permeability nature of the UCU.

Implementing a groundwater extraction system at the GMF GSP would require IEPA approval of the CAP permit, and extracted groundwater could likely be discharged under the NPDES permit. If an extraction trench is used, additional permitting related to construction in wetlands and/or Waters of the United States may be required, if they are determined to be present at the site. Depending upon the location of the extraction system, an Illinois Department of Natural Resources (IDNR) dam safety modification permit may also be required to construct an extraction system.

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

5.2.3 Source Control with Groundwater Cutoff Wall

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

Cutoff walls are designed to act as hydraulic barriers; as a result, cutoff walls inherently alter the existing groundwater flow system. Changes to the existing groundwater flow system may need to be controlled to maximize the effectiveness of the remedy by, for example, combining a cutoff wall with groundwater extraction to control build-up of hydraulic head upgradient and around the cutoff walls. The effectiveness of a cutoff wall as a hydraulic barrier also relies on the contrast between the hydraulic conductivity of the aquifer and the cutoff wall. The most effective barriers have hydraulic conductivity values that are several orders of magnitude lower than the geologic materials they are in contact with. A cutoff wall designed with hydraulic conductivity of 1×10^{-7} cm/s would several orders of magnitude lower than the sandier portions of UA, which has a mean hydraulic conductivity of 1.4×10^{-3} cm/s. A cutoff wall would be an effective containment method in the UA and could improve the performance of a UA extraction system.

Constructing a cutoff wall could alter the flow system, redirecting contaminants to areas where they are not currently present. Specialized construction contractor(s) may be required, depending upon construction methodology, which could delay implementation.

Additional data collection and analyses would be required to design a cutoff wall. Construction could be completed within 1 to 2 years. Time of implementation is approximately 4 to 5 years, including characterization, design, permitting, and construction. Construction could possibly be accelerated by combining with site closure activities. To attain GWPS, cutoff walls require a separate groundwater corrective measure to operate in concert with the cutoff wall(s). Cutoff walls are commonly coupled with groundwater polishing and/or groundwater extraction as groundwater corrective measures. The time to attain GWPS is dependent on the selected groundwater corrective measure or measures that are coupled with the cutoff walls. A cutoff wall would require IEPA approval of the CAP permit. Construction of a cutoff wall may also require an evaluation and/or permits related to wetlands if they are determined to be present in the area of the proposed remedy.

A cutoff wall alone would not be a viable corrective measure for the sulfate exceedance at the GMF GSP. Site conditions, including the relatively shallow and thin UA, do not suggest that a cutoff wall would provide a significant benefit to an extraction system or enhance the time required to meet GWPS. Therefore, the cutoff wall is not being advanced to the CAAA for further evaluation.

5.2.4 Source Control with In-Situ Treatment (Permeable Reactive Barrier [PRB] or In-Situ Chemical Treatment)

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

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

In-situ treatment presents design and construction challenges due to the heterogeneous, discontinuous nature of the UA. Depending upon the location of the PRB system, construction

may affect existing berms at the GMF GSP and periodic change-outs of IX resin media may be required.

No potential safety impacts or exposure to human health or environmental receptors are expected to result from a PRB.

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

Due to the uncertain performance, reliability and potential for regulatory acceptance, in-situ chemical treatment is not a viable corrective measure for the sulfate exceedance at the GMF GSP and is not being advanced to the CAAA for further evaluation.

5.3 Technologies Advanced to CAAA

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

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

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TABLES

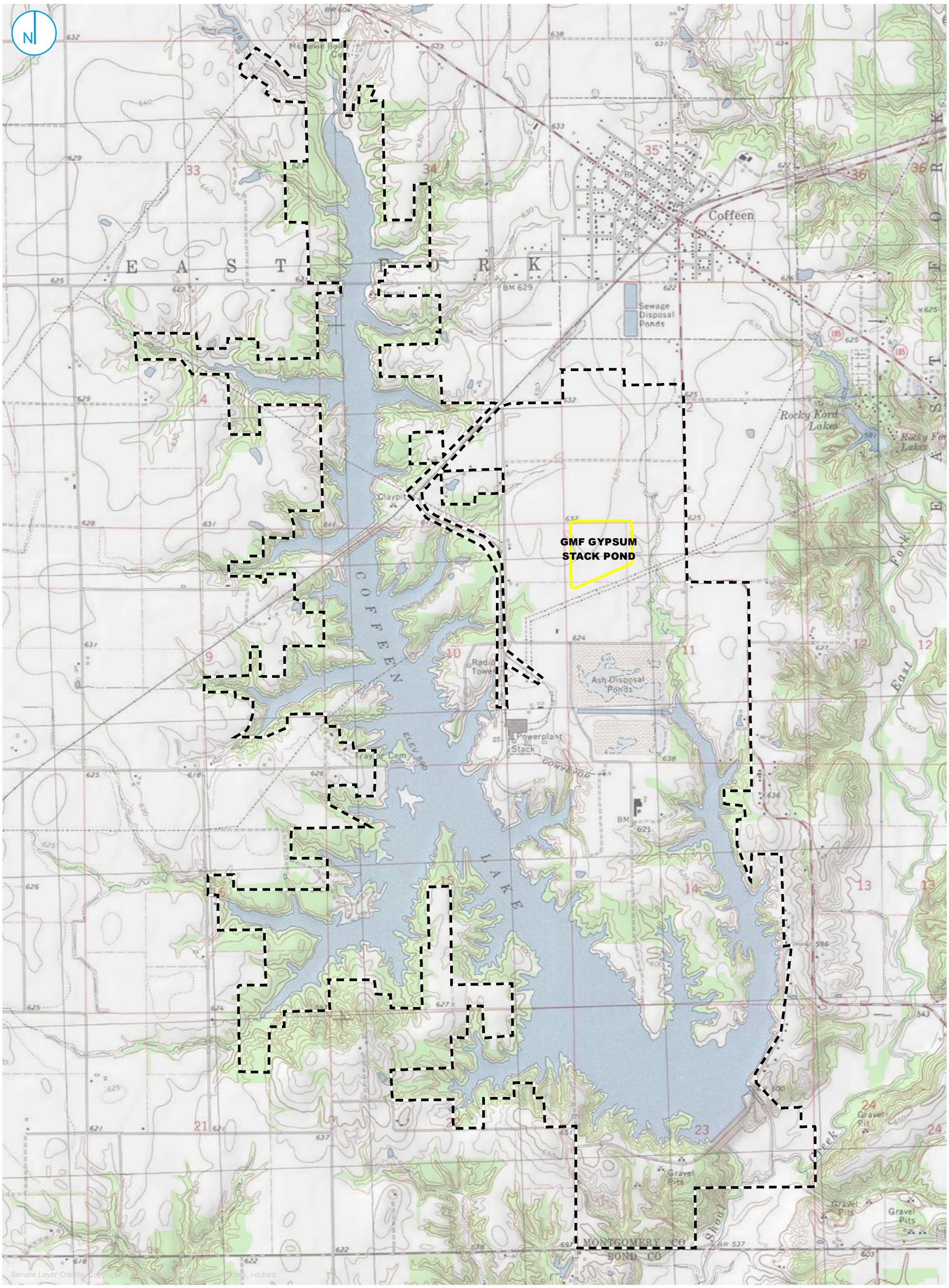
TABLE 5-1. CORRECTIVE MEASURES ASSESSMENT MATRIX
GMF GYPSUM STACK POND
COFEEN POWER PLANT
COFFEEN, ILLINOIS
June 12, 2024

Remedy	Evaluation Factors						
	Performance	**Reliability**	**Ease of Implementation**	**Potential Impacts of Remedy (safety impacts, cross-media impacts, control of exposure to any residual contamination)**	**Time Required to Begin and Implement Remedy[1]**	**Time to Attain Groundwater Protection Standards**	**Institutional Requirements (state/local permit requirements, environmental/public health requirements that affect implementation of remedy)**
Source Control with Groundwater Polishing	Performs best paired with source control, which is expected to be completed prior to 2026. Site conditions are favorable for physical processes, while chemical processes may be limited under normal aquifer conditions.	Ongoing analysis will evaluate if the geochemical mechanisms have low reversibility, the aquifer has sufficient capacity, and the hydrogeology is favorable for dilution/dispersion.	Long-term monitoring would be required. Implementing would not require extensive specialized equipment or contractors	None identified.	Approximately 90 days after CAP permit approval.	Less than the 7 years post-closure predicted by the groundwater model.	IEPA approval of the closure and CAP permits is required.
Source Control with Groundwater Extraction	Widely accepted, routinely approved technology; variable performance anticipated due to the heterogeneous, varied nature of uppermost aquifer.	Reliable if properly designed, constructed and maintained. However, the heterogeneous, varied nature of uppermost aquifer may present reliability challenges for pumping wells. Other technologies, such as an extraction trench, could potentially be utilized.	Design challenges due to heterogenous, varied nature of uppermost aquifer. Specialized contractors are not expected to be needed for construction of the groundwater extraction system. The extraction system would require ongoing routine operation and maintenance activities and extracted groundwater would require management, possibly including treatment, which may also require specialized equipment/contractors and higher maintenance costs.	Alters groundwater flow system and there is the some limited potential for contact exposure to extracted groundwater. Groundwater extraction may induce settlement, which could cause structural impacts to adjacent structures.	Design, permitting and construction is expected to take 3 to 4 years after CAP permit approval.	Dependent on site-specific conditions not yet fully characterized. May be similar to the 7 years predicted by the groundwater model due to the low permeability Upper Confining Unit.	IEPA approval of the closure and CAP permits is required. Extracted groundwater could likely be discharged under the NPDES permit. IDNR dam safety modification permit might also be required, depending on location of wells or extraction trenches and settlement potential.
Source Control with Groundwater Cutoff Wall	Widely accepted and routinely approved technology with good performance if properly designed and constructed. If not combined with groundwater extraction, a cutoff wall will provide directional control only, thus redirecting flow to other areas where GWPS may be exceeded.	Reliable for groundwater directional control if properly designed and constructed.	Widely used, established technology. May require specialized contractors depending upon the construction/implementation method.	Alters groundwater flow system but does not provide any treatment. Can result in unintended consequences resulting from redirecting contaminants to areas where they are not currently present.	Design, permitting and construction is expected to take 4 to 5 years after CAP approval. Implementation could be accelerated by combining with closure construction activities.	Provides groundwater directional control only. Combination with other groundwater corrective measure(s), such as groundwater extraction or permeable reactive barrier, may not significantly improve attainment of the GWPS due to the low permeability Upper Confining Unit.	IEPA approval of the closure and CAP permits is required.
Source Control with In-Situ Treatment	In-situ treatment using IX resins not well established for sulfate, therefore performance is unknown.	Unknown reliability for sulfate.	Design challenges related to reactive material delivery due to heterogenous, discontinuous nature of uppermost aquifer. Could require periodic change-outs of resin media. May cause structural impacts to the existing berms, depending on the location of the PRB.	None identified.	May require bench scale and/or pilot scale testing as part of design. Design, permitting and construction is expected to take 4 to 6 years after CAP approval.	There is uncertainty regarding whether a in-situ treatment would reduce sulfate concentrations to achieve the GWPS. Dependent on conditions specific to the reactive media used and the site. Treatment technology is not well understood.	IEPA approval of the CAP permit is required. IEPA approval of this innovative and relatively unproved solution may be challenging. IDNR dam safety permitting may be required, depending on the location of the PRB relative to the existing embankments.

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

CAP - Corrective Action Plan
GWPS - groundwater protection standard
IDNR - Illinois Department of Natural Resources
IEPA - Illinois Environmental Protection Agency
IX - Ion Exchange
NPDES - National Pollutant Discharge Elimination System
PRB - permeable reactive barrier

FIGURES



REGULATED UNIT (SUBJECT UNIT)
PROPERTY BOUNDARY

0 1,000 2,000 Feet

SITE LOCATION MAP

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

- COAL MINE SHAFT
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

0 275 550 Feet

SITE MAP

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
MONITORING WELL
SOURCE SAMPLE LOCATION
LEACHATE WELL
STAFF GAGE; RIVER
STAFF GAGE, CCR UNIT

GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

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)

POTENTIOMETRIC SURFACE MAP
APRIL 30, 2023

35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

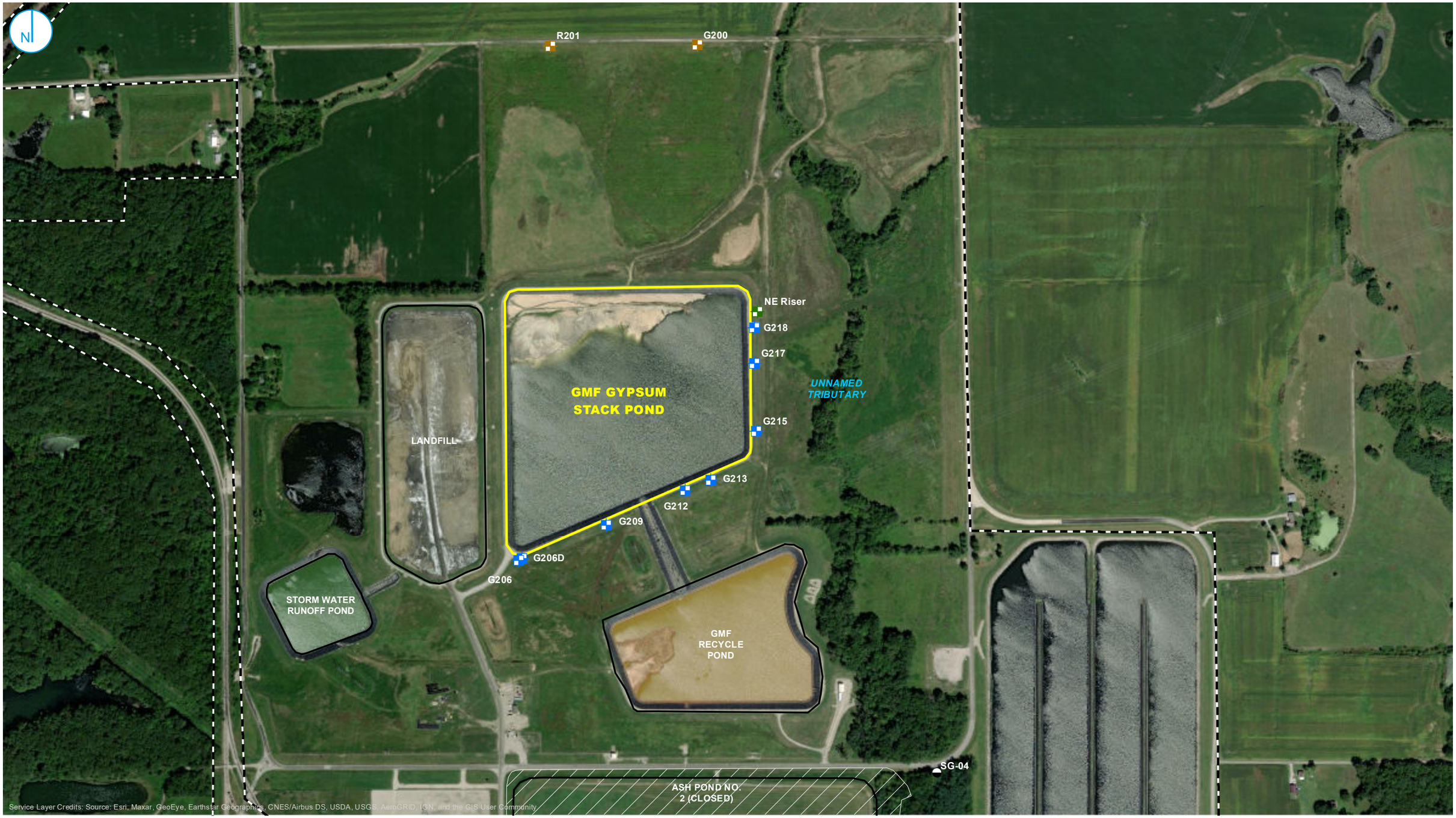
FIGURE 2-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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

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



BACKGROUND WELL
COMPLIANCE WELL
SOURCE SAMPLE LOCATION
STAFF GAGE
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 250 500 Feet

MONITORING WELL LOCATION MAP

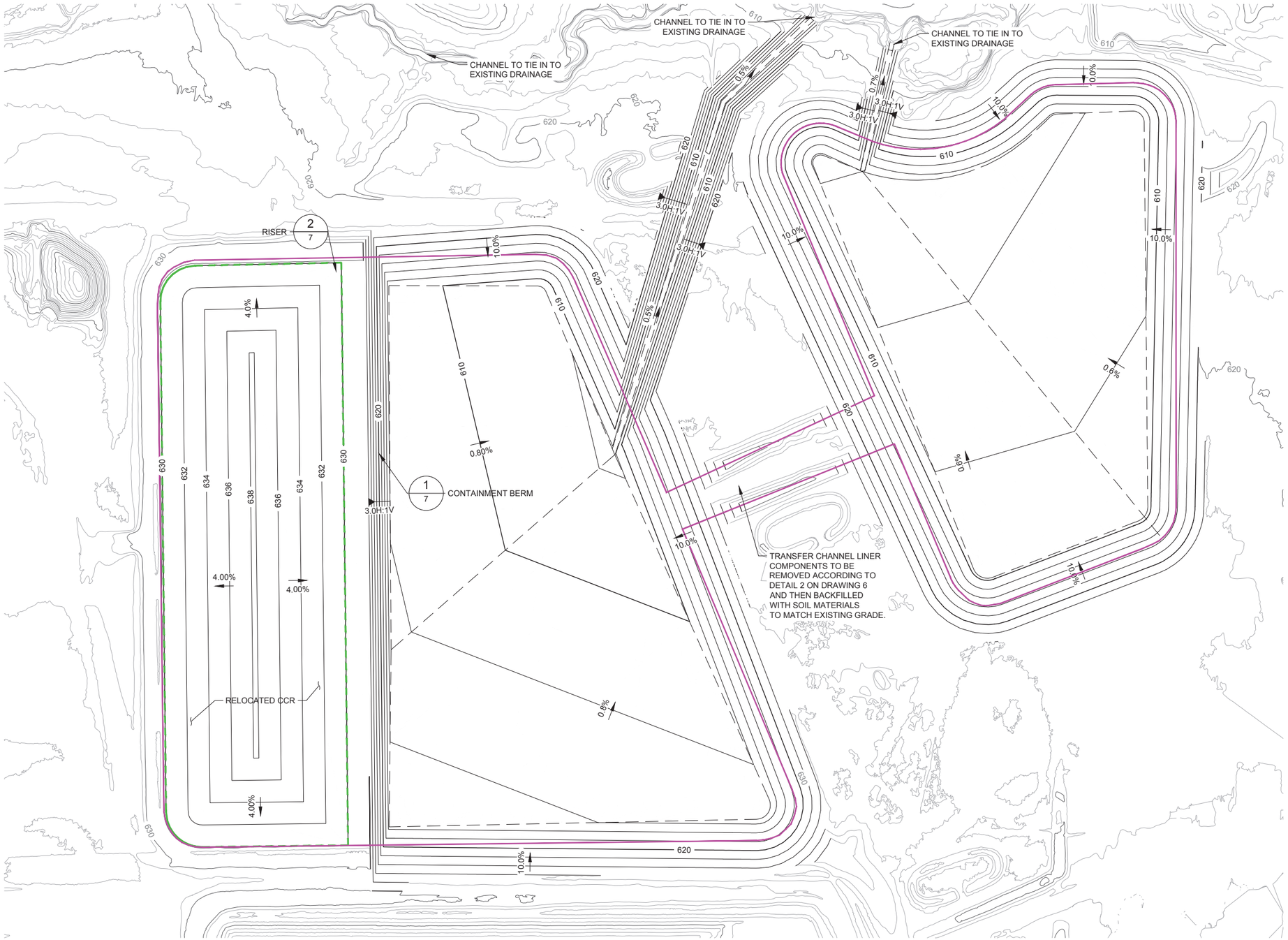
35 I.A.C. § 845 CORRECTIVE MEASURES ASSESSMENT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT A
Selected Construction Permit Application Plans



LEGEND

- 600 — GMF CLOSURE IN PLACE GRADES (SEE NOTES 1, 2, AND 3)
- 600 — EXISTING GROUND CONTOURS (SEE NOTE 4)
- LIMIT OF RELOCATED CCR WASTE
- LIMITS OF LINER SYSTEM (SEE NOTE 5)

NOTE(S)

1. THE CLOSURE-IN-PLACE CONCEPT FOR THE GYPSUM MANAGEMENT FACILITY (GMF) GYPSUM STACK POND (GSP) INVOLVES REMOVAL OF PONDED WATER, CONSTRUCTION OF A STRUCTURAL BERM (WITH COMPOSITE LINER ON THE UPSTREAM SLOPE), REMOVAL AND RELOCATION OF GYPSUM AND 1 FT (MAX.) OF CLAY LINER SOUTH OF THE BERM TO WITHIN THE CONSOLIDATED FOOTPRINT, PLACEMENT OF SOIL COVER ON GSP FLOOR SOUTH OF THE BERM FOR DRAINAGE, REMOVAL OF PERIMETER EMBANKMENT SOUTH OF RELOCATED WASTE, AND FINAL COVER CONSTRUCTION. EXISTING LINER COMPONENTS TO BE REMOVED SOUTH OF THE BERM ARE SPECIFIED IN DETAIL 1 ON DRAWING 7.
2. THE GMF RECYCLE POND CLOSURE WILL BE BY REMOVAL.
3. GMF GSP CLOSURE IN PLACE GRADES INCLUDE RELOCATED CCR WASTE, WASTE CONTAINMENT BERM, SOIL FILL FOR DRAINAGE ON GSP FLOOR, AND EXCAVATION GRADING FOR REMOVAL OF GSP PERIMETER EMBANKMENT SOUTH OF THE CONTAINMENT BERM. GMF RECYCLE POND GRADES ARE SOIL FILL FOR DRAINAGE ON RECYCLE POND FLOOR AND EXCAVATION GRADING FOR REMOVAL OF RECYCLE POND PERIMETER EMBANKMENT.
4. EXISTING CONTOURS ARE A COMPOSITE OF AN AERIAL SURVEY COMPLETED BY DRAGONFLY AEROSOLUTIONS DATED 12/3/2020, TOPOGRAPHIC/BATHYMETRIC SURVEYS COMPLETED BY INGENAE DATED 12/3/2020 & 12/4/2020.
5. LIMITS OF THE LINER SYSTEM ARE APPROXIMATE BASED ON GYPSUM MANAGEMENT FACILITY (GMF) GYPSUM STACK POND (GSP) AND RECYCLE POND (RP) BASE GRADES DEVELOPED FROM CONSTRUCTION RECORD DRAWINGS DATED 1/5/2011.

0 120 240
1" = 120' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2022-07-28	ISSUED FOR PERMIT APPLICATION	DVS	AGD	MWD	MNH

SEAL

CLIENT
ILLINOIS POWER RESOURCES GENERATING, LLC
COFFEEN POWER PLANT

CONSULTANT
WSP GOLDER
701 EMERSON ROAD, SUITE 250
CREVE COEUR, MO 63141
UNITED STATES
(313) 984 8800

PROJECT
GYPSUM MANAGEMENT FACILITY
CONSTRUCTION PERMIT APPLICATION

TITLE
GYPSUM REGRADING AND CONTAINMENT PLAN

PROJECT NO. 21465046 | REV. A | DRAWING 3

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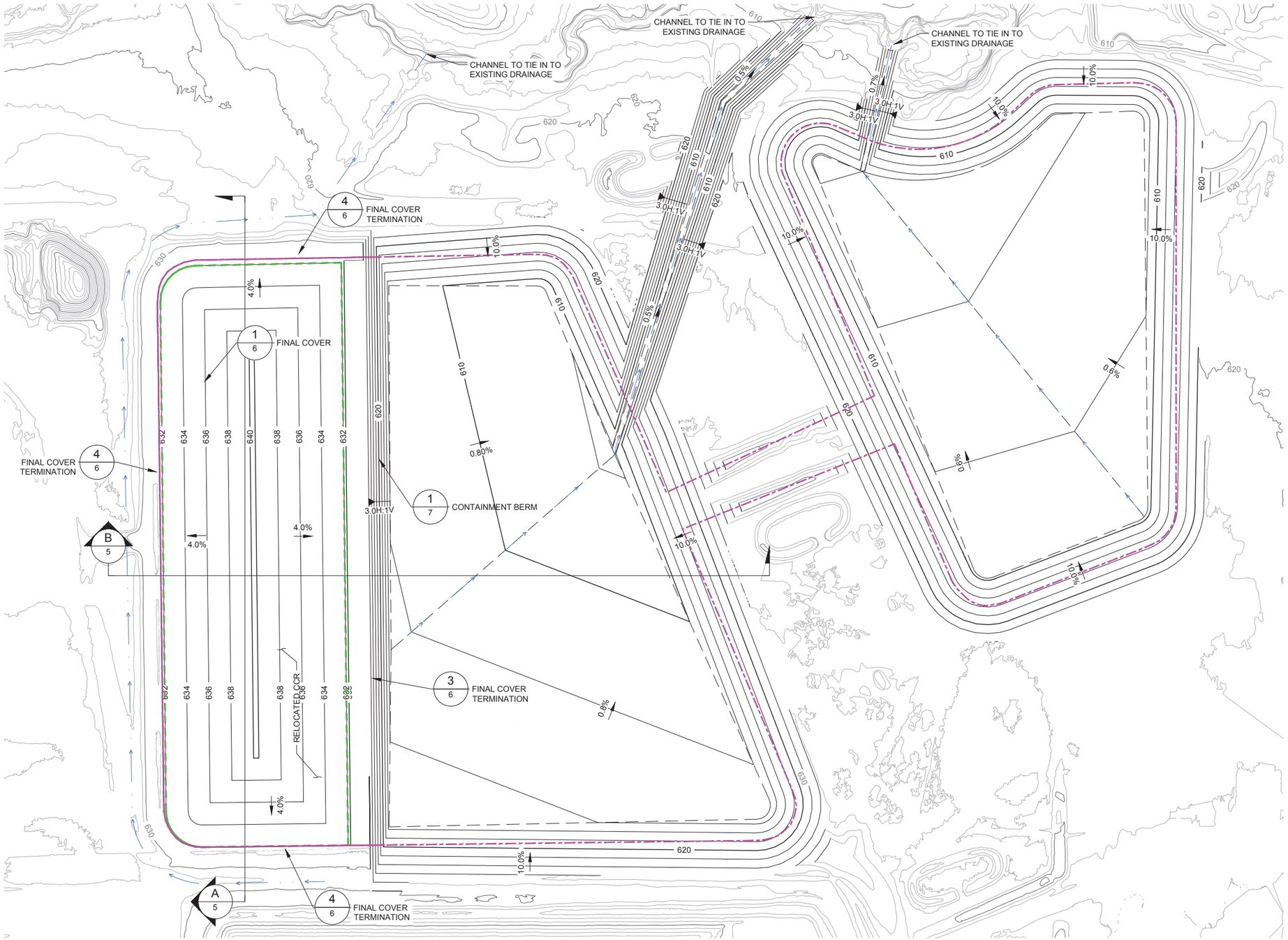

LEGEND

- 600 — GMF CLOSURE IN PLACE GRADES (SEE NOTES 1 AND 2)
- 600 — EXISTING GROUND CONTOURS (SEE NOTE 4)
- LIMIT OF RELOCATED CCR WASTE
- PROPOSED STORM WATER FLOW PATH
- EXISTING LINER TO REMAIN IN PLACE (SEE NOTE 5)
- EXISTING LINER TO BE REMOVED (SEE NOTE 5)

NOTE(S)

1. THE CLOSURE-IN-PLACE CONCEPT FOR THE GYPSUM MANAGEMENT FACILITY (GMF) GYPSUM STACK POND (GSP) INVOLVES REMOVAL OF PONDED WATER, CONSTRUCTION OF A STRUCTURAL BERM (WITH COMPOSITE LINER ON THE UPSTREAM SLOPE), REMOVAL AND RELOCATION OF GYPSUM AND 1 FT (MAX.) OF CLAY LINER SOUTH OF THE BERM TO WITHIN THE CONSOLIDATED FOOTPRINT, PLACEMENT OF SOIL COVER ON GSP FLOOR SOUTH OF THE BERM FOR DRAINAGE, REMOVAL OF PERIMETER EMBANKMENT SOUTH OF RELOCATED WASTE, AND FINAL COVER CONSTRUCTION. EXISTING LINER COMPONENTS TO BE REMOVED SOUTH OF THE BERM ARE SPECIFIED IN DETAIL 1 ON DRAWING 7.
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5. THE PROPOSED STORMWATER DRAINAGE CONCEPT IS TO SHED WATER INTO EXISTING DRAINAGE CHANNEL EAST OF THE FACILITY. STORMWATER COLLECTED WITHIN THE GMF GSP AND RECYCLE POND WILL BE DIRECTED INTO AN OPEN CHANNEL THAT BREACHES CONSTRUCTED BERMS TO CONNECT TO THE EXISTING DRAINAGE.
6. LIMITS OF THE LINER SYSTEM ARE APPROXIMATE BASED ON GYPSUM MANAGEMENT FACILITY (GMF) BASE GRADES DEVELOPED FROM CONSTRUCTION RECORD DRAWINGS DATED 1/5/2011.

0 120 240
1" = 120' FEET

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UNITED STATES
(313) 984 8800

PROJECT
GYPSUM MANAGEMENT FACILITY
CONSTRUCTION PERMIT APPLICATION

TITLE
FINAL COVER AND STORMWATER PLAN

PROJECT NO. 21465046 | REV. A | DRAWING 4

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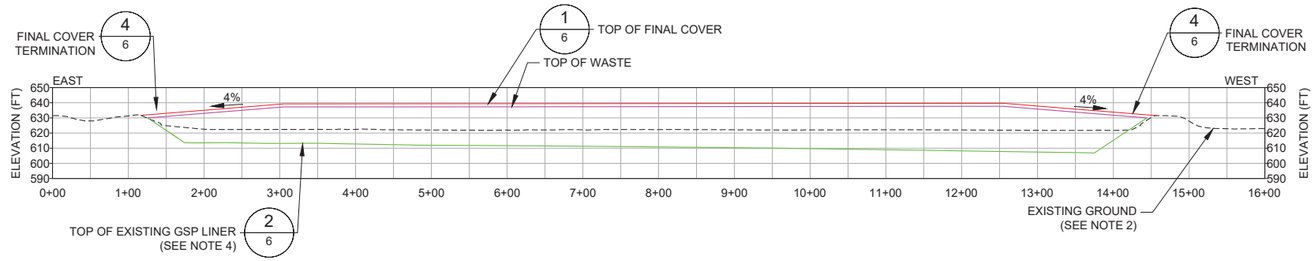

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A / 5 SECTION A

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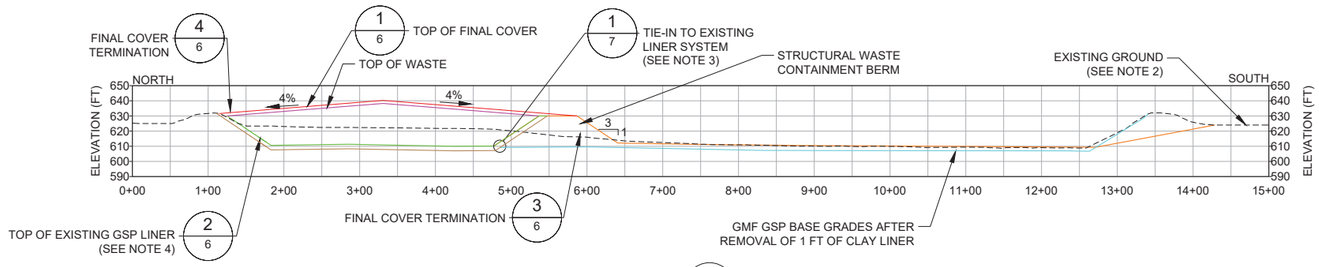
1" = 100' FEET



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VERTICAL SCALE X2

B / 5 SECTION B

0 100 200
1" = 100' FEET

NOTE(S)

1. THE CLOSURE-IN-PLACE CONCEPT FOR THE GYPSUM MANAGEMENT FACILITY (GMF) GYPSUM STACK POND (GSP) INVOLVES REMOVAL OF PONDED WATER, CONSTRUCTION OF A STRUCTURAL BERM (WITH COMPOSITE LINER ON THE UPSTREAM SLOPE), REMOVAL AND RELOCATION OF GYPSUM AND 1 FT (MAX.) OF CLAY LINER SOUTH OF THE BERM TO WITHIN THE CONSOLIDATED FOOTPRINT, PLACEMENT OF SOIL COVER ON GSP FLOOR SOUTH OF THE BERM FOR DRAINAGE, REMOVAL OF PERIMETER EMBANKMENT SOUTH OF RELOCATED WASTE, AND FINAL COVER CONSTRUCTION.
2. EXISTING CONTOURS ARE A COMPOSITE OF AN AERIAL SURVEY COMPLETED BY DRAGONFLY AEROSOLUTIONS DATED 12/3/2020, TOPOGRAPHIC/BATHYMETRIC SURVEYS COMPLETED BY INGENAE DATED 12/3/2020 & 12/4/2020.
3. THE GSP EXISTING LINER SYSTEM WILL BE EXTENDED UP THE UPSTREAM SLOPE OF THE BERM.
4. GMF GSP TOP OF EXISTING LINER GRADES WERE DEVELOPED FROM CONSTRUCTION RECORD DRAWINGS DATED 1/5/2011.

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CREVE COEUR, MO 63141
UNITED STATES
(313) 984 8800

PROJECT
GYPSUM MANAGEMENT FACILITY
CONSTRUCTION PERMIT APPLICATION

TITLE
CROSS SECTIONS

PROJECT NO. 21465046
REV. A
DRAWING 5

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Appendix D

Nature and Extent Report

NATURE & EXTENT REPORT

Intended for
Illinois Power Generating Company
134 CIPS Lane
Coffeen, IL 62017
Montgomery County

Date
June 12, 2024

Project No.
1940103584-002

NATURE AND EXTENT REPORT

COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO. W1350150004-03

RAMBOLL Bright ideas. Sustainable change.

NATURE AND EXTENT REPORT
COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO. W1350150004-03

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940103584-002**
Recipient	**Illinois Power Generating Company**
Document type	**Nature and Extent Report**
Revision	**Final**
Date	**June 12, 2024**
Prepared by	**Alison O'Connor, PhD and Nathaniel Keller**
Checked by	**Melanie Conklin**
Approved by	**Brian G. Hennings, PG**

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CONTENTS

EXECUTIVE SUMMARY **4**
1. Introduction **5**
2. Unit Background **6**
2.1 Site Location and Description 6
2.2 Description of CCR Unit 6
2.3 Geology and Hydrogeology 8
2.3.1 Hydrostratigraphic Units 8
2.3.2 Uppermost Aquifer 8
2.3.3 Potential Migration Pathways 9
2.3.4 Regional Bedrock Geology 9
2.3.5 Water Table Elevation and Groundwater Flow Direction 9
2.3.5.1 Vertical Hydraulic Gradients 10
2.3.5.2 Impact of Surface Water Bodies on Groundwater Flow 11
2.3.6 Hydraulic Conductivities 12
2.3.6.1 Field Hydraulic Conductivities 12
2.3.6.2 Laboratory Hydraulic Conductivities 13
2.4 Groundwater Monitoring 13
2.5 Hydrogeologic Conceptual Site Model 14
3. Occurrence and Distribution of Groundwater Exceedances (Extent) **16**
3.1 Additional Investigation to Define Nature and Extent 16
3.2 Extent in the Uppermost Aquifer 16
3.2.1 Sulfate 16
4. Geochemical Conceptual Site Model (Nature) **18**
5. Combined Geochemical and Hydrogeologic Conceptual Site Models **19**
5.1 Sulfate Conceptual Site Model 19
6. Conclusions and Future Activities **20**
7. References **21**

TABLES (ATTACHED)

Table 2-1 Summary of Groundwater Elevations
Table 2-2 Vertical Hydraulic Gradients
Table 2-3 Field Hydraulic Conductivities
Table 2-4 Geotechnical Data Summary
Table 3-1 Monitoring Well Construction Details
Table 3-2 Exceedance Parameter Statistical Results
Table 3-3 Summary of Groundwater Data

FIGURES (ATTACHED)

Figure 2-1 Site Location Map
Figure 2-2 Monitoring Well Location Map
Figure 2-3 CCR Observations
Figure 2-4 CCR Access Summary
Figure 2-5 Base of CCR
Figure 2-6 Top of Uppermost Aquifer
Figure 2-7 Geologic Cross-Sections A-A' & B-B'
Figure 2-8 Uppermost Aquifer Potentiometric Surface Map - May 30, 2023 (E001)
Figure 2-9 Deep Aquifer Potentiometric Surface Map – August 8, 2023 (E002)
Figure 3-1 GWPS Exceedance Map Uppermost Aquifer
Figure 3-2 2024 Nature and Extent Investigation Locations
Figure 3-3 GWPS Exceedance Map Deep Aquifer

APPENDICES

Appendix A Site-Wide Groundwater Elevations
Appendix B Supplemental Vertical Hydraulic Gradients
Appendix C Historical Field and Laboratory Hydraulic Conductivities
Appendix D Geochemical Conceptual Site Model

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
AP1	Ash Pond No. 1
AP2	Ash Pond No. 2
bgs	below ground surface
CAP	Corrective Action Plan
CCR	coal combustion residuals
cm/s	centimeters per second
CPP	Coffeen Power Plant
CSM	conceptual site model
DA	deep aquifer
E001	Event 1
E002	Event 2
E003	Event 3
ft/ft	feet per foot
GCSM	geochemical conceptual site model
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	groundwater protection standard
HCR	Hydrogeologic Site Characterization Report
HDPE	high-density polyethylene
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
LCL	lower confidence limit
LCU	lower confining unit
LF	Landfill
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
No.	number
PMP	potential migration pathway
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RP	Recycle Pond
SI	surface impoundment
UA	uppermost aquifer
UCU	upper confining unit
USGS	United States Geological Survey
WPCP	Water Pollution Control Permit

EXECUTIVE SUMMARY

Groundwater samples collected at the Coffeen Power Plant (CPP) Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) during June 2023 for the Quarter 2, 2023 compliance sampling event (Event 1 [E001]) were evaluated for exceedances of the groundwater protection standards (GWPS) described in Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.600. A statistical exceedance was identified in the following hydrostratigraphic unit and well:

- Detected Uppermost aquifer (UA) Exceedance: Sulfate at G215

As a result of the identified E001 exceedance, a Corrective Measures Assessment was initiated on January 14, 2024 in accordance with 35 I.A.C. § 845.660 and submitted on June 12, 2024 [1]. The subsequent compliance sampling events for the Quarter 3 and Quarter 4, 2023 sampling events (Event 2 [E002] and Event 3 [E003]) were completed in August and November 2023 and groundwater samples were evaluated for exceedances of the GWPS as described in 35 I.A.C. § 845.600. Exceedances identified during the E002 and E003 events were consistent with those listed above.

Pursuant to 35 I.A.C. § 845.650(e), potential alternative sources for the GWPS exceedance were evaluated, but were not conclusive in demonstrating an alternative source for the GWPS exceedance.

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

Statistical exceedances of sulfate greater than the GWPS were encountered only within the UA at G215. The lateral extent of sulfate exceedances are defined to the north by monitoring wells G217 and G218, to the southwest by monitoring wells G213 and G212, and to the west by the north-south trending groundwater divide. Wells G219 and G220 were installed downgradient of the GMF GSP in March 2024 and the downgradient delineation of sulfate exceedances is ongoing. Vertically, the extent of sulfate greater than the GWPS is limited by the presence of low permeability tills.

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations, which indicates that a portion of the sulfate concentrations in the groundwater system may be attenuated via surface complexation reactions. However, batch attenuation testing results indicate that chemical attenuation of sulfate downgradient of the GMF GSP could be minimal [2].

1. INTRODUCTION

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

The groundwater data and analysis in this report includes results from historical sampling (initiated in 2015) through E003, which was completed on November 17, 2023. Results of the E001, E002, and E003 events were submitted and placed in the facility's operating record by October 16, 2023; January 28, 2024; and March 10, 2024, respectively, as required by 35 I.A.C. § 845.800(d)(15), within 60 days of receiving final laboratory analytical data [2, 3, 4]. The statistical determination presented in the report identified the following exceedance of the GWPS at a compliance groundwater well in the following hydrostratigraphic unit:

- Detected UA Exceedance – Sulfate at G215

Pursuant to 35 I.A.C. § 845.650(e), the following were evaluated as potential alternative sources for the GWPS exceedance:

- Sources other than the CCR SI
- Error in sampling and analysis protocol
- Error in statistical analysis
- Natural variation in groundwater quality
- Change in the potentiometric surface and groundwater flow direction.

These evaluations were not conclusive in demonstrating an alternative source for the GWPS exceedance. This Nature and Extent Report discusses in detail the extent of the sulfate exceedances as well as a geochemical conceptual site model (GCSM) describing the nature of these exceedances.

2. UNIT BACKGROUND

2.1 Site Location and Description

The CPP is located in Montgomery County in central Illinois, approximately two miles south of the City of Coffeen and about eight miles southeast of the City of Hillsboro (**Figure 2-1**). The CPP was a coal-fired power plant with five CCR units present: GMF GSP (35 I.A.C. § 845 regulated CCR Unit and subject of this report), Ash Pond Number (No.) 1 (AP1), Ash Pond No. 2 (AP2), GMF Recycle Pond (RP), and Landfill (LF). The GMF GSP is located in Section 11, Township 7 North and Range 3 West. The GMF GSP is located northeast of the CPP and situated in a predominantly agricultural area (**Figure 2-2**). The GMF GSP is located between two lobes of Coffeen Lake (the western lobe is identified as "Coffeen Lake" and the upper reaches of the eastern lobe are fed by a stream labeled as "Unnamed Tributary" on **Figures 2-1** and **2-2**), which surround the SI to the west, east, and south. The GMF GSP is bordered by other CCR units and agricultural land to the north. The GMF RP is located south and immediately adjacent to the GMF GSP; therefore, the geology and hydrogeology are similar and results from the 35 I.A.C. § 845 investigations from both units are included and discussed in this report, and in the Nature and Extent report prepared for the GMF RP. The combined area including the GMF GSP and GMF RP will hereinafter be referred to as the site and data from both units will be utilized in portions of **Sections 2.3** and **2.5**.

2.2 Description of CCR Unit

The CPP was a coal-fired electrical generating plant that began operation in 1964. The plant initially burned bituminous coal from Illinois and CCR from the coal fired units was disposed of in AP1. AP2 was utilized for CCR disposal beginning in the early 1970's and AP1 was reconstructed in 1978. Both of these units were used until the mid-1980's, beginning in 2010 CCR material was placed in the LF and GMF Units.

- **GMF GSP:** The 37-acre GMF GSP received blowdown from the air emission scrubbers and was put into operation in 2010. Construction of the GMF GSP was in accordance with Water Pollution Control Permit (WPCP) 2008-EA-4661 and features a composite 60-mil high-density polyethylene (HDPE) liner with 3 feet of recompacted soil with a hydraulic conductivity of 1 x 10^{-7} centimeters per second (cm/s) with internal piping and drains to collect contact water. Construction of the unit required excavation to an elevation of approximately 603 feet[1] and installation of a groundwater underdrain system to eliminate inward pressure on the liner prior to placement of CCR. The GMF GSP underdrain was actively pumped during construction but is no longer used. Illinois Power Generating Company (IPGC) ceased placement of waste in the GMF GSP prior to April 11, 2021. Review of historical aerial imagery of the GMF GSP (observations summarized in **Figure 2-3**) illustrate the extent of CCR deposition through time as well as potential CCR variability (based on observed differences in color). The proposed porewater (*i.e.*, CCR source water) location could not be safely accessed during the 2021 investigation. Instead, characterization of the CCR material included collection of two grab samples of materials from the northwest corner of the GMF GSP that were safely accessible in 2021 and analysis of total metals to meet the requirements of 35 I.A.C. § 845 (**Figure 2-4**) (Hydrogeologic Site Characterization Report [HCR] [5]). The unit contains gypsum scrubber waste and the base of CCR at the GMF GSP is shown in **Figure 2-5**.

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

Water that may come into contact with CCR within the footprint of the GMF GSP becomes CCR source water. CCR source water samples are collected from a riser pipe connected to a process water recovery sump located in the northeast corner of the GMF GSP (NE Riser). Results from the source water samples are used to provide information for groundwater transport modeling[2]. Although the GMF GSP is a lined unit, the presence of sulfate exceedances in groundwater just outside of the east-southeast portion of the unit suggests that leakage from the GMF GSP may be causing elevated sulfate concentrations in this area. The CCR and the liner adjacent to this area, and in the entire southern portion of the GMF GSP, will be removed during closure which will provide source control in the future.

GMF RP: The 17-acre GMF RP received blowdown from the air emission scrubbers and was put into operation in 2010. Construction of the GMF RP was in accordance with WPCP 2008-EA-4661 and features a composite 60-mil HDPE liner with 3 feet of recompacted soil with a hydraulic conductivity of 1×10^{-7} cm/s with internal piping and drains to collect contact water. Construction of the unit required excavation to an elevation of approximately 601 feet and installation of a groundwater underdrain system to eliminate inward pressure on the liner prior to placement of CCR. The GMF RP underdrain is a passive, gravity drained system. IPGC ceased placement of waste to the GMF RP prior to April 11, 2021.

AP1: This SI (also known as the Bottom Ash/ Recycle Pond) is a reclaimed ash pond that was reconstructed utilizing the existing earthen berms with reinforcement, as provided by the WPCP 1978-EA-389 issued by the Illinois Environmental Protection Agency (IEPA) on May 26, 1978. AP1 (existing unlined SI) covers an area of approximately 23 acres, has berms up to 41 feet above the surrounding land surface, and a volume of 300 acre-feet. It primarily received bottom ash and low volume wastes from floor drains in the main power block building. Several years ago, air heater wash and boiler chemical cleaning wastes were directed to AP1, but this practice was discontinued. The bottom ash was periodically removed for beneficial uses by a third-party contractor. Sluicing of waste to AP1 ceased prior to November 4, 2019.

AP2: AP2 is a closed (IEPA-approved) SI with a surface area of approximately 60 acres and berms 47 feet higher than the surrounding land surface. AP2 was originally removed from service and capped in the mid 1980's. A clay and soil cap was placed on the surface of the pond with contouring and drainage provided to direct storm water to four engineered revetment down drain structures. Prior to capping, this pond was identified as Outfall 004 in the facility National Pollutant Discharge Elimination System operating permit, IL0000108. Additional closure activities include the construction of a geomembrane cover system that began in July 2019 and was completed on November 17, 2020. Construction was completed in accordance with the Closure and Post Closure Care Plan approved by the IEPA on January 30, 2018 [6].

LF: Fly ash was managed in a permitted composite lined landfill constructed in 2010. The LF has an active groundwater underdrain system that is currently being operated. Additionally, the ash landfill leachate collection system is restricted by rule to no more than one foot of leachate on

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

the composite liner. An IEPA groundwater monitoring program is in effect for the GMF (under Bureau of Water) and Ash Landfill (under Bureau of Land).

2.3 Geology and Hydrogeology

Significant site investigation has been completed at the CPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the GMF GSP has been well characterized and detailed in the HCR [5].

2.3.1 Hydrostratigraphic Units

In addition to the CCR, five hydrostratigraphic units have been identified at the CPP based on stratigraphic relationships and common hydrogeologic characteristics, and are summarized as follows:

- **Upper Confining Unit (UCU)**: Consists of the Loess Unit and the upper clayey portion of the Hagarstown Member which has generally lower vertical permeability and generally greater than 60 percent fines. This Unit was encountered across most of the CPP, with the exception of the eastern edges of the SIs near the Unnamed Tributary where the unit was eroded following deposition, or locations where it has been excavated for construction.
- **Uppermost Aquifer (UA):** This unit consists primarily of sand and sandy silts and clays at the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member. This unit is absent in several locations due to weathering and in others due to excavation during construction of the CCR Unit. The hydraulic characteristics of the Hagarstown Member are variable due to the different material compositions, but generally indicate the unit has a moderate hydraulic conductivity.
- **Lower Confining Unit (LCU):** This unit is composed of the sandy clay till of the Vandalia Member, the silt of the Mulberry Grove Formation, and the compacted clay till of the Smithboro Member. The unit underlies the UA and was encountered in all boring locations on the CPP. Results from laboratory tests completed for vertical hydraulic conductivity indicate the Vandalia Member has a very low vertical hydraulic conductivity.
- **Deep Aquifer (DA)**: This unit consists primarily of sandy silt and sands of the Yarmouth Soil, which are thin (less than 5 feet) and discontinuous across the CPP.
- **Deep Confining Unit (DCU)**: This unit underlies the DA and is composed of the Banner Formation, of which the thick Lierle Clay is the first encountered unit. No boring penetrated the full thickness of this formation.

2.3.2 Uppermost Aquifer

The UA has been identified as the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member. This unit is continuous across the site, but hydraulic characteristics are variable as a result of the unit composition. The UA is absent in several locations due to weathering and in other locations due to excavation during construction of the CCR Unit. The UA exhibits a moderate hydraulic conductivity and is the most likely unit to indicate potential impacts from the GMF GSP. Based on the geologic information, the top of UA occurs at an elevation of 609 to 611 feet near the GMF GSP (**Figure 2-6**) and was removed below the footprint of the unit (**Figure 2-7**). The base of the UA and the material on which the GMF GSP liner was placed is the top of the LCU, which contains the low permeability Vandalia Member, Mulberry Grove Member, and Smithboro Till.

2.3.3 Potential Migration Pathways

Potential migration pathways (PMPs) were interpreted using the lithologic composition and hydrogeologic properties (hydraulic conductivity, hydraulic position with respect to the unit) of the screened materials. In addition to the physical properties, the analytical results from the baseline groundwater monitoring performed in wells screened in the confining units and DA were used to identify PMPs. The UA is the first occurrence of groundwater and therefore the PMPs identified are in geologic units located below the UA. Monitoring well G206D is considered a DA PMP monitoring location and monitors the potential for migration of impacts from the GMF GSP through the UA and LCU.

2.3.4 Regional Bedrock Geology

Bedrock has not been investigated at the site due to the depth to bedrock and presence of two low permeability confining units underlying the UA and above the bedrock, and the intermittent coal beds found within the bedrock. There are no known monitoring wells or production wells screened within the bedrock at CPP. Bedrock has not been encountered at any borings on-site. A literature review was completed to supplement the site geology.

Detailed descriptions of the Pennsylvanian strata of Illinois were published by Willman et al. [7] and Kolata [8]. The Bond Formation includes all strata from the base of the Shoal Creek Limestone Member or the LaSalle Limestone Member to the top of the Millersville Limestone Member or the Livingstone Limestone Member. It is overlain by the Mattoon Formation and underlain by the Modesto Formation. It varies from less than 150 feet thick in eastern Illinois to over 300 feet thick in southeastern Illinois, averaging about 250 feet. The Bond Formation is characterized by a high percentage of limestone and calcareous clays and shales. The Bond and Modesto Formations of the McLeansboro Group also contain multiple thin (typically less than 2 feet) intermittent coal beds. The upper formation of the Kewanee Group is the Carbondale Formation which contains multiple coal beds, including the Herrin (No. 6) Coal, of varying thicknesses (up to 7 feet) [9]. It is bound by thick limestone members (up to 50 feet), the thickest and purest limestones in the Pennsylvanian System of Illinois. Gray shales constitute the greatest part of the formation, although thick channel sandstones are developed locally.

Two mines were operated historically in the vicinity of the site. The Hillsboro Mine located east/southeast of the GMF GSP was operated by the Truax-Traer Coal Company from 1964-1970 and by the Consolidation Coal Company from 1971 through 1983. The mine targeted the Herrin Coal at a depth of 500 to 510 feet below ground surface (bgs), and geological reports included roof problems and slight floor heaving. The Clover Leaf No. 4 Mine located north of the GMF GSP was operated by the Clover Leaf Coal Mining company and the Coffeen Coal Mining Company from 1906 through 1924. The mine targeted the Herrin Coal at a depth of 510 to 544 feet bgs. Geologic reports indicate a massive black shale roof, and unmined areas which could be related to water-bearing sandstones above the roof [10].

2.3.5 Water Table Elevation and Groundwater Flow Direction

The NE Riser was utilized during the 2021 investigation to collect source water samples from the GMF GSP. A transducer was installed near the NE Riser during the 2021 investigation to monitor pond water levels in the GMF GSP. Phreatic surface elevations in the GMF GSP showed minimal variation, with elevations from approximately 625 to 627 feet (**Table 2-1**). As indicated in **Section 2.3.2**, the UA was removed below the footprint of the GMF GSP (**Figure 2-7**) and the

IEPA-approved GMF GSP composite liner system exceeds the design criteria for a composite liner for new CCR landfills established by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.70(b). The material on which the GMF GSP liner was placed is the top of the LCU, which is comprised of the low permeability Vandalia Member, Mulberry Grove Member, and Smithboro Till.

Overall groundwater flow within the UA is divided towards the two lobes of Coffeen Lake. The groundwater divide runs approximately through the center of the CPP, with groundwater east of the divide flowing east to southeast towards the Unnamed Tributary or the eastern lobe of Coffeen Lake and groundwater west of the divide flowing west to southwest towards the western lobe of Coffeen Lake. Groundwater flows east to southeast across the GMF GSP (**Figure 2-8** and **Table 2-1**) toward the Unnamed Tributary. Based on the elevations of the Tributary and groundwater elevations measured east of the tributary (**Appendix A** and **Table 2-1**), the Unnamed Tributary may be a local groundwater receiving body and prevent or reduce groundwater migration east of the Unnamed Tributary. During 2023, groundwater elevations in the UA in the vicinity of the GMF GSP ranged from approximately 613 to 624 feet (**Figure 2-8** and **Table 2-1**). Although elevations vary seasonally, the groundwater flow direction in the UA is consistent and likely controlled by the proximity and hydraulic connection to both the eastern and western lobes of Coffeen Lake.

LCU (PMP) groundwater elevations are slightly lower than those in the UA and exhibit similar variability in seasonal groundwater elevation as the UA. Groundwater elevation within the LCU ranged from about 590 to 623 feet in 2023 (**Figure 2-8** and **Appendix A**). No monitoring wells in the GMF GSP monitoring system are screened in the LCU; however, monitoring well MW11D is screened across the LCU and is the nearest LCU well to the GMF GSP. Monitoring well MW11D had groundwater elevations ranging from about 616 to 622 feet during 2023.

DA (PMP) groundwater elevations are generally lower than those in the UA and LCU (PMP) and ranged from approximately 576 to 625 feet in 2023 (**Figure 2-8** and **Appendix A**). Monitoring well G206D, MW03D, and MW12D are the DA wells nearest to the GMF GSP and typically had groundwater elevations ranging from about 596 to 613 feet during 2023. A groundwater contour map was generated for the DA for the E002 event and groundwater flow within the DA generally follows subsurface topography for the unit (**Figure 2-9**).

No monitoring wells were installed in the UCU during 2021 investigation activities and no wells have historically been installed across solely the UCU because it is not present or is unsaturated where present at the CPP. Groundwater elevations within the DCU and bedrock unit are unknown because no wells are screened within these low hydraulic conductivity units.

2.3.5.1 Vertical Hydraulic Gradients

Vertical hydraulic gradients were calculated using available groundwater elevation data from February 2017 to November 2023 at nested well locations within the UA, LCU (upper and lower), and DA. Vertical hydraulic gradients for the GMF GSP are presented in **Table 2-2** and well locations are shown on **Figure 2-8**. Vertical hydraulic gradients for other nested well locations at the CPP, discussed below, are presented in **Appendix B**. The results of the vertical hydraulic gradient calculations between hydrostratigraphic units are summarized below:

- UA to Upper LCU (Vandalia Member):
  - Vertical gradients at well nest G405/T408, located north of AP2, vary between upward and downward with an average (downward) vertical gradient of 0.02 feet per foot (ft/ft).

  - Vertical gradients at well nest G406/T409, located south of AP2/northwest of AP1, vary between upward and downward with an average (upward) vertical gradient of -0.06 ft/ft. Since 2021, the vertical gradient observed at this well nest has been consistently upward, with the exception of August 2022.

- UA to Lower LCU (Smithboro Member)
  - Well nest G307/G307D, located south of AP1, has consistently downward vertical gradients with an average vertical gradient of 0.13 ft/ft.
  - In well nest G311/G311D, gradients are consistently strongly downward, with an average vertical gradient of 0.71 ft/ft.
- Upper LCU (Vandalia Member) to Lower LCU (Smithboro Member)
  - Well nest T408/G45D, located north of AP2, has consistently downward vertical gradients with an average vertical gradient of 0.98 ft/ft. Beginning in 2020, vertical gradients observed at this well nest have become less strongly downward.
  - Vertical gradients at well nest G406/T409, located south of AP2/northwest of AP1, are consistently downward, with the exception of August 2022, with an average vertical gradient of 0.64 ft/ft. Beginning in 2020, vertical gradients observed at this well nest have become less strongly downward.
- UA to DA
  - Well nest G206/G206D, located near the southwest corner of the GMF GSP, has consistently downward gradients, with an average vertical gradient of 0.72 ft/ft. Vertical gradients observed at this well nest have generally decreased in downward strength since observation began in 2021.
  - Well nest G275/G275D, located near the southeast corner of the GMF RP, has consistently downward gradients, with an average vertical gradient of 0.71 ft/ft. Vertical gradients observed at this well nest have generally decreased in downward strength since observation began in 2021.
- LCU to DA
  - Vertical gradients at well nest G314/G314D, located east of AP1, are consistently downward, with an average vertical gradient of 0.69 ft/ft. Beginning in 2022, vertical gradients observed at this well nest have become progressively less strongly downward and the vertical gradient was observed to be upward (-0.01 ft/ft) during December 2023.

Vertical hydraulic gradients indicate there is consistently downward migration of groundwater in most areas of the CPP, with the exception being northwest of AP1, where consistent upward gradients were measured between the UA and upper LCU. However, overall there has been a decrease in magnitude of downward gradients since approximately 2020, which is likely a result of plant shutdown and placement of a geomembrane on AP2.

2.3.5.2 Impact of Surface Water Bodies on Groundwater Flow

Surface water elevations were measured from various locations along the Unnamed Tributary from March 2021 to December 2023 (**Figure 2-8**). Elevations SG-04 (near CIPS Trail and determined to be destroyed in October 2023) ranged from 591.94 to 593.38 feet. Surface water elevations near the former discharge flume located between AP1 and AP2 were measured at

SG02 and ranged from 598.34 to 598.75 feet. Surface water elevations from Coffeen Lake at SG-03 (near the outfall east of AP1) ranged from 585.09 to 589.97 feet.

Groundwater contour maps prepared from elevation data measured in monitoring wells indicate groundwater elevations are variable, but flow directions are generally consistent in the UA.

Groundwater near the GMF GSP may periodically flow into the Unnamed Tributary to the east, which flows south into the eastern lobe of Coffeen Lake. The Unnamed Tributary is a local groundwater receiving body that may prevent or reduce groundwater migration east of the Unnamed Tributary.

Construction of the LF, GMF GSP, and GMF RP required removal of the Hagarstown Member, in effect removing the aquifer beneath the footprint of these units [11]. It is uncertain whether these constructed units significantly limit lateral groundwater flow, either by creating no flow zones or by capturing groundwater via their dewatering [12].

2.3.6 Hydraulic Conductivities

2.3.6.1 Field Hydraulic Conductivities

Field hydraulic conductivity tests were performed by Hanson in 2021 as part of characterization efforts to complete 35 I.A.C. § 845 requirements. Individual field hydraulic conductivity test results conducted at the GMF GSP are summarized in **Table 2-3** [5], historical results are included in **Appendix C** [12], and tested well locations are included on **Figure 2-8**.The results of the tests are summarized as follows:

- **UA:** Hydraulic conductivities near the GMF GSP ranged from 2.5 x 10^{-4} to 4.0 x 10^{-3} cm/s. Tests had a geometric mean of 1.4 x 10^{-3} cm/s. This is generally consistent with, although higher than, tests conducted prior to 2017 as part of CCR Rule characterization efforts that indicated hydraulic conductivities varied from 1.7 x 10^{-5} to 2.1 x 10^{-3} cm/s with a geometric mean of 2.9 x 10^{-4} cm/s.
- **LCU:** Hydraulic conductivities across the CPP ranged from 1.2 x 10^{-4} and 4.5 x 10^{-3} cm/s. Tests had a geometric mean of 7.2 x 10^{-4} cm/s. No monitoring wells near the GMF GSP are screened within the LCU. Monitoring wells with the highest hydraulic conductivities were located near the GMF RP and wells with the lowest hydraulic conductivities were located near AP1. Prior to 2017, field hydraulic conductivity tests completed in the LCU for monitoring well and temporary piezometers (G45D, G46D, T408, and T409) indicate horizontal conductivities from 4.0 x 10^{-8} and 3.4 x 10^{-5}. The elevated hydraulic conductivity values (10^{-4} to 10^{-3} cm/s) in wells near the GMF RP relative to other areas of the CPP are likely not representative of the primary LCU lithology, but instead reflect the isolated and discontinuous sandy lenses in which the wells are screened.
- **DA:** Geometric mean hydraulic conductivity at DA well G314D, near AP1, was 8.7 x 10^{-5} cm/s and was slightly lower than tests completed in the northern portion of the CPP in 2009 that resulted in hydraulic conductivity values ranging from 1.3 x 10^{-4} to 1.7 x 10^{-3} cm/s, with a geometric mean of 4.4 x 10^{-4} cm/s. Field hydraulic conductivity testing was not performed on DA monitoring well G206D, located near the GMF GSP.
- No monitoring wells are screened only within the DCU, and no field hydraulic conductivity tests have been conducted for the DCU.

2.3.6.2 Laboratory Hydraulic Conductivities

Falling head permeability tests (ASTM D5084 Method F) were performed in the laboratory on samples collected during the 2021 investigations [5] and historically [12]. The 2021 results are summarized in **Table 2-4** and historical results are provided in **Appendix C**; all results are discussed below.

- **CCR:** One geotechnical sample of CCR (gypsum) was collected as a grab sample from the northwest corner of the GMF GSP and the vertical hydraulic conductivity is 8.9 x 10^{-4} cm/s.
- **UCU:**
  - The 2021 sitewide geometric mean of vertical hydraulic conductivities of three samples collected from the UCU is 2.5 x 10^{-8} cm/s, which is consistent with historically reported values. Vertical hydraulic conductivity of a sample collected from SB289 (**Figure 2-7**) near the GMF GSP is 1.1 x 10^{-8} cm/s.
  - Geotechnical tests conducted prior to 2017 indicated UCU vertical hydraulic conductivity values ranging from 1.3 x 10^{-8} to 5.0 x 10^{-7} cm/s, with a geometric mean of 1.0 x 10^{-7} cm/s.
- **UA:** One geotechnical sample of UA material was collected from G275D, near the GMF RP, with a vertical hydraulic conductivity of 1.6 x 10^{-4} cm/s. No UA samples collected near the GMF GSP were analyzed for vertical hydraulic conductivity.
- **LCU:**
  - The 2021 sitewide geometric mean of vertical hydraulic conductivities of three samples collected from the LCU is 1.8 x 10^{-7} cm/s. Vertical hydraulic conductivities from 2021 are consistent with those observed historically. No LCU samples collected near the GMF GSP were analyzed for vertical hydraulic conductivity.
  - Intermittently present within the LCU is the Mulberry Grove Member. Historical vertical hydraulic conductivities of the Mulberry Grove Member were measured as 1.6 x 10^{-6} and 1.9 x 10^{-6} cm/s.
  - Historical laboratory tests reported LCU vertical hydraulic conductivity values ranging from 6.8 x 10^{-9} to 4.5 x 10^{-6} cm/s, with a geometric mean of 3.0 x 10^{-8} cm/s.
- **DA:** No laboratory vertical hydraulic conductivity tests were completed during 2021 on DA materials.
- **DCU:** No laboratory vertical hydraulic conductivity tests were completed during 2021 on DCU materials. Historical vertical hydraulic conductivity tests were performed on samples collected north and west of the GMF GSP. Vertical hydraulic conductivities of 6.8 x 10^{-9} and 4.5 x 10^{-6} cm/s were reported.
- **Bedrock**: No bedrock samples were analyzed for vertical hydraulic conductivity.

2.4 Groundwater Monitoring

The monitoring system for the GMF GSP is shown on **Figure 2-2** and consists of two background monitoring wells (G200 and R201), eight compliance monitoring wells (G206, G206D G209, G212, G213, G215, G217, and G218), one temporary water level only surface water staff gage (SG-04, which was destroyed in October 2023), and one water level only location (NE Riser)

primarily used to monitor water levels within the SI and can be used to characterize source water within the SI [13] . The monitoring wells are screened within the UA (G200, G206, G209, G212, G213, G215, G217, G218, and R201) and DA (G206D) along the perimeter of the GMF GSP. Source samples are collected from the NE Riser on the northeast corner of the GMF GSP (**Figure 2-2**).

2.5 Hydrogeologic Conceptual Site Model

The HCR [5] and information provided above forms the foundation of the GMF GSP hydrogeological setting. The GMF GSP and GMF RP overlie a potential recharge area for the underlying transmissive geologic media, which are composed of unlithified deposits. Recharge migrates downward into and through the UCU into the UA.

Groundwater flow in the UA at the CPP is divided towards the two lobes of Coffeen Lake. The loess of the UCU and sands of the UA are hydraulically connected. Groundwater flow in the silts and clays of the UCU and LCU is expected to be primarily vertical. The majority of horizontal groundwater migration is expected to be within the lower Hagarstown member (*i.e.*, UA). The geologic conceptual model for the site used for the groundwater modeling [14] consists of the following layers:

- Hagarstown Loess Unit (*i.e.*, UCU) – Loess Unit and the upper clayey portion of the Hagarstown Member.
- Hagarstown Member (*i.e.*, UA) – sand and sandy silts and clays at the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member.
- Vandalia Member/Mulberry Grove Member (*i.e.*, LCU) – unweathered sandy clay till and discontinuous silts.
- Smithboro Till (*i.e.*, LCU) – compacted clay till of the Smithboro Member.
- The Yarmouth Soil (*i.e.*, DA) and Lierle Clay (*i.e.*, DCU) were not included in the model, for consistency with the original model [15].

The United States Geological Survey (USGS) National Map places the CPP within the East Fork Shoal Creek watershed subbasin (Hydrologic Unit Code 071402030303). The CPP conceptual site model (CSM) extent is bounded by a hydrological catchment (watershed) divide to the east based on watershed data from USGS. Along the north, south, and east, the model boundary was placed along known waterbodies as much as possible. As such, it is assumed groundwater inflow from adjacent watersheds is negligible through both the UA and LCU. The Coffeen Lake water levels are managed at an average elevation of 591.0 feet. Coffeen Lake and Unnamed Tributary are the receiving surface water bodies in the area encompassed by the CSM.

Precipitation infiltrates and recharges the groundwater table throughout the site and upgradient of the site. Groundwater in the UCU migrates downward into the sandy material of the lower Hagarstown Formation or weathered Vandalia Till, which is considered the UA. Water that percolates downward from layers overlying the UA is most likely to travel laterally from the site within the UA due to the relatively high permeability (as compared to the underlying LCU) and horizontal gradients present within the UA as described above. During construction of the LF, GMF GSP, and the GMF RP, the Loess Unit and portions of the Hagarstown Member (including the UA) were excavated, therefore CCR within the lined GMF GSP does not overlie the UA, but rather

the LCU, which is separated from the base of CCR in the GMF GSP by a composite liner system that exceeds the design criteria for a composite liner for new CCR landfills established by 40 C.F.R. § 257.70(b). Groundwater and surface water elevations indicate groundwater flows towards Coffeen Lake, which is a local receiving body for the UA. Further downward migration is also limited by the relatively thick and low permeability LCU.

Based on the geology and hydrogeology, monitoring wells at the GMF GSP can be separated into three distinct groupings that exhibit similar geologic and hydraulic characteristics. Compliance monitoring well groupings are summarized as follows:

- South UA wells: shallow wells (generally 17 to 25 feet bgs) screened in moderate permeability materials (generally about 10^{-4} cm/s) including G206, G209, G212, and G213,
- East UA wells: shallow wells (generally 17 to 25 feet bgs) screened in moderate permeability materials (generally about 10^{-3} cm/s) including G215, G217, and G218.
- DA wells: deep well (approximately 60 feet bgs) screened in low to moderate permeability materials (generally about 10^{-5} cm/s) located southwest of the GMF GSP (G206D).

3. OCCURRENCE AND DISTRIBUTION OF GROUNDWATER EXCEEDANCES (EXTENT)

Results from groundwater samples collected from the GMF GSP during E001, E002, and E003 were received on August 17, 2023; November 29, 2023; and January 10, 2024, respectively. In accordance with 35 I.A.C. § 845.610(b)(3)(C), comparison of statistically derived values with the GWPSs described in 35 I.A.C. § 845.600 to determine statistical exceedances of the GWPS was completed [2, 3, 4]. Exceedances for which an Alternative Source Demonstration was not completed include the following parameter and well in the UA:

- Sulfate at G215 (**Figure 3-1**)

The extents of exceedances discussed below were defined using existing monitoring wells, including wells present on-site (**Table 3-1**) that may not be included in the 35 I.A.C. § 845 monitoring program.

3.1 Additional Investigation to Define Nature and Extent

Following initial sampling in 2021, potential statistical exceedances of the GWPS were identified for the parameters and locations identified above [2, 3, 4]. Horizontal delineation of sulfate exceedances at G215 is ongoing. Additional investigation was completed in 2024 and a total of two borings were advanced and converted to monitoring wells downgradient of G215 (**Figure 3-2**). Solids samples were collected and analyzed for the following:

- 6010B for 7-step sequential extraction (aluminum, arsenic, beryllium, calcium, chromium, cobalt, iron, lead, lithium, manganese, molybdenum, and selenium);
- Bulk Mineralogy by Reitveld x-ray diffraction Analysis;
- Sulfur contents;
- Total organic carbon; and,
- Cation Exchange Capacity Analysis.

Findings from the installation and sampling of these additional wells will be incorporated into the final Corrective Action Plan (CAP) Permit application, which will be submitted in 2025.

3.2 Extent in the Uppermost Aquifer

Groundwater samples are evaluated quarterly and statistical exceedances are identified following comparison of lower confidence limits (LCLs) to the GWPSs described in 35 I.A.C. § 845.600. The LCLs vary as the dataset is updated to include additional quarterly events (**Table 3-2**). The discussion below includes ranges of concentrations measured in wells with statistical exceedances, because there is no single value for LCLs.

3.2.1 Sulfate

Statistical exceedances of sulfate n the UA are located only in monitoring well G215, west of the GMF GSP. Concentrations of sulfate in G215, which has had GWPS (400 milligrams per liter [mg/L]) exceedances, range from 100 to 560 mg/L (**Table 3-3**). Sulfate statistical exceedances at G215 are defined laterally within the UA by monitoring well G213 to the southwest and G217

to the north (**Figure 3-1)**. The lateral extent downgradient and east of G215 is being further evaluated as discussed above in **Section 3.1**.

Downward migration of sulfate in the UA is inhibited by the underlying Vandalia Till, Mulberry Grove Member, and Smithboro Till which are, on average, greater than 15 feet thick at the site. Vertical hydraulic conductivity tests completed on samples of the LCU, beneath the UA, indicate hydraulic conductivities from 5.5×10^{-8} to 3.7×10^{-7} cm/s. This is very low relative to the horizontal hydraulic conductivity measured within the UA (geometric mean of 1.4×10^{-3} cm/s). The significant contrast in permeability (greater than two orders of magnitude) indicates groundwater will preferentially migrate horizontally toward the Unnamed Tributary and the elevated sulfate concentrations will not extend into the underlying hydrostratigraphic units. The extent of sulfate GWPS exceedances are additionally vertically defined by DA monitoring well G206D (**Figure 3-3**).

4. GEOCHEMICAL CONCEPTUAL SITE MODEL (NATURE)

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

CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" [16] and represents the material potentially leached from impoundments. CCR materials are the primary source of constituent loading to CCR porewater (*i.e.*, CCR source water). Over an extended period (*e.g.*, months to years), CCR porewater (*i.e.*, water contained within the interstitial pore spaces of CCR that can be sampled by low-flow groundwater sampling methods) reaches equilibrium with the CCR materials. Locations to install porewater wells within the GMF GSP could not be accessed safely and therefore source water, from the NE Riser, was collected to characterize the CCR. The NE riser is connected to a process recovery sump which is located at the base of the unit. As water percolates through the CCR, the resulting CCR contact water can be sampled from the base of the unit above the liner. Source water from the NE riser is representative of the mobile phase constituents capable of migrating into underlying materials and potentially downgradient in groundwater. The GMF GSP CCR source water is therefore the primary indicator of constituents *available* to groundwater and is considered as the primary source term for environmental investigation and fate and transport modeling.

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations, which indicates that a portion of the sulfate in the groundwater system may be attenuated via surface complexation reactions. However, crystalline iron oxides were not identified in mineralogical analysis. In addition, batch attenuation testing with solids from the site could not determine a partitioning coefficient for sulfate. These results indicate that chemical attenuation of sulfate downgradient of the GMF GSP could be minimal.

5. COMBINED GEOCHEMICAL AND HYDROGEOLOGIC CONCEPTUAL SITE MODELS

5.1 Sulfate Conceptual Site Model

The CSM describing current conditions at the GMF GSP combining the hydrogeologic and geochemical CSMs for sulfate is as follows. Water contained in the GMF GSP is hydraulically separated from the underlying unlithified glacial deposits by a 60-mil HDPE liner that was installed during construction of the GMF GSP in 2010. In addition, the UA was removed from beneath the footprint of the GMF GSP during its construction. Sulfate concentrations in wells immediately east of the UA have increased slowly since approximately 2018, with the sulfate concentration collected from G215 first greater than 400 mg/L in 2021. Concentrations of sulfate in G215 since then have remained above 400 mg/L, while concentrations at UA wells G217 and G218 to the north have continued to increase slowly. Although the GMF GSP is a lined unit, the presence of sulfate exceedances in groundwater just outside of the east-southeast portion of the unit suggests that leakage from the GMF GSP may be causing elevated sulfate concentrations in this area. The CCR and the liner adjacent to this area, and in the entire southern portion of the GMF GSP, will be removed during closure which will provide source control in the future.

Sulfate exceedances of the GWPS at G215 are defined laterally within the UA by monitoring wells G213 to the southwest and G217 to the north. The lateral extent downgradient and east of G215 is being further evaluated with the installation of monitoring wells G219 and G220 in April 2024. Based on the surface water elevations of the Unnamed Tributary and groundwater elevations measured east of the tributary, the Unnamed Tributary as a local groundwater receiving body may prevent or reduce groundwater migration east of the Unnamed Tributary.

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations near the GMF GSP, which indicates that a portion of the sulfate concentrations in the groundwater system may be attenuated via surface complexation reactions. However, batch attenuation testing results indicate that chemical attenuation of sulfate downgradient of the GMF GSP could be minimal.

6. CONCLUSIONS AND FUTURE ACTIVITIES

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

The lateral extents of statistical exceedances in the UA are illustrated in **Figure 3-1**. Sulfate extent is defined upgradient and laterally to G215 by multiple surrounding groundwater monitoring wells screened across the UA. Sulfate exceedances are constrained vertically by the underlying Vandalia Till. As discussed in **Section 3.2.1**, monitoring wells G219 and G220 were installed downgradient of the GMF GSP in March 2024 (**Figure 3-2**) and the downgradient delineation of sulfate exceedances is ongoing. Findings from the installation and sampling of these additional wells will be incorporated into the final CAP Permit application, which will be submitted in 2025.

Sulfate was selected for modeling source control presented in the Final Closure Plan, as described in the Groundwater Modeling Report [14]. For modeling purposes, it was assumed that sulfate would not significantly sorb or chemically react with aquifer solids (soil adsorption coefficient [Kd] was set to 0 milliliters per gram), which is a conservative estimate for predicting contaminant transport times in the model. The GCSM results indicate sulfate attenuation downgradient is expected to be minimal. Additional data collection is ongoing and geochemical modeling will be completed to evaluate how sorption to solid phases may affect sulfate mobility and therefore the time for sulfate to reach the GWPS.

7. REFERENCES

[1] Ramboll Americas Engineering Solutions, Inc. (Ramboll), "35 I.A.C. § 845 Corrective Measures Assessment, GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois, IEPA ID: W135015004-01," April 24, 2024.

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[14] Ramboll Americas Engineering Solutions, Inc., "Groundwater Monitoring Report, Coffeen Power Plant, GMF Gypsum Stack Pond and GMF Recycle Pond, Coffeen, Illinois. Illinois Power Generating Company.," July 28, 2022.

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TABLES

Table 2-1. Summary of Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G200	Background	05/30/2023	5.89	620.04
G206	Compliance	05/30/2023	11.17	621.64
G206D	Compliance	05/30/2023	30.22	603.91
G209	Compliance	05/30/2023	11.07	621.83
G212	Compliance	05/30/2023	11.64	621.24
G213	Compliance	05/30/2023	11.96	620.84
G215	Compliance	05/30/2023	14.76	618.29
G217	Compliance	06/08/2023	[16.35]	[616.75]
G218	Compliance	05/30/2023	13.72	619.38
R201	Background	05/30/2023	5.31	621.02
SG-04	Water Level	05/30/2023	6.41	593.11

Notes:
Only wells with groundwater elevations measured are included.
BMP = below measuring point
Bracketing [ ] indicates that the measurement was obtained outside of the 24-hour period from initiation of depth to groundwater measurements.
NAVD88 = North American Vertical Datum of 1988

Table 2-1. Summary of Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G200	Background	08/08/2023	9.21	616.73
G206	Compliance	08/08/2023	13.89	618.93
G206D	Compliance	08/08/2023	30.04	604.10
G209	Compliance	08/08/2023	13.79	619.12
G212	Compliance	08/08/2023	14.61	618.28
G213	Compliance	08/08/2023	15.05	617.76
G215	Compliance	08/08/2023	17.22	615.84
G217	Compliance	08/08/2023	18.29	614.81
G218	Compliance	08/08/2023	16.98	616.13
R201	Background	08/08/2023	11.61	614.73

Notes:
Only wells with groundwater elevations measured are included.
BMP = below measuring point
NAVD88 = North American Vertical Datum of 1988

Table 2-1. Summary of Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G200	Background	11/13/2023	11.88	614.06
G206	Compliance	11/13/2023	16.16	616.66
G206D	Compliance	11/13/2023	30.40	603.74
G209	Compliance	11/13/2023	16.24	616.67
G212	Compliance	11/13/2023	16.92	615.97
G213	Compliance	11/13/2023	17.41	615.40
G215	Compliance	11/13/2023	19.03	614.03
G217	Compliance	11/13/2023	19.68	613.42
G218	Compliance	11/13/2023	18.67	614.44
R201	Background	11/13/2023	11.73	614.61
NE Riser	Water Level	11/13/2023	Not Measured	
SG-04	Water Level	11/13/2023	Not Measured	

Notes:
Only wells with groundwater elevations measured are included.
BMP = below measuring point
NAVD88 = North American Vertical Datum of 1988

Table 2-2. Vertical Hydraulic Gradients

Nature and Extent Report

Coffeen Power Plant

GMF Gypsum Stack Pond

Coffeen, IL

Date	G206 Groundwater Elevation (ft NAVD88)	G206D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	DA (PMP)				
4/20/2021	622.07	585.96	36.11	33.51	1.08	down
5/3/2021	622.60	587.42	35.18	33.51	1.05	down
5/17/2021	622.31	587.81	34.50	33.51	1.03	down
6/9/2021	621.71	584.19	37.52	33.51	1.12	down
6/23/2021	620.54	589.66	30.88	33.51	0.92	down
7/12/2021	622.39	590.72	31.67	33.51	0.95	down
7/26/2021	622.00	591.14	30.86	33.51	0.92	down
8/16/2021	622.08	592.00	30.08	33.51	0.90	down
10/25/2021	622.94	595.04	27.90	33.51	0.83	down
2/7/2022	622.37	598.22	24.15	33.51	0.72	down
5/9/2022	623.70	601.30	22.40	33.51	0.67	down
8/23/2022	621.61	602.86	18.75	33.51	0.56	down
3/30/2023	623.69	601.99	21.70	33.51	0.65	down
4/30/2023	622.54	603.60	18.94	33.51	0.57	down
5/30/2023	621.64	603.91	17.73	33.51	0.53	down
7/8/2023	620.69	604.04	16.65	33.51	0.50	down
8/8/2023	618.93	604.10	14.83	33.51	0.44	down
9/25/2023	618.08	604.06	14.02	33.51	0.42	down
10/25/2023	617.11	603.80	13.31	33.51	0.40	down
11/13/2023	616.66	603.74	12.92	33.51	0.39	down
12/18/2023	616.97	603.82	13.15	33.51	0.39	down
			Middle of screen elevation G206			610.8
			Middle of screen elevation G206D			577.3

[O: KLT 6/4/21, C:YMD 6/7/21][U:KLT 8/25/21, C:EDP 8/31/21]
[KLT 5/3/24, C: SSW 5/7/24]

Notes:

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

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

-- = no data collected on date / no vertical gradient calculated

DA = deep aquifer

dh = head change

dl = distance change

ft = foot/feet

NAVD88 = North American Vertical Datum of 1988

PMP = potential migration pathway

UA = uppermost aquifer

Table 2-3. Field Hydraulic Conductivities
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Gradient Position	Bottom of Screen Elevation (ft NAVD88)	Screen Length [1] (ft)	Field Identified Screened Material	Slug Type	Analysis Method	Falling Head (Slug In) Hydraulic Conductivity (cm/s)	Rising Head (Slug Out) Hydraulic Conductivity (cm/s)	Minimum Hydraulic Conductivity (cm/s)	Maximum Hydraulic Conductivity (cm/s)	Hydraulic Conductivity Geometric Mean (cm/s)
Uppermost Aquifer											
G206	D	608.61	4.41	SM, s(CL), CL	solid	Kansas Geological Survey	5.0E-04	4.9E-04	2.5E-04	4.0E-03	1.4E-03
G209	D	608.29	4.54	CL	solid	Kansas Geological Survey	- -	2.5E-04			
G212	D	609.30	4.55	SM, s(CL), CL	solid	Kansas Geological Survey	2.1E-03	1.8E-03			
G215	D	606.68	4.39	SM, s(CL), ML	solid	Kansas Geological Survey	4.0E-03	3.5E-03			
G218	D	605.87	4.44	SM, SC, CL	solid	Kansas Geological Survey	2.6E-03	2.4E-03			

[O: KLT, C:EDP 8/31/21]

Notes:
1. All wells are constructed from 2 inch PVC with 0.01 inch slotted screens.
- - = Test not analyzed/performed
cm/s = centimeters per second
D = downgradient
ft = foot/feet
NAVD88 = North American Vertical Datum of 1988
PVC = polyvinyl chloride

USCS = Unified Soil Classification System
CL = Lean Clay
s(CL) = Sandy Lean Clay
ML = Silt
SC = Clayey Sand
SM = Silty Sand

Table 2-4. Geotechnical Data Summary

Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Sample ID	Field Location ID	Top of Sample (ft bgs)	Bottom of Sample (ft bgs)	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	Calculated Porosity [1] (%)	Vertical Hydraulic Conductivity (cm/s)	LL	PL	PI	USCS	Gravel (%)	Sand (%)	Fines (%)
Loess Unit															
G206D/Comp 1	G206D	4	16	20.5	105.3	2.60	35.1	--	42	18	24	CL	0	20	80
SB289/Comp 1	SB289	4	16	21.2	103.4	2.56	35.3	--	40	18	22	CL	0	20	80
SB289, ST5	SB289	8	10	20.2	105.9	--	--	1.1E-08	--	--	--	CL/CH	--	--	--
Hagarstown Member															
G206D/Comp 2	G206D	18.8	20	10.1	117.4	2.56	26.5	--	22	15	7	SC	0	57	43
SB289/Comp 2	SB289	18	22	16.6	112.6	2.60	30.6	--	23	14	9	CL	0	46	54
Vandalia Member															
G206D/Comp 3	G206D	20	31.8	8.3	131.4	2.56	17.7	--	21	13	8	CL	0	46	54
SB289/Comp 3	SB289	22	32.9	8.9	132.7	2.64	19.4	--	19	12	7	ML	0	47	53
Smithboro Member															
G206D/Comp 4	G206D	34	52	13.4	120.6	2.62	26.2	--	29	14	15	CL	0	29	72
SB289/Comp 4	SB289	34	52	14.9	116.6	2.61	28.4	--	31	15	16	CL	0	26	74
Yarmouth Soil															
G206D/Comp 5	G206D	54	58	14.9	--	2.75	--	--	18	12	6	SM	0	78	22
Lierle Clay															
SB289/Comp 5	SB289	54	60	25	98.4	2.63	40.0	--	48	18	30	CL	0	21	79
CCR															
Gypsum	NE Riser	grab	grab	25.3	78.0	--	--	8.9E-04	NP	NP	NP	Gypsum	0	22	78

[O:KLT, QC: FPO; U: FPO, QC:KLT 8/9/21; U:KLT 8/13/21, C:EDP 8/30/21]

Notes:

[1] Porosity calculated as relationship of bulk density (p_b) to particle density (p_d) ($n = 100[1- (p_b/p_d)]$)
-- = not analyzed
% = Percent
bgs = below ground surface
cm/s = centimeters per second
ft = foot/feet
GMF = Gypsum Management Facility
LL = Liquid limit
NP = Non Plastic
pcf = pounds per cubic foot
PI = Plasticity Index
PL = Plastic Limit

USCS = Unified Soil Classification System
CH = Fat Clay
CL = Lean Clay
ML = Silt
SC = Clayey Sand
SM = Silty Sand

RAMBOLL

Table 3-1. Monitoring Well Construction Details
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Location	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft bgs)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
G200	UA	2008-02-25	--	625.71	Top of Disk	623.27	12.19	16.98	611.08	606.29	17.36	605.30	4.8	2	39.0751386	-89.3950088
G206	UA	2010-10-14	--	632.73	Top of Disk	630.53	17.51	21.92	613.02	608.61	22.42	606.50	4.4	2	39.0673987	-89.3985475
G206D	DA	2021-01-25	634.14	633.85	Top of PVC	631.41	49.2	59.0	582.2	572.4	59.4	571.4	9.8	2	39.067428	-89.398493
G209	UA	2010-10-07	--	632.68	Top of Disk	630.57	17.74	22.28	612.83	608.29	22.81	606.60	4.5	2	39.0679228	-89.3968503
G212	UA	2010-10-11	--	632.77	Top of Disk	630.59	16.74	21.29	613.85	609.30	21.81	606.60	4.6	2	39.0684296	-89.395318
G213	UA	2010-10-12	--	632.80	Top of Disk	630.34	16.75	21.29	613.59	609.05	21.82	606.30	4.5	2	39.0685852	-89.3948216
G215	UA	2010-10-13	--	632.96	Top of Disk	630.48	19.41	23.80	611.07	606.68	24.31	606.20	4.4	2	39.0693092	-89.39394
G217	UA	2010-10-12	--	633.04	Top of Disk	630.67	20.49	24.88	610.18	605.79	25.38	604.70	4.4	2	39.07034	-89.3939589
G218	UA	2010-10-12	--	632.91	Top of Disk	630.64	20.33	24.77	610.31	605.87	25.27	604.60	4.4	2	39.0708763	-89.393956
R201	UA	2010-10-08	--	626.12	Top of Disk	624.02	14.59	19.32	609.43	604.70	19.85	604.20	4.7	2	39.0751423	-89.3978553
NE Riser	S	--	--	--	--	--	--	--	--	--	--	--	--	--	39.07111111	-89.39388889

Notes:
All elevation data are presented relative to the North American Vertical Datum of 1988 (NAVD88), GEOID 12A
-- = not measured/recorded
bgs = below ground surface
DA = Deep Aquifer
ft = foot or feet
HSU = Hydrostratigraphic Unit
PVC = polyvinyl chloride
S = Source Water
UA = Uppermost Aquifer

Table 3-2. Exceedance Parameter Statistical Results
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Location	Parameter	Unit	Groundwater Protection Standard	2023 Q2 LCL	2023 Q3 LCL	2023 Q4 LCL
G215	Sulfate, total	mg/L	400	468	474	488

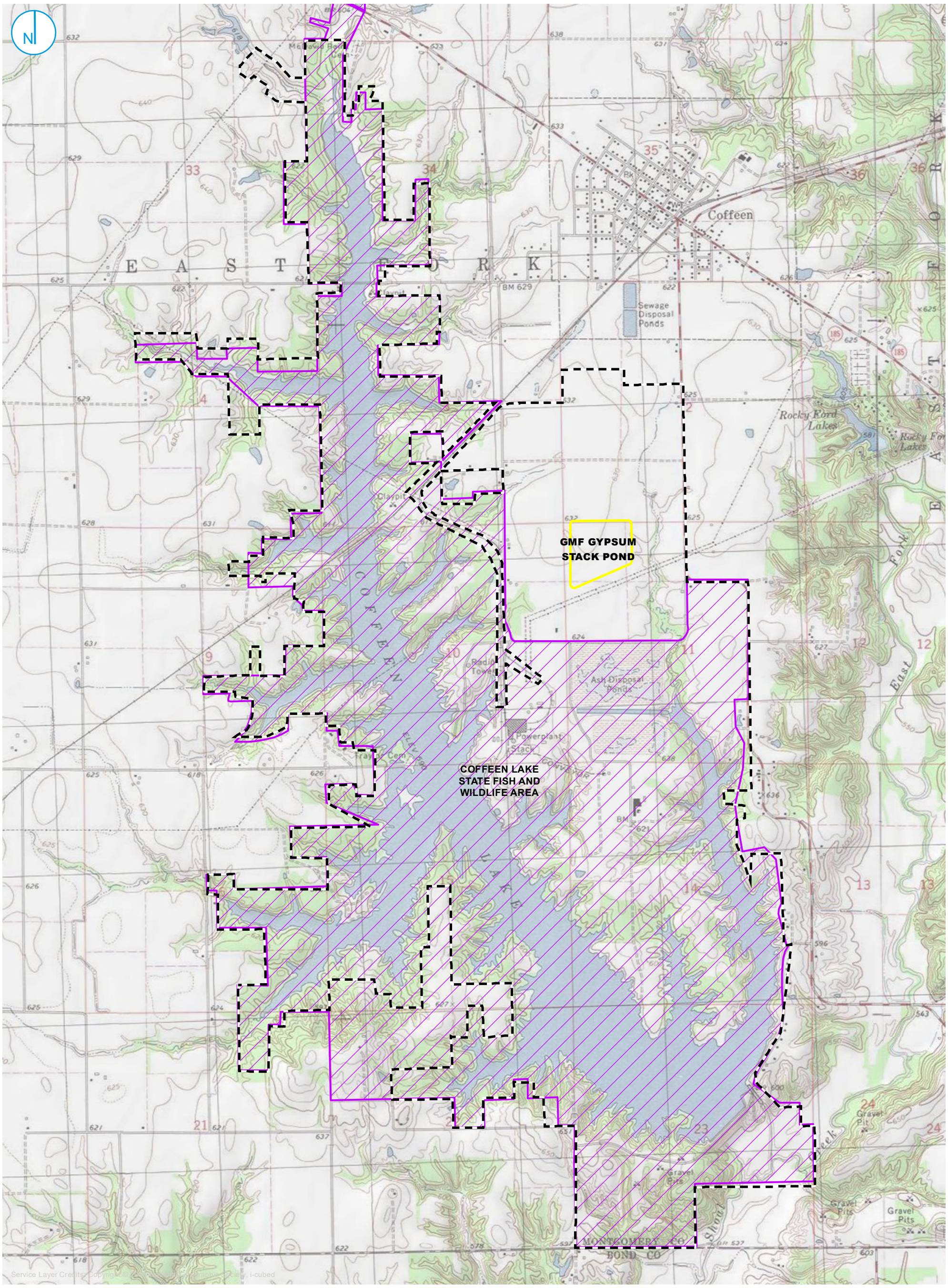
Notes:
LCL = Lower Confidence Level
mg/L = milligrams per liter

Table 3-3. Summary of Groundwater Data
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

HSU	Location	Parameter	Unit	Sample Count	Non-Detect Result Count	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
DA	G206D	Sulfate, total	mg/L	9	0	0	03/30/2021	11/17/2023	153	250	331	600
S	NE Riser	Sulfate, total	mg/L	9	0	0	03/31/2021	02/15/2023	8,800	10,000	10,533	12,000
UA	G200	Sulfate, total	mg/L	35	0	0	01/20/2015	11/14/2023	87.0	100	102	120
UA	G206	Sulfate, total	mg/L	32	0	0	01/21/2015	11/15/2023	32.0	130	124	150
UA	G209	Sulfate, total	mg/L	32	0	0	01/21/2015	11/16/2023	95.0	250	247	310
UA	G212	Sulfate, total	mg/L	32	0	0	01/21/2015	11/16/2023	49.0	54.5	55.7	66.0
UA	G213	Sulfate, total	mg/L	17	0	0	01/21/2015	11/16/2023	50.0	56.0	57.8	79.0
UA	G215	Sulfate, total	mg/L	33	0	0	01/21/2015	11/16/2023	100	180	283	560
UA	G217	Sulfate, total	mg/L	17	0	0	01/21/2015	11/16/2023	130	240	253	427
UA	G218	Sulfate, total	mg/L	32	0	0	01/21/2015	11/16/2023	94.0	145	200	433
UA	R201	Sulfate, total	mg/L	38	0	0	01/20/2015	11/14/2023	89.0	220	212	370

Notes:
DA = Deep Aquifer
HSU = Hydrostratigraphic Unit
mg/L = milligrams per liter
S = Source Water
UA = Uppermost Aquifer

FIGURES



PART 845 REGULATED UNIT (SUBJECT UNIT)
PROPERTY BOUNDARY
COFFEEN LAKE STATE FISH AND WILDLIFE AREA

0 1,000 2,000 Feet

SITE LOCATION MAP

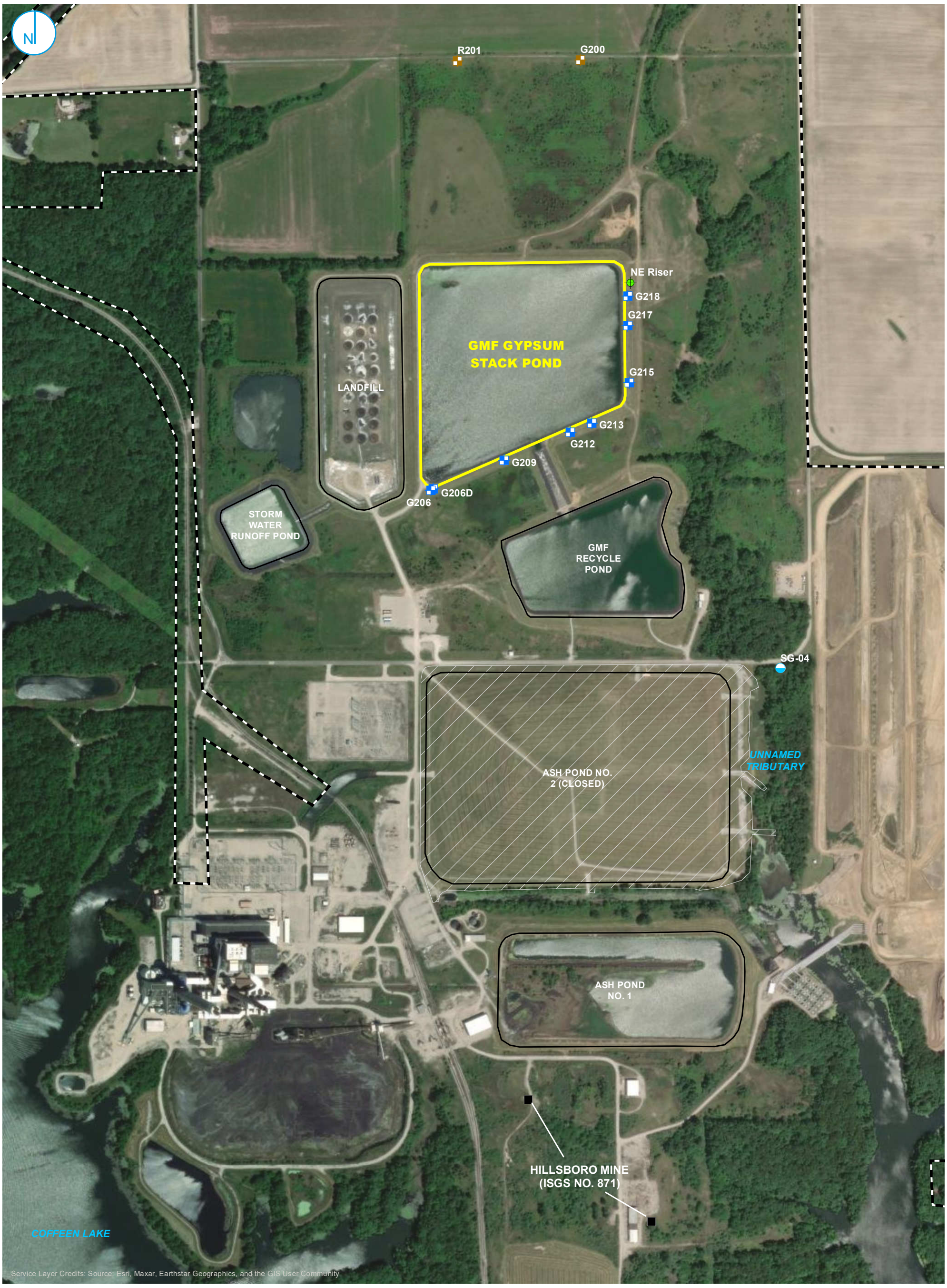
FIGURE 2-1

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- LEACHATE WELL
- STAFF GAGE, RIVER
- COAL MINE SHAFT
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

NOTE:
STAFF GAGE SG-04 WAS IDENTIFIED AS DESTROYED DURING OCTOBER 2023.

0 300 600 Feet

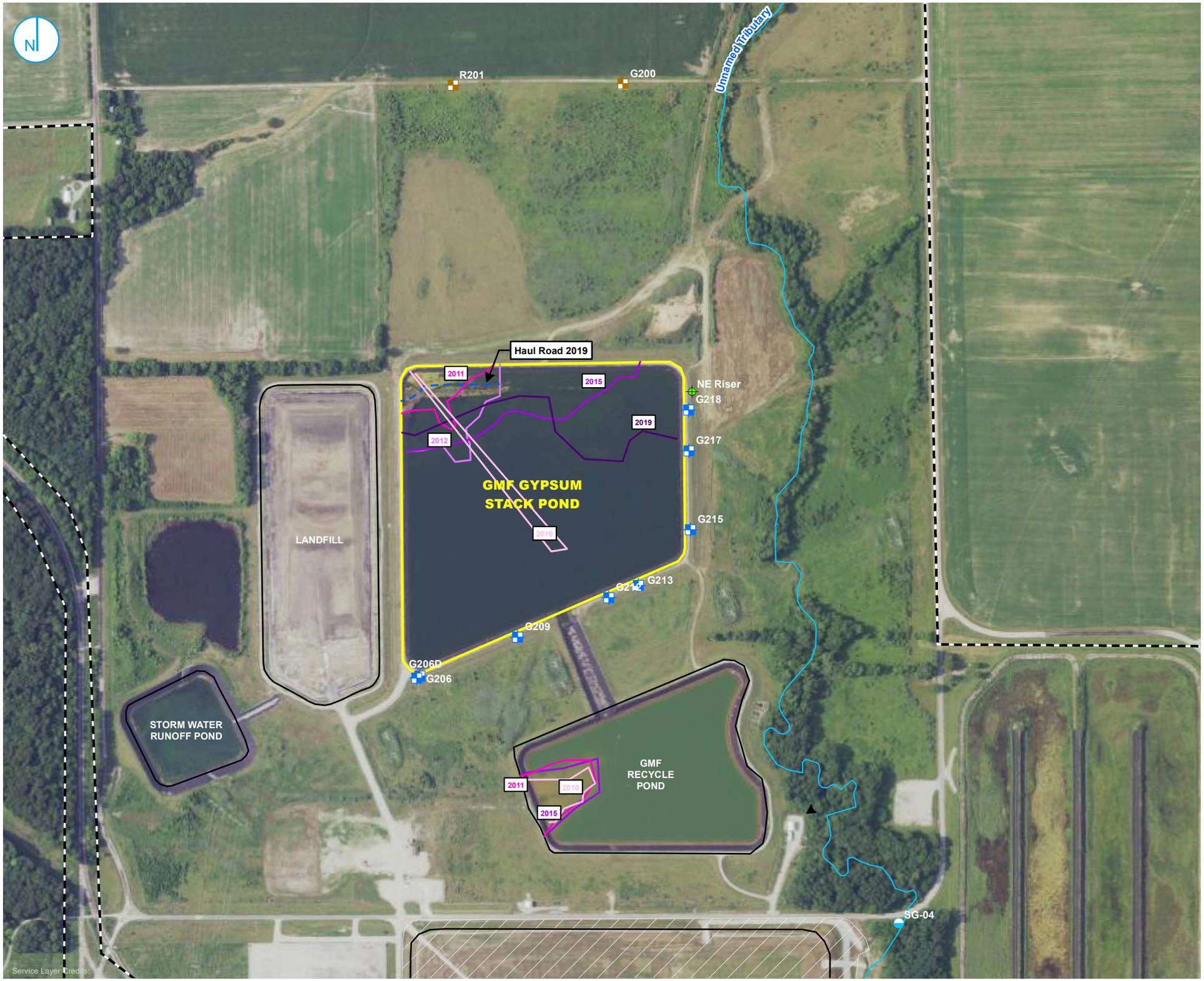
MONITORING WELL LOCATION MAP

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
LEACHATE WELL
STAFF GAGE, RIVER
APPROXIMATE LIMITS OF ASH BASED ON 2010 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2011 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2012 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2015 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2019 AERIAL
HAUL ROAD 2019
SURFACE WATER FEATURE
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTE:
STAFF GAGE SG-04 WAS IDENTIFIED AS DESTROYED DURING OCTOBER 2023.

0 225 450 Feet

CCR OBSERVATIONS

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\Nature_and_Extent\COF\Nature_and_Extent_Report\103\Figure 2-3. CCR Observations.mxd

PROJECT: 169000XXXX | DATED: 5/9/2024 | DESIGNER: GALARNMC

Y:\Mapping\Projects\22\2285\MXD\Nature_and_Extent\COF\Nature_and_Extent_Report\103\Figure 2-4. CCR Access Summary.mxd

PROJECT: 169000XXXX | DATED: 5/29/2024 | DESIGNER: GALARNMC

MONITORING WELL
LEACHATE WELL
SOIL BORING
CCR SAMPLE

626-FT ELEVATION CONTOUR (NAVD88)
SURFACE WATER FEATURE
ELEVATION BELOW 626

REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
PROPERTY BOUNDARY

0 75 150 Feet

CCR ACCESS SUMMARY

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\221285\MXD\Nature_and_Extent\COF\Nature_and_Extent_Report\103\Figure 2-5_Base of CCR.mxd

PROJECT: 169000XXXX | DATED: 5/10/2024 | DESIGNER: GALARNMC

10-FT BOTTOM OF ASH ELEVATION CONTOUR (NAVD88)

2-FT BOTTOM OF ASH ELEVATION CONTOUR (NAVD88)

SURFACE WATER FEATURE

REGULATED UNIT (SUBJECT UNIT)

SITE FEATURE

0 75 150 Feet

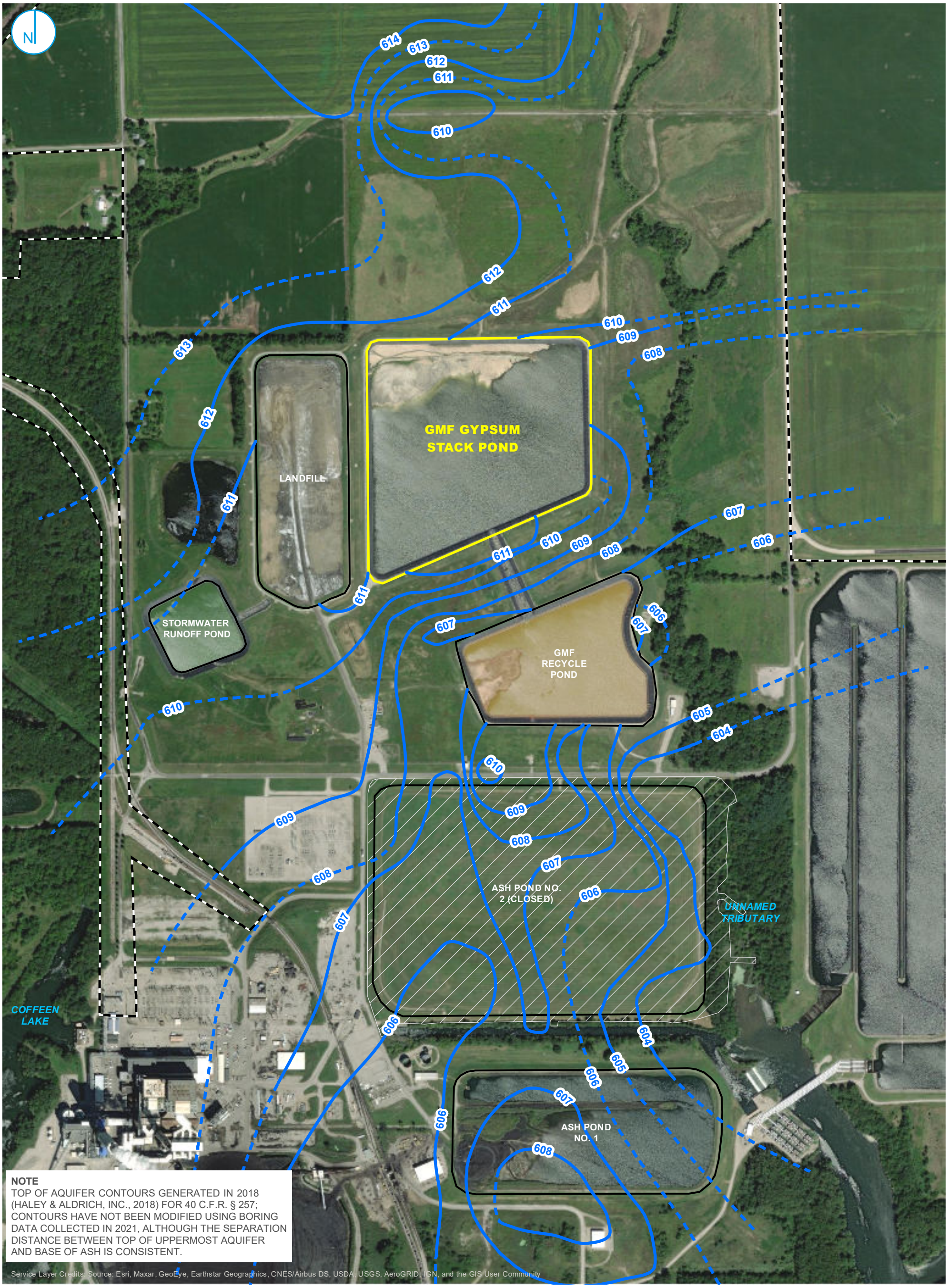
BASE OF CCR

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-5

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



HAGARSTOWN MEMBER ELEVATION CONTOUR (1-FT INTERVAL, NAVD88)
INFERRED HAGARSTOWN MEMBER ELEVATION CONTOUR
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 275 550 Feet

TOP OF UPPERMOST AQUIFER

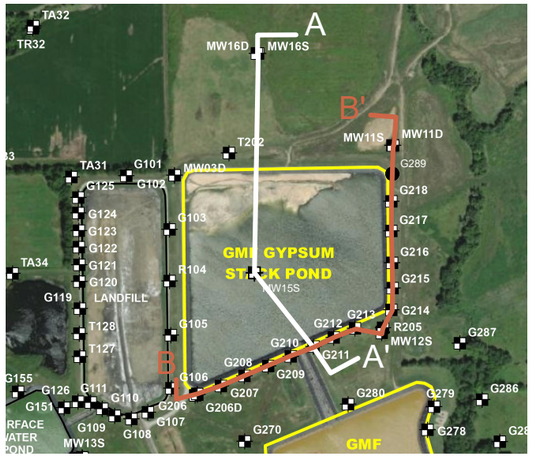
NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-6

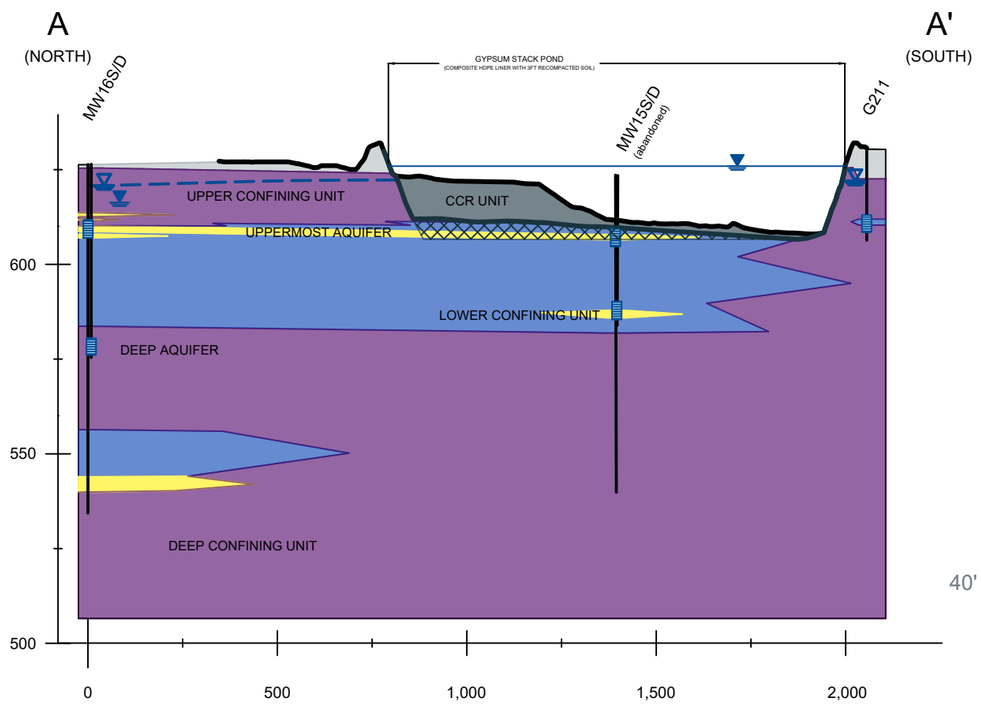
RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

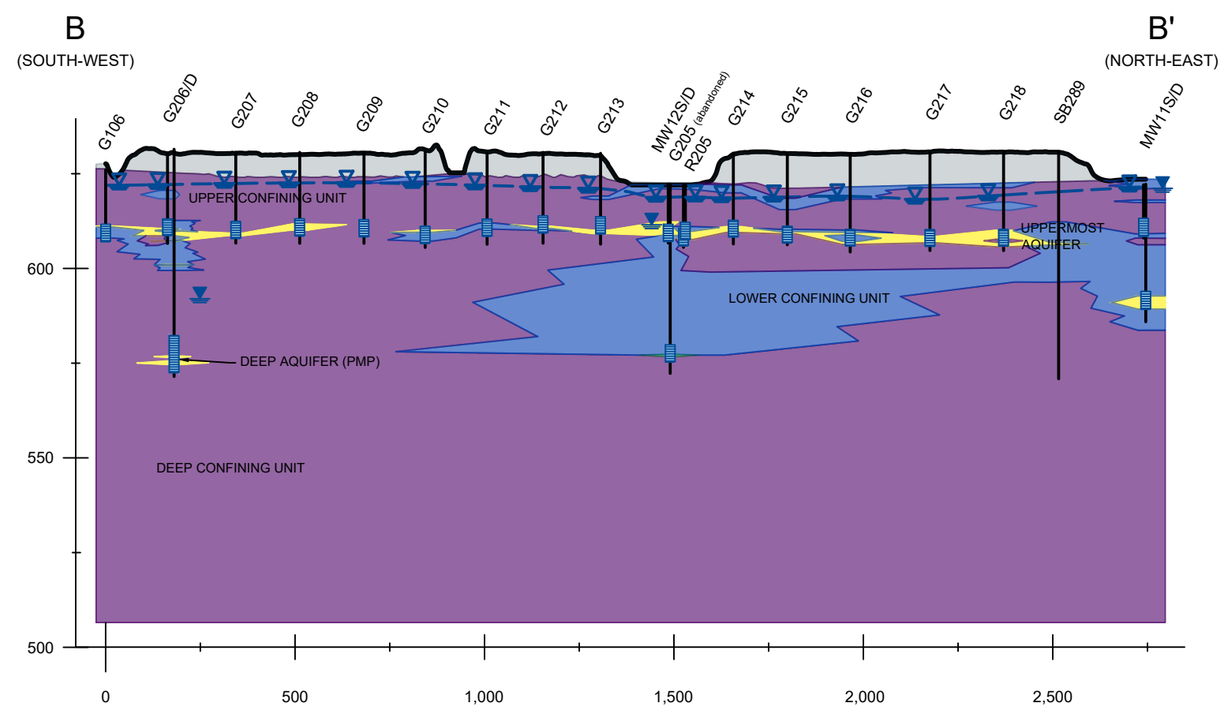
RAMBOLL

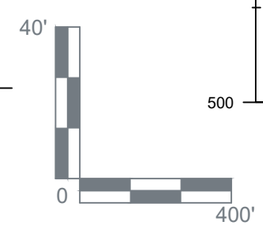


NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 10X.
4. Groundwater elevations measured on July 26, 2021.
5. Updated June 2024 to illustrate area where the uppermost aquifer was removed during unit construction.







LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- FILL
- CLAY (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- PEAT
- WELL SCREEN INTERVAL
- UPPERMOST AQUIFER POTENTIOMETRIC SURFACE
- UPPERMOST AQUIFER GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)
- SURFACE WATER
- MATERIAL REMOVED DURING CONSTRUCTION

GEOLOGIC CROSS SECTIONS
A-A' & B-B'

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

C:\Users\Engelhsa\OneDrive - Ramboll\Projects\Vistra\Modeling & Calcs\COF\CAD\Cross Sections\Coffeen-GMF-GSP-Cross Sections.dwg
DESIGNER: ENGELHSA
DATED: 6/11/2024
PROJECT: 1940100806

COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
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
REGULATED UNIT (SUBJECT UNIT)
LIMITS OF FINAL COVER
PROPERTY BOUNDARY
SITE FEATURE

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)

UPPERMOST AQUIFER POTENTIOMETRIC SURFACE MAP MAY 30, 2023 (E001)

FIGURE 2-8

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

MONITORING WELL

GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

REGULATED UNIT (SUBJECT UNIT)

SITE FEATURE

LIMITS OF FINAL COVER

PROPERTY BOUNDARY

0 325 650 Feet

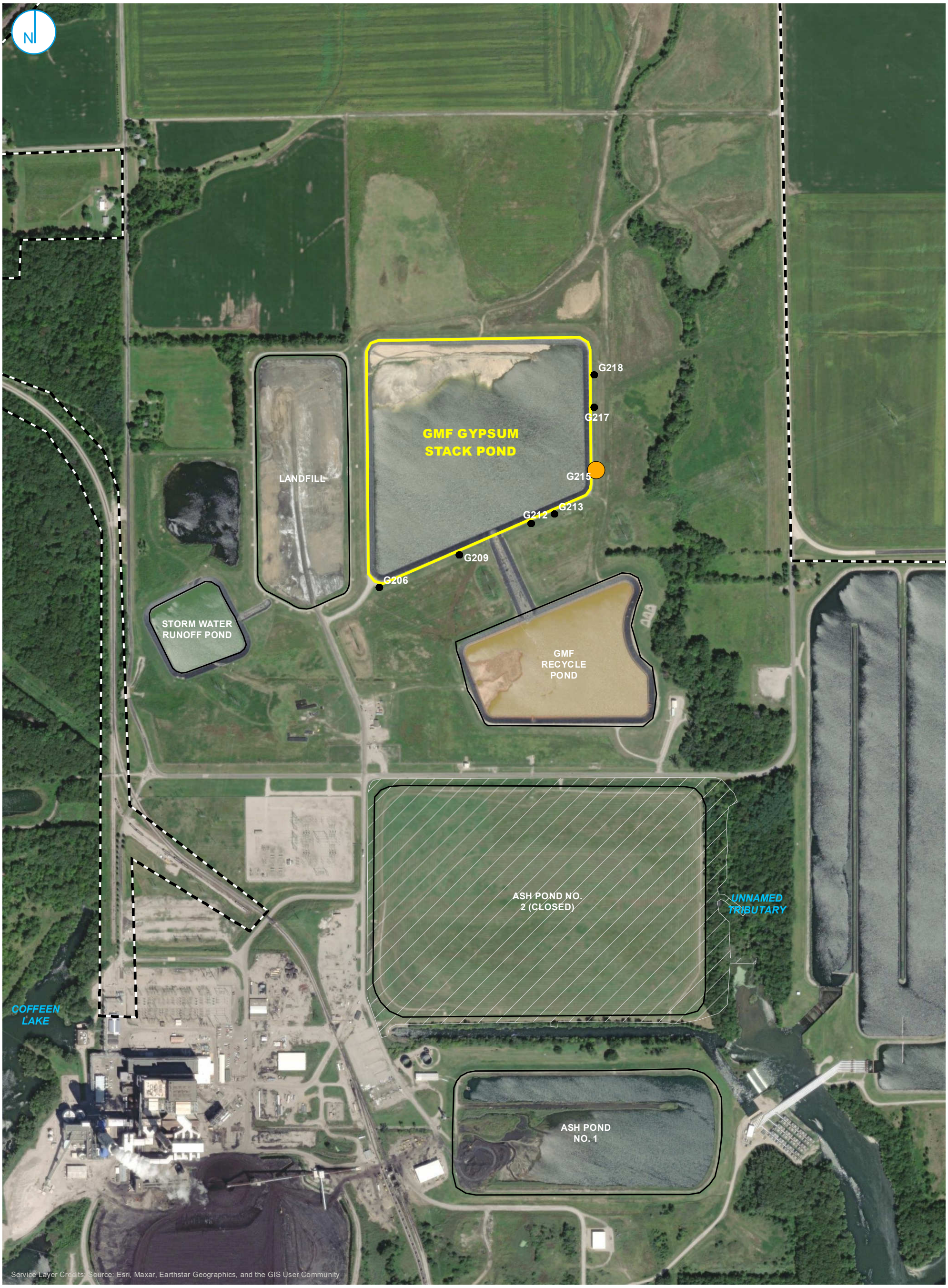
DEEP AQUIFER POTENTIOMETRIC SURFACE MAP- AUGUST 8, 2023 (E002)

FIGURE 2-9

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



TOTAL SULFATE EXCEEDANCE
COMPLIANCE WELL WITHOUT EXCEEDANCE
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 275 550 Feet

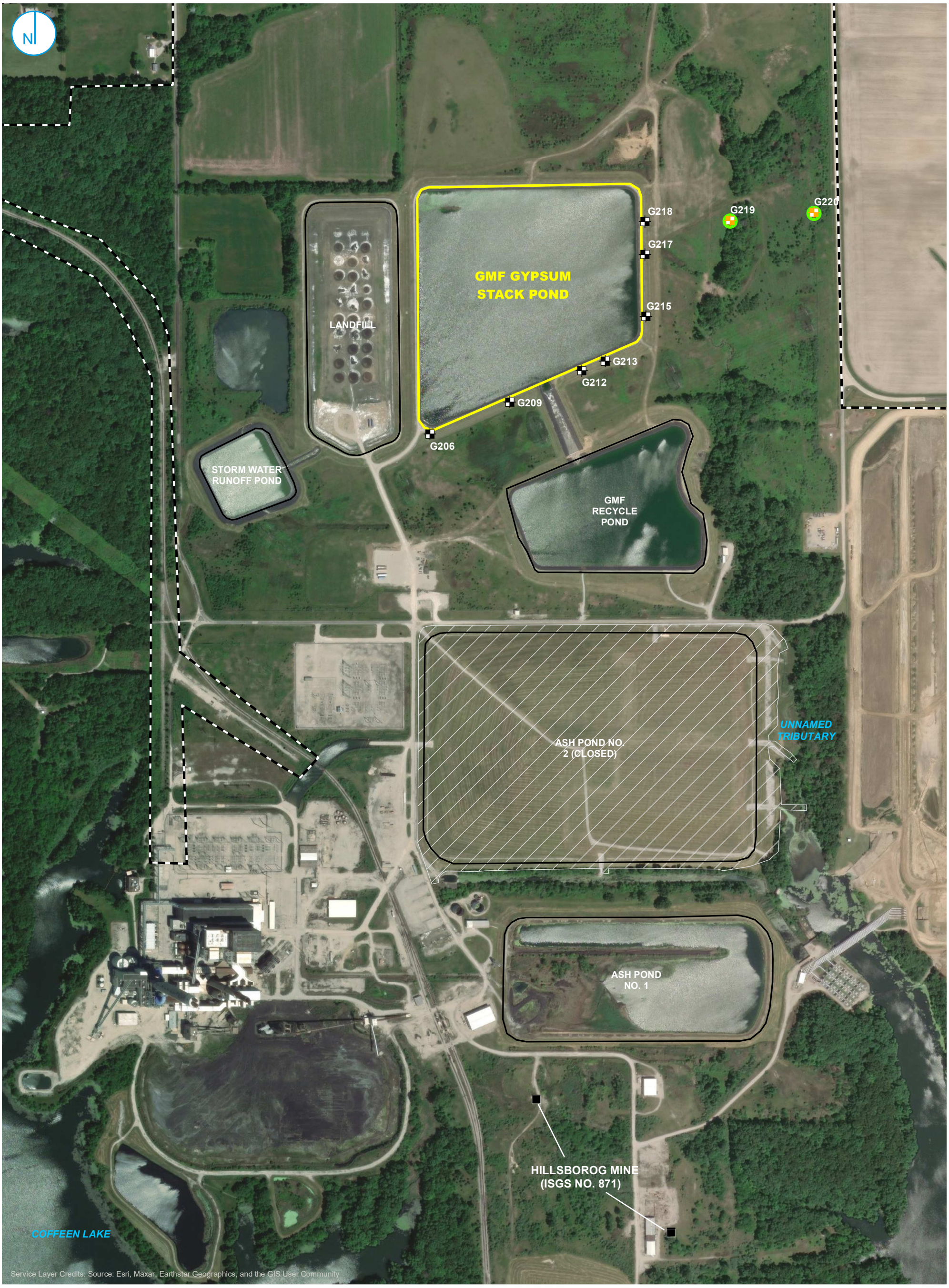
GWPS EXCEEDANCE MAP UPPERMOST AQUIFER

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 3-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



2024 NATURE AND EXTENT INVESTIGATION WELLS
MONITORING WELL
LOCATION IS PRELIMINARY AND PENDING OFFICIAL SURVEY
COAL MINE SHAFT

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

0 275 550 Feet

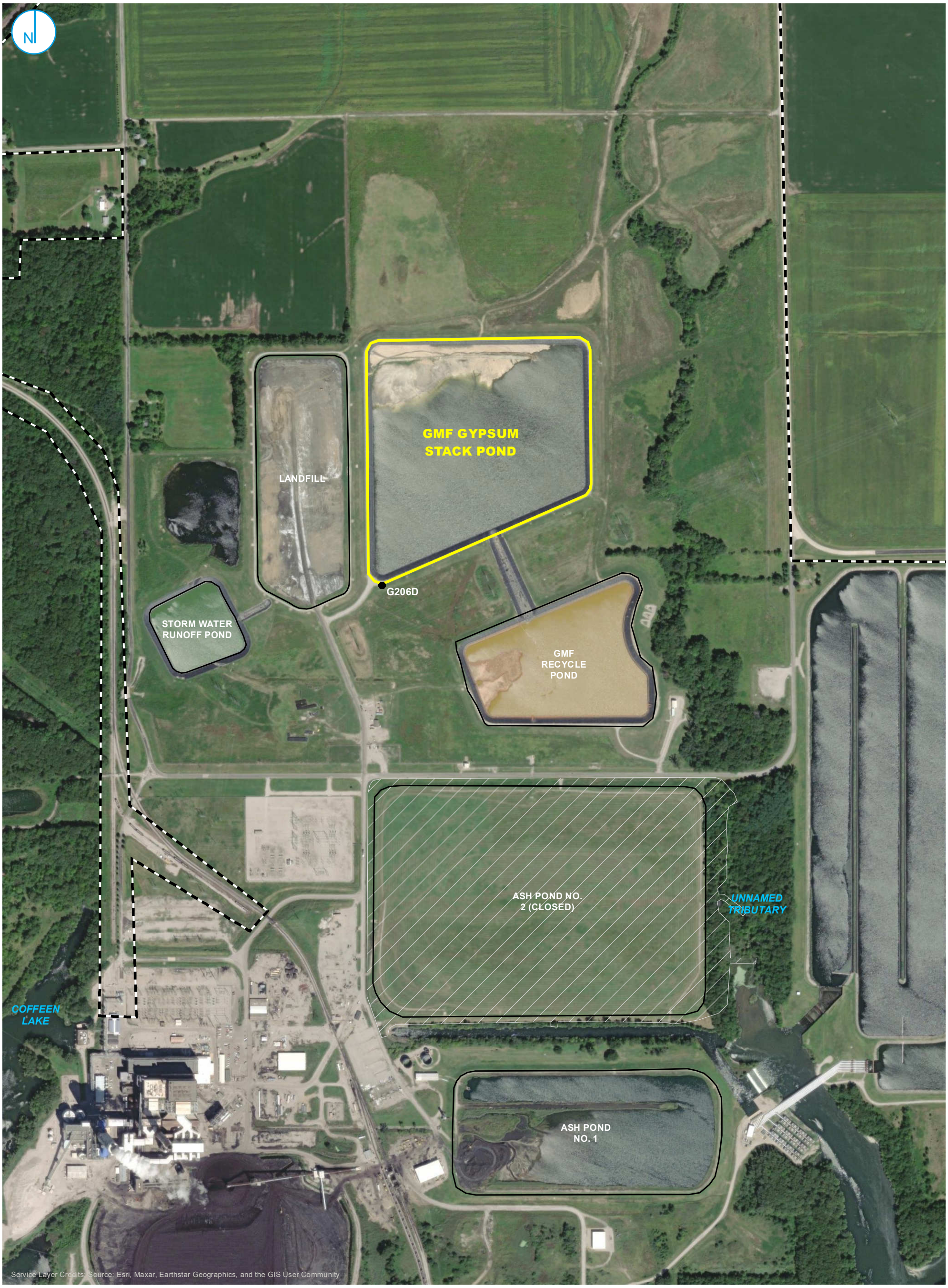
2024 NATURE AND EXTENT INVESTIGATION LOCATIONS

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 3-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



● COMPLIANCE WELL WITHOUT EXCEEDANCE

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

0 275 550 Feet

GWPS EXCEEDANCE MAP
DEEP AQUIFER

FIGURE 3-3

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

APPENDIX A
Site-Wide Groundwater Elevations

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G045D	Water Level	LCU	02/13/2023	9.12	614.69
G045D	Water Level	LCU	05/30/2023	9.82	613.99
G045D	Water Level	LCU	08/08/2023	10.34	613.47
G045D	Water Level	LCU	10/24/2023	10.41	613.40
G045D	Water Level	LCU	11/13/2023	10.26	613.55
G046D	Water Level	LCU	02/13/2023	14.85	610.39
G046D	Water Level	LCU	05/30/2023	14.54	610.70
G046D	Water Level	LCU	08/08/2023	15.10	610.14
G046D	Water Level	LCU	10/24/2023	15.59	609.65
G046D	Water Level	LCU	11/13/2023	15.54	609.70
G1001	Water Level	LCU	02/13/2023	6.12	591.49
G1001	Water Level	LCU	03/30/2023	6.09	591.51
G1001	Water Level	LCU	04/30/2023	6.53	591.07
G1001	Water Level	LCU	05/30/2023	6.61	590.99
G1001	Water Level	LCU	08/08/2023	6.32	591.29
G1001	Water Level	LCU	09/25/2023	6.14	591.46
G1001	Water Level	LCU	10/24/2023	6.20	591.41
G1001	Water Level	LCU	11/13/2023	6.49	591.12
G1001	Water Level	LCU	12/18/2023	5.88	591.73
G1003	Water Level	LCU	02/13/2023	Dry	Dry
G1003	Water Level	LCU	05/30/2023	Dry	Dry
G1003	Water Level	LCU	08/08/2023	Dry	Dry
G1003	Water Level	LCU	10/24/2023	Dry	Dry
G1003	Water Level	LCU	11/13/2023	Dry	Dry
G101	Water Level	UA	02/13/2023	4.71	622.89
G101	Water Level	UA	05/30/2023	6.53	621.07
G101	Water Level	UA	08/08/2023	11.16	616.44
G101	Water Level	UA	10/25/2023	14.15	613.45
G101	Water Level	UA	11/13/2023	13.95	613.65
G102	Water Level	UA	02/13/2023	4.80	624.24
G102	Water Level	UA	08/08/2023	10.34	618.70
G102	Water Level	UA	10/24/2023	12.60	616.44
G102	Water Level	UA	11/13/2023	12.84	616.20
G102	Water Level	UA	12/18/2023	12.82	616.22

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G103	Water Level	UA	02/13/2023	9.59	624.21
G103	Water Level	UA	03/30/2023	7.94	625.85
G103	Water Level	UA	04/30/2023	9.58	624.21
G103	Water Level	UA	05/30/2023	10.49	623.31
G103	Water Level	UA	06/08/2023	11.00	622.80
G103	Water Level	UA	07/08/2023	12.05	621.74
G103	Water Level	UA	08/08/2023	13.53	620.27
G103	Water Level	UA	09/25/2023	14.74	619.06
G103	Water Level	UA	10/25/2023	15.66	618.14
G103	Water Level	UA	11/13/2023	16.00	617.80
G103	Water Level	UA	12/18/2023	16.24	617.56
G105	Water Level	UA	02/13/2023	8.24	623.84
G105	Water Level	UA	08/08/2023	10.84	621.24
G105	Water Level	UA	09/25/2023	15.74	616.34
G105	Water Level	UA	10/25/2023	12.90	619.18
G105	Water Level	UA	11/13/2023	13.46	618.62
G105	Water Level	UA	12/18/2023	13.63	618.45
G106	Water Level	UA	02/13/2023	8.44	622.71
G106	Water Level	UA	03/30/2023	7.82	623.32
G106	Water Level	UA	04/30/2023	9.16	621.98
G106	Water Level	UA	05/30/2023	9.81	621.33
G106	Water Level	UA	06/08/2023	10.39	620.76
G106	Water Level	UA	07/08/2023	10.50	620.65
G106	Water Level	UA	08/08/2023	12.17	618.98
G106	Water Level	UA	09/25/2023	12.97	618.18
G106	Water Level	UA	10/25/2023	14.01	617.14
G106	Water Level	UA	11/13/2023	14.21	616.94
G106	Water Level	UA	12/18/2023	13.87	617.28
G107	Water Level	UA	02/13/2023	9.07	621.15
G107	Water Level	UA	05/30/2023	10.85	619.37
G107	Water Level	UA	08/08/2023	12.76	617.46
G107	Water Level	UA	10/25/2023	14.31	615.91
G107	Water Level	UA	11/13/2023	14.40	615.82
G108	Water Level	UA	02/13/2023	9.67	620.55

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G108	Water Level	UA	05/30/2023	11.65	618.57
G108	Water Level	UA	08/08/2023	13.24	616.98
G108	Water Level	UA	10/25/2023	14.89	615.33
G108	Water Level	UA	11/13/2023	14.96	615.26
G109	Water Level	UA	02/13/2023	9.81	619.95
G109	Water Level	UA	05/30/2023	11.89	617.87
G109	Water Level	UA	08/08/2023	13.64	616.12
G109	Water Level	UA	10/25/2023	14.89	614.87
G109	Water Level	UA	11/13/2023	15.09	614.67
G110	Water Level	UA	02/13/2023	10.80	618.85
G110	Water Level	UA	05/30/2023	12.70	616.95
G110	Water Level	UA	08/08/2023	14.16	615.49
G110	Water Level	UA	10/25/2023	15.31	614.34
G110	Water Level	UA	11/13/2023	15.43	614.22
G111	Water Level	UA	02/13/2023	12.91	616.99
G111	Water Level	UA	05/30/2023	13.70	616.20
G111	Water Level	UA	08/08/2023	14.95	614.95
G111	Water Level	UA	10/25/2023	16.00	613.90
G111	Water Level	UA	11/13/2023	16.09	613.81
G119	Water Level	UA	02/13/2023	14.64	616.91
G119	Water Level	UA	05/30/2023	15.08	616.47
G119	Water Level	UA	08/08/2023	15.65	615.90
G119	Water Level	UA	10/25/2023	16.40	615.15
G119	Water Level	UA	11/13/2023	16.25	615.30
G120	Water Level	UA	02/13/2023	14.43	617.44
G120	Water Level	UA	05/30/2023	14.86	617.01
G120	Water Level	UA	08/08/2023	16.31	615.56
G120	Water Level	UA	10/25/2023	17.18	614.69
G120	Water Level	UA	11/13/2023	17.08	614.79
G121	Water Level	UA	02/13/2023	14.72	618.11
G121	Water Level	UA	05/30/2023	15.38	617.45
G121	Water Level	UA	08/08/2023	18.40	614.43
G121	Water Level	UA	10/25/2023	19.45	613.38
G121	Water Level	UA	11/13/2023	18.96	613.87

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G122	Water Level	UA	02/13/2023	13.89	618.80
G122	Water Level	UA	05/30/2023	14.00	618.69
G122	Water Level	UA	08/08/2023	19.54	613.15
G122	Water Level	UA	10/25/2023	21.21	611.48
G122	Water Level	UA	11/13/2023	20.40	612.29
G123	Water Level	UA	02/13/2023	11.80	621.16
G123	Water Level	UA	05/30/2023	12.68	620.28
G123	Water Level	UA	08/08/2023	18.57	614.39
G123	Water Level	UA	10/25/2023	20.09	612.87
G123	Water Level	UA	11/13/2023	19.94	613.02
G124	Water Level	UA	02/13/2023	12.14	621.25
G124	Water Level	UA	05/30/2023	13.43	619.96
G124	Water Level	UA	08/08/2023	18.49	614.90
G124	Water Level	UA	10/25/2023	21.05	612.34
G124	Water Level	UA	11/13/2023	Dry	Dry
G125	Water Level	UA	02/13/2023	11.99	621.52
G125	Water Level	UA	05/30/2023	13.54	619.97
G125	Water Level	UA	08/08/2023	18.53	614.98
G125	Water Level	UA	10/25/2023	21.21	612.30
G125	Water Level	UA	11/13/2023	Dry	Dry
G126	Water Level	UA	02/13/2023	8.92	616.47
G126	Water Level	UA	05/30/2023	10.04	615.35
G126	Water Level	UA	08/08/2023	10.93	614.46
G126	Water Level	UA	10/25/2023	11.85	613.54
G126	Water Level	UA	11/13/2023	11.91	613.48
G151	Water Level	UA	02/13/2023	10.88	615.05
G151	Water Level	UA	05/30/2023	11.58	614.35
G151	Water Level	UA	08/08/2023	12.22	613.71
G151	Water Level	UA	10/25/2023	12.99	612.94
G151	Water Level	UA	11/13/2023	12.97	612.96
G152	Water Level	UA	02/13/2023	10.25	616.27
G152	Water Level	UA	05/30/2023	11.11	615.41
G152	Water Level	UA	08/08/2023	12.40	614.12
G152	Water Level	UA	10/25/2023	13.42	613.10

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G152	Water Level	UA	11/13/2023	13.07	613.45
G153	Water Level	UA	02/13/2023	12.24	614.16
G153	Water Level	UA	05/30/2023	11.40	615.00
G153	Water Level	UA	08/08/2023	13.08	613.32
G153	Water Level	UA	10/25/2023	14.81	611.59
G153	Water Level	UA	11/13/2023	14.90	611.50
G154	Water Level	UA	02/13/2023	10.91	615.44
G154	Water Level	UA	05/30/2023	13.15	613.20
G154	Water Level	UA	08/08/2023	14.60	611.75
G154	Water Level	UA	10/25/2023	15.90	610.45
G154	Water Level	UA	11/13/2023	15.76	610.59
G155	Water Level	UA	02/13/2023	11.56	614.30
G155	Water Level	UA	05/30/2023	12.44	613.42
G155	Water Level	UA	08/08/2023	13.21	612.65
G155	Water Level	UA	10/25/2023	14.01	611.85
G155	Water Level	UA	11/13/2023	13.92	611.94
G200	Water Level	UA	02/13/2023	2.91	623.03
G200	Water Level	UA	03/30/2023	3.01	622.92
G200	Water Level	UA	04/30/2023	4.51	621.42
G200	Water Level	UA	05/30/2023	5.89	620.04
G200	Water Level	UA	06/08/2023	6.44	619.49
G200	Water Level	UA	08/08/2023	9.21	616.73
G200	Water Level	UA	09/25/2023	10.61	615.33
G200	Water Level	UA	10/25/2023	11.51	614.43
G200	Water Level	UA	11/13/2023	11.88	614.06
G200	Water Level	UA	12/18/2023	11.48	614.46
G206	Water Level	UA	02/13/2023	9.20	623.62
G206	Water Level	UA	03/30/2023	9.12	623.69
G206	Water Level	UA	04/30/2023	10.27	622.54
G206	Water Level	UA	05/30/2023	11.17	621.64
G206	Water Level	UA	07/08/2023	12.13	620.69
G206	Water Level	UA	08/08/2023	13.89	618.93
G206	Water Level	UA	09/25/2023	14.74	618.08
G206	Water Level	UA	10/25/2023	15.71	617.11

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G206	Water Level	UA	11/13/2023	16.16	616.66
G206	Water Level	UA	12/18/2023	15.85	616.97
G206D	Water Level	DA	02/13/2023	9.92	624.22
G206D	Water Level	DA	02/16/2023	[29.69]	[604.16]
G206D	Water Level	DA	03/30/2023	32.14	601.99
G206D	Water Level	DA	04/30/2023	30.53	603.60
G206D	Water Level	DA	05/30/2023	30.22	603.91
G206D	Water Level	DA	07/08/2023	30.10	604.04
G206D	Water Level	DA	08/08/2023	30.04	604.10
G206D	Water Level	DA	09/25/2023	30.08	604.06
G206D	Water Level	DA	10/25/2023	30.34	603.80
G206D	Water Level	DA	11/13/2023	30.40	603.74
G206D	Water Level	DA	12/18/2023	30.32	603.82
G207	Water Level	UA	02/13/2023	10.25	622.96
G207	Water Level	UA	03/30/2023	9.67	623.53
G207	Water Level	UA	04/30/2023	10.55	622.65
G207	Water Level	UA	05/30/2023	11.47	621.73
G207	Water Level	UA	07/08/2023	12.45	620.76
G207	Water Level	UA	08/08/2023	14.20	619.01
G207	Water Level	UA	09/25/2023	15.27	617.94
G207	Water Level	UA	10/25/2023	16.24	616.97
G207	Water Level	UA	11/13/2023	16.67	616.54
G207	Water Level	UA	12/18/2023	16.31	616.90
G208	Water Level	UA	02/13/2023	10.28	622.88
G208	Water Level	UA	03/30/2023	9.65	623.50
G208	Water Level	UA	04/30/2023	10.30	622.85
G208	Water Level	UA	05/30/2023	11.10	622.05
G208	Water Level	UA	06/08/2023	12.38	620.78
G208	Water Level	UA	07/08/2023	12.32	620.83
G208	Water Level	UA	08/08/2023	14.08	619.08
G208	Water Level	UA	09/25/2023	15.31	617.84
G208	Water Level	UA	10/25/2023	16.25	616.91
G208	Water Level	UA	11/13/2023	16.66	616.50
G208	Water Level	UA	12/18/2023	16.24	616.92

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G209	Water Level	UA	02/13/2023	10.01	622.90
G209	Water Level	UA	03/30/2023	9.63	623.27
G209	Water Level	UA	04/30/2023	10.25	622.65
G209	Water Level	UA	05/30/2023	11.07	621.83
G209	Water Level	UA	07/08/2023	11.82	621.08
G209	Water Level	UA	08/08/2023	13.79	619.12
G209	Water Level	UA	09/25/2023	14.78	618.13
G209	Water Level	UA	10/25/2023	15.60	617.31
G209	Water Level	UA	11/13/2023	16.24	616.67
G209	Water Level	UA	12/18/2023	16.04	616.87
G210	Water Level	UA	02/13/2023	10.49	622.50
G210	Water Level	UA	03/30/2023	9.73	623.25
G210	Water Level	UA	04/30/2023	10.36	622.62
G210	Water Level	UA	05/30/2023	11.09	621.89
G210	Water Level	UA	06/08/2023	11.76	621.23
G210	Water Level	UA	07/08/2023	12.29	620.70
G210	Water Level	UA	08/08/2023	13.75	619.24
G210	Water Level	UA	09/25/2023	14.67	618.32
G210	Water Level	UA	10/25/2023	15.52	617.47
G210	Water Level	UA	11/13/2023	15.82	617.17
G210	Water Level	UA	12/18/2023	15.99	617.00
G211	Water Level	UA	02/13/2023	9.90	622.74
G211	Water Level	UA	03/30/2023	9.18	623.45
G211	Water Level	UA	04/30/2023	9.99	622.64
G211	Water Level	UA	05/30/2023	10.54	622.09
G211	Water Level	UA	06/08/2023	11.76	620.88
G211	Water Level	UA	07/08/2023	12.43	620.21
G211	Water Level	UA	08/08/2023	13.44	619.20
G211	Water Level	UA	09/25/2023	14.74	617.90
G211	Water Level	UA	10/25/2023	15.15	617.49
G211	Water Level	UA	11/13/2023	15.61	617.03
G211	Water Level	UA	12/18/2023	15.93	616.71
G212	Water Level	UA	02/13/2023	10.38	622.51
G212	Water Level	UA	03/30/2023	9.77	623.11

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G212	Water Level	UA	04/30/2023	10.89	621.99
G212	Water Level	UA	05/30/2023	11.64	621.24
G212	Water Level	UA	06/08/2023	12.80	620.08
G212	Water Level	UA	07/08/2023	13.48	619.41
G212	Water Level	UA	08/08/2023	14.61	618.28
G212	Water Level	UA	09/25/2023	15.97	616.92
G212	Water Level	UA	10/25/2023	16.46	616.43
G212	Water Level	UA	11/13/2023	16.92	615.97
G212	Water Level	UA	12/18/2023	17.00	615.89
G213	Water Level	UA	02/13/2023	10.83	621.98
G213	Water Level	UA	03/30/2023	10.15	622.65
G213	Water Level	UA	04/30/2023	11.04	621.76
G213	Water Level	UA	05/30/2023	11.96	620.84
G213	Water Level	UA	06/08/2023	12.80	620.00
G213	Water Level	UA	07/08/2023	13.50	619.31
G213	Water Level	UA	08/08/2023	15.05	617.76
G213	Water Level	UA	09/25/2023	15.90	616.91
G213	Water Level	UA	10/25/2023	16.81	616.00
G213	Water Level	UA	11/13/2023	17.41	615.40
G213	Water Level	UA	12/18/2023	17.34	615.47
G214	Water Level	UA	02/13/2023	14.53	618.32
G214	Water Level	UA	03/30/2023	13.04	619.80
G214	Water Level	UA	04/30/2023	13.98	618.86
G214	Water Level	UA	05/30/2023	14.73	618.11
G214	Water Level	UA	06/08/2023	15.56	617.29
G214	Water Level	UA	07/08/2023	16.44	616.41
G214	Water Level	UA	08/08/2023	17.64	615.21
G214	Water Level	UA	09/25/2023	18.42	614.43
G214	Water Level	UA	10/25/2023	19.14	613.71
G214	Water Level	UA	11/13/2023	19.35	613.50
G214	Water Level	UA	12/18/2023	19.23	613.62
G215	Water Level	UA	02/13/2023	14.38	618.68
G215	Water Level	UA	03/30/2023	13.16	619.89
G215	Water Level	UA	04/30/2023	14.03	619.02

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G215	Water Level	UA	05/30/2023	14.76	618.29
G215	Water Level	UA	06/08/2023	15.46	617.59
G215	Water Level	UA	07/08/2023	16.06	616.99
G215	Water Level	UA	08/08/2023	17.22	615.84
G215	Water Level	UA	09/25/2023	18.06	614.99
G215	Water Level	UA	10/25/2023	18.41	614.65
G215	Water Level	UA	11/13/2023	19.03	614.03
G215	Water Level	UA	12/18/2023	18.75	614.31
G216	Water Level	UA	02/13/2023	13.54	619.22
G216	Water Level	UA	03/30/2023	12.27	620.48
G216	Water Level	UA	04/30/2023	12.94	619.81
G216	Water Level	UA	05/30/2023	13.63	619.12
G216	Water Level	UA	06/08/2023	14.99	617.77
G216	Water Level	UA	07/08/2023	15.42	617.33
G216	Water Level	UA	08/08/2023	16.51	616.25
G216	Water Level	UA	09/25/2023	17.38	615.38
G216	Water Level	UA	10/25/2023	17.86	614.90
G216	Water Level	UA	11/13/2023	18.21	614.55
G216	Water Level	UA	12/18/2023	18.00	614.76
G217	Water Level	UA	02/13/2023	14.72	618.38
G217	Water Level	UA	08/08/2023	18.29	614.81
G217	Water Level	UA	10/25/2023	19.51	613.59
G217	Water Level	UA	11/13/2023	19.68	613.42
G217	Water Level	UA	12/18/2023	19.33	613.77
G218	Water Level	UA	02/13/2023	13.71	619.40
G218	Water Level	UA	03/30/2023	12.50	620.60
G218	Water Level	UA	04/30/2023	12.98	620.12
G218	Water Level	UA	05/30/2023	13.72	619.38
G218	Water Level	UA	06/08/2023	15.11	618.00
G218	Water Level	UA	07/08/2023	15.80	617.31
G218	Water Level	UA	08/08/2023	16.98	616.13
G218	Water Level	UA	09/25/2023	17.95	615.16
G218	Water Level	UA	10/25/2023	18.48	614.63
G218	Water Level	UA	11/13/2023	18.67	614.44

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G218	Water Level	UA	12/18/2023	18.38	614.73
G270	Water Level	UA	02/13/2023	2.53	623.33
G270	Water Level	UA	03/30/2023	2.41	623.44
G270	Water Level	UA	04/30/2023	2.83	623.02
G270	Water Level	UA	05/30/2023	5.06	620.79
G270	Water Level	UA	08/14/2023	[8.52]	[617.34]
G270	Water Level	UA	10/25/2023	10.92	614.94
G270	Water Level	UA	11/13/2023	10.90	614.96
G270	Water Level	UA	12/18/2023	9.84	616.02
G271	Water Level	UA	02/13/2023	8.93	616.64
G271	Water Level	UA	03/30/2023	7.12	618.44
G271	Water Level	UA	04/30/2023	8.97	616.59
G271	Water Level	UA	05/30/2023	9.28	616.28
G271	Water Level	UA	06/08/2023	9.57	615.99
G271	Water Level	UA	07/08/2023	9.83	615.73
G271	Water Level	UA	08/08/2023	11.20	614.37
G271	Water Level	UA	09/25/2023	12.44	613.13
G271	Water Level	UA	10/25/2023	12.95	612.62
G271	Water Level	UA	11/13/2023	13.00	612.57
G271	Water Level	UA	12/18/2023	12.79	612.78
G272	Water Level	UA	02/13/2023	8.55	615.26
G272	Water Level	UA	03/30/2023	6.96	616.84
G272	Water Level	UA	04/30/2023	9.20	614.60
G272	Water Level	UA	05/30/2023	9.48	614.32
G272	Water Level	UA	08/08/2023	10.55	613.26
G272	Water Level	UA	09/25/2023	11.63	612.18
G272	Water Level	UA	10/25/2023	12.03	611.78
G272	Water Level	UA	11/13/2023	12.01	611.80
G272	Water Level	UA	12/18/2023	11.81	612.00
G273	Water Level	UA	02/13/2023	8.95	614.07
G273	Water Level	UA	03/30/2023	7.80	615.21
G273	Water Level	UA	04/30/2023	10.09	612.92
G273	Water Level	UA	05/30/2023	10.41	612.60
G273	Water Level	UA	08/08/2023	11.56	611.46

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G273	Water Level	UA	09/25/2023	12.39	610.63
G273	Water Level	UA	10/25/2023	12.78	610.24
G273	Water Level	UA	11/13/2023	12.71	610.31
G273	Water Level	UA	12/18/2023	12.40	610.62
G274	Water Level	UA	02/13/2023	13.22	610.82
G274	Water Level	UA	03/30/2023	11.96	612.07
G274	Water Level	UA	04/30/2023	13.85	610.18
G274	Water Level	UA	05/30/2023	14.16	609.87
G274	Water Level	UA	06/08/2023	14.41	609.63
G274	Water Level	UA	07/08/2023	14.33	609.70
G274	Water Level	UA	08/08/2023	14.99	609.05
G274	Water Level	UA	09/25/2023	15.46	608.57
G274	Water Level	UA	10/25/2023	Dry	Dry
G274	Water Level	UA	11/13/2023	15.77	608.27
G274	Water Level	UA	12/18/2023	15.53	608.51
G275	Water Level	UA	02/13/2023	13.02	605.24
G275	Water Level	UA	05/30/2023	13.38	604.88
G275	Water Level	UA	08/08/2023	Dry	Dry
G275	Water Level	UA	11/13/2023	Dry	Dry
G275D	Water Level	DA	02/13/2023	39.49	580.82
G275D	Water Level	DA	08/08/2023	31.27	589.04
G275D	Water Level	DA	09/25/2023	42.29	578.02
G275D	Water Level	DA	10/25/2023	39.74	580.57
G275D	Water Level	DA	12/18/2023	43.46	576.85
G276	Water Level	UA	02/13/2023	27.37	604.63
G276	Water Level	UA	03/30/2023	25.78	606.21
G276	Water Level	UA	04/30/2023	26.04	605.95
G276	Water Level	UA	05/30/2023	26.60	605.39
G276	Water Level	UA	06/08/2023	26.84	605.16
G276	Water Level	UA	07/08/2023	27.27	604.73
G276	Water Level	UA	08/08/2023	27.75	604.25
G276	Water Level	UA	10/25/2023	28.49	603.51
G276	Water Level	UA	11/13/2023	28.59	603.41
G276	Water Level	UA	12/18/2023	28.71	603.29

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G277	Water Level	UA	02/13/2023	19.67	603.41
G277	Water Level	UA	05/30/2023	18.21	604.87
G277	Water Level	UA	08/08/2023	19.76	603.32
G277	Water Level	UA	11/13/2023	Dry	Dry
G278	Water Level	UA	02/13/2023	19.95	611.22
G278	Water Level	UA	05/30/2023	21.75	609.42
G278	Water Level	UA	08/08/2023	20.98	610.19
G278	Water Level	UA	10/25/2023	23.48	607.69
G278	Water Level	UA	11/13/2023	24.23	606.94
G279	Water Level	UA	02/13/2023	20.83	611.21
G279	Water Level	UA	05/30/2023	22.73	609.31
G279	Water Level	UA	08/08/2023	23.69	608.35
G279	Water Level	UA	10/25/2023	24.56	607.48
G279	Water Level	UA	11/13/2023	23.39	608.65
G280	Water Level	UA	02/13/2023	3.01	622.34
G280	Water Level	UA	03/30/2023	2.74	622.60
G280	Water Level	UA	04/30/2023	3.52	621.82
G280	Water Level	UA	05/30/2023	3.96	621.38
G280	Water Level	UA	08/08/2023	5.80	619.55
G280	Water Level	UA	09/25/2023	7.42	617.92
G280	Water Level	UA	10/25/2023	8.56	616.79
G280	Water Level	UA	11/13/2023	8.91	616.44
G280	Water Level	UA	12/18/2023	9.04	616.31
G281	Water Level	UA	02/13/2023	4.63	621.73
G281	Water Level	UA	03/30/2023	3.94	622.41
G281	Water Level	UA	04/30/2023	6.44	619.91
G281	Water Level	UA	05/30/2023	6.64	619.71
G281	Water Level	UA	08/08/2023	6.39	619.97
G281	Water Level	UA	10/24/2023	8.64	617.72
G281	Water Level	UA	11/13/2023	8.59	617.77
G281	Water Level	UA	12/18/2023	6.83	619.53
G283	Water Level	LCU	02/13/2023	4.61	606.14
G283	Water Level	LCU	03/30/2023	3.55	607.19
G283	Water Level	LCU	04/30/2023	4.71	606.03

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G283	Water Level	LCU	05/30/2023	5.60	605.14
G283	Water Level	LCU	08/14/2023	[7.45]	[603.30]
G283	Water Level	LCU	10/24/2023	7.79	602.96
G283	Water Level	LCU	11/13/2023	7.22	603.53
G283	Water Level	LCU	12/18/2023	6.49	604.26
G284	Water Level	UA	02/13/2023	9.72	608.70
G284	Water Level	UA	03/30/2023	8.65	609.76
G284	Water Level	UA	04/30/2023	11.62	606.79
G284	Water Level	UA	05/30/2023	12.43	605.98
G284	Water Level	UA	08/14/2023	[12.28]	[606.14]
G284	Water Level	UA	10/24/2023	Dry	Dry
G284	Water Level	UA	11/13/2023	Dry	Dry
G284	Water Level	UA	12/18/2023	12.91	605.51
G285	Water Level	LCU	02/13/2023	6.12	607.40
G285	Water Level	LCU	03/30/2023	4.18	609.33
G285	Water Level	LCU	04/30/2023	5.80	607.71
G285	Water Level	LCU	05/30/2023	6.71	606.80
G285	Water Level	LCU	07/08/2023	8.14	605.37
G285	Water Level	LCU	08/08/2023	8.25	605.26
G285	Water Level	LCU	08/14/2023	[8.44]	[605.08]
G285	Water Level	LCU	09/25/2023	8.47	605.05
G285	Water Level	LCU	10/24/2023	8.96	604.56
G285	Water Level	LCU	11/13/2023	9.38	604.14
G285	Water Level	LCU	12/18/2023	8.03	605.49
G286	Water Level	UA	02/13/2023	6.18	606.95
G286	Water Level	UA	08/10/2023	[Dry]	[Dry]
G286	Water Level	UA	10/24/2023	Dry	Dry
G286	Water Level	UA	11/13/2023	Dry	Dry
G286	Water Level	UA	12/18/2023	Dry	Dry
G287	Water Level	UA	02/13/2023	5.75	611.70
G288	Water Level	UA	02/13/2023	9.78	610.29
G288	Water Level	UA	03/30/2023	4.70	615.37
G288	Water Level	UA	04/30/2023	6.66	613.41
G288	Water Level	UA	05/30/2023	7.40	612.67

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G288	Water Level	UA	06/08/2023	8.05	612.02
G288	Water Level	UA	07/08/2023	7.65	612.42
G288	Water Level	UA	08/08/2023	8.62	611.45
G288	Water Level	UA	08/11/2023	[8.70]	[611.37]
G288	Water Level	UA	09/25/2023	9.57	610.50
G288	Water Level	UA	10/24/2023	9.95	610.12
G288	Water Level	UA	11/13/2023	9.84	610.23
G288	Water Level	UA	12/18/2023	8.56	611.51
G301	Water Level	UA	02/13/2023	5.30	617.35
G301	Water Level	UA	06/08/2023	7.70	614.94
G301	Water Level	UA	07/08/2023	7.82	614.82
G301	Water Level	UA	08/08/2023	8.11	614.54
G301	Water Level	UA	10/24/2023	8.51	614.14
G301	Water Level	UA	11/13/2023	8.43	614.22
G301	Water Level	UA	12/18/2023	8.00	614.65
G302	Water Level	UA	02/13/2023	7.16	612.88
G302	Water Level	UA	03/30/2023	4.68	615.35
G302	Water Level	UA	04/30/2023	9.10	610.93
G302	Water Level	UA	05/30/2023	11.04	608.99
G302	Water Level	UA	06/08/2023	11.57	608.46
G302	Water Level	UA	07/08/2023	12.07	607.96
G302	Water Level	UA	08/08/2023	12.68	607.36
G302	Water Level	UA	09/25/2023	13.12	606.92
G302	Water Level	UA	11/13/2023	13.16	606.88
G302	Water Level	UA	12/18/2023	12.47	607.57
G303	Water Level	UA	02/13/2023	4.20	617.82
G303	Water Level	UA	03/30/2023	3.62	618.39
G303	Water Level	UA	04/30/2023	4.62	617.39
G303	Water Level	UA	05/30/2023	5.92	616.09
G303	Water Level	UA	08/08/2023	8.40	613.62
G303	Water Level	UA	09/25/2023	9.18	612.83
G303	Water Level	UA	10/24/2023	9.71	612.31
G303	Water Level	UA	11/13/2023	9.32	612.70
G303	Water Level	UA	12/18/2023	8.22	613.80

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G305	Water Level	UA	02/13/2023	6.08	619.59
G305	Water Level	UA	03/30/2023	5.81	619.85
G305	Water Level	UA	04/30/2023	6.59	619.07
G305	Water Level	UA	05/30/2023	7.63	618.03
G305	Water Level	UA	06/08/2023	8.35	617.31
G305	Water Level	UA	07/08/2023	8.23	617.43
G305	Water Level	UA	08/08/2023	9.19	616.48
G305	Water Level	UA	10/24/2023	9.95	615.72
G305	Water Level	UA	11/13/2023	8.50	617.17
G305	Water Level	UA	12/18/2023	8.24	617.43
G306	Water Level	UA	02/13/2023	5.80	620.11
G306	Water Level	UA	03/30/2023	5.41	620.49
G306	Water Level	UA	04/30/2023	6.64	619.26
G306	Water Level	UA	05/30/2023	8.13	617.77
G306	Water Level	UA	06/08/2023	9.18	616.72
G306	Water Level	UA	07/08/2023	8.60	617.30
G306	Water Level	UA	08/08/2023	9.70	616.21
G306	Water Level	UA	10/24/2023	10.81	615.10
G306	Water Level	UA	11/13/2023	10.13	615.78
G306	Water Level	UA	12/18/2023	7.56	618.35
G307	Water Level	UA	02/13/2023	Above Top of Casing	Above Top of Casing
G307	Water Level	UA	08/08/2023	0.70	623.90
G307	Water Level	UA	11/13/2023	1.96	622.64
G307D	Water Level	LCU	02/13/2023	2.75	622.13
G307D	Water Level	LCU	03/30/2023	2.32	622.55
G307D	Water Level	LCU	04/30/2023	2.41	622.46
G307D	Water Level	LCU	05/30/2023	2.48	622.39
G307D	Water Level	LCU	08/08/2023	7.89	616.99
G307D	Water Level	LCU	10/24/2023	11.33	613.55
G307D	Water Level	LCU	11/13/2023	12.36	612.52
G307D	Water Level	LCU	12/18/2023	7.55	617.33
G308	Water Level	UA	02/13/2023	3.88	620.71
G308	Water Level	UA	03/30/2023	3.79	620.79
G308	Water Level	UA	04/30/2023	4.84	619.74

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G308	Water Level	UA	05/30/2023	5.56	619.02
G308	Water Level	UA	06/08/2023	5.93	618.66
G308	Water Level	UA	07/08/2023	5.37	619.22
G308	Water Level	UA	08/08/2023	5.09	619.50
G308	Water Level	UA	09/25/2023	6.16	618.42
G308	Water Level	UA	10/24/2023	6.19	618.40
G308	Water Level	UA	11/13/2023	6.00	618.59
G308	Water Level	UA	12/18/2023	4.71	619.88
G309	Water Level	UA	02/13/2023	9.64	616.24
G309	Water Level	UA	08/08/2023	8.04	617.84
G309	Water Level	UA	09/25/2023	8.24	617.64
G309	Water Level	UA	10/24/2023	8.69	617.19
G309	Water Level	UA	11/13/2023	8.32	617.56
G309	Water Level	UA	12/18/2023	7.60	618.28
G310	Water Level	UA	02/13/2023	7.09	615.78
G310	Water Level	UA	03/30/2023	6.42	616.44
G310	Water Level	UA	04/30/2023	8.94	613.92
G310	Water Level	UA	05/30/2023	9.57	613.29
G310	Water Level	UA	06/08/2023	9.96	612.90
G310	Water Level	UA	08/08/2023	10.30	612.57
G310	Water Level	UA	09/25/2023	10.73	612.14
G310	Water Level	UA	10/24/2023	10.82	612.05
G310	Water Level	UA	11/13/2023	10.56	612.31
G310	Water Level	UA	12/18/2023	9.95	612.92
G311	Water Level	UA	05/30/2023	8.26	612.78
G311	Water Level	UA	08/08/2023	9.08	611.96
G311	Water Level	UA	10/24/2023	9.29	611.75
G311	Water Level	UA	11/13/2023	9.38	611.66
G311D	Water Level	LCU	02/13/2023	23.66	597.58
G311D	Water Level	LCU	05/30/2023	23.26	597.98
G311D	Water Level	LCU	08/08/2023	23.52	597.72
G311D	Water Level	LCU	10/24/2023	23.51	597.73
G311D	Water Level	LCU	11/13/2023	24.15	597.09
G312	Water Level	UA	03/30/2023	8.28	611.49

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G312	Water Level	UA	04/30/2023	10.81	608.96
G312	Water Level	UA	05/30/2023	12.42	607.35
G312	Water Level	UA	06/08/2023	12.87	606.91
G312	Water Level	UA	07/08/2023	13.42	606.36
G312	Water Level	UA	08/08/2023	14.00	605.78
G312	Water Level	UA	10/24/2023	Dry	Dry
G312	Water Level	UA	11/13/2023	Dry	Dry
G312	Water Level	UA	12/18/2023	14.45	605.33
G313	Water Level	UA	02/13/2023	3.24	611.06
G313	Water Level	UA	08/08/2023	3.01	611.29
G313	Water Level	UA	10/24/2023	3.08	611.22
G313	Water Level	UA	11/13/2023	3.36	610.94
G313	Water Level	UA	12/18/2023	3.48	610.82
G314	Water Level	LCU	02/13/2023	6.14	607.74
G314	Water Level	LCU	03/30/2023	8.96	604.91
G314	Water Level	LCU	04/30/2023	5.53	608.34
G314	Water Level	LCU	05/30/2023	4.81	609.06
G314	Water Level	LCU	06/08/2023	9.43	604.44
G314	Water Level	LCU	07/08/2023	5.67	608.20
G314	Water Level	LCU	08/08/2023	4.88	609.00
G314	Water Level	LCU	09/25/2023	4.96	608.92
G314	Water Level	LCU	10/24/2023	5.30	608.58
G314	Water Level	LCU	11/13/2023	5.67	608.21
G314	Water Level	LCU	12/18/2023	7.39	606.49
G314D	Water Level	DA	02/13/2023	16.40	597.30
G314D	Water Level	DA	03/30/2023	9.98	603.71
G314D	Water Level	DA	04/30/2023	7.48	606.21
G314D	Water Level	DA	05/30/2023	6.69	607.00
G314D	Water Level	DA	06/08/2023	11.80	601.90
G314D	Water Level	DA	07/08/2023	7.25	606.45
G314D	Water Level	DA	08/08/2023	7.78	605.92
G314D	Water Level	DA	09/25/2023	8.50	605.20
G314D	Water Level	DA	10/24/2023	8.56	605.14
G314D	Water Level	DA	11/13/2023	7.97	605.73

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G314D	Water Level	DA	12/18/2023	7.04	606.66
G315	Water Level	UA	02/13/2023	2.08	621.44
G315	Water Level	UA	08/08/2023	3.50	620.02
G315	Water Level	UA	10/24/2023	4.04	619.48
G315	Water Level	UA	11/13/2023	4.11	619.41
G315	Water Level	UA	12/18/2023	2.55	620.97
G316	Water Level	LCU	02/13/2023	11.53	591.06
G316	Water Level	LCU	05/30/2023	12.28	590.31
G316	Water Level	LCU	08/08/2023	11.70	590.89
G316	Water Level	LCU	10/24/2023	12.54	590.05
G316	Water Level	LCU	11/13/2023	12.46	590.13
G317	Water Level	UA	02/13/2023	34.52	607.41
G317	Water Level	UA	08/08/2023	Dry	Dry
G317	Water Level	UA	09/25/2023	37.42	604.51
G317	Water Level	UA	10/24/2023	Dry	Dry
G317	Water Level	UA	11/13/2023	Dry	Dry
G317	Water Level	UA	12/18/2023	38.02	603.91
G401	Water Level	UA	02/13/2023	21.17	604.40
G401	Water Level	UA	05/30/2023	21.72	603.85
G401	Water Level	UA	08/08/2023	21.75	603.82
G401	Water Level	UA	10/24/2023	21.66	603.91
G401	Water Level	UA	11/13/2023	13.63	611.94
G402	Water Level	UA	02/13/2023	8.83	604.54
G402	Water Level	UA	03/30/2023	8.23	605.13
G402	Water Level	UA	04/30/2023	9.59	603.77
G402	Water Level	UA	05/30/2023	10.56	602.80
G402	Water Level	UA	06/08/2023	10.94	602.43
G402	Water Level	UA	07/08/2023	11.08	602.29
G402	Water Level	UA	08/08/2023	11.65	601.72
G402	Water Level	UA	10/24/2023	12.01	601.36
G402	Water Level	UA	11/13/2023	11.71	601.66
G402	Water Level	UA	12/18/2023	11.48	601.89
G403	Water Level	UA	02/13/2023	6.05	620.42
G403	Water Level	UA	03/30/2023	5.81	620.65

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G403	Water Level	UA	04/30/2023	7.09	619.37
G403	Water Level	UA	05/30/2023	8.13	618.33
G403	Water Level	UA	06/08/2023	8.74	617.73
G403	Water Level	UA	07/08/2023	7.21	619.26
G403	Water Level	UA	08/08/2023	7.45	619.02
G403	Water Level	UA	09/25/2023	8.82	617.64
G403	Water Level	UA	10/24/2023	8.62	617.85
G403	Water Level	UA	11/13/2023	8.27	618.20
G403	Water Level	UA	12/18/2023	6.64	619.83
G404	Water Level	UA	02/13/2023	3.46	612.21
G404	Water Level	UA	03/30/2023	3.24	612.42
G404	Water Level	UA	04/30/2023	4.64	611.02
G404	Water Level	UA	05/30/2023	5.42	610.24
G404	Water Level	UA	08/14/2023	[5.62]	[610.05]
G404	Water Level	UA	10/24/2023	7.09	608.58
G404	Water Level	UA	11/13/2023	6.48	609.19
G404	Water Level	UA	12/18/2023	4.70	610.97
G405	Water Level	UA	02/13/2023	6.13	617.50
G405	Water Level	UA	03/30/2023	5.87	617.75
G405	Water Level	UA	04/30/2023	6.53	617.09
G405	Water Level	UA	05/30/2023	6.83	616.79
G405	Water Level	UA	06/08/2023	7.08	616.55
G405	Water Level	UA	07/08/2023	6.59	617.04
G405	Water Level	UA	08/08/2023	6.85	616.78
G405	Water Level	UA	09/25/2023	7.59	616.04
G405	Water Level	UA	10/24/2023	7.84	615.79
G405	Water Level	UA	11/13/2023	7.73	615.90
G405	Water Level	UA	12/18/2023	6.55	617.08
G406	Water Level	UA	02/13/2023	11.25	614.11
G406	Water Level	UA	03/30/2023	9.94	615.41
G406	Water Level	UA	04/30/2023	12.48	612.87
G406	Water Level	UA	05/30/2023	13.06	612.29
G406	Water Level	UA	06/08/2023	13.75	611.61
G406	Water Level	UA	07/08/2023	11.92	613.44

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
G406	Water Level	UA	08/08/2023	11.49	613.87
G406	Water Level	UA	09/25/2023	13.95	611.41
G406	Water Level	UA	10/24/2023	14.08	611.28
G406	Water Level	UA	11/13/2023	13.83	611.53
G406	Water Level	UA	12/18/2023	12.03	613.33
G407	Water Level	UA	02/13/2023	5.60	615.72
G407	Water Level	UA	03/30/2023	5.49	615.82
G407	Water Level	UA	04/30/2023	6.91	614.40
G407	Water Level	UA	05/30/2023	7.35	613.96
G407	Water Level	UA	06/08/2023	8.75	612.57
G407	Water Level	UA	07/08/2023	8.22	613.10
G407	Water Level	UA	08/08/2023	8.79	612.53
G407	Water Level	UA	10/24/2023	8.39	612.93
G407	Water Level	UA	11/13/2023	8.31	613.01
G407	Water Level	UA	12/18/2023	6.76	614.56
G410	Water Level	UA	02/13/2023	7.44	612.35
G410	Water Level	UA	05/30/2023	8.99	610.80
G410	Water Level	UA	08/08/2023	9.66	610.13
G410	Water Level	UA	10/24/2023	10.88	608.91
G410	Water Level	UA	11/13/2023	10.68	609.11
G411	Water Level	UA	02/13/2023	6.15	617.10
G411	Water Level	UA	05/30/2023	8.52	614.73
G411	Water Level	UA	08/08/2023	8.69	614.56
G411	Water Level	UA	10/24/2023	11.33	611.92
G411	Water Level	UA	11/13/2023	11.20	612.05
MW03D	Water Level	DA	02/13/2023	30.75	598.26
MW03D	Water Level	DA	03/30/2023	30.43	598.57
MW03D	Water Level	DA	04/30/2023	30.00	599.01
MW03D	Water Level	DA	05/30/2023	30.11	598.90
MW03D	Water Level	DA	06/08/2023	30.17	598.83
MW03D	Water Level	DA	07/08/2023	30.39	598.62
MW03D	Water Level	DA	08/08/2023	30.65	598.36
MW03D	Water Level	DA	09/25/2023	29.29	599.72
MW03D	Water Level	DA	10/25/2023	29.64	599.37

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
MW03D	Water Level	DA	11/13/2023	32.01	597.00
MW03D	Water Level	DA	12/18/2023	32.08	596.93
MW04S	Water Level	UA	02/13/2023	4.30	621.59
MW04S	Water Level	UA	05/30/2023	6.63	619.26
MW04S	Water Level	UA	08/08/2023	9.80	616.09
MW04S	Water Level	UA	11/13/2023	12.20	613.69
MW05S	Water Level	UA	02/13/2023	5.22	620.73
MW05S	Water Level	UA	05/30/2023	7.25	618.70
MW05S	Water Level	UA	08/08/2023	9.35	616.60
MW05D	Water Level	DA	02/13/2023	19.65	606.26
MW05D	Water Level	DA	05/30/2023	18.29	607.62
MW05D	Water Level	DA	08/08/2023	21.12	604.79
MW06S	Water Level	UA	02/13/2023	4.51	621.64
MW06S	Water Level	UA	05/30/2023	6.45	619.70
MW06S	Water Level	UA	08/08/2023	8.72	617.43
MW06S	Water Level	UA	10/24/2023	9.94	616.21
MW06S	Water Level	UA	11/13/2023	8.91	617.24
MW07S	Water Level	UA	02/13/2023	3.15	624.45
MW07S	Water Level	UA	05/30/2023	5.23	622.37
MW07S	Water Level	UA	08/08/2023	7.79	619.81
MW07S	Water Level	UA	10/24/2023	9.37	618.23
MW07S	Water Level	UA	11/13/2023	8.48	619.12
MW09S	Water Level	UA	02/13/2023	3.14	624.48
MW09S	Water Level	UA	05/30/2023	5.45	622.17
MW09S	Water Level	UA	08/08/2023	8.11	619.51
MW09D	Water Level	LCU	05/30/2023	13.91	613.70
MW09D	Water Level	LCU	08/08/2023	14.73	612.88
MW10S	Water Level	UA	05/30/2023	5.44	619.01
MW10S	Water Level	UA	08/08/2023	8.67	615.78
MW10D	Water Level	LCU	02/14/2023	3.41	621.06
MW10D	Water Level	LCU	05/30/2023	15.73	608.74
MW10D	Water Level	LCU	08/08/2023	18.69	605.78
MW11S	Water Level	UA	02/14/2023	3.78	621.49
MW11S	Water Level	UA	08/08/2023	8.00	617.27

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
MW11D	Water Level	LCU	02/14/2023	4.73	620.79
MW11D	Water Level	LCU	03/30/2023	3.97	621.55
MW11D	Water Level	LCU	04/30/2023	4.00	621.51
MW11D	Water Level	LCU	05/30/2023	4.76	620.75
MW11D	Water Level	LCU	06/08/2023	6.52	618.99
MW11D	Water Level	LCU	07/08/2023	7.38	618.14
MW11D	Water Level	LCU	08/08/2023	8.57	616.95
MW12S	Water Level	UA	02/14/2023	5.30	620.01
MW12S	Water Level	UA	05/30/2023	7.36	617.95
MW12S	Water Level	UA	08/08/2023	10.87	614.44
MW12S	Water Level	UA	10/25/2023	12.51	612.80
MW12S	Water Level	UA	11/13/2023	12.80	612.51
MW12D	Water Level	DA	02/14/2023	13.63	611.58
MW12D	Water Level	DA	03/30/2023	13.17	612.04
MW12D	Water Level	DA	04/30/2023	12.69	612.52
MW12D	Water Level	DA	05/30/2023	12.71	612.50
MW12D	Water Level	DA	06/08/2023	12.80	612.41
MW12D	Water Level	DA	07/08/2023	13.31	611.90
MW12D	Water Level	DA	08/08/2023	13.93	611.28
MW12D	Water Level	DA	09/25/2023	14.86	610.35
MW12D	Water Level	DA	10/25/2023	15.32	609.89
MW12D	Water Level	DA	11/13/2023	15.64	609.57
MW12D	Water Level	DA	12/18/2023	16.00	609.21
MW13S	Water Level	UA	02/13/2023	8.55	617.41
MW13S	Water Level	UA	05/30/2023	10.19	615.77
MW13S	Water Level	UA	08/08/2023	11.34	614.62
MW13S	Water Level	UA	10/25/2023	12.79	613.17
MW13S	Water Level	UA	11/13/2023	12.33	613.63
MW13D	Water Level	DA	02/13/2023	1.20	624.66
MW13D	Water Level	DA	05/30/2023	13.52	612.34
MW13D	Water Level	DA	08/08/2023	12.86	613.00
MW13D	Water Level	DA	10/25/2023	12.75	613.11
MW13D	Water Level	DA	11/13/2023	12.45	613.41
MW16S	Water Level	UA	02/14/2023	6.61	622.86

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
MW16S	Water Level	UA	03/30/2023	3.70	625.77
MW16S	Water Level	UA	04/30/2023	5.10	624.37
MW16S	Water Level	UA	05/30/2023	6.89	622.57
MW16S	Water Level	UA	06/08/2023	8.31	621.16
MW16S	Water Level	UA	07/08/2023	9.95	619.52
MW16S	Water Level	UA	08/08/2023	11.63	617.84
MW16D	Water Level	DA	02/14/2023	14.63	614.75
MW16D	Water Level	DA	03/30/2023	13.05	616.33
MW16D	Water Level	DA	04/30/2023	12.09	617.29
MW16D	Water Level	DA	05/30/2023	11.83	617.55
MW16D	Water Level	DA	06/08/2023	11.85	617.53
MW16D	Water Level	DA	07/08/2023	12.34	617.04
MW16D	Water Level	DA	08/08/2023	12.97	616.41
MW17S	Water Level	UA	05/30/2023	6.91	623.65
MW17S	Water Level	UA	08/08/2023	10.81	619.75
MW17D	Water Level	DA	02/14/2023	19.92	610.37
MW17D	Water Level	DA	05/30/2023	13.33	616.96
MW17D	Water Level	DA	08/08/2023	14.58	615.71
MW20S	Water Level	UA	02/13/2023	8.21	614.69
MW20S	Water Level	UA	03/30/2023	6.59	616.31
MW20S	Water Level	UA	04/30/2023	8.97	613.93
MW20S	Water Level	UA	05/30/2023	9.28	613.61
MW20S	Water Level	UA	06/08/2023	9.56	613.33
MW20S	Water Level	UA	07/08/2023	9.63	613.26
MW20S	Water Level	UA	08/08/2023	10.60	612.30
MW20S	Water Level	UA	09/25/2023	11.53	611.37
MW20S	Water Level	UA	10/25/2023	11.74	611.16
MW20S	Water Level	UA	11/13/2023	11.96	610.94
MW20S	Water Level	UA	12/18/2023	11.60	611.30
R104	Water Level	UA	02/14/2023	7.44	625.40
R104	Water Level	UA	03/30/2023	6.14	626.69
R104	Water Level	UA	04/30/2023	7.47	625.36
R104	Water Level	UA	05/30/2023	8.02	624.81
R104	Water Level	UA	06/08/2023	8.41	624.43

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
R104	Water Level	UA	07/08/2023	8.92	623.92
R104	Water Level	UA	08/08/2023	10.45	622.39
R104	Water Level	UA	09/25/2023	11.50	621.34
R104	Water Level	UA	10/25/2023	12.52	620.32
R104	Water Level	UA	11/13/2023	12.91	619.93
R104	Water Level	UA	12/18/2023	12.81	620.03
R201	Water Level	UA	02/14/2023	2.80	623.54
R201	Water Level	UA	03/30/2023	2.56	623.77
R201	Water Level	UA	04/30/2023	3.95	622.38
R201	Water Level	UA	05/30/2023	5.31	621.02
R201	Water Level	UA	06/08/2023	6.13	620.21
R201	Water Level	UA	07/08/2023	6.75	619.59
R201	Water Level	UA	08/08/2023	11.61	614.73
R201	Water Level	UA	09/25/2023	10.12	616.22
R201	Water Level	UA	10/24/2023	11.20	615.14
R201	Water Level	UA	11/13/2023	11.73	614.61
R201	Water Level	UA	12/18/2023	11.37	614.97
R205	Water Level	UA	02/13/2023	7.49	617.03
R205	Water Level	UA	08/08/2023	9.69	614.83
R205	Water Level	UA	10/25/2023	11.16	613.36
R205	Water Level	UA	11/13/2023	11.48	613.04
R205	Water Level	UA	12/18/2023	11.16	613.36
T127	Water Level	UA	02/13/2023	14.15	616.81
T127	Water Level	UA	05/30/2023	14.56	616.40
T127	Water Level	UA	08/08/2023	15.20	615.76
T127	Water Level	UA	10/25/2023	15.99	614.97
T127	Water Level	UA	11/13/2023	15.95	615.01
T128	Water Level	UA	02/13/2023	13.97	616.96
T128	Water Level	UA	05/30/2023	14.26	616.67
T128	Water Level	UA	08/08/2023	14.80	616.13
T128	Water Level	UA	10/25/2023	15.54	615.39
T128	Water Level	UA	11/13/2023	15.50	615.43
T202	Water Level	UA	02/13/2023	5.04	623.59
T202	Water Level	UA	05/30/2023	5.80	622.83

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
T202	Water Level	UA	08/08/2023	9.23	619.40
T202	Water Level	UA	10/24/2023	11.02	617.61
T202	Water Level	UA	11/13/2023	11.66	616.97
T408	Water Level	LCU	02/13/2023	6.92	617.16
T408	Water Level	LCU	05/30/2023	7.42	616.66
T408	Water Level	LCU	08/08/2023	7.46	616.62
T408	Water Level	LCU	10/24/2023	8.11	615.97
T408	Water Level	LCU	11/13/2023	8.02	616.06
T409	Water Level	LCU	02/13/2023	9.36	615.65
T409	Water Level	LCU	05/30/2023	11.27	613.74
T409	Water Level	LCU	08/08/2023	9.99	615.02
T409	Water Level	LCU	10/24/2023	12.46	612.55
T409	Water Level	LCU	11/13/2023	12.00	613.01
TA31	Water Level	UA	02/13/2023	5.00	621.55
TA31	Water Level	UA	05/30/2023	7.06	619.49
TA31	Water Level	UA	08/08/2023	11.98	614.57
TA31	Water Level	UA	10/24/2023	14.65	611.90
TA31	Water Level	UA	11/13/2023	14.31	612.24
TA33	Water Level	UA	02/13/2023	8.04	617.23
TA33	Water Level	UA	05/30/2023	8.42	616.85
TA33	Water Level	UA	08/08/2023	12.10	613.17
TA33	Water Level	UA	10/24/2023	13.86	611.41
TA33	Water Level	UA	11/13/2023	13.98	611.29
TA34	Water Level	UA	02/13/2023	8.03	618.49
TA34	Water Level	UA	05/30/2023	9.48	617.04
TA34	Water Level	UA	08/08/2023	18.31	608.21
TA34	Water Level	UA	10/24/2023	12.98	613.54
TA34	Water Level	UA	11/13/2023	12.60	613.92
TR32	Water Level	UA	02/13/2023	6.11	615.57
TR32	Water Level	UA	05/30/2023	6.18	615.50
TR32	Water Level	UA	10/24/2023	9.02	612.66
TR32	Water Level	UA	11/13/2023	9.67	612.01
X201	Water Level	S	02/14/2023	--	614.71
X201	Water Level	S	03/30/2023	--	614.53

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
X201	Water Level	S	04/30/2023	--	614.69
X201	Water Level	S	05/30/2023	--	614.93
X201	Water Level	S	08/08/2023	--	615.31
X201	Water Level	S	11/13/2023	[34.00]	[584.47]
X201	Water Level	S	12/12/2023	--	617.10
XPW01	Water Level	CCR	02/13/2023	4.51	630.06
XPW01	Water Level	CCR	03/30/2023	3.99	630.57
XPW01	Water Level	CCR	04/30/2023	4.24	630.32
XPW01	Water Level	CCR	05/30/2023	4.56	630.00
XPW01	Water Level	CCR	08/08/2023	5.29	629.28
XPW01	Water Level	CCR	10/24/2023	6.03	628.54
XPW01	Water Level	CCR	11/13/2023	6.32	628.25
XPW01	Water Level	CCR	12/18/2023	6.11	628.46
XPW02	Water Level	CCR	02/13/2023	9.38	630.31
XPW02	Water Level	CCR	03/30/2023	8.87	630.81
XPW02	Water Level	CCR	04/30/2023	9.11	630.57
XPW02	Water Level	CCR	05/30/2023	9.40	630.28
XPW02	Water Level	CCR	08/08/2023	10.30	629.39
XPW02	Water Level	CCR	09/25/2023	10.71	628.98
XPW02	Water Level	CCR	10/24/2023	10.93	628.76
XPW02	Water Level	CCR	11/13/2023	11.12	628.57
XPW02	Water Level	CCR	12/18/2023	11.02	628.67
NE Riser	Water Level	S	02/14/2023	--	625.24
XSG-01	Water Level	CCR	02/13/2023	5.40	630.12
XSG-01	Water Level	CCR	05/30/2023	5.45	630.07
XSG-01	Water Level	CCR	08/08/2023	6.25	629.27
XSG-01	Water Level	CCR	10/24/2023	7.02	628.50
XSG-01	Water Level	CCR	11/13/2023	10.38	625.14
XSG-01	Water Level	CCR	12/18/2023	7.04	628.48
SG-02	Water Level	SW	02/13/2023	7.25	598.62
SG-02	Water Level	SW	05/30/2023	7.47	598.40
SG-02	Water Level	SW	10/24/2023	7.49	598.38
SG-02	Water Level	SW	11/13/2023	7.36	598.51
SG-02	Water Level	SW	12/18/2023	7.31	598.56

Appendix A. Site-Wide Groundwater Elevations
Nature and Extent Report
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Well ID	Well Type	Monitored Unit	Date	Depth to Groundwater (feet BMP)	Groundwater Elevation (feet NAVD88)
SG-03	Water Level	SW	02/13/2023	9.55	585.39
SG-03	Water Level	SW	05/30/2023	9.85	585.09
SG-03	Water Level	SW	08/08/2023	9.65	585.29
SG-03	Water Level	SW	10/24/2023	8.96	585.98
SG-03	Water Level	SW	11/13/2023	9.71	585.23
SG-03	Water Level	SW	12/18/2023	8.92	586.02
SG-04	Water Level	SW	02/13/2023	6.27	593.25
SG-04	Water Level	SW	05/30/2023	6.41	593.11

Notes:
Bracketing [] indicates that the measurement was obtained outside of the 24-hour period from initiaion of depth to groundwater measurements.
BMP = below measuring point
CCR = coal combustion residuals
DA = deep aquifer
LCU = lower confining unit
NAVD88 = North American Vertical Datum of 1988
S = source
SW = surface water

APPENDIX B
Supplemental Vertical Hydraulic Gradients

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	G405 Groundwater Elevation (ft NAVD88)	T408 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (upper)				
2/4/2017	618.47	619.46	-0.99	12.00	-0.08	up
5/13/2017	618.74	619.00	-0.26	12.00	-0.02	up
7/8/2017	618.54	619.12	-0.58	12.00	-0.05	up
10/21/2017	614.47	614.81	-0.34	12.00	-0.03	up
5/8/2018	618.94	615.82	3.12	12.00	0.26	down
8/2/2018	617.55	614.45	3.10	12.00	0.26	down
10/23/2018	616.40	616.30	0.10	12.00	0.01	down
1/15/2019	616.81	617.01	-0.20	12.00	-0.02	up
8/5/2019	617.72	617.15	0.57	12.00	0.05	down
1/20/2020	619.28	619.13	0.15	12.00	0.01	down
8/10/2020	617.62	617.38	0.24	12.00	0.02	down
1/20/2021	617.12	616.85	0.27	12.00	0.02	down
4/20/2021	617.13	616.65	0.48	12.00	0.04	down
7/26/2021	617.37	617.21	0.16	12.00	0.01	down
8/16/2021	617.28	617.22	0.06	12.00	0.00	down
10/25/2021	618.12	615.50	2.62	12.00	0.22	down
2/7/2022	617.28	616.88	0.40	12.00	0.03	down
5/9/2022	617.91	617.78	0.13	12.00	0.01	down
8/23/2022	616.85	616.99	-0.14	12.00	-0.01	up
2/13/2023	617.50	617.16	0.34	12.00	0.03	down
5/30/2023	616.79	616.66	0.13	12.00	0.01	down
8/8/2023	616.78	616.62	0.16	12.00	0.01	down
10/24/2023	615.79	615.97	-0.18	12.00	-0.02	up
11/13/2023	615.90	616.06	-0.16	12.00	-0.01	up
			Middle of screen elevation G405D			610.0
			Middle of screen elevation T408			598.0

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	G406 Groundwater Elevation (ft NAVD88)	T409 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (upper)				
2/4/2017	617.52	615.93	1.59	8.23	0.19	down
5/13/2017	616.20	616.75	-0.55	8.23	-0.07	up
7/8/2017	616.29	617.05	-0.76	8.23	-0.09	up
10/21/2017	611.27	612.16	-0.89	8.23	-0.11	up
5/8/2018	615.47	616.02	-0.55	8.23	-0.07	up
8/2/2018	615.75	615.25	0.50	8.23	0.06	down
10/23/2018	614.11	613.96	0.15	8.23	0.02	down
1/15/2019	615.36	614.78	0.58	8.23	0.07	down
8/5/2019	616.50	615.10	1.40	8.23	0.17	down
1/20/2020	617.48	617.16	0.32	8.23	0.04	down
8/10/2020	615.54	615.43	0.11	8.23	0.01	down
1/20/2021	612.97	614.41	-1.44	8.23	-0.17	up
4/20/2021	613.78	615.33	-1.55	8.23	-0.19	up
7/26/2021	614.20	615.72	-1.52	8.23	-0.18	up
8/16/2021	613.82	615.42	-1.60	8.23	-0.19	up
10/25/2021	614.93	616.43	-1.50	8.23	-0.18	up
2/7/2022	613.55	614.97	-1.42	8.23	-0.17	up
5/9/2022	615.36	616.81	-1.45	8.23	-0.18	up
8/23/2022	613.47	610.73	2.74	8.23	0.33	down
2/13/2023	614.11	615.65	-1.54	8.23	-0.19	up
5/30/2023	612.29	613.74	-1.45	8.23	-0.18	up
8/8/2023	613.87	615.02	-1.15	8.23	-0.14	up
10/24/2023	611.28	612.55	-1.27	8.23	-0.15	up
11/13/2023	611.53	613.01	-1.48	8.23	-0.18	up
			Middle of screen elevation G406			605.9
			Middle of screen elevation T409			597.7

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	T408 Groundwater Elevation (ft NAVD88) LCU (upper)	G45D Groundwater Elevation (ft NAVD88) LCU (lower)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
2/4/2017	619.46	587.71	31.75	13.78	2.30	down
5/13/2017	619.00	586.19	32.81	13.78	2.38	down
7/8/2017	619.12	586.29	32.83	13.78	2.38	down
10/21/2017	614.81	584.69	30.12	13.78	2.19	down
5/8/2018	615.82	587.56	28.26	13.78	2.05	down
8/2/2018	614.45	585.81	28.64	13.78	2.08	down
10/23/2018	616.30	584.60	31.70	13.78	2.30	down
1/15/2019	617.01	586.96	30.05	13.78	2.18	down
8/5/2019	617.15	588.04	29.11	13.78	2.11	down
8/10/2020	617.38	614.21	3.17	13.78	0.23	down
1/20/2021	616.85	614.60	2.25	13.78	0.16	down
4/20/2021	616.65	614.32	2.33	13.78	0.17	down
7/26/2021	617.21	613.58	3.63	13.78	0.26	down
8/16/2021	617.22	613.83	3.39	13.78	0.25	down
10/25/2021	615.50	614.51	0.99	13.78	0.07	down
2/7/2022	616.88	615.01	1.87	13.78	0.14	down
5/9/2022	617.78	614.95	2.83	13.78	0.21	down
8/23/2022	616.99	614.58	2.41	13.78	0.17	down
2/13/2023	617.16	614.69	2.47	13.78	0.18	down
5/30/2023	616.66	613.99	2.67	13.78	0.19	down
8/8/2023	616.62	613.47	3.15	13.78	0.23	down
10/24/2023	615.97	613.40	2.57	13.78	0.19	down
11/13/2023	616.06	613.55	2.51	13.78	0.18	down
			Middle of screen elevation T408			598.0
			Middle of screen elevation G45D			584.2

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	T409 Groundwater Elevation (ft NAVD88) LCU (upper)	G46D Groundwater Elevation (ft NAVD88) LCU (lower)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
2/4/2017	615.93	586.06	29.87	22.19	1.35	down
5/13/2017	616.75	584.87	31.88	22.19	1.44	down
7/8/2017	617.05	585.22	31.83	22.19	1.43	down
5/8/2018	616.02	585.86	30.16	22.19	1.36	down
8/2/2018	615.25	583.95	31.30	22.19	1.41	down
10/23/2018	613.96	582.05	31.91	22.19	1.44	down
1/15/2019	614.78	583.17	31.61	22.19	1.42	down
8/5/2019	615.10	583.68	31.42	22.19	1.42	down
8/10/2020	615.43	609.00	6.43	22.19	0.29	down
1/20/2021	614.41	610.49	3.92	22.19	0.18	down
4/20/2021	615.33	611.06	4.27	22.19	0.19	down
7/26/2021	615.72	607.21	8.51	22.19	0.38	down
8/16/2021	615.42	608.17	7.25	22.19	0.33	down
10/25/2021	616.43	609.87	6.56	22.19	0.30	down
2/7/2022	614.97	610.71	4.26	22.19	0.19	down
5/9/2022	616.81	611.34	5.47	22.19	0.25	down
8/23/2022	610.73	615.13	-4.40	22.19	-0.20	up
2/13/2023	615.65	610.39	5.26	22.19	0.24	down
5/30/2023	613.74	610.70	3.04	22.19	0.14	down
8/8/2023	615.02	610.14	4.88	22.19	0.22	down
10/24/2023	612.55	609.65	2.90	22.19	0.13	down
11/13/2023	613.01	609.70	3.31	22.19	0.15	down
			Middle of screen elevation T409			597.7
			Middle of screen elevation G46D			575.5

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	G307 Groundwater Elevation (ft NAVD88)	G307D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (lower)				
4/20/2021	624.50	622.48	2.02	38.06	0.05	down
5/17/2021	624.45	622.44	2.01	38.06	0.05	down
7/12/2021	624.45	622.59	1.86	38.06	0.05	down
8/16/2021	624.46	621.49	2.97	38.06	0.08	down
2/7/2022	624.60	622.32	2.28	38.06	0.06	down
5/9/2022	624.60	616.31	8.29	38.06	0.22	down
8/23/2022	624.60	615.09	9.51	38.06	0.25	down
2/13/2023	624.60	622.13	2.47	38.06	0.06	down
8/8/2023	623.90	616.99	6.91	38.06	0.18	down
11/13/2023	622.64	612.52	10.12	38.06	0.27	down
			Middle of screen elevation G307			606.7
			Middle of screen elevation G307D			568.6

Date	G311 Groundwater Elevation (ft NAVD88)	G311D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (lower)				
3/29/2021	616.54	575.42	41.12	43.41	0.95	down
4/22/2021	613.68	575.74	37.94	43.41	0.87	down
5/3/2021	614.01	573.09	40.92	43.41	0.94	down
5/17/2021	613.86	572.40	41.46	43.41	0.96	down
6/9/2021	613.13	573.85	39.28	43.41	0.90	down
6/15/2021	612.78	575.25	37.53	43.41	0.86	down
6/23/2021	612.45	571.74	40.71	43.41	0.94	down
7/12/2021	613.75	571.63	42.12	43.41	0.97	down
7/26/2021	613.05	569.74	43.31	43.41	1.00	down
8/16/2021	613.30	570.34	42.96	43.41	0.99	down
10/25/2021	615.13	583.70	31.43	43.41	0.72	down
2/7/2022	614.28	593.14	21.14	43.41	0.49	down
5/9/2022	615.74	596.43	19.31	43.41	0.44	down
8/23/2022	613.19	597.46	15.73	43.41	0.36	down
5/30/2023	612.78	597.98	14.80	43.41	0.34	down
8/8/2023	611.96	597.72	14.24	43.41	0.33	down
10/24/2023	611.75	597.73	14.02	43.41	0.32	down
11/13/2023	611.66	597.09	14.57	43.41	0.34	down
			Middle of screen elevation G311			606.7
			Middle of screen elevation G311D			563.3

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 1

Coffeen Power Plant

Coffeen, IL

Date	G314 Groundwater Elevation (ft NAVD88)	G314D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	LCU (upper)	DA (PMP)				
3/29/2021	596.40	572.75	23.65	29.76	0.79	down
4/20/2021	603.16	571.76	31.40	27.40	1.15	down
5/3/2021	604.66	568.77	35.89	27.40	1.31	down
5/17/2021	605.61	566.84	38.77	27.40	1.42	down
6/9/2021	607.54	567.45	40.09	27.40	1.46	down
6/14/2021	608.16	568.60	39.56	27.40	1.44	down
6/23/2021	605.19	566.77	38.42	27.40	1.40	down
7/12/2021	605.32	566.88	38.44	27.40	1.40	down
7/26/2021	606.66	566.65	40.01	27.40	1.46	down
8/16/2021	608.60	567.28	41.32	27.40	1.51	down
10/25/2021	610.36	581.05	29.31	27.40	1.07	down
2/7/2022	607.85	590.46	17.39	27.40	0.63	down
5/9/2022	609.11	594.81	14.30	27.40	0.52	down
8/23/2022	610.58	595.70	14.88	27.40	0.54	down
2/13/2023	607.74	597.30	10.44	27.40	0.38	down
3/30/2023	604.91	603.71	1.20	27.40	0.04	down
4/30/2023	608.34	606.21	2.13	27.40	0.08	down
5/30/2023	609.06	607.00	2.06	27.40	0.08	down
6/8/2023	604.44	601.90	2.54	27.40	0.09	down
7/8/2023	608.20	606.45	1.75	27.40	0.06	down
8/8/2023	609.00	605.92	3.08	27.40	0.11	down
9/25/2023	608.92	605.20	3.72	27.40	0.14	down
10/24/2023	608.58	605.14	3.44	27.40	0.13	down
11/13/2023	608.21	605.73	2.48	27.40	0.09	down
12/18/2023	606.49	606.66	-0.17	27.40	-0.01	up
			Middle of screen elevation G314			594.0
			Middle of screen elevation G314D			566.6

[O: KLT 6/4/21, C:YMD 6/7/21; U:KLT 8/25/21, C:EDP 8/31/21]
[KLT 5/3/24, C: SSW 5/7/24]

Notes:

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

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

- - = no data collected on date / no vertical gradient calculated
DA = deep aquifer
dh = head change
dl = distance change
ft = foot/feet
LCU (lower) = lower confining unit (Smithboro)
LCU (upper) = lower confining unit (Vandalia)
NAVD88 = North American Vertical Datum of 1988
PMP = potential migration pathway
UA = uppermost aquifer

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 2

Coffeen Power Plant

Coffeen, IL

Date	G405 Groundwater Elevation (ft NAVD88)	T408 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (upper)				
2/4/2017	618.47	619.46	-0.99	12.00	-0.08	up
5/13/2017	618.74	619.00	-0.26	12.00	-0.02	up
7/8/2017	618.54	619.12	-0.58	12.00	-0.05	up
10/21/2017	614.47	614.81	-0.34	12.00	-0.03	up
5/8/2018	618.94	615.82	3.12	12.00	0.26	down
8/2/2018	617.55	614.45	3.10	12.00	0.26	down
10/23/2018	616.40	616.30	0.10	12.00	0.01	down
1/15/2019	616.81	617.01	-0.20	12.00	-0.02	up
8/5/2019	617.72	617.15	0.57	12.00	0.05	down
1/20/2020	619.28	619.13	0.15	12.00	0.01	down
8/10/2020	617.62	617.38	0.24	12.00	0.02	down
1/20/2021	617.12	616.85	0.27	12.00	0.02	down
4/20/2021	617.13	616.65	0.48	12.00	0.04	down
7/26/2021	617.37	617.21	0.16	12.00	0.01	down
8/16/2021	617.28	617.22	0.06	12.00	0.00	down
10/25/2021	618.12	615.50	2.62	12.00	0.22	down
2/7/2022	617.28	616.88	0.40	12.00	0.03	down
5/9/2022	617.91	617.78	0.13	12.00	0.01	down
8/23/2022	616.85	616.99	-0.14	12.00	-0.01	up
2/13/2023	617.50	617.16	0.34	12.00	0.03	down
5/30/2023	616.79	616.66	0.13	12.00	0.01	down
8/8/2023	616.78	616.62	0.16	12.00	0.01	down
10/24/2023	615.79	615.97	-0.18	12.00	-0.02	up
11/13/2023	615.90	616.06	-0.16	12.00	-0.01	up
			Middle of screen elevation G405D			610.0
			Middle of screen elevation T408			598.0

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 2

Coffeen Power Plant

Coffeen, IL

Date	G406 Groundwater Elevation (ft NAVD88)	T409 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (upper)				
2/4/2017	617.52	615.93	1.59	8.23	0.19	down
5/13/2017	616.20	616.75	-0.55	8.23	-0.07	up
7/8/2017	616.29	617.05	-0.76	8.23	-0.09	up
10/21/2017	611.27	612.16	-0.89	8.23	-0.11	up
5/8/2018	615.47	616.02	-0.55	8.23	-0.07	up
8/2/2018	615.75	615.25	0.50	8.23	0.06	down
10/23/2018	614.11	613.96	0.15	8.23	0.02	down
1/15/2019	615.36	614.78	0.58	8.23	0.07	down
8/5/2019	616.50	615.10	1.40	8.23	0.17	down
1/20/2020	617.48	617.16	0.32	8.23	0.04	down
8/10/2020	615.54	615.43	0.11	8.23	0.01	down
1/20/2021	612.97	614.41	-1.44	8.23	-0.17	up
4/20/2021	613.78	615.33	-1.55	8.23	-0.19	up
7/26/2021	614.20	615.72	-1.52	8.23	-0.18	up
8/16/2021	613.82	615.42	-1.60	8.23	-0.19	up
10/25/2021	614.93	616.43	-1.50	8.23	-0.18	up
2/7/2022	613.55	614.97	-1.42	8.23	-0.17	up
5/9/2022	615.36	616.81	-1.45	8.23	-0.18	up
8/23/2022	613.47	610.73	2.74	8.23	0.33	down
2/13/2023	614.11	615.65	-1.54	8.23	-0.19	up
5/30/2023	612.29	613.74	-1.45	8.23	-0.18	up
8/8/2023	613.87	615.02	-1.15	8.23	-0.14	up
10/24/2023	611.28	612.55	-1.27	8.23	-0.15	up
11/13/2023	611.53	613.01	-1.48	8.23	-0.18	up
			Middle of screen elevation G406			605.9
			Middle of screen elevation T409			597.7

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 2

Coffeen Power Plant

Coffeen, IL

Date	T408 Groundwater Elevation (ft NAVD88) LCU (upper)	G45D Groundwater Elevation (ft NAVD88) LCU (lower)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
2/4/2017	619.46	587.71	31.75	13.78	2.30	down
5/13/2017	619.00	586.19	32.81	13.78	2.38	down
7/8/2017	619.12	586.29	32.83	13.78	2.38	down
10/21/2017	614.81	584.69	30.12	13.78	2.19	down
5/8/2018	615.82	587.56	28.26	13.78	2.05	down
8/2/2018	614.45	585.81	28.64	13.78	2.08	down
10/23/2018	616.30	584.60	31.70	13.78	2.30	down
1/15/2019	617.01	586.96	30.05	13.78	2.18	down
8/5/2019	617.15	588.04	29.11	13.78	2.11	down
8/10/2020	617.38	614.21	3.17	13.78	0.23	down
1/20/2021	616.85	614.60	2.25	13.78	0.16	down
4/20/2021	616.65	614.32	2.33	13.78	0.17	down
7/26/2021	617.21	613.58	3.63	13.78	0.26	down
8/16/2021	617.22	613.83	3.39	13.78	0.25	down
10/25/2021	615.50	614.51	0.99	13.78	0.07	down
2/7/2022	616.88	615.01	1.87	13.78	0.14	down
5/9/2022	617.78	614.95	2.83	13.78	0.21	down
8/23/2022	616.99	614.58	2.41	13.78	0.17	down
2/13/2023	617.16	614.69	2.47	13.78	0.18	down
5/30/2023	616.66	613.99	2.67	13.78	0.19	down
8/8/2023	616.62	613.47	3.15	13.78	0.23	down
10/24/2023	615.97	613.40	2.57	13.78	0.19	down
11/13/2023	616.06	613.55	2.51	13.78	0.18	down
			Middle of screen elevation T408			598.0
			Middle of screen elevation G45D			584.2

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

Ash Pond No. 2

Coffeen Power Plant

Coffeen, IL

Date	T409 Groundwater Elevation (ft NAVD88)	G46D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	LCU (upper)	LCU (lower)				
2/4/2017	615.93	586.06	29.87	22.19	1.35	down
5/13/2017	616.75	584.87	31.88	22.19	1.44	down
7/8/2017	617.05	585.22	31.83	22.19	1.43	down
5/8/2018	616.02	585.86	30.16	22.19	1.36	down
8/2/2018	615.25	583.95	31.30	22.19	1.41	down
10/23/2018	613.96	582.05	31.91	22.19	1.44	down
1/15/2019	614.78	583.17	31.61	22.19	1.42	down
8/5/2019	615.10	583.68	31.42	22.19	1.42	down
8/10/2020	615.43	609.00	6.43	22.19	0.29	down
1/20/2021	614.41	610.49	3.92	22.19	0.18	down
4/20/2021	615.33	611.06	4.27	22.19	0.19	down
7/26/2021	615.72	607.21	8.51	22.19	0.38	down
8/16/2021	615.42	608.17	7.25	22.19	0.33	down
10/25/2021	616.43	609.87	6.56	22.19	0.30	down
2/7/2022	614.97	610.71	4.26	22.19	0.19	down
5/9/2022	616.81	611.34	5.47	22.19	0.25	down
8/23/2022	610.73	615.13	-4.40	22.19	-0.20	up
2/13/2023	615.65	610.39	5.26	22.19	0.24	down
5/30/2023	613.74	610.70	3.04	22.19	0.14	down
8/8/2023	615.02	610.14	4.88	22.19	0.22	down
10/24/2023	612.55	609.65	2.90	22.19	0.13	down
11/13/2023	613.01	609.70	3.31	22.19	0.15	down
			Middle of screen elevation T409			597.7
			Middle of screen elevation G46D			575.5

[O: KLT 6/4/21, C:YMD 6/7/21; U:KLT 8/25/21, C:EDP 8/31/21]
[KLT 5/3/24, C: 5/7/24]

Notes:

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

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

- - = no data collected on date / no vertical gradient calculated
DA = deep aquifer
dh = head change
dl = distance change
ft = foot/feet
LCU (lower) = lower confining unit (Smithboro)
LCU (upper) = lower confining unit (Vandalia)
NAVD88 = North American Vertical Datum of 1988
PMP = potential migration pathway
UA = uppermost aquifer

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

GMF Recycle Pond

Coffeen Power Plant

Coffeen, IL

Date	G405 Groundwater Elevation (ft NAVD88)	T408 Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	LCU (upper)				
2/4/2017	618.47	619.46	-0.99	12.00	-0.08	up
5/13/2017	618.74	619.00	-0.26	12.00	-0.02	up
7/8/2017	618.54	619.12	-0.58	12.00	-0.05	up
10/21/2017	614.47	614.81	-0.34	12.00	-0.03	up
5/8/2018	618.94	615.82	3.12	12.00	0.26	down
8/2/2018	617.55	614.45	3.10	12.00	0.26	down
10/23/2018	616.40	616.30	0.10	12.00	0.01	down
1/15/2019	616.81	617.01	-0.20	12.00	-0.02	up
8/5/2019	617.72	617.15	0.57	12.00	0.05	down
1/20/2020	619.28	619.13	0.15	12.00	0.01	down
8/10/2020	617.62	617.38	0.24	12.00	0.02	down
1/20/2021	617.12	616.85	0.27	12.00	0.02	down
4/20/2021	617.13	616.65	0.48	12.00	0.04	down
7/26/2021	617.37	617.21	0.16	12.00	0.01	down
8/16/2021	617.28	617.22	0.06	12.00	0.005	down
10/25/2021	618.12	615.50	2.62	12.00	0.218	down
2/7/2022	617.28	616.88	0.40	12.00	0.033	down
5/9/2022	617.91	617.78	0.13	12.00	0.011	down
8/23/2022	616.85	616.99	-0.14	12.00	-0.012	up
2/13/2023	617.50	617.16	0.34	12.00	0.028	down
5/30/2023	616.79	616.66	0.13	12.00	0.011	down
8/8/2023	616.78	616.62	0.16	12.00	0.013	down
10/24/2023	615.79	615.97	-0.18	12.00	-0.015	up
11/13/2023	615.90	616.06	-0.16	12.00	-0.013	up
			Middle of screen elevation G405D			610.0
			Middle of screen elevation T408			598.0

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

GMF Recycle Pond

Coffeen Power Plant

Coffeen, IL

Date	G275 Groundwater Elevation (ft NAVD88)	G275D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	UA	DA (PMP)				
4/20/21-4/21/20	605.00	568.33	36.67	42.14	0.87	down
7/12/21-7/13/21	605.63	570.43	35.20	42.77	0.82	down
7/26/2021	605.05	570.35	34.70	42.18	0.82	down
8/16/2021	605.09	571.48	33.61	42.23	0.80	down
10/25/2021	605.17	578.52	26.65	42.30	0.63	down
2/7/2022	605.10	580.46	24.64	42.24	0.58	down
5/9/2022	605.67	581.11	24.56	42.80	0.57	down
2/13/2023	605.24	580.82	24.42	42.38	0.58	down
			Middle of screen elevation G275			605.7
			Middle of screen elevation G275D			562.9

Appendix B. Supplemental Vertical Hydraulic Gradients

Nature and Extent Report

GMF Recycle Pond

Coffeen Power Plant

Coffeen, IL

Date	T408 Groundwater Elevation (ft NAVD88)	G45D Groundwater Elevation (ft NAVD88)	Head Change (ft)	Distance Change [1] (ft)	Vertical Hydraulic Gradient [2] (dh/dl)	
	LCU (upper)	LCU (lower)				
2/4/2017	619.46	587.71	31.75	13.78	2.30	down
5/13/2017	619.00	586.19	32.81	13.78	2.38	down
7/8/2017	619.12	586.29	32.83	13.78	2.38	down
10/21/2017	614.81	584.69	30.12	13.78	2.19	down
5/8/2018	615.82	587.56	28.26	13.78	2.05	down
8/2/2018	614.45	585.81	28.64	13.78	2.08	down
10/23/2018	616.30	584.60	31.70	13.78	2.30	down
1/15/2019	617.01	586.96	30.05	13.78	2.18	down
8/5/2019	617.15	588.04	29.11	13.78	2.11	down
8/10/2020	617.38	614.21	3.17	13.78	0.23	down
1/20/2021	616.85	614.60	2.25	13.78	0.16	down
4/20/2021	616.65	614.32	2.33	13.78	0.17	down
7/26/2021	617.21	613.58	3.63	13.78	0.26	down
8/16/2021	617.22	613.83	3.39	13.78	0.25	down
10/25/2021	615.50	614.51	0.99	13.78	0.07	down
2/7/2022	616.88	615.01	1.87	13.78	0.14	down
5/9/2022	617.78	614.95	2.83	13.78	0.21	down
8/23/2022	616.99	614.58	2.41	13.78	0.17	down
2/13/2023	617.16	614.69	2.47	13.78	0.18	down
5/30/2023	616.66	613.99	2.67	13.78	0.19	down
8/8/2023	616.62	613.47	3.15	13.78	0.23	down
10/24/2023	615.97	613.40	2.57	13.78	0.19	down
11/13/2023	616.06	613.55	2.51	13.78	0.18	down
			Middle of screen elevation T408			598.0
			Middle of screen elevation G45D			584.2

[O: KLT 6/4/21, C:YMD 6/7/21][U:KLT 8/25/21, C:EDP 8/31/21]
[KLT 5/3/24, C: 5/7/24]

Notes:

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

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

-- = no data collected on date / no vertical gradient calculated

DA = deep aquifer

dh = head change

dl = distance change

ft = foot/feet

LCU (lower) = lower confining unit (Smithboro)

LCU (upper) = lower confining unit (Vandalia)

NAVD88 = North American Vertical Datum of 1988

PMP = potential migration pathway

UA = uppermost aquifer

APPENDIX C
Historical Field and Laboratory Hydraulic Conductivities

Appendix C. Historical Field and Laboratory Hydraulic Conductivities
Nature and Extent Report
GMF Recycle Pond
Coffeen Power Plant
Coffeen, IL

Well ID	Unit	Method (fh)	Method (rh)	K (fh)	K (rh)	Well Geometric Mean	Approximate Screened Elevation (ft)	Interpreted Unit
Upper-most Aquifer								
R104	Landfill	KGS	B-R	7.0E-05	2.8E-04	1.4E-04	614.4-609.7	Hagarstown Beds
G105		KGS	KGS	1.5E-04	5.7E-05	9.2E-05	613.2-608.4	
G106		B-R	B-R	4.0E-05	7.4E-04	1.7E-04	614.0-609.4	
G107		KGS	KGS	6.3E-05	8.9E-05	7.5E-05	613.9-609.3	
G110		KGS	KGS	4.7E-05	2.0E-05	3.1E-05	612.0-607.4	
G119		KGS	KGS	8.6E-05	8.2E-05	8.4E-05	611.6-607	
G120		low water elevation; no test conducted					614.2-609.7	
G125		KGS	KGS	4.8E-05	4.1E-05	4.4E-05	613.7-609.1	
T127		KGS	KGS	1.2E-03	1.7E-05	1.4E-04	610.5-606	
			Unit Geometric Mean			8.5E-05		
T202	Gypsum Pond	KGS	KGS	4.5E-04	5.5E-04	5.0E-04	614.0-609.6	Hagarstown Beds
G206		B-R	KGS	3.0E-04	1.6E-04	2.2E-04	613.0-608.6	
G208		KGS	KGS	6.0E-05	2.1E-05	3.5E-05	613.0-608.5	
G209		KGS	KGS	2.0E-04	1.6E-04	1.8E-04	612.8-608.3	
G210		KGS	KGS	5.0E-04	4.8E-04	4.9E-04	611.1-606.6	
G212		KGS	KGS	1.3E-04	1.8E-04	1.5E-04	613.9-609.3	
G215		KGS	KGS	5.0E-04	3.5E-04	4.2E-04	611.1-606.7	
G218		KGS	KGS	4.1E-04	4.1E-04	4.1E-04	610.3-605.9	
			Unit Geometric Mean			2.3E-04		
G270	Recycle Pond	KGS	KGS	5.5E-04	4.8E-04	5.1E-04	609.8-605.0	Hagarstown Beds
G271		KGS	KGS	1.6E-04	1.1E-03	4.2E-04	612.9-608.6	
G273		KGS	KGS	1.0E-03	8.3E-04	9.1E-04	611.1-605.6	
G276		low water					606.7-601.9	Hagarstown Beds, v. thin
G279		KGS	KGS	1.7E-03	1.5E-03	1.6E-03	606.8-602.4	Hagarstown Beds
G280		KGS	KGS	1.3E-03	1.3E-03	1.3E-03	610.2-605.3	
G281		KGS	KGS	2.1E-03	8.9E-04	1.4E-03	608.3-603.7	
			Unit Geometric Mean			9.0E-04		
G301	Ash Pond 1	KGS	KGS	2.7E-04	5.0E-04	3.7E-04	609-604.3	Upper Vandalia Till
G302		KGS	KGS	4.9E-04	6.3E-04	5.6E-04	604.7-600.1	
G303		KGS	KGS	5.6E-05	3.1E-05	4.2E-05	609.1-599.1	Hagarstown/Vandalia Till Contact
G304		KGS	KGS	8.9E-04	1.0E-03	9.4E-04	613.5-603.5	Hagarstown Beds
			Unit Geometric Mean			3.0E-04		
G401	Ash Pond 2	B-R	B-R	1.8E-04	2.8E-04	2.2E-04	608.7-603.7	Hagarstown Beds
G402		KGS	KGS	4.5E-04	1.9E-04	2.9E-04	600.6-590.6	Upper Vandalia Till
G403		KGS	KGS	4.3E-05	7.2E-05	5.6E-05	610.7-606.0	Hagarstown Beds, v. thin
G404		KGS	KGS	4.2E-04	3.8E-04	4.0E-04	606.7-601.9	Hagarstown Beds
G405		KGS	KGS	9.8E-04	9.7E-04	9.7E-04	611.9-607.1	
			Unit Geometric Mean			2.7E-04		
G153	SW Pond	KGS	KGS	2.5E-04	5.4E-04	3.7E-04	607.5-603.0	Hagarstown Beds
			Unit Geometric Mean			3.7E-04		
MW03S	2009 Hydrogeo. Invest.	B-R	B-R	6.0E-04	1.1E-03	8.1E-04	613.7-608.6	Hagarstown Beds
MW04S		B-R	B-R	1.3E-03	8.0E-04	1.0E-03	612.6-607.6	
MW10S		B-R	B-R	8.0E-04	8.0E-04	8.0E-04	610.9-604.9	
MW13S		B-R	B-R	1.0E-03	2.0E-04	4.5E-04	611.3-606.1	
MW14S		B-R	B-R	1.0E-03	5.0E-04	7.1E-04	612.4-607.2	
MW15S		B-R	B-R	1.5E-04	8.1E-05	1.1E-04	609.3-604.2	
MW16S		B-R	B-R	6.0E-04	4.5E-04	5.2E-04	611.5-606.3	
MW17S		B-R	B-R	5.8E-04	5.5E-04	5.6E-04	613.1-603	
			Unit Geometric Mean			5.4E-04		
Lower Confining Unit (Vandalia and Smithboro Till)								
T408	Ash Pond 2	KGS	KGS	2.15E-06	7.50E-08	9.02E-07	600.4-595.2	Vandalia Till
T409		KGS	KGS	3.6E-05	3.20E-05	3.41E-05	600.1-594.9	Vandalia Till (sand seam)
G405D		KGS	KGS			4.90E-07	589.1-579	Smithboro Till
G406D		KGS	KGS			4.00E-08	580.3-570.3	
			Unit Geometric Mean			5.55E-06		

Notes:
fh = Falling head test
rh = Rising head test

Hydraulic Conductivity tests analyzed using Aqtesolv® Pro version 4.50 (HydroSOLVE, Inc.)

Test Methods

B-R Bouwer and Rice, 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifer with Completely or Partially Penetrating Wells", Water Resources Research v.12, no. 3. American Geophysical Union, Washington, DC. pp. 423-428.

KGS Hyder, Z., J.J. Butler, C.D. McElwee, and W. Liu, 1974. "Slug tests in partially penetrating wells", Water Resources Research, v. 30, no. 11. American Geophysical Union, Washington, DC. pp. 2945-2957.

Appendix C. Historical Field and Laboratory Hydraulic Conductivities
Nature and Extent Report
GMF Recycle Pond
Coffeen Power Plant
Coffeen, IL

Laboratory Tests			
Well/ Soil Boring ID	**Approximate Sample Elevation (ft)**	**Hydraulic Conductivity (cm/sec)**	**Interpreted Unit**
COF-B001	613.0	1.3E-08	Loess - Upper Confining Unit
COF-B003	606.5	2.2E-07	
COF-B004	610.5	5.0E-07	
COF-B007	615.0	7.0E-08	
	Geometric Mean	**1.0E-07**	
G46D	599.2	4.5E-06	Vandalia Till
T408	597.6	1.5E-07	
SB-12	577.7-572.7	6.8E-09	
SB-13	598-593	7.0E-09	
SB-18	603.5-603	8.8E-09	
	Geometric Mean	**4.9E-08**	
SB-09	598.5-598	1.9E-06	Mulberry Grove Silt
SB-16	589-588.5	1.6E-06	
	Geometric Mean	**1.7E-06**	
G45D	586.4	1.0E-07	Smithboro Till
G46D	578.9	2.1E-08	
SB-07	572-571.5	1.1E-09	
	Geometric Mean	**1.3E-08**	
SB-19	569-564	3.4E-09	Deep Confining Unit
SB-16	548-547.5	1.3E-08	
	Geometric Mean	**6.6E-09**	

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APPENDIX D
Geochemical Conceptual Site Model

Geosyntec consultants

engineers | scientists | innovators

Geochemical Conceptual Site Model

Coffeen Power Plant – Gypsum Management Facility Gypsum Stack Pond

(CCR Unit #103)

Prepared for

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 1

2. INTRODUCTION 2

3. SITE BACKGROUND 3
   3.1 Site Overview 3
   3.2 Groundwater Monitoring Network 3

4. GEOCHEMICAL SITE CONDITIONS 5
   4.1 Constituent Transport and Fate 5
   4.2 Site Solids Characterization 5
      4.2.1 Bulk Characterization 6
      4.2.2 Mineralogical Analysis 7
   4.3 Aqueous Geochemistry 7
      4.3.1 Redox/pH Summary 8
      4.3.2 Exceedance Parameters 8
      4.3.3 Pourbaix Diagrams 9
      4.3.4 Total and Dissolved Iron and Manganese Concentrations 9
      4.3.5 Major Ion Distribution and Groundwater Signatures 10

5. EVALUATION OF PARTITION COEFFICIENT RESULTS 11
   5.1 Batch Attenuation Testing 11
   5.2 Partition Coefficient Results 11

6. GEOCHEMICAL CONCEPTUAL SITE MODEL 12
   6.1 Source and Mobilization Mechanisms 12
   6.2 Potential and Observed Attenuation Mechanisms 12

7. REFERENCES 13

LIST OF FIGURES

Figure 1	pH Time Series
Figure 2	ORP Time Series
Figure 3a	Total Sulfate Concentration Time Series
Figure 3b	Dissolved Sulfate Concentration Time Series
Figure 4	Iron Pourbaix Diagram
Figure 5	Manganese Pourbaix Diagram
Figure 6	Piper Diagram
Figure 7	G215 Sulfate Partition Coefficients

LIST OF TABLES

Table 1	Bulk Characterization of Site Solids
Table 2	XRD Analysis of Site Solids
Table 3	Eh-pH Diagram Inputs
Table 4	Total and Dissolved Aqueous Iron and Manganese Results
Table 5	Microcosm Amendment and Target Concentrations
Table 6	Batch Attenuation Testing Results, G215
Table 7	Partition Coefficient Results, G215

LIST OF ATTACHMENTS

Attachment A:	Site Layout Figure
Attachment B:	Proposed Part 845 Groundwater Monitoring Network and Geologic Cross Sections
Attachment C:	Monitoring Well Construction Information
Attachment D:	Boring Logs
Attachment E:	Site Solids Bulk Characterization Analytical Data
Attachment F:	X-Ray Diffraction Analytical Data
Attachment G:	Site Evaluation Aqueous Phase Data
Attachment H:	Memorandum – Evaluation of Partition Coefficients Results – Coffeen GMF Recycle Pond

ACRONYMS AND ABBREVIATIONS

CEC	cation exchange capacity
CCR	coal combustion residuals
COCs	constituents of concern
CPP	Coffeen Power Plant
DA	deep aquifer
DCU	deep confining unit
GCSM	geochemical conceptual site model
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	groundwater protection standards
HSU	hydrostratigraphic unit
I.A.C.	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
LCU	lower confining unit
meq/100g	milliequivalents per 100 grams
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
N&E	nature and extent
ORP	oxidation-reduction potential
PMP	potential migration pathway
SU	standard units
TDS	total dissolved solids
TOC	total organic carbon
UA	uppermost aquifer
UCU	upper confining unit
XRD	X-Ray diffraction

1. EXECUTIVE SUMMARY

A geochemical conceptual site model (GCSM) has been developed to describe subsurface conditions at the Coffeen Power Plant Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) coal combustion residuals unit (Unit #103). A GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of constituents of concern (COCs) in the subsurface environment. This report describes the GCSM for constituents that have exceeded the groundwater protection standards (GWPS) in GMF GSP groundwater, and which will be addressed in the corrective action plan. Sulfate is the only constituent with an exceedance at the GMF GSP, with an exceedance present in the uppermost aquifer (UA). The UA is comprised predominantly of sandy to gravelly silts with thin sand beds.

The coal combustion residual (CCR) materials within the GMF GSP are the primary source of constituent loading to the CCR porewater (i.e., CCR source water). Over an extended period (e.g., months to years), the CCR source water (i.e., water contained within the interstitial pore spaces of the CCR that can be sampled by low-flow groundwater sampling methods) reaches equilibrium with the CCR materials. The porewater is therefore representative of the mobile phase constituents capable of migrating into the underlying materials and potentially downgradient in groundwater. The GMF GSP CCR source water is therefore the primary indicator of sulfate available to the groundwater and is considered as the primary source term for environmental investigation and fate and transport modeling.

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations, which indicates that a portion of the sulfate in the groundwater system may be attenuated via surface complexation reactions. However, crystalline iron oxides were not identified in the mineralogical analysis and a site-specific partition coefficient for sulfate could not be calculated from the results of batch attenuation testing completed with solids from the Site. These results indicate that chemical attenuation of sulfate downgradient of the GMF GSP may be limited.

2. INTRODUCTION

This report documents the development of a geochemical conceptual site model (GCSM) to describe subsurface conditions at the Coffeen Power Plant (CPP) (CPP) Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) coal combustion residuals (CCR) unit (Unit #103). A GCSM describes the environmental media and geochemical processes that contribute to the mobilization, distribution, and attenuation of constituents in the subsurface environment. The GCSM was prepared in support of an evaluation of the nature and extent of exceedances of constituents of concern (COCs) above the groundwater protection standards (GWPS) at the GSP. The document has been prepared as an appendix to the CPP GMF GSP N&E Report prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll).

Sulfate is the only constituent with an exceedance above the GWPS at the GSP for the second, third, and fourth quarters of 2023 (Q2 2023, Q3, 2023, and Q4 2023) monitoring events completed under Illinois Administrative Code (I.A.C.) Title 35 Section 845.630. An exceedance of sulfate was detected only at compliance monitoring well G215 during these sampling events (Ramboll 2024). The sulfate exceedance is present within the uppermost aquifer (UA).

3. SITE BACKGROUND

3.1 Site Overview

An overview of Site characteristics and hydrogeology is presented in CPP GMF GSP Nature and Extent (N&E) Report. A Site layout figure is provided in Attachment A.[1] The Coffeen GMF GSP impoundment is located to the north of the GMF Recycle Pond CCR unit (Unit #104). An unnamed tributary runs north to south to the east of the GMF GSP and Recycle Pond. The CPP property is located approximately two miles south of the city of Coffeen, Illinois, and bordered by lobes of Coffeen Lake to the west, east, and south, and by agricultural land to the north.

The GMF GSP is a 77-acre lined surface impoundment that received blowdown for the air emission scrubbers from 2010 to 2021. The GMF GSP was constructed in accordance with Illinois Environmental Protection Agency (IEPA) Water Pollution Control Permit No. 2008-EA-4661 and features a composite high-density polyethylene (HDPE) liner with three feet of compacted soil and an inactive groundwater underdrain system.

A Hydrogeologic Site Characterization Report (Ramboll 2021a) previously described the hydrostratigraphic units (HSUs) present in the vicinity of the GMF GSP, which consist of an Upper Confining Unit (UCU), UA, Lower Confining Unit (LCU), Deep Aquifer (DA), and Deep Confining Unit (DCU). The UCU consists of the silty or clayey silt of the Loess Unit and the upper clayey portion of the Hagerstown Member. The UA is predominantly sandy to gravelly silts with thin sand beds, with lithology identified as the Hagarstown Member. The LCU is comprised primarily of sandy to silty till, with discontinuous sand lenses that have been identified as potential migration pathways (PMPs). The LCU includes lithologies identified as the Vandalia Member, Mulberry Grove Member, and Smithboro Member. The DA is predominantly sand and sandy silt/clay units of the Yarmouth Soil and is discontinuous beneath the CPP.

Vertical gradients measured near the CPP indicate downward flow from the UA to the LCU and DA (Ramboll 2021a). Both the DA and the LCU have been identified as PMPs due to the presence of these downward gradients.

3.2 Groundwater Monitoring Network

A groundwater monitoring network was proposed in accordance with I.A.C Title 35 Section 845.630 to monitor groundwater quality which passes the waste boundary as part of the Operating Permit application to IEPA for the GMF GSP. The proposed groundwater monitoring network is described in the Groundwater Monitoring Plan (Ramboll 2021b) and shown in Attachment B.[2] Well construction information is provided in Attachment C.[3]

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[1] This figure is also provided as Figure 2-1 of the CPP GMF GSP N&E Report.
[2] This figure is also provided as Figure 2-2 of the CPP GMF GSP N&E Report.
[3] This table is also provided as Table 3-1 of the CPP GMF GSP N&E Report.

Groundwater flow is generally east to southeast in the vicinity of the GMF GSP in the direction of the unnamed tributary. Groundwater flow directions are generally consistent across seasons. A detailed discussion of the hydrology of the Site is presented in Section 2 of the CPP GMF GSP N&E Report.

4. GEOCHEMICAL SITE CONDITIONS

The general behavior of the COC, sulfate, is discussed in Section 4.1. Summaries of Site solids and aqueous conditions within the relevant HSUs are provided in Section 4.2 and 4.3, respectively, with discussion of how groundwater both upgradient and downgradient of the GMF GSP may interact with the Site solids to affect constituent behavior. This includes discussion of potential sorbing or precipitating phases and how the stability of those phases may be affected by variable groundwater pH and redox conditions.

4.1 Constituent Transport and Fate

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

4.2 Site Solids Characterization

Solid phase data for the CCR source material within the unit is limited to two grab sample locations in the northwest corner of the GSP due to safety concerns. These CCR solids samples consist primarily of gypsum scrubber waste.

Solids from across the monitoring network were characterized using various analytical techniques, the results of which are presented in Tables 1 and 2, to characterize their geochemical properties and to understand their effect on the geochemistry of the groundwater system.[4] Solids were collected from three locations adjacent to the following existing wells in the GMF GSP monitoring network, and one additional location adjacent to the GMF GSP:

- G200, located upgradient of the GMF GSP to the north. Solids were collected within the UA and are considered representative of background conditions for the GMF GSP.
- G206 and G206D, located at the downgradient edge of the GMF GSP to the south. Solids were collected within the UCU, UA, LCU, and DA

[4] Sequential extraction procedures are chemical extractions used to dissolve metals from specific solid-associated phases. While useful for solid phase characterization, reporting limits are often elevated for sulfate and boron and samples from the vicinity of the CPP GMF GSP were not submitted for analysis via this technique.

- SB289, located downgradient of the GMF GSP on the northeast corner. Solids were collected within the UCU, UA, LCU, and DA.
- G215, located at the downgradient edge of the GSP to the east, with solids collected within the UA. Statistical exceedances of sulfate above the GWPS limits were identified at G215 in 2023.

The monitoring well and boring locations are shown in Attachment B[5]. Boring logs for these locations are provided in Attachment D.

4.2.1 Bulk Characterization

Bulk characterization analytical data is presented on Table 1 and the analytical data is provided in Attachment E. Total organic carbon (TOC) represents only the carbon component of organic matter within a solid material. Non-detect to low (1.79 percent by dry weight [wt %]) TOC values were reported in the vicinity of the GMF GSP within the UA, with similarly low abundances in DA solids (0.08 to 0.23 % wt).[6]

The cation exchange capacity (CEC) of a solid represents the total negative surface charge of that material, which is related to the material's surface potential to sorb cations. Amorphous iron hydroxides, organic matter, and clays all tend to possess high negative surface charges at circumneutral pH and therefore tend to contribute to higher CEC values. CEC values in UA solids (3.38 to 4.68 milliequivalents per 100 g of sample [meq/100g]) are lower than in DA solids (19.98 to 21.02 meq/100g), consistent with expectations for the differing lithologies.

Where analyzed, total sulfides within Site solids were low across all lithologies (<0.1 % wt), in agreement with low total sulfur concentrations (less than 1,500 milligrams per kilogram [mg/kg]) in all samples. Acid volatile sulfide (AVS) represents the portion of sulfide within a solid material that can be liberated to hydrogen sulfide (H_2S) gas after the acidification of the sample. AVS was low in the limited number of UA samples analyzed (<0.2 mg/kg). The low abundances of total sulfides and AVS suggest sulfides have a limited abundance in the Site solids and sulfur is primarily present within other mineral phases. Sulfate was detected in UA solids (26 to 61 mg/kg), and not detected in solid samples from the DA (Table 1); samples were only analyzed for sulfate at downgradient locations so the source of the sulfate could not be identified. Note that sulfate concentrations in GMF GSP solids were 15,000 to 19,000 mg/kg, as shown on Table 1; the higher concentrations in the CCR solid materials compared to the aquifer lithology is consistent with the predominance of gypsum in the CCR.

Total metals were analyzed to determine the major and trace metal content of the solids. The abundance of total aluminum, iron, and manganese can provide insights into the potential presence

[5] Boring locations figure also provided as Figure 2-7 of the COF GMF GSP N&E Report.
[6] While the analytical laboratory reports provided in Attachment E provide TOC as mg/kg, the results have been converted to % wt for ease of interpretation.

of adsorbing phases, as oxyhydroxides of these metals can provide sorption capacity. The total metals results are presented in Table 1 and the analytical data is provided in Attachment E.

Total aluminum was only measured at two locations within the UA (SB-200 and SB-215), with concentrations ranging between 21,000 to 22,000 mg/kg, or approximately two percent (2%) by weight. Total iron concentrations are low (about 0.7% to 2.1% by weight) and similar between UA solids in background (16,000 mg/kg) and downgradient locations (6,800 to 21,000 mg/kg), with concentrations generally lower in DA solids (8,100 to 12,000 mg/kg). Total manganese concentrations follow a similar pattern to iron, with concentrations similar across UA solids (270 mg/kg to 650 mg/kg) and elevated compared to DA solids (39 to 110 mg/kg). The abundance of iron within the bulk solids matrix of the UA indicates the presence of iron-bearing minerals, which was confirmed via X-Ray diffraction (XRD) as discussed in Section 4.2.2.

4.2.2 Mineralogical Analysis

XRD with Rietveld refinement was conducted for identification of minerals in solid samples. XRD is an analytical technique that provides information about the identity of the crystalline material within a sample but does not provide information about non-crystalline or amorphous phases. XRD results are normalized to 100% of the total weight, meaning that material not detected by XRD is ignored in the percent calculation.

The XRD data are presented in Table 2 and the analytical data is provided in Attachment F. Solids from the UA across the Site were predominantly composed of quartz, ranging from 53.1 to 58.3% of the minerals present. Feldspar minerals including albite (8.0 to 9.0%) and microcline (6.2 to 6.4%), and the carbonates dolomite (12.9 to 18.2 %) and calcite (3.3-4.5%), were detected as additional primary crystalline mineral phases. While crystalline forms of iron oxides were not detected in Site solids, ankerite, an iron-bearing carbonate mineral, was detected in all Site solids at abundances from 4.3 to 5.2%. The observation of ankerite indicates that the total iron within Site solids is associated with minerals other than crystalline iron oxides and that iron oxides within Site solids are likely present as non-crystalline or amorphous phases. No crystalline manganese oxide or aluminum oxide minerals were detected in Site solids.

4.3 Aqueous Geochemistry

Groundwater from wells across the UA and DA in the vicinity of the GMF GSP were analyzed for a range of geochemical parameters, as presented in Figures 1–7. For clarity in interpretation, UA well locations are shown with square symbology and G206D, the only DA location, is shown with triangular symbology. Wells G200 and R201, both of which are screened in the UA, represent background for the GMF GSP and are shown with hollow symbology. The groundwater data used in the Site evaluation is summarized in Attachment G.

A limited set of porewater (i.e., CCR contact water) samples has been collected in the recent past from the NE Riser location, which collects contact water from process piping located in the northeast corner of the GSP. CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" (USEPA 2014) and represents

the material potentially leached from impoundments. The CCR materials are the primary source of constituent loading to the CCR porewater. Over an extended period (e.g., months to years), the CCR porewater (i.e., water) reaches equilibrium with the CCR materials. The concentrations within the porewater are "the most representative data available for impoundments because these data are field-measured concentrations of leachate" (USEPA 2014). Porewater is therefore the most appropriate source term for potential flux out of CCR impoundments. The porewater data used in the Site evaluation is also summarized in Attachment G.

4.3.1 Redox/pH Summary

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

GMF GSP porewater pH values ranged between 6.9 to 7.9 SU (Figure 1). In wells across the groundwater monitoring network, pH values appear to be stable and are circumneutral, consistent with the buffering capacity associated with the presence of carbonate mineral species detected within UA solids (Table 2). Compliance UA groundwater pH values largely range between 6.5 to 7.8 SU, which overlaps the range observed for background UA groundwater with pH values 6.7 to 7.7 SU. A range of pH values between 6.9 to 7.5 SU were detected in samples from DA groundwater near the GSP, as represented by samples from G206D. Within UA compliance wells, pH values are observed to generally decrease along a transect from G206 to G213, then G215 to G218, moving northeast and then north.

A limited range of redox conditions were detected in groundwater across the Site, with both positive and negative ORP values reported at UA monitoring network wells (Figure 2). ORP values appear to be more variable after the Q4 2019 sampling event, which may be related to changes in water management at the GMF after the CPP was shut down on November 1, 2019. GMF GSP porewater at the NE Riser location is relatively more oxidizing than groundwater in the UA compliance network. This is likely due to the shallow construction of the GMF GSP and its high surface area. Since 2019, the ORP of UA background groundwater at G200 is generally comparable to downgradient conditions, whereas groundwater at R201 is relatively more reducing.

4.3.2 Exceedance Parameters

Total sulfate concentrations within GSP porewater leachate at the NE Riser location ranged between 8,800 to 12,000 mg/L, above the GWPS of 400 mg/L (Figure 3a). The only dissolved sulfate measurement (June 2023) was similarly elevated (9,100 mg/L) (Figure 3b). These elevated concentrations are consistent with the nature of the CCR material within the unit (gypsum) and the high sulfate concentrations detected for GMF GSP solids (Table 1).

Sulfate concentrations detected in groundwater samples statistically exceed the GWPS only at G215 (Figure 3a). Groundwater samples at UA background wells G200 (64 to 120 mg/L) and R201 (89 to 370 mg/L) did not exceed the GWPS for sulfate (Figure 3a). Sulfate concentrations are largely stable through time at UA background wells and compliance wells along the southern side of the GMF GSP. Sulfate concentrations at G215 have shown an increasing trend since early

2020. Increasing sulfate concentrations were also observed at G217 and G218, which are also located on the east side of the GMF GSP, over the same period, although neither yet statistically exceed the GWPS. When measured, dissolved sulfate represents the majority of total sulfate at all locations (Figure 3b), indicative of limited associated with suspended solids in the unfiltered sample.

4.3.3 Pourbaix Diagrams

Eh-pH (Pourbaix) diagrams can be used to illustrate the predicted stability of specific phases at thermodynamic equilibrium under the conditions detected for a groundwater sample. Select crystalline mineral species were suppressed to be representative of anticipated groundwater conditions (e.g. mineral formation not anticipated to be kinetically favored).

Using conditions detected at well G215 on 1 June 2023 to represent groundwater within the UA (Table 3), amorphous ferrihydrite (represented as $Fe(OH)_3$ on the diagram) is predicted to be stable under groundwater conditions at most locations (Figure 4). [7] At G206, G206D, and background location R201, amorphous ferrihydrite is not expected to be thermodynamically stable, while siderite, an iron carbonate mineral, is favored (Figure 4). Ankerite, which was identified via XRD and is an analogous iron-bearing carbonate species to siderite, is therefore expected to be thermodynamically stable within the UA based upon the detected redox conditions. With some locations experiencing groundwater conditions that are poised on the redox boundary between iron carbonates and amorphous iron oxides, dissolution of iron carbonate minerals may provide a source of iron for formation of amorphous iron oxide coatings. Overall, these modeling results indicate that amorphous iron oxides, the formation of which is more thermodynamically favorable than crystalline iron oxides, are likely to be present at most locations within the UA. However, the higher abundance of total iron at G215 (12 mg/L, Table 3) which was used to inform the Eh-pH diagram generation may overestimate the stability of solid phase iron species at locations with lower aqueous iron concentrations (see Section 4.3.4).

The manganese Eh-pH diagram predicts that solid phase manganese minerals, including manganese oxides, are not predicted to be stable under Eh and pH conditions across the Site (Figure 5).

4.3.4 Total and Dissolved Iron and Manganese Concentrations

The distribution of iron and manganese between total and dissolved phases can provide insights on Site redox conditions and constituent behavior. Paired total and dissolved iron and manganese data are available across the Site for the Q2, Q3, and Q4 2023 sampling events. A comparison of the total and dissolved iron and manganese data for these events is provided in Table 4. Total iron concentrations ranged from 0.06 mg/L at downgradient UA well G212 on 10 August 2023 to 18 mg/L at background UA well G200 on 7 June 2023. Dissolved iron concentrations ranged from below reporting limits to 3.4 mg/L at downgradient DA well G206D on 9 June 2023. Where

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

dissolved iron was detected, the dissolved concentration as a percentage of the total iron value varied spatially. At well locations on the southwest portion of the GSP, including G206 and G209 (Attachment A), dissolved iron was consistently greater than 50% of total iron, indicating that iron is largely in aqueous phases at these locations. These observations are not consistent with Eh-pH modeling results indicating geochemical conditions favoring the stability of iron oxides and carbonates at these locations (Figure 4). At well locations to the east of the GMF GSP, dissolved iron was typically less than 50% of total iron, indicating iron is largely associated with particulates at these locations. This is consistent with the higher turbidity periodically observed at these locations (Attachment G).

Total manganese concentrations ranged from 0.004 mg/L at downgradient UA well G212 on 7 June 2023 to 1.2 mg/L at background UA well G200 on 7 June 2023 (Table 4). Dissolved manganese concentrations ranged from below reporting limits to 0.61 mg/L at downgradient UA well G215 on 10 August 2023. Dissolved manganese represents the majority of total manganese concentrations at most locations, which is consistent with the predicted instability of manganese-bearing minerals based on the Pourbaix diagrams (Figure 5).

4.3.5 Major Ion Distribution and Groundwater Signatures

Piper diagrams were constructed using data from the UA to visualize major ion distributions in groundwater (Figure 6). Piper diagrams are a common tool for assessing geochemical similarities or differences between aqueous samples. The cation composition of the GMF GSP leachate is dominated by magnesium, with a major anion composition that is sulfate-dominated. Background wells G200 and R201 have lower contributions of sulfate, greater contributions of carbonate alkalinity (consistent with the high abundance of carbonate minerals in the solids [Table 2]) and are major cation distributions of relatively equal contributions of both monovalent and divalent cations. Groundwater from UA compliance wells to the south of the GMF GSP (G206, G209, G212, and G213) cluster with these background wells. Groundwater from the compliance network wells located to the east of the GSP (G215, G217, and G218) cluster together between background locations and GMF GSP leachate, consistent with the elevated concentrations of sulfate detected at these locations. These results provide further evidence for the influence of GMF GSP porewater on compliance wells located to the east.

5. EVALUATION OF PARTITION COEFFICIENT RESULTS

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

5.1 Batch Attenuation Testing

Batch attenuation testing was conducted for sulfate to evaluate the potential for sorption and to generate site-specific distribution coefficients between the solid and aqueous phase. In 2021, Geosyntec conducted a field investigation at the GMF GSP which included completion of two soil borings ranging in depth from 18 to 28 feet below ground surface. One groundwater sample (G215) and one soil sample (SB-215) were used for batch attenuation testing at five soil:solution ratios (Table 7), each ran in duplicate. One set of microcosms was amended (i.e., spiked) with sodium sulfate (Na_2SO4) to achieve target concentrations of sulfate (Table 5). After the end of the test, the samples were filtered through a 0.45-micron (µm) filter prior to analysis for dissolved concentrations of sulfate. Analysis of the dissolved phase is important to adequately measure the portioning of mass between the solid and liquid fractions of the experiment.

5.2 Partition Coefficient Results

The mass of sulfate in the water versus in the solids of each sample was plotted according to three sorption models: linear, Langmuir, and Freundlich. Data obtained from the batch attenuation tests was used to calculate attenuation distribution coefficients (K_d) for each sorption model. The calculated linear, Langmuir, and Freundlich distribution coefficients (K_d, K_L, and K_F, respectively) and $1/n$ values are shown in Table 7. The linear and Langmuir isotherms for sulfate are provided in Figure 7.

A sulfate partition coefficient was not determined for any isotherm for the sulfate amended microcosms. The linear isotherm yielded a partition coefficient of 0.1 L/kg but had a very poor goodness-of-fit, and the Langmuir isotherm yielded a negative coefficient. A Freundlich isotherm could not be calculated because the data were not conducive to log transformation.

6. GEOCHEMICAL CONCEPTUAL SITE MODEL

6.1 Source and Mobilization Mechanisms

Sulfate is concentrated in flue gas desulfurization wastewater, as gypsum is the main solid component formed in the blowdown and the majority of sulfate mineral phases are soluble under environmental conditions such that sulfate associated with flue gas desulfurization wastewater is leachable (Koralegedara et al., 2019). The likely primary source of sulfate to the UA is GMF GSP CCR porewater. Sulfate was identified in the CCR leachate at concentrations up to 12,000 mg/L.

6.2 Potential and Observed Attenuation Mechanisms

Sulfate exceedances are currently limited to the UA. Sulfate is typically considered to be a conservative species within groundwater at circumneutral pH conditions, although sorption onto mineral surfaces is a potential attenuation mechanism. Sulfate attenuation is expected to occur largely as the result of sorption onto positively charged iron oxides and oxyhydroxides associated with solids. While crystalline iron oxide phases were not identified via XRD, modeling of redox conditions support the presence of iron oxides in amorphous phases across the Site in the UA at some locations. However, chemical attenuation of sulfate is anticipated to be limited, as batch attenuation testing was not able to determine a partition coefficient for sulfate at the Site.

7. REFERENCES

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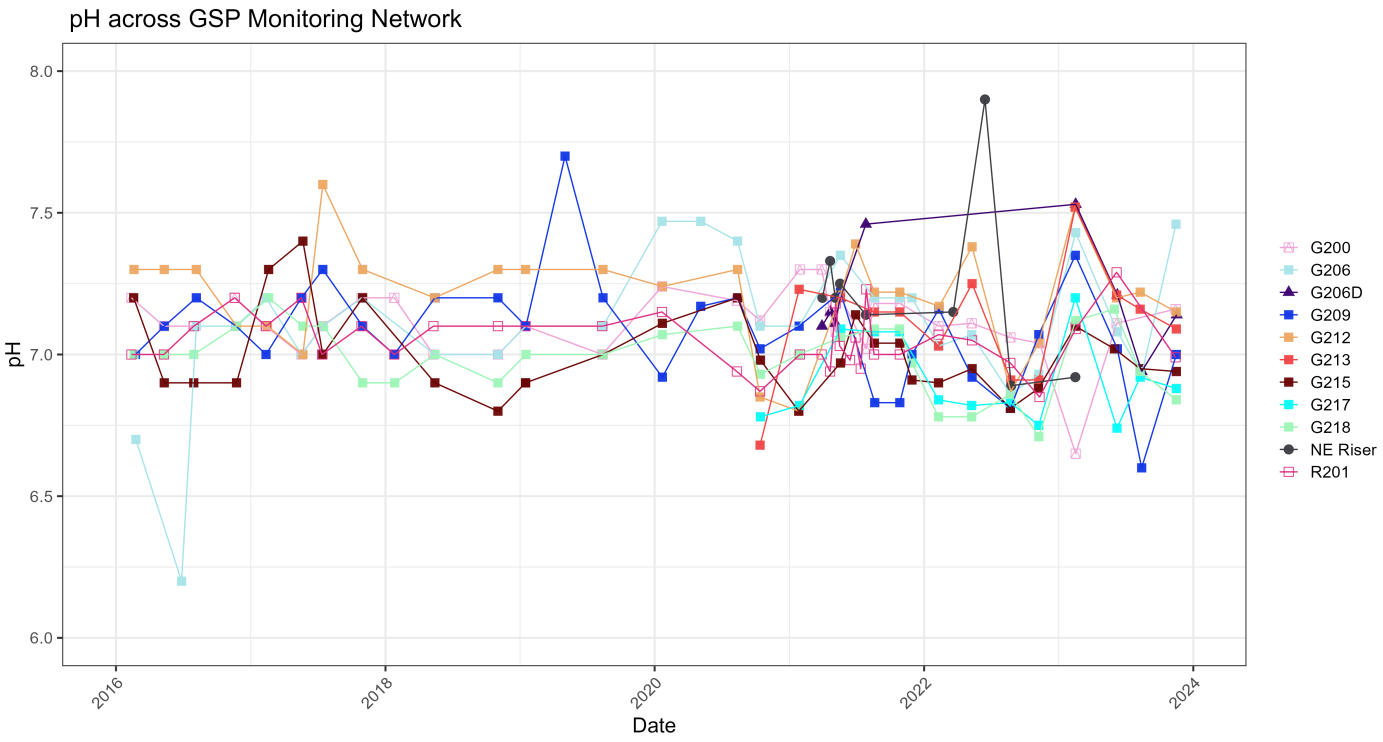
FIGURES



Notes:
SU: Standard Units
Background wells shown with open symbols.

pH Time Series

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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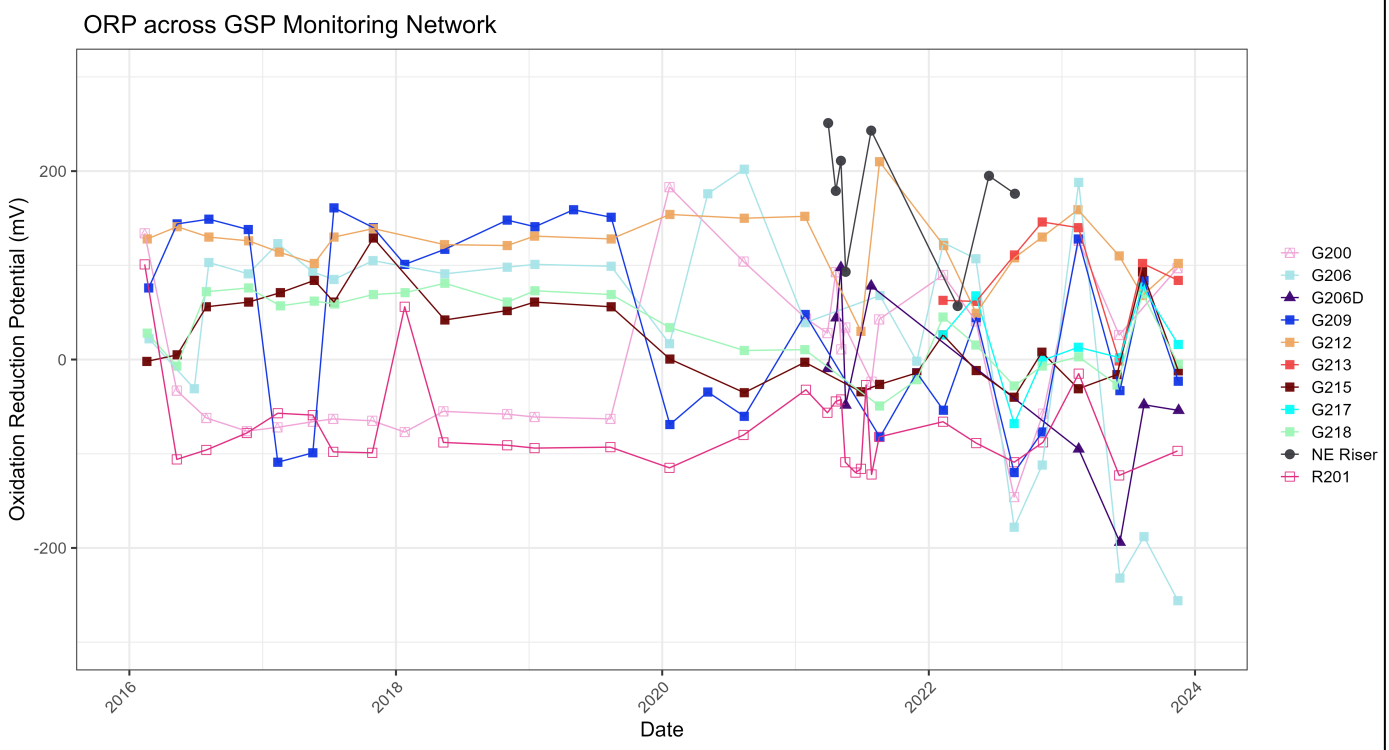
Figure 1

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



Notes:
mV: millivolts
Background wells shown with open symbols.

ORP Time Series

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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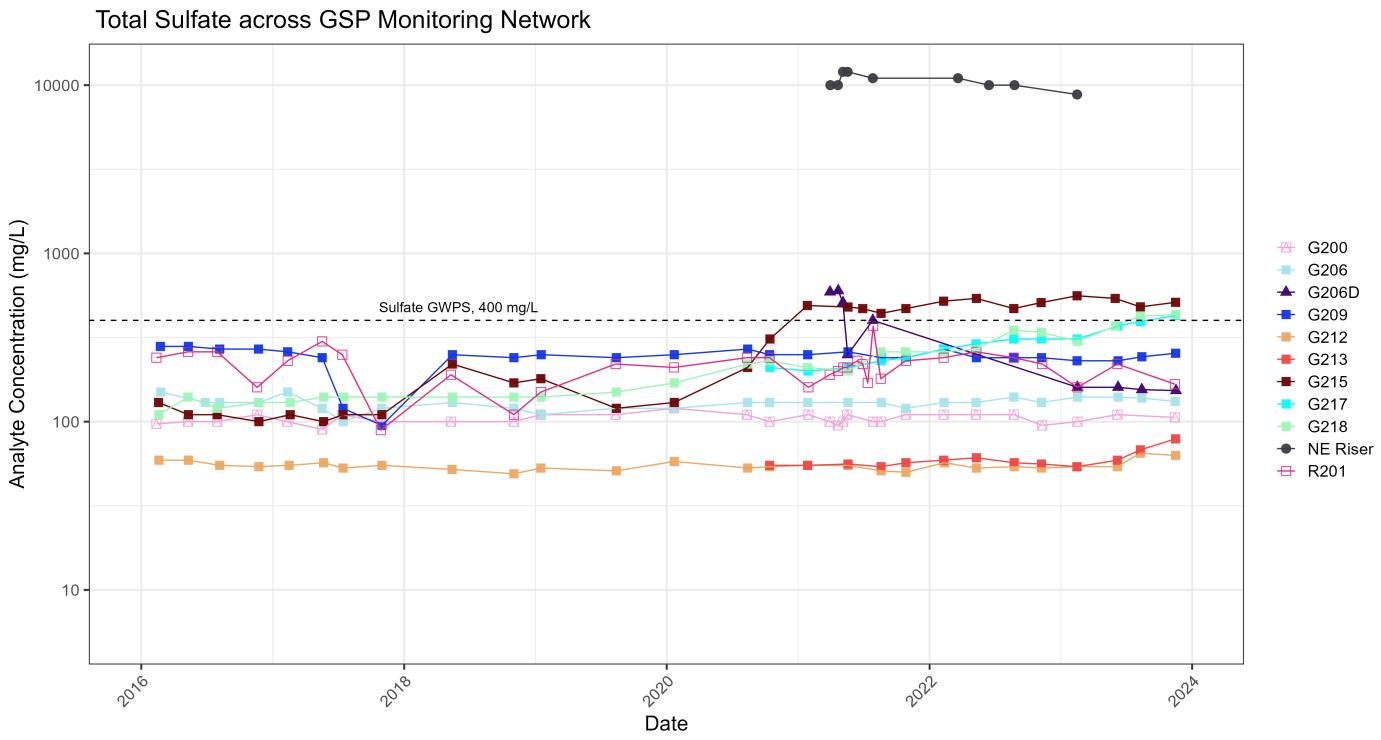
Figure **2**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



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

Total Sulfate Concentration Time Series

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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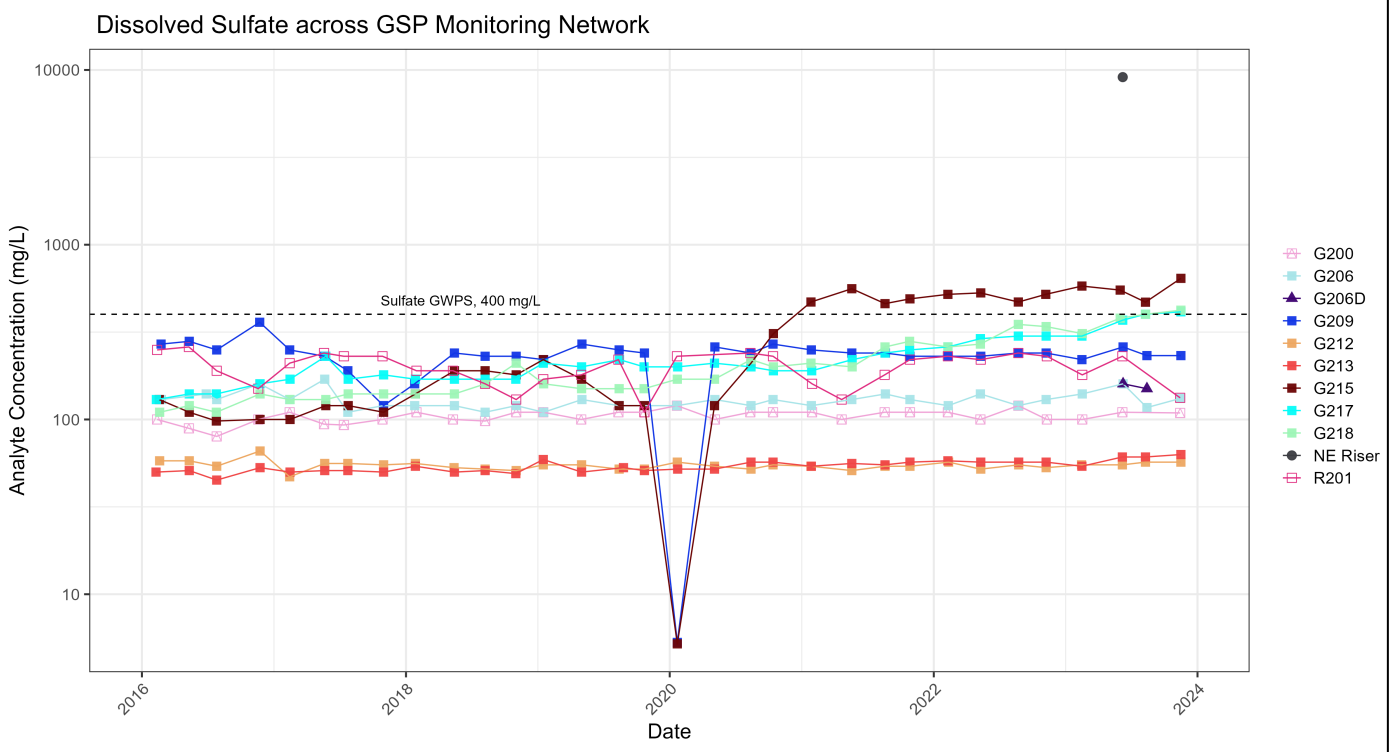
Figure **3a**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



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

Dissolved Sulfate Concentration Time Series

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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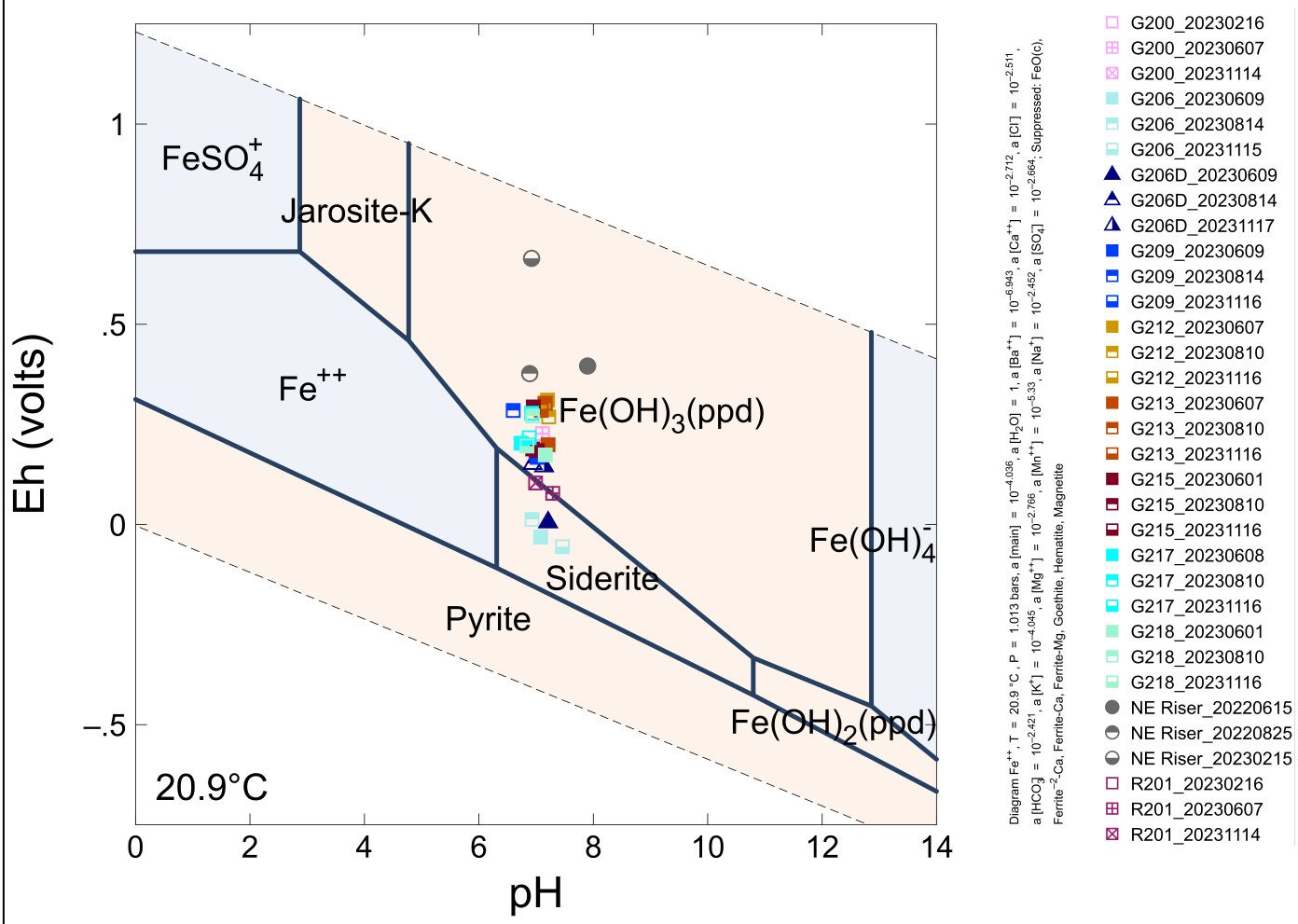
Figure **3b**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



Notes:

1. Diagram was generated using conditions observed at G215 on 6/1/2023.
2. Well G215 is screened in the uppermost aquifer.
3. The three most recent available pH and ORP data points for each location are displayed.
4. Ferrite-Ca, ferrite^{-2}-Ca, ferrite-Mg, crystalline iron oxide, goethite, hematite, and magnetite were suppressed during model generation.

Iron Pourbaix Diagram

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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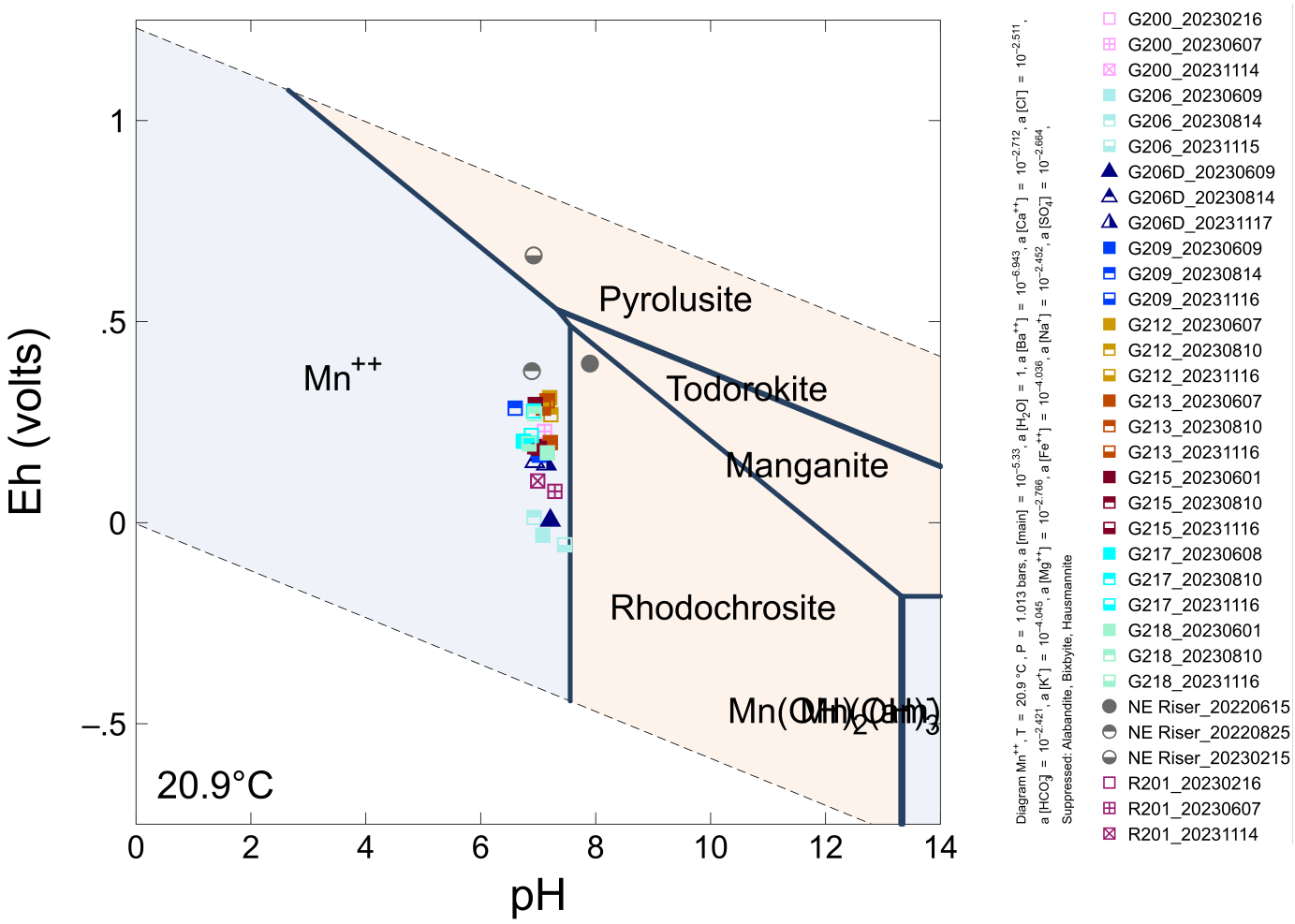
Figure **4**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



Notes:

1. Diagram was generated using conditions observed at G215 on 6/1/2023.
2. Well G215 is screened in the uppermost aquifer.
3. The three most recent available pH and ORP data points for each location are displayed.
4. Alabandite, bixbyite, and hausmannite were suppressed during model generation.

Manganese Pourbaix Diagram

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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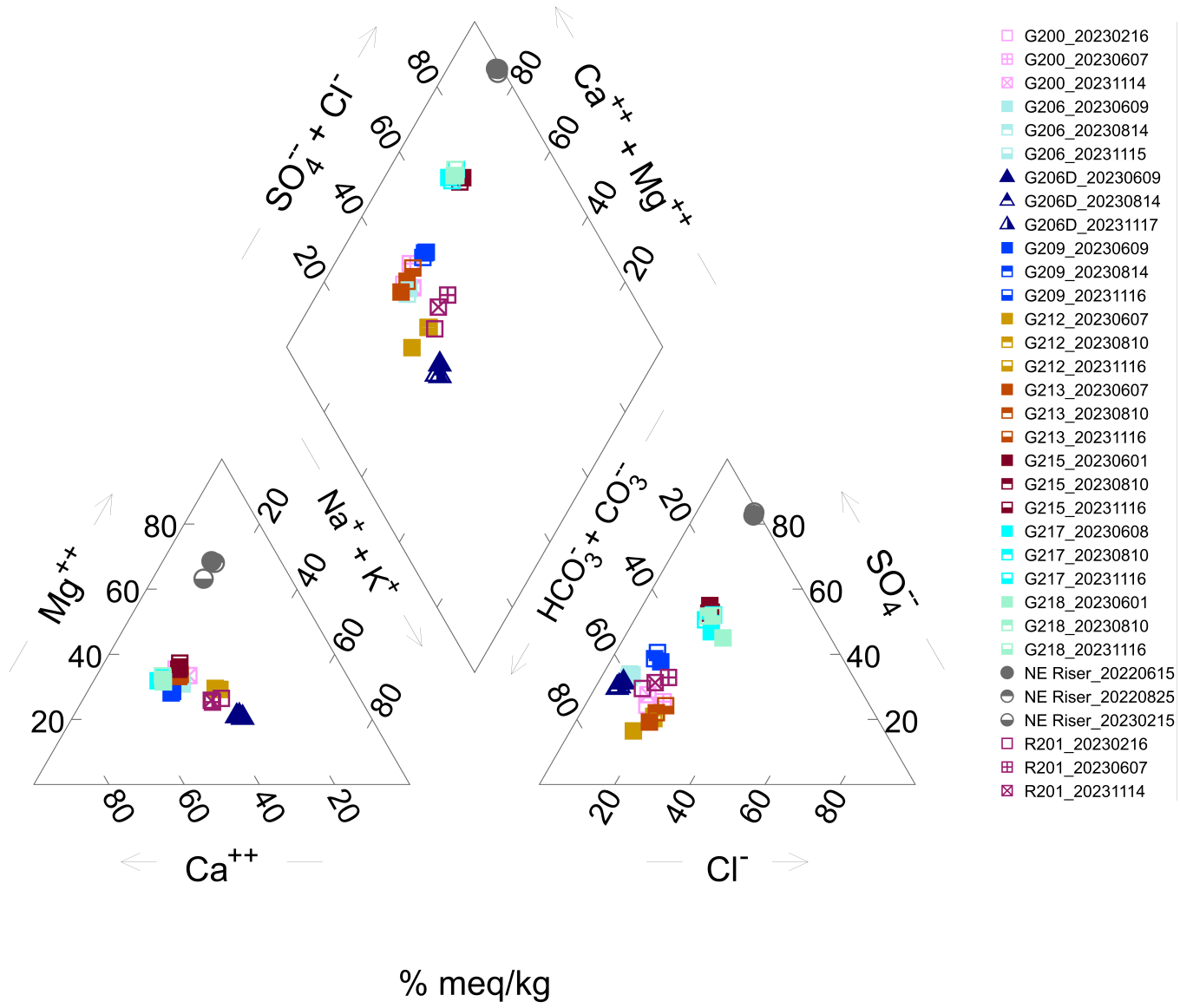
Figure **5**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures



Notes:

1. The three most recent available data points for each location are displayed.

% meq/kg: percent milliequivalents per kilogram

Piper Diagram

Coffeen Power Plant – Gypsum Management Facility
Gypsum Stack Pond

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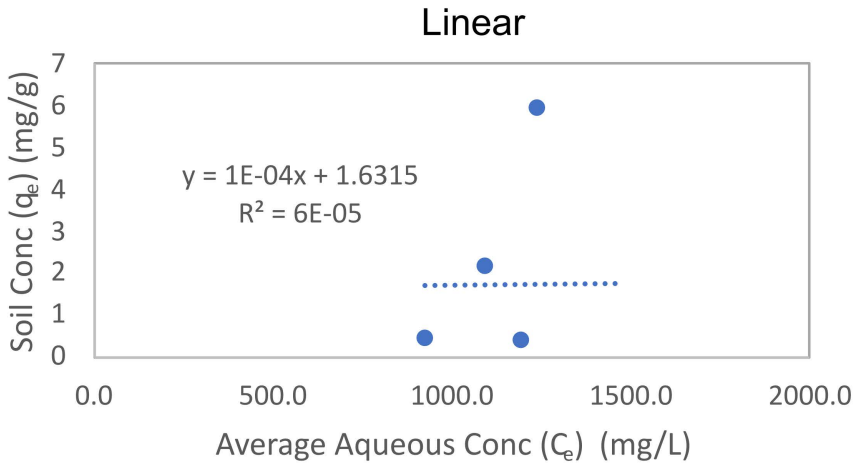
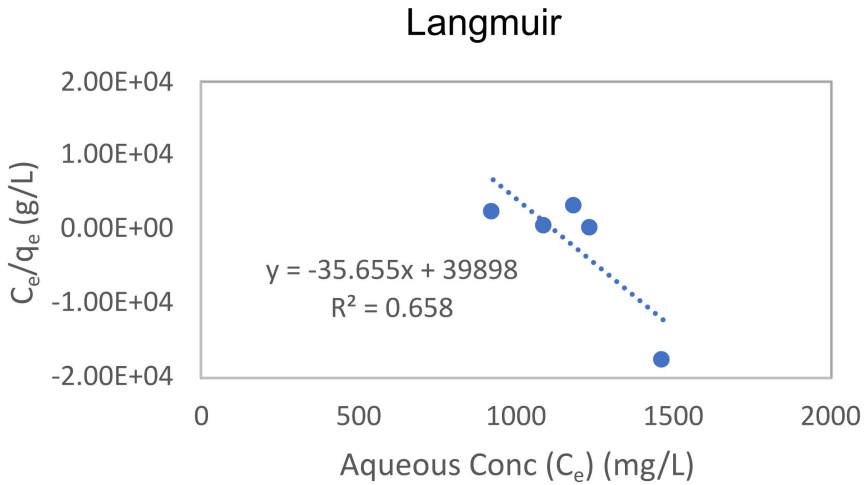
Figure **6**

Vistra - Groundwater Compliance - Documents\General\GCSM\Coffeen\GMF\GSP\Figures





Notes:

The Freundlich isotherm was not calculated because the data were not conducive to log transformation.

q_e - mass of constituent adsorbed to the solid phase
C_e - remaining aqueous constituent concentration
mg/L - milligrams per liter
mg/g - milligrams per gram
g/L - grams per liter

G215 Sulfate Partition Coefficients
Coffeen Power Plant - GMF Gypsum Stack Pond

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Columbus, OH | April 2024

Figure 7

TABLES

Table 1. Bulk Characterization of Site Solids
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Field Boring Location	SB-200	SB-215	GSP Gypsum 1	GSP Gypsum 2	G206D	G206D	G206D	G206D	G206D	SB289	SB289	SB289	SB289	SB289	SB289
Sample Depth (ft bgs)	**(14-15, 15-18)**	**(23-24, 24-24.5)**	**0-0**	**0-0**	**4-16**	**18.8-20**	**20-31.8**	**34-52**	**54-58**	**0-0**	**4-16**	**18-22**	**22-32.9**	**34-52**	**54-60**
Sampled Aquifer Unit	**UA**	**UA**	**CCR**	**CCR**	**UCU**	**UCU/UA**	**LCU**	**LCU**	**DA/DCU**	**UCU**	**UCU**	**UCU/UA**	**LCU**	**LCU**	**DA**
Analyte	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**	**Concentration**
Aluminum	21000	22000	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	< 0.8	< 0.8	<1.5	<3	<3.6	<3.6	<3.3	<3.6	<3.6	--	<2.8	<2.8	<3	<3	<3
Arsenic	3.1	7.9	<0.51	<1	9.1	3.1	1.3	3.8	1.9	--	<0.95	1.3	1.8	2.6	2.8
Barium	205	219	6.6	13	65	110	33	89	160	--	30	29	12	34	110
Beryllium	0.42	0.45	<0.51	<1	<1.2	<1.2	<1.1	<1.2	<1.2	--	<0.95	<0.95	<1	<1	<1
Bismuth	< 0.09	< 0.09	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	--	--	13	<10	<12	<12	<11	<12	<12	--	<9.5	<9.5	<10	<10	<10
Cadmium	0.17	0.17	<0.51	<0.51	<1.2	<12	<1.1	<1.2	<1.2	--	<0.95	<0.95	<1	<1	<1
Calcium	59000	63000	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	--	--	25	260	46	14	<11	<12	<12	--	14	17	<10	<10	<10
Chromium	144	124	<2	<4	10	6.2	9.4	11	11	--	4.9	6.7	4.8	7.6	11
Cobalt	4	4	<1	<2	7.7	3	4	5.3	6.4	--	<1.9	6.8	2.5	3.5	4.7
Copper	10	8	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoride	--	--	13	7.6	4.7	<3	2.8	3.6	7.6	--	3.9	0.47	<2.5	3.4	5.7
Iron	16000	16000	--	--	18000	6800	10000	13000	8100	13000	2900	21000	8200	10000	12000
Lead	10	11	0.67	<1	4.9	4.8	5.9	8	12	--	3.8	5.4	2.8	6.3	13
Lithium	8.8	7.1	<2.6	<5	6.8	<6.1	13	11	8.4	--	<4.7	6.8	5.9	8.9	7.1
Magnesium	26000	25000	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	403	364	--	--	230	650	300	450	110	470	12	270	750	310	39
Mercury	--	--	<0.1	--	<0.24	<0.24	<0.22	<0.24	<0.24	--	<0.19	<0.19	<0.2	<0.2	<0.2
Molybdenum	1.5	1.1	1.2	<1	<1.2	<1.2	<1.1	1.4	<1.2	--	<0.95	<0.95	<1	<1	<1
Nickel	14	10	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	320	320	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	11000	12000	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	0.7	< 0.7	<0.51	<1	<1.2	<1.2	<1.1	<1.2	<1.2	--	<0.95	<0.95	<1	<1	<1
Silver	< 0.5	< 0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	5200	4900	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	102	90	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	--	--	19000	15000	300	26	<11	<12	<12	--	23	61	16	<10	<10
Tin	< 6	< 6	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	955	374	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	0.18	0.2	<0.51	<1	<1.2	<1.2	<1.1	<1.2	<1.2	--	<0.95	<0.95	<1	<1	<1
Uranium	0.65	0.52	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	20	19	--	--	--	--	--	--	--	--	--	--	--	--	--
Yttrium	8.76	8.52	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	31	30	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon (%)	3.17	2.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	950	60	--	--	26	17	210	1100	200	130	11	22	600	1500	77
Sulfide (%)	0.08	< 0.04	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC (%)	0.531	0.566	--	--	0.0655	<0.221	1.23	1.43	0.227	0.18	0.0654	1.79	1.28	1.02	0.0796
Cation Exchange Capacity (meq/100g)	--	--	--	--	13.75	4.68	3.91	9.98	19.98	19.81	18.42	3.38	4	9.34	21.02
AVS	0.17	< 0.19	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes
Sample depth is shown in feet below ground surface (ft bgs)
All results shown in mg/kg (milligrams per kilogram) unless otherwise noted
Non-detect values are shown as less than the reporting limit
Dashes indicate sample was not analyzed for analyte
meq/100g - milliequivalents per 100 grams
UA - uppermost aquifer
CCR - coal combustion residuals
UCU - upper confining unit
LCU - lower confining unit
DA - deep aquifer
DCU - deep confining unit
TOC - total organic carbon
AVS - acid volatile sulfide

Table 2. XRD Analysis of Site Solids
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Field Boring Location			**SB-200**	**SB-215**
Sample Depth (ft bgs)			**(14-15, 15-18)**	**(23-24, 24-24.5)**
Aquifer Unit			**UA**	**UA**
Mineral/compound	**Formula**	**Mineral type**	**(wt %)**	**(wt %)**
Quartz	SiO_2	Silicate	53.1	58.3
Microcline	$KAlSi_3O_8$	Feldspar	6.4	6.2
Albite	$NaAlSi_3O_8$	Feldspar	8.0	9.0
Calcite	$CaCO_3$	Carbonate	3.3	4.5
Dolomite	$CaMg(CO_3)_2$	Carbonate	18.2	12.9
Ankerite	$CaFe(CO3)_2$	Carbonate	5.2	4.3
Diopside	$CaMgSi_2O_6$	Pyroxene	3.8	4.1
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	Phyllosilicate/clay	2.1	0.8
Clay minerals total			2.1	0.8

Notes

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

UA - uppermost aquifer

wt % - percentage by weight

Table 3. Eh-pH Diagram Inputs
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Well ID		**G215**
Sample Date		**6/1/2023**
Aquifer Unit		**UA**
Input Parameter	**Unit**	
Temperature	°C	20.9
pH	SU	7.02
Calcium	mg/L	180
Chloride	mg/L	130
Bicarbonate Alkalinity	mg/L	340
Magnesium	mg/L	88
Sodium	mg/L	96
Potassium	mg/L	4.2
Sulfate	mg/L	540
Total Manganese	mg/L	0.58
Total Iron	mg/L	12

Notes
°C - degrees Celsius
mg/L - milligrams per liter
SU - standard units
UA - uppermost aquifer

Table 4. Total and Dissolved Aqueous Iron and Manganese Results
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Well ID	Well Characterization	Sampled Aquifer Unit	Sample Date	Dissolved Iron (mg/L)	Total Iron (mg/L)	Dissolved Manganese (mg/L)	Total Manganese (mg/L)
G200	Background	UA	2023/06/07	<0.01	18	0.1	1.2
			2023/11/14	<0.0115	2.49	0.147	0.399
G206	Compliance	UA	2023/06/09	0.84	1.2	0.25	0.16
			2023/08/14	0.285	0.301	0.164	0.169
			2023/11/15	0.309	0.462	0.156	0.23
G206D	Compliance	DA	2023/06/09	3.4	4.5	0.2	0.22
			2023/08/14	3.12	3.38	0.176	0.194
G209	Compliance	UA	2023/06/09	0.88	1.9	0.5	0.85
			2023/08/14	0.798	0.96	0.276	0.272
			2023/11/16	0.704	1.06	0.237	0.282
G212	Compliance	UA	2023/06/07	<0.01	0.076	<0.001	0.0044
			2023/08/10	<0.0115	0.0643	0.0024	0.0077
			2023/11/16	<0.0115	0.0852	0.0024	0.0044
G213	Compliance	UA	2023/06/07	0.021	0.47	0.021	0.046
			2023/08/10	0.022	0.487	0.0059	0.0285
			2023/11/16	<0.0115	0.195	0.0047	0.0089
G215	Compliance	UA	2023/06/01	0.72	12	0.52	0.58
			2023/08/10	0.882	1.88	0.605	0.582
			2023/11/16	0.7	7.62	0.489	0.759
G217	Compliance	UA	2023/06/08	0.27	3.7	0.38	0.8
			2023/08/10	0.32	0.699	0.444	0.438
			2023/11/16	0.256	0.985	0.384	0.41
G218	Compliance	UA	2023/06/01	1	3.2	0.45	0.72
			2023/08/10	0.95	1.86	0.429	0.465
			2023/11/16	0.905	3.36	0.436	0.797
NE Riser	Compliance	GSP Porewater	2023/06/08	0.038	0.046	6.3	6.3
R201	Background	UA	2023/06/07	3.3	5.6	0.24	0.24
			2023/11/14	2.66	5.74	0.378	0.424

Notes
Non-detect values are shown as less than the reporting limit
mg/L - milligrams per liter
UA - uppermost aquifer
DA - deep aquifer

Table 5 - Microcosm Amendment and Target Concentrations
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Groundwater Sample ID	Soil Sample ID	Compound	Amendment	Target Concentration (mg/L)
G215	SB-215 (19-24.5 ft bgs)	Sulfate	3.41 g of Na_2SO_4	1500

Notes:

ft bgs - feet below ground surface
mg/L - milligrams per liter
Na_2SO_4 - sodium sulfate

Table 6 - Batch Attenuation Testing Results, G215
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Soil: Water Ratio	Date	Day	Replicate	Dissolved Sulfate	pH	ORP
							mg/L	SU	mV
G215	--	Groundwater Only Control	--	25-Jan-22	0	G215-1a (SO_4^{2-})	1,589	6.98	83
						G215-2a (SO_4^{2-})	1,826	6.99	79
						Average Concentration (mg/L)	**1,708**	**6.99**	**81**
				7-Feb-22	7	G215-1 (SO_4^{2-})	1,617	6.8	26
						G215-2 (SO_4^{2-})	1,478	6.81	13
						Average Concentration (mg/L)	**1,548**	**6.81**	**20**
	G215 SB-215 Geologic Material	2:1 Soil:Water Ratio	2:1.5	31-Jan-22	0				
				7-Feb-22	7	SB-215-(19-24.5) :G215 2:1-1 (SO_4^{2-})	1,321	6.92	57
						SB-215-(19-24.5) :G215 2:1-2 (SO_4^{2-})	1,302	6.94	103
						Average Concentration (mg/L)	**1,311**	**6.93**	**80**
		1:1 Soil:Water Ratio	1:1.3	31-Jan-22	0				
				7-Feb-22	7	SB-215-(19-24.5) :G215 1:1-1 (SO_4^{2-})	1,727	6.89	85
						SB-215-(19-24.5) :G215 1:1-2 (SO_4^{2-})	860	6.91	91
						Average Concentration (mg/L)	**1,294**	**6.90**	**88**
		1:5 Soil:Water Ratio	1:5.8	31-Jan-22	0				
				7-Feb-22	7	SB-215-(19-24.5) :G215 1:5-1 (SO_4^{2-})	1,326	6.92	29
						SB-215-(19-24.5) :G215 1:5-2 (SO_4^{2-})	1,516	6.87	15
						Average Concentration (mg/L)	**1,421**	**6.90**	**22**
		1:10 Soil:Water Ratio	1:11.5	31-Jan-22	0				
				7-Feb-22	7	SB-215-(19-24.5) :G215 1:10-1 (SO_4^{2-})	1,570	6.87	23
						SB-215-(19-24.5) :G215 1:10-2 (SO_4^{2-})	1,551	6.85	30
						Average Concentration (mg/L)	**1,560**	**6.86**	**27**
		1:20 Soil:Water Ratio	1:27.2	31-Jan-22	0				
				7-Feb-22	7	SB-215-(19-24.5) :G215 1:20-1 (SO_4^{2-})	1,511	6.83	32
						SB-215-(19-24.5) :G215 1:20-2 (SO_4^{2-})	1,588	6.84	79
						Average Concentration (mg/L)	**1,550**	**6.84**	**56**

Notes:
mg/L - milligrams per liter
mV - millivolts
SU - Standard Units
ORP - oxidation/reduction potential

Table 7 - Partition Coefficient Results, G215
Geochemical Conceptual Site Model
Coffeen Power Plant - Gypsum Stack Pond

Analyte	Amendment	Isotherm	Variable	Value
Sulfate	Sodium Sulfate	Linear	R^2	0.0
			K_D (L/kg)	0.10
		Langmuir	R^2	0.66
			q_m (mg/g)	-0.028
			K_L (L/kg)	-8.94E+02
		Freundlich	R^2	--
			1/n	--
			K_F (L/kg)	--

Notes:

The Freundlich isotherm was not calculated for sulfate because the data were not conducive to log transformation

K_D - linear partition coefficient

K_L - Langmuir partition coefficient

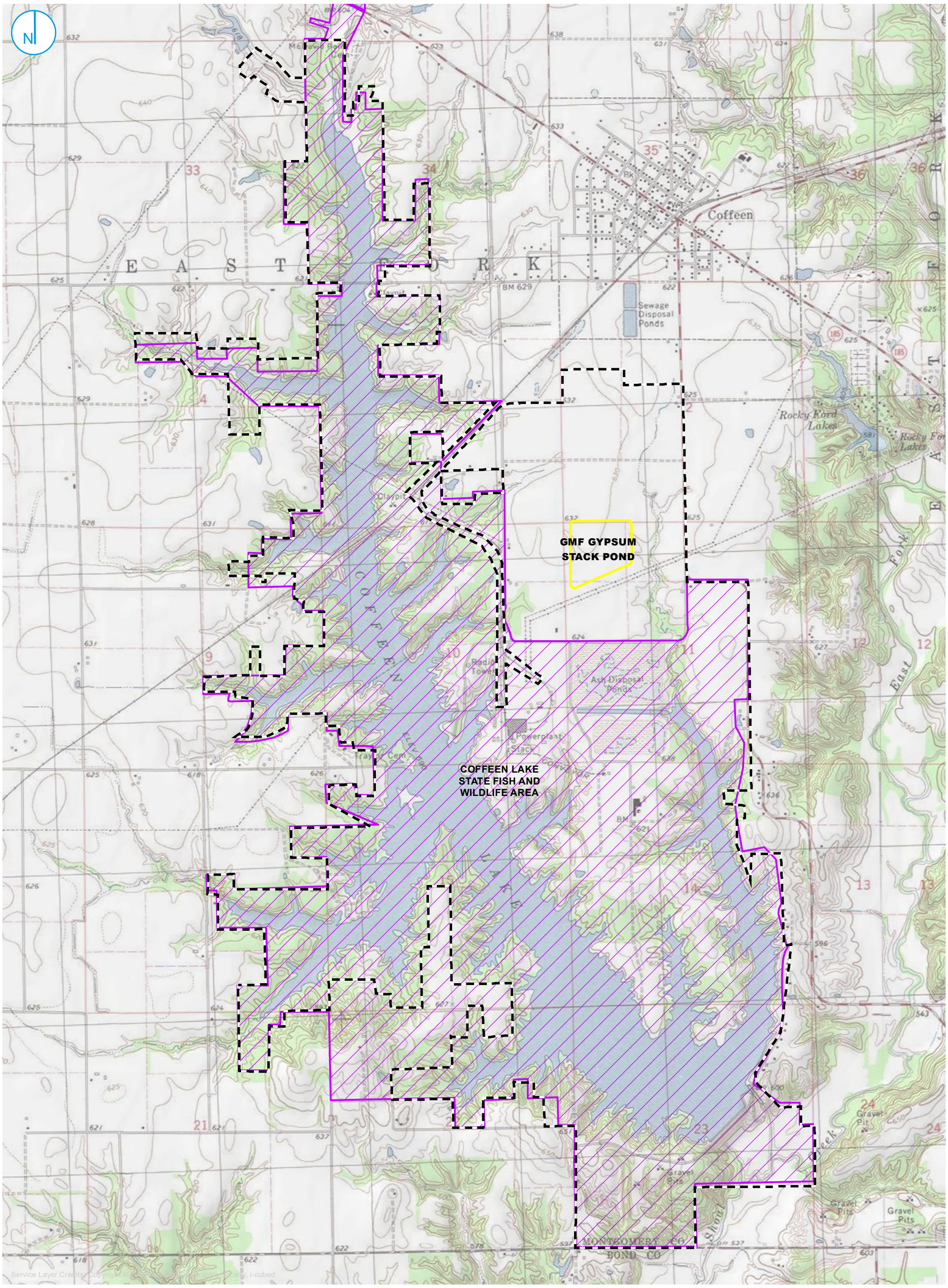
K_F - Freundlich partition coefficient

q_m - inverse of the slope of the linearized Langmuir isotherm

n - non-linearity constant of the Freundlich isotherm

L/kg - liters per kilogram

Attachment A
Site Layout Figure



PART 845 REGULATED UNIT (SUBJECT UNIT)
PROPERTY BOUNDARY
COFFEEN LAKE STATE FISH AND WILDLIFE AREA

0 1,000 2,000 Feet

SITE LOCATION MAP

FIGURE 2-1

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND

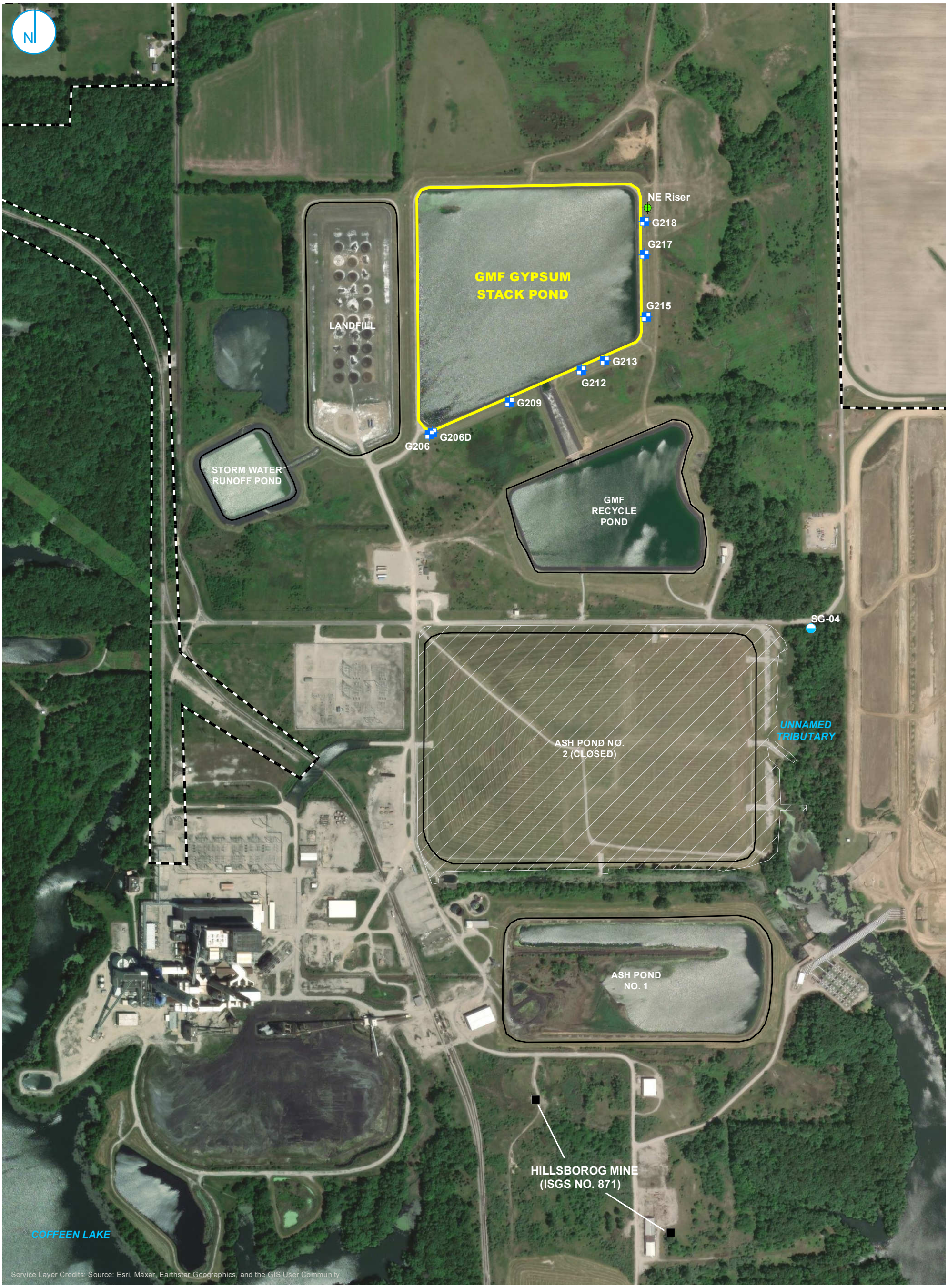
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Attachment B

Proposed Part 845 Groundwater Monitoring Network



COMPLIANCE MONITORING WELL
LEACHATE WELL
STAFF GAGE, RIVER
COAL MINE SHAFT
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 275 550 Feet

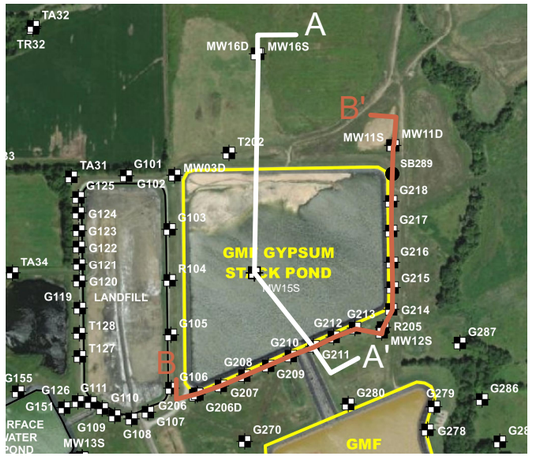
MONITORING WELL LOCATION MAP

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-2

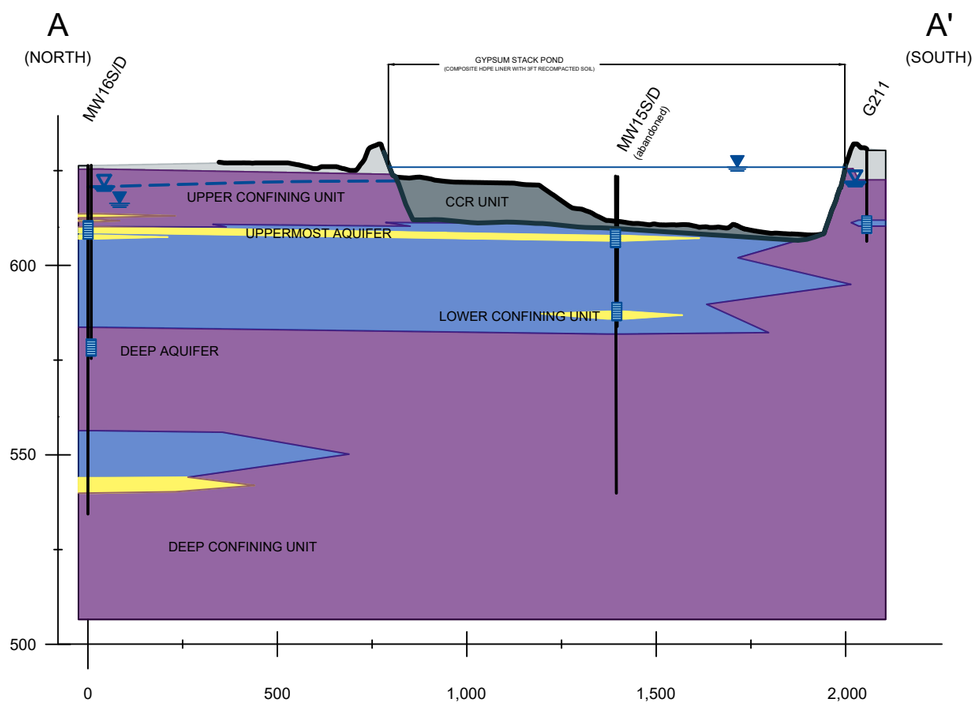
RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

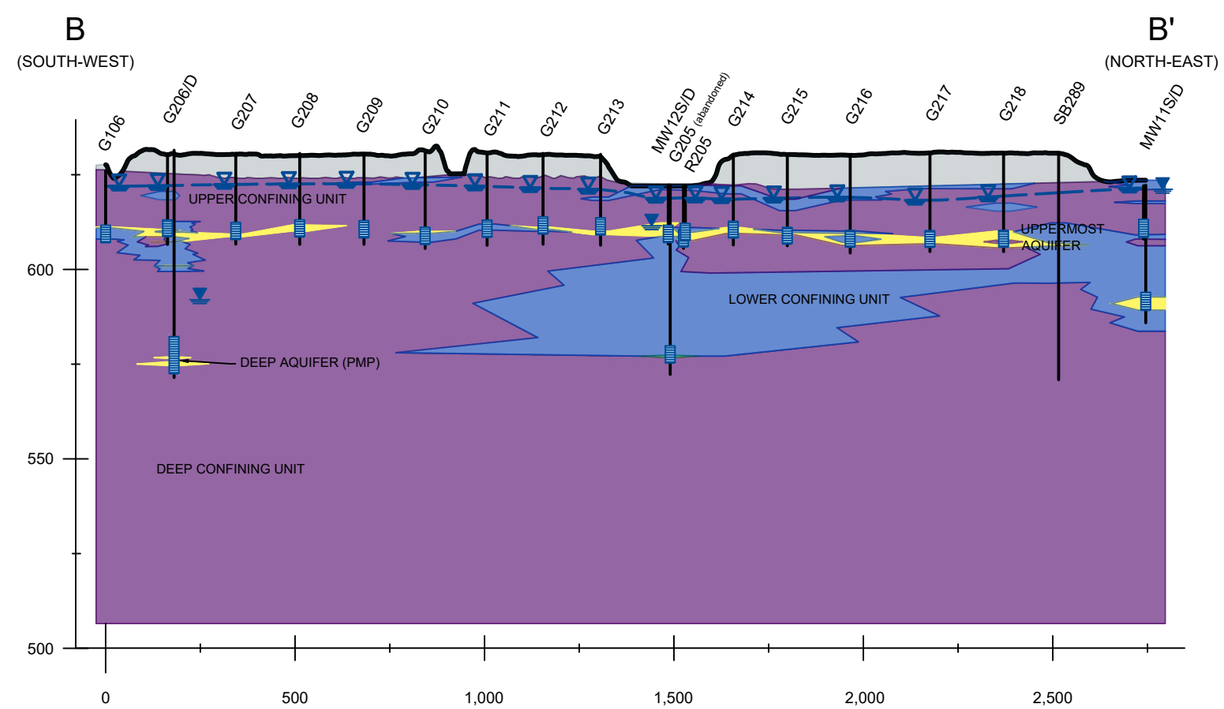
RAMBOLL



NOTES

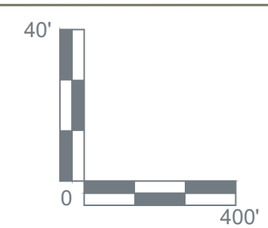
1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 10X.
4. Groundwater elevations measured on July 26, 2021.





LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- FILL
- CLAY (CL/CH)
- SILT (ML)
- SAND (SP/SM/SW)
- PEAT
- WELL SCREEN INTERVAL
- UPPERMOST AQUIFER POTENTIOMETRIC SURFACE
- UPPERMOST AQUIFER GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER / OTHER GROUNDWATER / SURFACE WATER ELEVATION(S)
- SURFACE WATER



GEOLOGIC CROSS SECTIONS
A-A' & B-B'

NATURE AND EXTENT REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-7

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Attachment C
Monitoring Well Construction Information

Attachment C. Monitoring Well Construction Information
Geochemical Conceptual Site Model
Coffeen GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft bgs)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
G200	UA	2008-02-25	--	625.71	Top of Disk	623.27	12.19	16.98	611.08	606.29	17.36	605.30	4.8	2	39.0751386	-89.3950088
G206	UA	2010-10-14	--	632.73	Top of Disk	630.53	17.51	21.92	613.02	608.61	22.42	606.50	4.4	2	39.0673987	-89.3985475
G206D	DA	2021-01-25	634.14	633.85	Top of PVC	631.41	49.2	59	582.21	572.41	59.39	571.41	9.8	2	39.067428	-89.398493
G209	UA	2010-10-07	--	632.68	Top of Disk	630.57	17.74	22.28	612.83	608.29	22.81	606.60	4.5	2	39.0679228	-89.3968503
G212	UA	2010-10-11	--	632.77	Top of Disk	630.59	16.74	21.29	613.85	609.30	21.81	606.60	4.6	2	39.0684296	-89.395318
G213	UA	2010-10-12	--	632.80	Top of Disk	630.34	16.75	21.29	613.59	609.05	21.82	606.30	4.5	2	39.0685852	-89.3948216
G215	UA	2010-10-13	--	632.96	Top of Disk	630.48	19.41	23.8	611.07	606.68	24.31	606.20	4.4	2	39.0693092	-89.39394
G217	UA	2010-10-12	--	633.04	Top of Disk	630.67	20.49	24.88	610.18	605.79	25.38	604.70	4.4	2	39.07034	-89.3939589
G218	UA	2010-10-12	--	632.91	Top of Disk	630.64	20.33	24.77	610.31	605.87	25.27	604.60	4.4	2	39.0708763	-89.393956
R201	UA	2010-10-08	--	626.12	Top of Disk	624.02	14.59	19.32	609.43	604.70	19.85	604.20	4.7	2	39.0751423	-89.3978553
NE Riser	S	--	--	--	--	--	--	--	--	--	--	--	--	--	39.07111111	-89.39388889

Notes:
All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
bgs = below ground surface
ft = foot or feet
HSU = Hydrostratigraphic Unit
UA = Uppermost Aquifer
S = Source Water
DA = Deep Aquifer
PVC = polyvinyl chloride

Attachment D
Boring Logs

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 2/25/2008
Finish: 2/25/2008
WEATHER: Overcast, cold

CONTRACTOR: Testing Service Corp.
Rig mfg/model: CME-650 Track Drill
Drilling Method: 3¼" HSA w/SS & CME samplers
FIELD STAFF: Driller: B. Williamson
Helper: R. Keedy
Eng/Geo: .

BOREHOLE ID: G200
Well ID: G200
Surface Elev: 624.20 ft. MSL
Completion: 18.00 ft. BGS
Station: 877,930.59N
2,515,649.96E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 2, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 13.50 - While drilling
▼ = 2.75 - 3/12/08
▽ =

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
	24/24 *100%*	ss	*3-2 3-3* N=5			
1A				31		1.36 B
2A	19/24 *79%*	ss	*3-3 6-6* N=9	26		1.94 BSh
2B				26		2.33 Sh
3A	19/24 *79%*	ss	*3-3 4-5* N=7	26		1.59 B
3B				23		1.55 B
4A	22/24 *92%*	ss	*5-5 5-5* N=10	29		0.31 B
5A	20/24 *83%*	ss	*2-2 3-5* N=5	25		1.09 B
6A	22/24 *92%*	ss	*1-3 2-3* N=5	22		1.01
	24/24 *100%*	ss	*3-3 5-6* N=8			
7A				15		0.50 B
7B				18		
8A	19/24 *79%*	ss	*0-3 5-8* N=8	24		0.27 B
8B				17		
9A	24/24 *100%*	ss	*8-15 30-50* N=45	13		
9B				8		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	Very dark grayish brown (10YR3/2), moist, firm, friable, clayey SILT	624	
2	Dark gray (10YR4/1) with 5% yellowish brown (10YR5/6) mottles, moist, firm, silty CLAY	622	
4	Dark gray (10YR4/1) with 70% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY	620	
	Dark gray (10YR4/1) with 70% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand		
	Very dark gray (10YR3/1), moist, firm, silty CLAY, slight trace sand		
6	Dark gray (10YR4/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace coarse sand	618	
8	Dark gray (10YR4/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, sand and slight trace gravel	616	
10		614	
12	Yellowish brown (10YR5/8), moist, soft, sandy CLAY	612	
14	Gray (10YR5/1), wet, soft, fine- to coarse-grained SAND	610	
	Gray (10YR5/1), wet, soft, silty CLAY, trace sand and gravel		
16	Yellowish brown (10YR5/4), wet, soft, fine- to coarse-grained SAND, trace gravel	608	
	Gray (10YR5/1), moist, hard, silty CLAY, trace sand and gravel		
18			

End of Boring = 18.0 ft. BGS

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/14/2010
Finish: 10/14/2010
WEATHER: Sunny, warm, breezy (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G206
Well ID: G206
Surface Elev: 630.54 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,103.91N
2,514,669.16E

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

WATER LEVEL INFORMATION:
▼ = 22.00 - While drilling
▼ = 21.54 - Upon completion
▽ =

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
1A	12/24 50%	ss	2-2 3-2 N=5	18		
2A	20/24 83%	ss	2-2 3-5 N=5	16		
3A	20/24 83%	ss	4-9 6-8 N=15	19		
4A	19/24 79%	ss	2-4 5-6 N=9	20		
5A	17/24 71%	ss	2-3 4-5 N=7	30		
6A	22/24 92%	ss	2-3 4-6 N=7	19		
7A	23/24 96%	ss	1-2 3-4 N=5	23		
8A	22/24 92%	ss	1-1 3-3 N=4	22		
9A	24/24 100%	ss	1-1 2-2 N=3	21		
10A	24/24 100%	ss	woh-woh 1-5	25		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	FILL - Grayish brown (10YR5/2), moist, firm, silty CLAY with trace sand and gravel.	630	
2		628	
4	FILL - Dark gray (10YR4/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	626	
6		624	
8	Very dark gray (10YR3/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, trace roots.	622	
	Dark grayish brown (10YR4/2) with 35% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.		
10	Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand and gravel.	620	
12	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	618	
14	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.	616	
16	Dark yellowish brown (10YR4/6) with 30% gray (10YR5/1) mottles, moist, soft, silty CLAY with trace sand and gravel.	614	
	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		
18	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, very soft, silty CLAY with trace sand and gravel.	612	
	Gray (10YR5/1), moist, very soft, very fine- to fine-grained sandy CLAY with trace gravel.		
20	Gray (10YR5/1), moist, firm, very fine- to fine-grained		

NOTE(S): G206 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/14/2010
Finish: 10/14/2010
WEATHER: Sunny, warm, breezy (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G206
Well ID: G206
Surface Elev: 630.54 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,103.91N
2,514,669.16E

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

WATER LEVEL INFORMATION:
▼ = 22.00 - While drilling
▼ = 21.54 - Upon completion
▽ =

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
								sandy CLAY with trace gravel.			
11A	22/24 *92%*	ss	*19-6* *13-19* N=19	13				Dark yellowish brown (10YR4/6), wet dense, silty, fine- to coarse-grained SAND with trace gravel.		610	
11B				16			▼ ▼ 22	Dark yellowish brown (10YR4/6), moist, hard, clayey SILT with sand and gravel. Grayish brown (10YR5/2), moist, dense, silty, very fine- to fine-grained SAND.			
12A	20/24 *83%*	ss	*11-20* *19-13* N=39	10				Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.		608	
12B				10				Dark gray (10YR4/1), wet, dense, silty, fine- to coarse-grained SAND with gravel.			
							24	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.			

End of Boring = 24.0 ft. BGS

NOTE(S): G206 installed in borehole.

FIELD BORING LOG

Installed near G206.
Re-identified as G206D.

HANSON

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/25/2021
Finish: 1/25/2021
WEATHER: Rain, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: CME-75 Track Rig
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G206D
Well ID: G206D
Surface Elev: ft. MSL
Completion: 60.00 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.80 - During Drilling
= 55.90 - During Drilling
=

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type
1A	15/24 63%	SS	3-3 3-4 N=6			
2A	17/24 71%	SS	3-4 4-5 N=8			
3A	22/24 92%	SS	2-3 5-6 N=8			
4A	20/24 83%	SS	3-4 4-5 N=8			
5A	22/24 92%	SS	2-3 5-7 N=8			
6A	20/24 83%	SS	3-4 4-7 N=8			
7A	20/24 83%	SS	2-3 4-5 N=7			
8A	20/24 83%	SS	1-2 3-4 N=5			
9A	21/24 88%	SS	1-2 2-3 N=4			
10A						
10B	24/24 100%	SS	0-1 1-0 N=2			

Depth ft. BGS	Lithologic Description
	Gray (10YR6/1), wet, loose, GRAVEL, with some sand. [FILL]
	Brown (10YR5/3), moist, stiff, lean CLAY, with some silt, trace very fine- to fine-grained sand. [FILL]
2	
	Yellowish brown (10YR5/4) with 10% gray (10YR6/1) mottles, moist, stiff, lean CLAY, with some silt, trace very fine- to fine-grained sand and small gravel. [FILL]
4	
	Grayish brown (10YR5/2), moist, stiff, lean CLAY, with some silt, trace small gravel.
6	
	Grayish brown (10YR5/2) with 10% yellowish brown (10YR5/4) mottles, moist, stiff, lean CLAY, with some silt, trace small gravel.
8	
	Grayish brown (10YR5/2) with 10% yellowish brown (10YR5/4) and 5% gray (10YR5/1) mottles, moist, stiff, lean CLAY, with some silt, trace small gravel.
10	
	Grayish brown (10YR5/2) with 20% yellowish brown (10YR5/4) and 5% gray (10YR5/1) mottles, moist, stiff, lean CLAY, with some silt, trace small gravel.
12	
	Gray (10YR6/1) with 20% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, little very fine- to fine-grained sand, trace small gravel.
14	
	Dark gray (10YR4/1), moist, stiff, lean CLAY, with some silt.
	Gray (10YR6/1) with 20% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, little very fine- to fine-grained sand, trace small gravel.
16	
	Gray (10YR6/1) with 30% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, little very fine- to fine-grained sand, trace small gravel.
18	
	Yellowish brown (10YR5/6) with 10% gray (10YR6/1) mottles, wet, very loose, SILT, with some very fine- to fine-grained sand, few small gravel, trace clay.
20	

Borehole Detail | Elevation ft. MSL | Remarks

NOTE(S): G282D installed in borehole.

FIELD BORING LOG

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/25/2021
Finish: 1/25/2021
WEATHER: Rain, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: CME-75 Track Rig
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G206D
Well ID: G206D
Surface Elev: ft. MSL
Completion: 60.00 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.80 - During Drilling
= 55.90 - During Drilling
=

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	24/24 100%	SS	3-7 11-16 N=18					Yellowish brown (10YR5/4) with 20% yellowish brown (10YR5/6) and 5% yellowish red (5YR4/6) mottles, moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel.			
							22	Yellowish brown (10YR5/4), wet, fine- to medium-grained SAND.			
12A	24/24 100%	SS	7-12 17-24 N=29					Yellowish brown (10YR5/4) with 20% yellowish brown (10YR5/6) and 5% yellowish red (5YR4/6) mottles, moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel, trace medium gravel.			
							24				
13A	24/24 100%	SS	9-15 22-22 N=37								
							26				
14A	22/24 92%	SS	8-17 16-22 N=33					Dark gray (10YR4/1), moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel, trace medium gravel.			
							28				
15A	21/24 88%	SS	5-11 15-19 N=26								
							30				
16A	22/22 100%	SS	5-25 33-50/4" N=58					Dark gray (10YR4/1), moist, SAND, little silt and clay.			
								Dark gray (10YR4/1), moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel, trace medium gravel.			
							32				
17A	22/24 92%	SS	7-10 15-20 N=25								
							34				
18A	24/24 100%	SS	4-8 10-16 N=18								
							36	Dark gray (10YR4/1), moist, hard, lean CLAY, with some silt, few very fine- to fine-grained sand, little small gravel.			
19A	24/24 100%	SS	5-8 13-15 N=21								
							38				
20A	21/24 88%	SS	2-4 8-11 N=12								
							40				

NOTE(S): G282D installed in borehole.

FIELD BORING LOG

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/25/2021
Finish: 1/25/2021
WEATHER: Rain, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: CME-75 Track Rig
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G206D
Well ID: G206D
Surface Elev: ft. MSL
Completion: 60.00 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.80 - During Drilling
= 55.90 - During Drilling
=

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type
21A	24/24 100%	SS	4-8 11-14 N=19			
22A	22/24 92%	SS	3-7 8-12 N=15			
23A	24/24 100%	SS	3-6 9-13 N=15			
24A	24/24 100%	SS	4-6 9-12 N=15			
25A	24/24 100%	SS	4-6 12-13 N=18			
26A	24/24 100%	SS	2-7 9-13 N=16			
27A	24/24 100%	SS	4-7 11-14 N=18			
28A 28B	24/24 100%	SS	6-12 9-18 N=21			
29A	24/24 100%	SS	6-10 11-11 N=21			
30A	24/24 100%	SS	4-5 8-9 N=13			

Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
42				
44				
46	Dark gray (10YR4/1), moist, hard, lean CLAY, with some silt, few very fine- to fine-grained sand, little small gravel. *[Continued from previous page]*			Trace wood fragments below 45.7 ft.
48				0.5" gravel seam at 48.5 ft.
50				
52				
54	Light yellowish brown (10YR6/5), moist, very fine- to medium-grained SAND, with some silt, little small to medium gravel.			
56	Dark gray (10YR4/1), moist, hard, lean CLAY, with some silt, few very fine- to fine-grained sand, little small gravel, trace wood fragments.			
	Light yellowish brown (10YR6/5), wet, medium dense, very fine- to coarse-grained SAND, little small gravel, few silt.			
58	Dark gray (10YR4/1) with 5% dark yellowish brown (10YR3/6) mottles, moist, stiff, lean CLAY, with some silt.			
60				

NOTE(S): G282D installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: **Start:** 1/25/2021
Finish: 1/25/2021
WEATHER: Rain, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: CME-75 Track Rig
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: **Driller:** Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G206D
Well ID: G206D
Surface Elev: ft. MSL
Completion: 60.00 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.80 - During Drilling
= 55.90 - During Drilling
=

SAMPLE			TESTING							
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Water Content (%)	Dry Density (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
								End of boring = 60.0 feet			

NOTE(S): G282D installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

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

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

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
1A	23/24 *96%*	ss	*5-3 3-5* N=6	18		
2A	19/24 *79%*	ss	*3-3 5-6* N=8	17		
3A	20/24 *83%*	ss	*2-3 7-7* N=10	13		
4A	23/24 *96%*	ss	*3-6 6-7* N=12	16		
4B				27		
5A	20/24 *83%*	ss	*3-3 3-5* N=6	20		
6A	13/24 *54%*	ss	*2-2 3-5* N=5	24		
7A	19/24 *79%*	ss	*2-3 4-6* N=7	17		
8A	20/24 *83%*	ss	*2-3 4-5* N=7	19		
9A	22/24 *92%*	ss	*1-3 3-4* N=6	19		
10A	24/24 *100%*	ss	*woh-1 2-2* N=3	17		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
2	FILL - Brown (10YR4/3) with 30% dark gray (10YR4/1) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	630	
4		628	
6		626	
8	FILL - Dark grayish brown (10YR4/2), moist, firm, silty CLAY with trace sand and gravel.	624	
10	FILL - Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.	622	
12	Very dark gray (10YR3/1), moist, firm, silty CLAY with trace sand, trace roots.	620	
14	Dark gray (10YR4/1) with 30% dark yellowish brown (10YR4/6) moist, firm, silty CLAY with trace sand.	618	
16	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.	616	
18	Dark gray (10YR4/1), moist, firm, clayey SILT with trace sand.	614	
20	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	612	
	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, soft, sandy CLAY with trace gravel.		

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

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

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

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	Elevation ft. MSL	Remarks
11A	20/24 *83%*	SS	*2-4 4-4* N=8	17				Dark yellowish brown (10YR4/6), moist, medium dense, clayey SILT with sand and trace gravel.	610	
								Yellowish brown (10YR5/6), moist, medium dense, silty, very fine- to fine-grained SAND.		
							22 ▽	Dark yellowish brown (10YR4/6) with 30% dark gray (10YR4/1) mottles, moist, firm, sandy CLAY with trace gravel.		
12A	24/24 *100%*	SS	*7-11 17-19* N=28	11				Grayish brown (10YR5/2), slightly moist, very firm, very silty CLAY with sand and gravel.	608	
12B	0/4 *0%*	BD		9			24	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.		

End of Boring = 24.3 ft. BGS

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/26/2021
Finish: 1/27/2021
WEATHER: Overcast, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: GeoProbe 8040DT
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G289
Well ID: n/a
Surface Elev: ft. MSL
Completion: 60.0 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.60 - During Drilling
= 8.00 - 1/27/2021 8am
=

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	17/24 *71%*	SS	*2-2 4-4* N=6					Brown (10YR4/3) with 10% gray (10YR6/1) and 10% yellowish brown (10YR5/6) mottles, moist, stiff, SILT, with some clay, trace very fine- to fine-grained sand.			
							2				
2A	19/24 *79%*	SS	*3-5 6-8* N=11					Dark gray (10YR4/1) with 20% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, few very fine- to fine-grained sand, trace small gravel.			
							4				
3A	19/24 *79%*	SS	*3-4 4-10* N=8								
							6	Dark gray (10YR4/1) with 20% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, little very fine- to fine-grained sand, trace small gravel.			
4A	21/24 *88%*	SS	*2-2 4-6* N=6					Dark gray (10YR4/1), SILT, with some clay.			
5A							8	Dark gray (10YR4/1) with 20% yellowish brown (10YR5/6) and 5% very pale brown (10YR7/3) mottles, moist, stiff, lean CLAY, with some silt, little very fine- to fine-grained sand, trace small gravel.			
	18/24 *75%*	SH									
6A							10	Dark grayish brown (10YR4/3), moist, stiff, lean CLAY, with some silt.			
6B	22/24 *92%*	SS	*3-4 4-6* N=8					Gray (10YR6/1) with 20% dark grayish brown (10YR4/2) and 10% yellowish brown (10YR5/6) mottles, moist, stiff, lean CLAY, with some silt, few very fine- to fine-grained sand, trace small gravel.			
							12				
7A	19/24 *79%*	SS	*3-4 6-6* N=10					Gray (10YR6/1) with 30% dark yellowish brown (10YR4/6) and 20% dark grayish brown (10YR4/2) mottles, moist, stiff, lean CLAY, with some silt, few very fine- to fine-grained sand, trace small gravel.			
							14				
8A	22/24 *92%*	SS	*3-4 5-6* N=9					Very dark gray (10YR3/1), moist, stiff, lean CLAY, with some silt, few very fine- to fine-grained sand, trace small gravel.			
							16				
9A	24/24 *100%*	SS	*2-3 4-4* N=7					Gray (10YR6/1) with 10% yellowish brown (10YR5/6) mottles, moist, medium stiff, lean CLAY, with some silt and very fine- to fine-grained sand, few small gravel.			
							18				
10A	24/24 *100%*	SS	*2-2 1-2* N=3					Gray (10YR6/1) with 10% yellowish brown (10YR5/6) mottles, moist to wet, SILT, with some very fine- to fine-grained sand and clay, few small gravel.			
10B								Strong brown (7.5YR5/8), moist to wet, SILT, with some very			
							20				

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/26/2021
Finish: 1/27/2021
WEATHER: Overcast, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: GeoProbe 8040DT
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G289
Well ID: n/a
Surface Elev: ft. MSL
Completion: 60.0 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.60 - During Drilling
= 8.00 - 1/27/2021 8am
=

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Remarks
								fine- to fine-grained sand and clay, few small gravel.	
11A	22/24 *92%*	SS	*2-2* *4-7* N=6					Strong brown (7.5YR5/8) with 20% gray (10YR6/1) mottles, moist to wet, SILT, with some very fine- to fine-grained sand and clay, few small gravel.	1" wet, fine- to coarse-grained SAND, with little small gravel.
							22	Gray (10YR6/1), moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel.	
12A	21/24 *88%*	SS	*6-20* *17-26* N=37					Gray (10YR6/1), wet, SILT, with some sand, little small to medium gravel.	
								Gray (10YR6/1), moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel.	
13A							24	Gray (10YR6/1), wet, loose, very fine- to medium-grained SAND, with some silt, little small to medium gravel.	
13B	23/24 *96%*	SS	*4-23* *32-41* N=55						
							26		
14A	22/24 *92%*	SS	*23-25* *24-27* N=49						Trace large gravel from 27 to 28 ft.
							28		
15A	23/23 *100%*	SS	*14-22* *32-50/5"* N=54					Gray (10YR6/1), moist, hard, SILT, with some very fine- to fine-grained sand, little clay, few small gravel.	
							30		
16A	14/17 *82%*	SS	*4-6* *50/5"*						Trace large gravel from 31 to 31.5 ft.
							32		
17A	11/11 *100%*	SS	*27-50/5"*						
							34		
18A	19/24 *79%*	SS	*20-17* *15-19* N=32						
							36		
19A	24/24 *100%*	SS	*7-14* *16-16* N=30					Dark gray (10YR4/1), moist, hard, lean CLAY, with some silt, few very fine- to fine- grained sand, few small gravel.	
							38		
20A	24/24 *100%*	SS	*7-12* *15-18* N=27						
							40		

NOTE(S):

FIELD BORING LOG

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: Start: 1/26/2021
Finish: 1/27/2021
WEATHER: Overcast, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: GeoProbe 8040DT
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: Driller: Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G289
Well ID: n/a
Surface Elev: ft. MSL
Completion: 60.0 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.60 - During Drilling
= 8.00 - 1/27/2021 8am
=

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
21A	24/24 100%	SH									
							42				Trace wood fragments below 42 ft.
22A	24/24 100%	SS	5-13 20-22 N=33								
							44				
23A	22/24 92%	SS	3-7 11-14 N=18								
							46				
24A	24/24 100%	SS	4-9 10-14 N=19					Dark gray (10YR4/1), moist, hard, lean CLAY, with some silt, few very fine- to fine- grained sand, few small gravel. *[Continued from previous page]*			
							48				
25A	23/24 96%	SS	2-5 7-10 N=12								
							50				
26A	24/24 100%	SS	4-10 12-18 N=22								
							52				
27A	24/24 100%	SS	5-9 11-15 N=20								
							54				
28A	24/24 100%	SS	3-5 7-8 N=12					Gray (10YR5/1) with 15% dark brown (10YR3/6) mottles, moist, stiff, lean CLAY, with some silt.			
							56				
29A	24/24 100%	SS	3-5 9-9 N=14								
							58	Gray (10YR5/1) with 20% dark brown (10YR3/6) and 10% dark gray (10YR4/1) mottles, moist, stiff, lean CLAY, with some silt.			
30A	24/24 100%	SS	0-4 8-9 N=12								Few fine- to medium-grained sand below 59 ft.
							60				

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: Illinois Power Generating Co.
Site: Coffeen Part 845 Groundwater
Location: Coffeen, Illinois
Project: 20E0111A
DATES: **Start:** 1/26/2021
Finish: 1/27/2021
WEATHER: Overcast, cold (30s)

CONTRACTOR: Roberts
Rig mfg/model: GeoProbe 8040DT
Drilling Method: 4.25" HSA w/SS sampler
FIELD STAFF: **Driller:** Matt
Helper: Corey
Eng/Geo: C. Colin Winter

BOREHOLE ID: G289
Well ID: n/a
Surface Elev: ft. MSL
Completion: 60.0 ft. BGS
Station: N
E

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

WATER LEVEL INFORMATION:
= 18.60 - During Drilling
= 8.00 - 1/27/2021 8am
=

SAMPLE			TESTING							
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Water Content (%)	Dry Density (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
								End of boring = 60.0 feet			

NOTE(S):

Attachment E

Site Solids Bulk Characterization Analytical Data

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

16-November-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. : 31 August 2021
LR Report: **CA19059-AUG21**
Reference: Project Name: Coffeen GMF MNA, PO# 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: SB-200-(14-15,15-18)	6: SB-215-(23-24,24-24.5)
Sample Date & Time					30-Aug-21 14:30	30-Aug-21 14:45
Ag [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	< 0.5	< 0.5
Al [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	21000	22000
As [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	3.1	7.9
Ba [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	205	219
Be [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	0.42	0.45
Bi [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	< 0.09	< 0.09
Ca [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	59000	63000
Cd [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	0.17	0.17
Co [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	4	4
Cr [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	144	124
Cu [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	10	8.0
Fe [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	16000	16000
K [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	11000	12000
Li [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	8.8	7.1
Mg [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	26000	25000
Mn [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	403	364
Mo [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	1.5	1.1
Na [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	5200	4900
Ni [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	14	10
P [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	320	320
Pb [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	10	11
Sb [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	< 0.8	< 0.8
Se [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	< 0.7	< 0.7
Sn [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	< 6	< 6
Sr [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	102	90

OnLine LIMS

0002713594

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Test method information available upon request. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.
SGS Canada Inc. Environment-Health & Safety statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

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

LR Report : CA19059-AUG21

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: SB-200-(14-15,15-18)	6: SB-215-(23-24,24-24.5)
Ti [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	955	374
Tl [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	0.18	0.20
U [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	0.65	0.52
V [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	20	19
Y [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	8.76	8.52
Zn [µg/g]	29-Sep-21	13:16	16-Nov-21	08:46	31	30
C [%]	14-Sep-21	19:33	15-Sep-21	09:28	3.17	2.84
S [%]	14-Sep-21	19:33	15-Sep-21	09:28	0.095	0.006
TOC [%]	15-Sep-21	09:51	16-Sep-21	15:24	0.531	0.566
Sulphide [%]	16-Sep-21	17:28	17-Sep-21	09:35	0.08	< 0.04

Catharine Arnold

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

OnLine LIMS

0002713594

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

September 15, 2021

Michael Healy
SiREM
130 Stone Road West
Guelph, Ontario, Canada N1G 3Z2

RE: Report of Findings, Measurement of AVS
Client ID: Coffeen GMF MNA
PRIMA ID: Sirem 08312021-Coffeen GMF

Dear Mr. Healy:

This letter report describes the results of analyses conducted on two soil samples. Each soil was analyzed for acid volatile sulfide (AVS). Results are reported herein.

Sample Receipt and Preparation

Samples were received on August 31, 2021. The samples were placed in an anaerobic glovebox upon receipt. All sample preparation was conducted in the glove box.

Procedures

AVS was measured via sequential extraction of soil based on methods provided by Microseeps, Inc. In order to minimize exposure of the soil or extraction fluid to oxygen, the soil samples were transferred to the extraction vessel while in the glove box and the extractions were carried out on the bench top under a flow of nitrogen. A brief description of the extraction procedure is provided below.

WAS-Fe. Approximately 10 g of soil is extracted with 1 N hydrochloric acid (HCl) for 30 minutes at room temperature (approximately 20° C), after which an aliquot of the HCl is withdrawn and analyzed for ferrous iron and total iron colorimetrically using a Hach DR2800 spectrophotometer and appropriate Hach test kit reagents. Dilutions are made as needed using deoxygenated, deionized (DO/DI) water.

AVS. Hydrogen sulfide generated during the WAS extraction step is collected in a trap filled with 1.25 N sodium hydroxide (NaOH). After collection of the WAS Fe sample, concentrated HCl is added to the soil and the mixture is heated for 30 minutes. The concentration of sulfide in trap is then measured using the methylene blue method via a

Hach DR2800 spectrophotometer and appropriate Hach test kit reagents. Dilutions are made as needed using DO/DI water.

Results

The amount of AVS in each sample is shown in **Table 1** (attached). QC results are given in **Table 2** (attached).

If you have any questions regarding these results, please give me a call at 916-939-7300. Thank you for the opportunity to be of service.

Sincerely,
PRIMA Environmental, Inc.

Cindy G. Schreier

Cindy G. Schreier, Ph.D.
President

Attachments

Table 1. AVS Results.

Sample	AVS, mg/kg
SB-200-(14-15, 15-18)	0.17
SB-215-(23-24, 24-24.5)	< 0.19

Table 2. QC Results for AVS.

Sample ID	Result	Units
Blank *		
AVS	< 0.025	mg/L
FeS standard		
Sulfide concentration	365	g/kg
AVS	378	g/kg
% Recovered as AVS	104	%

* A blank was run in the absence of a solid material. Therefore, values are concentrations in the extraction fluids or traps.

5070 Robert J Mathews Parkway, Suite 300
El Dorado Hills, CA 95762
916-939-7300
www.primaenvironmental.com

Sample Receipt Summary

Date/Time: 8/31/21 10:40 AM

Client/Company: SiRem - AVS 08312021

Project: Coffeen GMF

	Yes	No	N/A
Custody seals intact?	☐	☐	☒
Chain of custody Present?	☒	☐	☐

If no, list number of samples and Sample ID

Ice present?	☒ Blue ice	☐	☐

If no, what is temperature? _____

Samples in good condition?	☐	☐	☐

If no, explain:
jars in tact, but no tape around lids.
Lid for SB-215 (23-24, 24-24.5) was loose.

Do sample IDs on containers match IDs on COC?	☒	☐	☐

If no, explain:

Other Comments:
Store in glove box

PRIMA ENVIRONMENTAL INC.
Mathews Parkway, Suite 300 El Dorado Hills, CA 95762
(916) 939-7300; (916) 939-7398 Fax
www.primaenvironmental.com

CHAIN of CUSTODY

Project Manager: Michael Healey
Project Name: Coffeen GMF MNA
Job Number:
Sampler Signature:

Phone: (519) 822-2265
Fax: (519) 822-3151
Email: mhealey@siremlab.com
TAT: 1 week

SAMPLE ID	Date	Time	Matrix	# Containers	Acid Volatile Sulfide										Comments
SB-200-(14-15,15-18)	30-Aug-21	2:30	S	1	X										
SB-215-(23-24,24-24.5)	30-Aug-21	2:45	S	1	X										

Special Instructions	Relinquished by:		Received by:
	Company SiREM	Date 30 Aug 21	Company
	Printed Name Rachel Hallman	Time 3:00 pm.	Printed Name
	Signature		Signature
	Relinquished by:		**Received by:**
	Company	Date 8/31/21	Company PRIMA
	Printed Name	Time 10:40	Printed Name Molly Scott
	Signature		Signature

Matrix key: S - soil/sediment; W - water; OT - other

February 23, 2021

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

RE: HANSON VISTRA SOIL

Dear Rhonald Hasenyager:

Please find enclosed the analytical results for the **6** sample(s) the laboratory received on **1/29/21 4:12 pm** and logged in under work order **EA04870**. 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

SAMPLE RECEIPT CHECK LIST

Items not applicable will be marked as in compliance

Work Order EA04870

YES	Samples received within temperature compliance when applicable
YES	COC present upon sample receipt
YES	COC completed & legible
YES	Sampler name & signature present
YES	Unique sample IDs assigned
YES	Sample collection location recorded
YES	Date & time collected recorded on COC
YES	Relinquished by client signature on COC
YES	COC & labels match
YES	Sample labels are legible
YES	Appropriate bottle(s) received
YES	Sufficient sample volume received
YES	Sample containers recieved undamaged
NO	Zero headspace, <6 mm present in VOA vials
NO	Trip blank(s) received
YES	All non-field analyses received within holding times
NO	Short hold time analysis
YES	Current PDC COC submitted
NO	Case narrative provided

ANALYTICAL RESULTS

Sample: EA04870-01
Name: G275D - S1
Matrix: Soil - Composite

Sampled: 01/28/21 16:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - A & L Great Lakes Laboratory									
Cation Exchange Capacity - subcontracted	22.95	meq/100g			1	1			Subcontracted

Sample: EA04870-02
Name: G275D - S2
Matrix: Soil - Composite

Sampled: 01/28/21 16:30
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - A & L Great Lakes Laboratory									
Cation Exchange Capacity - subcontracted	7.93	meq/100g			1	1			Subcontracted

Sample: EA04870-03
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - A & L Great Lakes Laboratory									
Cation Exchange Capacity - subcontracted	9.25	meq/100g			1	1			Subcontracted

Sample: EA04870-04
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - A & L Great Lakes Laboratory									
Cation Exchange Capacity - subcontracted	9.63	meq/100g			1	1			Subcontracted

ANALYTICAL RESULTS

Sample: EA04870-06
Name: GYPSUM
Matrix: Soil - Composite

Sampled: 01/29/21 11:15
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - A & L Great Lakes Laboratory									
Cation Exchange Capacity - subcontracted	0.41	meq/100g			1	1			Subcontracted

ANALYTICAL RESULTS

Sample: EA04870-01
Name: G275D - S1
Matrix: Soil - Composite

Sampled: 01/28/21 16:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
General Chemistry - Eurofins Eaton Analytical, Inc. - Lancaster, PA									
Total Organic Carbon (TOC)	603	mg/kg			1.37	411	02/10/21 15:53		SM 5310C 2000

Sample: EA04870-02
Name: G275D - S2
Matrix: Soil - Composite

Sampled: 01/28/21 16:30
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
General Chemistry - Eurofins Eaton Analytical, Inc. - Lancaster, PA									
Total Organic Carbon (TOC)	11200	mg/kg			6.62	1990	02/11/21 18:38		SM 5310C 2000

Sample: EA04870-03
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
General Chemistry - Eurofins Eaton Analytical, Inc. - Lancaster, PA									
Total Organic Carbon (TOC)	10900	mg/kg			10.08	3020	02/11/21 18:51		SM 5310C 2000

ANALYTICAL RESULTS

Sample: EA04870-04
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
General Chemistry - Eurofins Eaton Analytical, Inc. - Lancaster, PA									
Total Organic Carbon (TOC)	13500	mg/kg			9.12	2740	02/11/21 19:04		SM 5310C 2000

Sample: EA04870-06
Name: GYPSUM
Matrix: Soil - Composite

Sampled: 01/29/21 11:15
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
General Chemistry - Eurofins Eaton Analytical, Inc. - Lancaster, PA									
Total Organic Carbon (TOC)	184 J	mg/kg	J		1.33	399	02/10/21 17:47		SM 5310C 2000

ANALYTICAL RESULTS

Sample: EA04870-01
Name: G275D - S1
Matrix: Soil - Composite

Sampled: 01/28/21 16:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - Pace Analytical - Mt Juliet, Tn									
Radium 226 - subcontracted	0.376	pCi/g dry wt			1	0.0478	02/20/21 11:20		Subcontracted
Radium 228 - subcontracted	0.653	pCi/g dry wt			1	0.401	02/17/21 10:35		Subcontracted

Sample: EA04870-02
Name: G275D - S2
Matrix: Soil - Composite

Sampled: 01/28/21 16:30
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - Pace Analytical - Mt Juliet, Tn									
Radium 226 - subcontracted	0.402	pCi/g dry wt			1	0.0888	02/20/21 11:20		Subcontracted
Radium 228 - subcontracted	1.34	pCi/g dry wt			1	0.383	02/17/21 10:35		Subcontracted

ANALYTICAL RESULTS

Sample: EA04870-03
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - Pace Analytical - Mt Juliet, Tn									
Radium 226 - subcontracted	0.445	pCi/g dry wt			1	0.074	02/20/21 11:20		Subcontracted
Radium 228 - subcontracted	0.807	pCi/g dry wt			1	0.402	02/17/21 10:35		Subcontracted

Sample: EA04870-04
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - Pace Analytical - Mt Juliet, Tn									
Radium 226 - subcontracted	0.606	pCi/g dry wt			1	0.0671	02/20/21 11:20		Subcontracted
Radium 228 - subcontracted	0.726	pCi/g dry wt			1	0.422	02/17/21 10:35		Subcontracted

Sample: EA04870-06
Name: GYPSUM
Matrix: Soil - Composite

Sampled: 01/29/21 11:15
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Miscellaneous - Pace Analytical - Mt Juliet, Tn									
Radium 226 - subcontracted	0.212	pCi/g dry wt			1	0.0682	02/20/21 11:20		Subcontracted
Radium 228 - subcontracted	-0.226	pCi/g dry wt	U		1	0.388	02/17/21 10:35		Subcontracted

ANALYTICAL RESULTS

ANALYTICAL RESULTS

Sample: EA04870-01
Name: G275D - S1
Matrix: Soil - Composite

Sampled: 01/28/21 16:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	< 10	mg/kg		02/04/21 17:23	1	10	02/04/21 17:23	CRD	EPA 9056A
Sulfate	50	mg/kg		02/04/21 17:23	1	10	02/04/21 17:23	CRD	EPA 9056A
General Chemistry - PIA									
Fluoride	< 2.5	mg/kg		02/04/21 16:42	1	2.5	02/04/21 16:42	TTH	SM 4500F C 1997
Total Nitrogen	300	mg/kg dry		02/04/21 08:00	1	58	02/05/21 10:23	CRS1	(calc)
Metals by ICP-MS - PIA									
Iron as Fe2O3	22000	mg/kg		02/04/21 07:36	10	41	02/05/21 15:03	JMW	calculated
Manganese as MnO2	180	mg/kg		02/04/21 07:36	10	1.5	02/05/21 15:03	JMW	calculated
Nutrients - PIA									
Nitrate/Nitrite-N	1.4	mg/kg		02/03/21 13:42	1	0.20	02/03/21 13:42	CJP	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	260	mg/kg		02/04/21 08:00	1	50	02/05/21 10:23	CRS1	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 2.9	mg/kg		02/04/21 07:36	10	2.9	02/05/21 15:03	JMW	EPA 6020A
Arsenic	4.3	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Barium	47	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Beryllium	< 0.95	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Boron	< 9.5	mg/kg		02/04/21 07:36	10	9.5	02/05/21 15:03	JMW	EPA 6020A*
Cadmium	< 0.95	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Chromium	14	mg/kg		02/04/21 07:36	10	3.8	02/05/21 15:03	JMW	EPA 6020A
Cobalt	6.3	mg/kg		02/04/21 07:36	10	1.9	02/05/21 15:03	JMW	EPA 6020A
Iron	16000	mg/kg		02/04/21 07:36	10	29	02/05/21 15:03	JMW	EPA 6020A*
Lead	13	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Manganese	110	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Molybdenum	< 0.95	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Selenium	0.96	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Thallium	< 0.95	mg/kg		02/04/21 07:36	10	0.95	02/05/21 15:03	JMW	EPA 6020A
Mercury	< 0.19	mg/kg		02/04/21 07:36	10	0.19	02/05/21 15:03	JMW	EPA 6020A
Lithium	6.7	mg/kg		02/04/21 07:36	1	4.8	02/05/21 13:50	TJJ	EPA 6010B*
Sulfur	24	mg/kg		02/04/21 07:36	1	9.5	02/04/21 11:48	TJJ	EPA 6010B*

ANALYTICAL RESULTS

Sample: EA04870-02
Name: G275D - S2
Matrix: Soil - Composite

Sampled: 01/28/21 16:30
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	< 10	mg/kg		02/04/21 18:00	1	10	02/04/21 18:00	CRD	EPA 9056A
Sulfate	20	mg/kg		02/04/21 18:00	1	10	02/04/21 18:00	CRD	EPA 9056A
General Chemistry - PIA									
Fluoride	< 2.5	mg/kg		02/04/21 16:53	1	2.5	02/04/21 16:53	TTH	SM 4500F C 1997
Total Nitrogen	270	mg/kg dry		02/04/21 08:00	1	56	02/05/21 10:24	CRS1	(calc)
Metals by ICP-MS - PIA									
Iron as Fe2O3	14000	mg/kg		02/04/21 07:36	10	43	02/05/21 15:06	JMW	calculated
Manganese as MnO2	310	mg/kg		02/04/21 07:36	10	1.6	02/05/21 15:06	JMW	calculated
Nutrients - PIA									
Nitrate/Nitrite-N	< 0.20	mg/kg		02/03/21 13:41	1	0.20	02/03/21 13:41	CJP	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	240	mg/kg		02/04/21 08:00	1	50	02/05/21 10:24	CRS1	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 3.0	mg/kg		02/04/21 07:36	10	3.0	02/05/21 15:06	JMW	EPA 6020A
Arsenic	2.1	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Barium	63	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Beryllium	< 1.0	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Boron	< 10	mg/kg		02/04/21 07:36	10	10	02/05/21 15:06	JMW	EPA 6020A*
Cadmium	< 1.0	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Chromium	11	mg/kg		02/04/21 07:36	10	4.0	02/05/21 15:06	JMW	EPA 6020A
Cobalt	4.2	mg/kg		02/04/21 07:36	10	2.0	02/05/21 15:06	JMW	EPA 6020A
Iron	9900	mg/kg		02/04/21 07:36	10	30	02/05/21 15:06	JMW	EPA 6020A*
Lead	7.2	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Manganese	190	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Molybdenum	< 1.0	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Selenium	< 1.0	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Thallium	< 1.0	mg/kg		02/04/21 07:36	10	1.0	02/05/21 15:06	JMW	EPA 6020A
Mercury	< 0.20	mg/kg		02/04/21 07:36	10	0.20	02/05/21 15:06	JMW	EPA 6020A
Lithium	12	mg/kg		02/04/21 07:36	1	5.0	02/05/21 13:51	TJJ	EPA 6010B*
Sulfur	66	mg/kg		02/04/21 07:36	1	10	02/04/21 11:50	TJJ	EPA 6010B*

ANALYTICAL RESULTS

Sample: EA04870-03
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	< 10	mg/kg		02/04/21 18:18	1	10	02/04/21 18:18	CRD	EPA 9056A
Sulfate	48	mg/kg		02/04/21 18:18	1	10	02/04/21 18:18	CRD	EPA 9056A
General Chemistry - PIA									
Fluoride	< 2.5	mg/kg		02/04/21 16:55	1	2.5	02/04/21 16:55	TTH	SM 4500F C 1997
Total Nitrogen	370	mg/kg dry		02/04/21 08:00	1	57	02/05/21 10:25	CRS1	(calc)
Metals by ICP-MS - PIA									
Iron as Fe2O3	12000	mg/kg		02/09/21 14:58	10	43	02/10/21 10:06	wjm	calculated
Manganese as MnO2	370	mg/kg		02/09/21 14:58	10	1.6	02/10/21 10:06	wjm	calculated
Nutrients - PIA									
Nitrate/Nitrite-N	0.29	mg/kg		02/03/21 13:43	1	0.20	02/03/21 13:43	CJP	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	330	mg/kg		02/04/21 08:00	1	50	02/05/21 10:25	CRS1	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 3.0	mg/kg		02/09/21 14:58	10	3.0	02/10/21 10:06	wjm	EPA 6020A
Arsenic	2.6	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Barium	53	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Beryllium	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 12:18	KMC	EPA 6020A
Boron	< 10	mg/kg		02/09/21 14:58	10	10	02/10/21 12:18	KMC	EPA 6020A*
Cadmium	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Chromium	9.1	mg/kg		02/09/21 14:58	10	4.0	02/10/21 10:06	wjm	EPA 6020A
Cobalt	4.3	mg/kg		02/09/21 14:58	10	2.0	02/10/21 10:06	wjm	EPA 6020A
Iron	8200	mg/kg		02/09/21 14:58	10	30	02/10/21 10:06	wjm	EPA 6020A*
Lead	6.7	mg/kg		02/09/21 14:58	10	1.0	02/10/21 12:18	KMC	EPA 6020A
Manganese	240	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Molybdenum	1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Selenium	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Thallium	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:06	wjm	EPA 6020A
Mercury	< 0.20	mg/kg		02/09/21 14:58	10	0.20	02/10/21 10:06	wjm	EPA 6020A
Lithium	7.7	mg/kg		02/09/21 14:58	1	5.0	02/10/21 09:48	TJJ	EPA 6010B*
Sulfur	640	mg/kg		02/09/21 14:58	1	10	02/11/21 14:46	tjj	EPA 6010B*

ANALYTICAL RESULTS

Sample: EA04870-04
Name: G275D - S3
Matrix: Soil - Composite

Sampled: 01/29/21 11:00
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	< 10	mg/kg		02/04/21 19:30	1	10	02/04/21 19:30	CRD	EPA 9056A
Sulfate	42	mg/kg	Q4	02/04/21 19:30	1	10	02/04/21 19:30	CRD	EPA 9056A
General Chemistry - PIA									
Fluoride	3.1	mg/kg		02/04/21 16:56	1	2.5	02/04/21 16:56	TTH	SM 4500F C 1997
Total Nitrogen	410	mg/kg dry		02/04/21 08:00	1	56	02/05/21 10:26	CRS1	(calc)
Metals by ICP-MS - PIA									
Iron as Fe2O3	7400	mg/kg		02/09/21 14:58	10	43	02/10/21 10:10	wjm	calculated
Manganese as MnO2	400	mg/kg		02/09/21 14:58	10	1.6	02/10/21 10:10	wjm	calculated
Nutrients - PIA									
Nitrate/Nitrite-N	0.23	mg/kg		02/03/21 13:32	1	0.20	02/03/21 13:32	CJP	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	360	mg/kg	Q3	02/04/21 08:00	1	50	02/05/21 10:26	CRS1	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 3.0	mg/kg		02/09/21 14:58	10	3.0	02/10/21 10:10	wjm	EPA 6020A
Arsenic	< 1.0	mg/kg	Q3	02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Barium	16	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Beryllium	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 12:22	KMC	EPA 6020A
Boron	< 10	mg/kg	R	02/09/21 14:58	10	10	02/10/21 12:22	KMC	EPA 6020A*
Cadmium	< 1.0	mg/kg	R	02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Chromium	5.6	mg/kg	R	02/09/21 14:58	10	4.0	02/10/21 10:10	wjm	EPA 6020A
Cobalt	3.9	mg/kg		02/09/21 14:58	10	2.0	02/10/21 10:10	wjm	EPA 6020A
Iron	5200	mg/kg	Q4	02/09/21 14:58	10	30	02/10/21 10:10	wjm	EPA 6020A*
Lead	6.7	mg/kg		02/09/21 14:58	10	1.0	02/10/21 12:22	KMC	EPA 6020A
Manganese	250	mg/kg	Q4	02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Molybdenum	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Selenium	< 1.0	mg/kg	Q3	02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Thallium	< 1.0	mg/kg	R	02/09/21 14:58	10	1.0	02/10/21 10:10	wjm	EPA 6020A
Mercury	< 0.20	mg/kg		02/09/21 14:58	10	0.20	02/10/21 10:10	wjm	EPA 6020A
Lithium	5.1	mg/kg		02/09/21 14:58	1	5.0	02/10/21 09:50	TJJ	EPA 6010B*
Sulfur	390	mg/kg		02/09/21 14:58	1	10	02/11/21 14:48	tjj	EPA 6010B*

ANALYTICAL RESULTS

Sample: EA04870-06
Name: GYPSUM
Matrix: Soil - Composite

Sampled: 01/29/21 11:15
Received: 01/29/21 16:12

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	25	mg/kg		02/08/21 17:23	10	10	02/08/21 17:23	CRD	EPA 9056A
Sulfate	19000	mg/kg		02/12/21 14:49	250	2500	02/12/21 14:49	CRD	EPA 9056A
General Chemistry - PIA									
Fluoride	13	mg/kg	Q3	02/04/21 16:44	1	2.5	02/04/21 16:44	TTH	SM 4500F C 1997
Total Nitrogen	1400	mg/kg dry		02/04/21 08:00	1	87	02/05/21 10:29	CRS1	(calc)
Metals by ICP-MS - PIA									
Iron as Fe2O3	370	mg/kg		02/09/21 14:58	10	22	02/10/21 10:47	wjm	calculated
Manganese as MnO2	43	mg/kg		02/09/21 14:58	10	0.81	02/10/21 10:47	wjm	calculated
Nutrients - PIA									
Nitrate/Nitrite-N	6.3	mg/kg		02/03/21 13:44	1	0.20	02/03/21 13:44	CJP	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	820	mg/kg		02/04/21 08:00	1	50	02/05/21 10:29	CRS1	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 1.5	mg/kg		02/09/21 14:58	10	1.5	02/10/21 10:47	wjm	EPA 6020A
Arsenic	< 0.51	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Barium	6.6	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Beryllium	< 0.51	mg/kg		02/09/21 14:58	10	0.51	02/10/21 13:13	KMC	EPA 6020A
Boron	13	mg/kg		02/09/21 14:58	10	5.1	02/10/21 13:13	KMC	EPA 6020A*
Cadmium	< 0.51	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Chromium	< 2.0	mg/kg		02/09/21 14:58	10	2.0	02/10/21 10:47	wjm	EPA 6020A
Cobalt	< 1.0	mg/kg		02/09/21 14:58	10	1.0	02/10/21 10:47	wjm	EPA 6020A
Iron	260	mg/kg		02/09/21 14:58	10	15	02/10/21 10:47	wjm	EPA 6020A*
Lead	0.67	mg/kg		02/09/21 14:58	10	0.51	02/10/21 13:13	KMC	EPA 6020A
Manganese	27	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Molybdenum	1.2	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Selenium	< 0.51	mg/kg		02/09/21 14:58	10	0.51	02/10/21 10:47	wjm	EPA 6020A
Thallium	< 0.51	mg/kg		02/09/21 14:58	10	0.51	02/10/21 13:13	KMC	EPA 6020A
Mercury	< 0.10	mg/kg		02/09/21 14:58	10	0.10	02/10/21 13:13	KMC	EPA 6020A
Lithium	< 2.6	mg/kg		02/09/21 14:58	1	2.6	02/10/21 09:51	TJJ	EPA 6010B*
Sulfur	30000	mg/kg		02/09/21 14:58	100	510	02/15/21 15:36	AMB	EPA 6010B*

NOTES

Specifications regarding method revisions and method modifications used for analysis are available upon request. Please contact your project manager.

* Not a TNI accredited analyte

Certifications

CHI - McHenry, IL - 4314-A W. Crystal Lake Road, McHenry, IL 60050
TNI Accreditation for Drinking Water and Wastewater Fields of Testing through IL EPA Accreditation No. 100279
Illinois Department of Public Health Bacterial 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, Solid and Hazardous Material Fields of Testing through IL EPA Accreditation No. 100230
Illinois Department of Public Health Bacterial Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications/Accreditations: Iowa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications/Accreditations: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Solid and Hazardous Material Certifications/Accreditations: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

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

STL - Hazelwood, MO - 944 Anglum Rd, Hazelwood, MO 63042
TNI Accreditation for Wastewater, Solid and Hazardous Material Fields of Testing through KS KDHE Certification No. E-10389
TNI Accreditation for Wastewater, Solid and Hazardous Material Fields of Testing through IL EPA Accreditation No. - 200080
Illinois Department of Public Health Bacterial Analysis in Drinking Water Approved Laboratory, Registry No. 171050
Missouri Department of Natural Resources - Certificate of Approval for Microbiological Laboratory Service - No. 1050

Qualifiers

Q3 Matrix Spike/Matrix Spike Duplicate both failed % recovery acceptance limits. The associated blank spike recovery was acceptable.
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.
R Matrix Spike/Matrix Spike Duplicate Failed %Relative Percent Difference criterion.

Gail J Schindler

Certified by: Gail Schindler, Project Manager

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Lancaster Laboratories Env, LLC
2425 New Holland Pike
Lancaster, PA 17601
Tel: (717)656-2300

Laboratory Job ID: 410-28227-1
Client Project/Site: EA04870

For:
PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, Illinois 61615

Attn: Gail Schindler

Marrissa Williams

Authorized for release by:
2/12/2021 10:07:09 AM

Marrissa Williams, Project Manager
(717)556-7246
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LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory.

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.
· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.
· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.
· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.
Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

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Marrissa Williams

Marrissa Williams
Project Manager
2/12/2021 10:07:10 AM

Table of Contents

Cover Page 1
Table of Contents 3
Definitions/Glossary 4
Case Narrative 5
Detection Summary 6
Client Sample Results 7
QC Sample Results 8
QC Association Summary 9
Lab Chronicle 10
Certification Summary 11
Method Summary 12
Sample Summary 13
Chain of Custody 14
Receipt Checklists 16

Definitions/Glossary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
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
1C	Result is from the primary column on a dual-column method.
2C	Result is from the confirmation column on a dual-column method.
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 410-28227-1

Laboratory: Eurofins Lancaster Laboratories Env, LLC

Narrative

Job Narrative
410-28227-1

Receipt
The samples were received on 2/2/2021 11:46 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 0.3°C

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

Detection Summary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Client Sample ID: EA04870-1 G275D-S1 — Lab Sample ID: 410-28227-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Organic Carbon	603		411	137	mg/Kg	1.37		Lloyd Kahn	Total/NA

Client Sample ID: EA04870-2 G275D-S2 — Lab Sample ID: 410-28227-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Organic Carbon	11200		1990	662	mg/Kg	6.62		Lloyd Kahn	Total/NA

Client Sample ID: EA04870-3 G275D-S3 — Lab Sample ID: 410-28227-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Organic Carbon	10900		3020	1010	mg/Kg	10.08		Lloyd Kahn	Total/NA

Client Sample ID: EA04870-4 G275D-S1 — Lab Sample ID: 410-28227-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Organic Carbon	13500		2740	912	mg/Kg	9.12		Lloyd Kahn	Total/NA

Client Sample ID: EA04870-6 GYPSUM — Lab Sample ID: 410-28227-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Organic Carbon	184	J	399	133	mg/Kg	1.33		Lloyd Kahn	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Client Sample ID: EA04870-1 G275D-S1

Lab Sample ID: 410-28227-1
Matrix: Solid

Date Collected: 01/28/21 16:00
Date Received: 02/02/21 11:46

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	603		411	137	mg/Kg			02/10/21 15:53	1.37
Percent Moisture	16.9		1.0	1.0	%			02/03/21 10:39	1
Percent Solids	83.1		1.0	1.0	%			02/03/21 10:39	1

Client Sample ID: EA04870-2 G275D-S2

Lab Sample ID: 410-28227-2
Matrix: Solid

Date Collected: 01/28/21 16:30
Date Received: 02/02/21 11:46

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	11200		1990	662	mg/Kg			02/11/21 18:38	6.62
Percent Moisture	18.6		1.0	1.0	%			02/03/21 10:39	1
Percent Solids	81.4		1.0	1.0	%			02/03/21 10:39	1

Client Sample ID: EA04870-3 G275D-S3

Lab Sample ID: 410-28227-3
Matrix: Solid

Date Collected: 01/28/21 11:00
Date Received: 02/02/21 11:46

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	10900		3020	1010	mg/Kg			02/11/21 18:51	10.08
Percent Moisture	18.3		1.0	1.0	%			02/03/21 10:39	1
Percent Solids	81.7		1.0	1.0	%			02/03/21 10:39	1

Client Sample ID: EA04870-4 G275D-S1

Lab Sample ID: 410-28227-4
Matrix: Solid

Date Collected: 01/28/21 11:00
Date Received: 02/02/21 11:46

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	13500		2740	912	mg/Kg			02/11/21 19:04	9.12
Percent Moisture	19.7		1.0	1.0	%			02/03/21 10:44	1
Percent Solids	80.3		1.0	1.0	%			02/03/21 10:44	1

Client Sample ID: EA04870-6 GYPSUM

Lab Sample ID: 410-28227-5
Matrix: Solid

Date Collected: 01/28/21 11:15
Date Received: 02/02/21 11:46

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	184	J	399	133	mg/Kg			02/10/21 17:47	1.33
Percent Moisture	39.4		1.0	1.0	%			02/03/21 10:39	1
Percent Solids	60.6		1.0	1.0	%			02/03/21 10:39	1

Method: Lloyd Kahn - Organic Carbon, Total (TOC)

Lab Sample ID: MB 410-93317/22
Matrix: Solid
Analysis Batch: 93317

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		300	100	mg/Kg			02/10/21 19:03	1

Lab Sample ID: MB 410-93317/3
Matrix: Solid
Analysis Batch: 93317

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		300	100	mg/Kg			02/10/21 15:02	1

Lab Sample ID: LCS 410-93317/23
Matrix: Solid
Analysis Batch: 93317

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	4300	4595		mg/Kg		107	47 - 143

Lab Sample ID: LCS 410-93317/4
Matrix: Solid
Analysis Batch: 93317

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	4300	3708		mg/Kg		86	47 - 143

Lab Sample ID: MB 410-93774/3
Matrix: Solid
Analysis Batch: 93774

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		300	100	mg/Kg			02/11/21 17:35	1

Lab Sample ID: MB 410-93774/31
Matrix: Solid
Analysis Batch: 93774

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		300	100	mg/Kg			02/11/21 23:30	1

Lab Sample ID: LCS 410-93774/32
Matrix: Solid
Analysis Batch: 93774

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	4300	3789		mg/Kg		88	47 - 143

Lab Sample ID: LCS 410-93774/4
Matrix: Solid
Analysis Batch: 93774

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	4300	3038		mg/Kg		71	47 - 143

QC Association Summary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

General Chemistry

Analysis Batch: 90493

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-28227-1	EA04870-1 G275D-S1	Total/NA	Solid	Moisture	
410-28227-2	EA04870-2 G275D-S2	Total/NA	Solid	Moisture	
410-28227-3	EA04870-3 G275D-S3	Total/NA	Solid	Moisture	
410-28227-5	EA04870-6 GYPSUM	Total/NA	Solid	Moisture	

Analysis Batch: 90496

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-28227-4	EA04870-4 G275D-S1	Total/NA	Solid	Moisture	

Analysis Batch: 93317

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-28227-1	EA04870-1 G275D-S1	Total/NA	Solid	Lloyd Kahn	
410-28227-1	EA04870-1 G275D-S1	Total/NA	Solid	Lloyd Kahn	
410-28227-1	EA04870-1 G275D-S1	Total/NA	Solid	Lloyd Kahn	
410-28227-1	EA04870-1 G275D-S1	Total/NA	Solid	Lloyd Kahn	
410-28227-5	EA04870-6 GYPSUM	Total/NA	Solid	Lloyd Kahn	
MB 410-93317/22	Method Blank	Total/NA	Solid	Lloyd Kahn	
MB 410-93317/3	Method Blank	Total/NA	Solid	Lloyd Kahn	
LCS 410-93317/23	Lab Control Sample	Total/NA	Solid	Lloyd Kahn	
LCS 410-93317/4	Lab Control Sample	Total/NA	Solid	Lloyd Kahn	

Analysis Batch: 93774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-28227-2	EA04870-2 G275D-S2	Total/NA	Solid	Lloyd Kahn	
410-28227-3	EA04870-3 G275D-S3	Total/NA	Solid	Lloyd Kahn	
410-28227-4	EA04870-4 G275D-S1	Total/NA	Solid	Lloyd Kahn	
MB 410-93774/3	Method Blank	Total/NA	Solid	Lloyd Kahn	
MB 410-93774/31	Method Blank	Total/NA	Solid	Lloyd Kahn	
LCS 410-93774/32	Lab Control Sample	Total/NA	Solid	Lloyd Kahn	
LCS 410-93774/4	Lab Control Sample	Total/NA	Solid	Lloyd Kahn	

Lab Chronicle

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Client Sample ID: EA04870-1 G275D-S1

Lab Sample ID: 410-28227-1
Matrix: Solid

Date Collected: 01/28/21 16:00
Date Received: 02/02/21 11:46

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Lloyd Kahn		1.38	93317	02/10/21 15:27	NKL9	ELLE
Total/NA	Analysis	Lloyd Kahn		1.38	93317	02/10/21 15:40	NKL9	ELLE
Total/NA	Analysis	Lloyd Kahn		1.37	93317	02/10/21 15:53	NKL9	ELLE
Total/NA	Analysis	Lloyd Kahn		1.37	93317	02/10/21 16:05	NKL9	ELLE
Total/NA	Analysis	Moisture		1	90493	02/03/21 10:39	UVJN	ELLE

Client Sample ID: EA04870-2 G275D-S2

Lab Sample ID: 410-28227-2
Matrix: Solid

Date Collected: 01/28/21 16:30
Date Received: 02/02/21 11:46

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Lloyd Kahn		6.62	93774	02/11/21 18:38	NKL9	ELLE
Total/NA	Analysis	Moisture		1	90493	02/03/21 10:39	UVJN	ELLE

Client Sample ID: EA04870-3 G275D-S3

Lab Sample ID: 410-28227-3
Matrix: Solid

Date Collected: 01/28/21 11:00
Date Received: 02/02/21 11:46

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Lloyd Kahn		10.08	93774	02/11/21 18:51	NKL9	ELLE
Total/NA	Analysis	Moisture		1	90493	02/03/21 10:39	UVJN	ELLE

Client Sample ID: EA04870-4 G275D-S1

Lab Sample ID: 410-28227-4
Matrix: Solid

Date Collected: 01/28/21 11:00
Date Received: 02/02/21 11:46

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Lloyd Kahn		9.12	93774	02/11/21 19:04	NKL9	ELLE
Total/NA	Analysis	Moisture		1	90496	02/03/21 10:44	USA6	ELLE

Client Sample ID: EA04870-6 GYPSUM

Lab Sample ID: 410-28227-5
Matrix: Solid

Date Collected: 01/28/21 11:15
Date Received: 02/02/21 11:46

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Lloyd Kahn		1.33	93317	02/10/21 17:47	NKL9	ELLE
Total/NA	Analysis	Moisture		1	90493	02/03/21 10:39	UVJN	ELLE

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Env, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Accreditation/Certification Summary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Laboratory: Eurofins Lancaster Laboratories Env, LLC

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

Authority	Program	Identification Number	Expiration Date
A2LA	Dept. of Defense ELAP	1.01	11-30-22
Alaska	State	PA00009	06-30-21
Alaska (UST)	State	17-027	01-31-21 *
Arizona	State	AZ0780	03-12-21
Arkansas DEQ	State	19-053-0	08-09-21
California	State	2792	02-01-22
Colorado	State	PA00009	06-30-21
Connecticut	State	PH-0746	06-30-21
DE Haz. Subst. Cleanup Act (HSCA)	State	019-006 (PA cert)	01-31-22
Delaware (DW)	State	N/A	02-01-22
Florida	NELAP	E87997	07-01-21
Hawaii	State	N/A	01-31-22
Iowa	State	361	03-02-22
Kansas	NELAP	E-10151	10-31-21
Kentucky (DW)	State	KY90088	01-01-22
Kentucky (WW)	State	KY90088	12-31-21
Louisiana	NELAP	02055	06-30-21
Maine	State	2019012	03-12-21
Maryland	State	100	06-30-21
Massachusetts	State	M-PA009	06-30-21
Minnesota	NELAP	042-999-487	12-31-21
Missouri	State	450	01-31-22
Montana (DW)	State	0098	01-01-22
Montana (UST)	State	0098	01-01-22
Nebraska	State	NE-OS-32-17	01-31-20 *
Nevada	State	PA000092019-3	07-31-21
New Hampshire	NELAP	273019	01-10-22
New Jersey	NELAP	PA011	06-30-21
New York	NELAP	10670	04-01-21
North Carolina (DW)	State	42705	07-31-21
North Carolina (WW/SW)	State	521	12-31-21
North Dakota	State	R-205	01-31-20 *
Oklahoma	NELAP	R-205	08-31-21
Oregon	NELAP	PA200001-018	09-12-21
PALA	Canada	1978	05-08-21
Pennsylvania	NELAP	36-00037	01-31-22
Tennessee	State	02838	01-31-22
Texas	NELAP	T104704194-20-38	08-31-21
Utah	NELAP	PA000092019-16	02-28-21
Vermont	State	VT - 36037	10-29-21
Virginia	NELAP	10561	06-14-21
Washington	State	C457	04-11-21
West Virginia DEP	State	055	06-30-21
Wyoming	State	8TMS-L	01-31-22
Wyoming (UST)	A2LA	1.01	11-30-22

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Method	Method Description	Protocol	Laboratory
Lloyd Kahn	Organic Carbon, Total (TOC)	EPA	ELLE
Moisture	Percent Moisture	EPA	ELLE

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Env, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: PDC Laboratories, Inc.
Project/Site: EA04870

Job ID: 410-28227-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
410-28227-1	EA04870-1 G275D-S1	Solid	01/28/21 16:00	02/02/21 11:46	
410-28227-2	EA04870-2 G275D-S2	Solid	01/28/21 16:30	02/02/21 11:46	
410-28227-3	EA04870-3 G275D-S3	Solid	01/28/21 11:00	02/02/21 11:46	
410-28227-4	EA04870-4 G275D-S1	Solid	01/28/21 11:00	02/02/21 11:46	
410-28227-5	EA04870-6 GYPSUM	Solid	01/28/21 11:15	02/02/21 11:46	

SUBCONTRACT ORDER
Transfer Chain of Custody

PDC Laboratories, Inc.

EA04870

410-28227 Chain of Custody

SENDING LABORATORY

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

RECEIVING LABORATORY

Eurofins Eaton Analytical, Inc. - Lancaster, PA
2425 New Holland Pike
Lancaster, PA 17601
(717) 656-2300

Sample: EA04870-01
Name: G275D - S1

Sampled: 01/28/21 16:00
Matrix: Soil
Preservative: H2SO4, cool <6

Analysis	Due	Expires	Comments
01-TOC-STL	02/09/21 16:00	02/25/21 16:00	

Sample: EA04870-02
Name: G275D - S2

Sampled: 01/28/21 16:30
Matrix: Soil
Preservative: H2SO4, cool <6

Analysis	Due	Expires	Comments
01-TOC-STL	02/09/21 16:00	02/25/21 16:30	

Sample: EA04870-03
Name: G275D - S3

Sampled: 01/29/21 11:00
Matrix: Soil
Preservative: H2SO4, cool <6

Analysis	Due	Expires	Comments
01-TOC-STL	02/09/21 16:00	02/26/21 11:00	

Sample: EA04870-04
Name: G275D - S3

Sampled: 01/29/21 11:00
Matrix: Soil
Preservative: H2SO4, cool <6

Analysis	Due	Expires	Comments
01-TOC-STL	02/09/21 16:00	02/26/21 11:00	

Sample: EA04870-06
Name: GYPSUM

Sampled: 01/29/21 11:15
Matrix: Soil
Preservative: H2SO4, cool <6

Analysis	Due	Expires	Comments
01-TOC-STL	02/09/21 16:00	02/26/21 11:15	

SUBCONTRACT ORDER
Transfer Chain of Custody

PDC Laboratories, Inc.

EA04870

Please email results to Gail Schindler at gschindler@pdclab.com

Date Shipped: 2/1/21 Total # of Containers: 5 Sample Origin (State): IL PO #: 11506

Turn-Around Time Requested ☒ NORMAL ☐ RUSH Date Results Needed: _____

Relinquished By	Date/Time	Received By	Date/Time
[signature]	2/1/21 1434		
		[signature]	2/2/21 1146

Sample Temperature Upon Receipt	____ °C
Sample(s) Received on Ice	Y or N
Proper Bottles Received in Good Condition	Y or N
Bottles Filled with Adequate Volume	Y or N
Samples Received Within Hold Time	Y or N
Date/Time Taken From Sample Bottle	Y or N

Login Sample Receipt Checklist

Client: PDC Laboratories, Inc.

Job Number: 410-28227-1

Login Number: 28227
List Number: 1
Creator: Jeremiah, Cory T

List Source: Eurofins Lancaster Laboratories Env

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable (</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
Sample Preservation Verified.	N/A	
Residual Chlorine Checked.	N/A	
Sample custody seals are intact.	N/A	

Report Number
F21034-0049
Account Number
67045

a&lgreatlakes LABORATORIES
Scientists who don't mind getting dirty.™

3505 Conestoga Dr.
Fort Wayne, IN 46808
260.483.4759
algreatlakes.com

To: PDC LABORATORIES, INC.
2231 W ALTORFER DR
PEORIA, IL 61615-1807

For: EA04870

Attn: JANET CLUTTERS

REPORT OF ANALYSIS

Date Received: 02/03/2021
Date Reported: 02/18/2021

Lab Number	Sample ID	Analysis	Result	Unit	Method
19134	01	Cation Exchange Capacity (NH4-Sat.)	22.95	meq/100g	MSA Part 3 (1996) pp 1220-1221
19135	02	Cation Exchange Capacity (NH4-Sat.)	7.93	meq/100g	MSA Part 3 (1996) pp 1220-1221
19136	03	Cation Exchange Capacity (NH4-Sat.)	9.25	meq/100g	MSA Part 3 (1996) pp 1220-1221
19137	04	Cation Exchange Capacity (NH4-Sat.)	9.63	meq/100g	MSA Part 3 (1996) pp 1220-1221
19138	06	Cation Exchange Capacity (NH4-Sat.)	0.41	meq/100g	MSA Part 3 (1996) pp 1220-1221

Report reviewed and approved by our professional agronomy staff.

SOILMISC

Report Number
F21034-0049
Account Number
67045

a&lgreatlakes LABORATORIES
Scientists who don't mind getting dirty.™

3505 Conestoga Dr.
Fort Wayne, IN 46808
260.483.4759
algreatlakes.com

To: PDC LABORATORIES, INC.
2231 W ALTORFER DR
PEORIA, IL 61615-1807

For: EA04870

Attn: JANET CLUTTERS

REPORT OF ANALYSIS

Date Received: 02/03/2021
Date Reported: 02/18/2021

Lab Number	Sample ID	Analysis	Result	Unit	Method
19134	01	Cation Exchange Capacity (NH4-Sat.)	22.95	meq/100g	MSA Part 3 (1996) pp 1220-1221
19135	02	Cation Exchange Capacity (NH4-Sat.)	7.93	meq/100g	MSA Part 3 (1996) pp 1220-1221
19136	03	Cation Exchange Capacity (NH4-Sat.)	9.25	meq/100g	MSA Part 3 (1996) pp 1220-1221
19137	04	Cation Exchange Capacity (NH4-Sat.)	9.63	meq/100g	MSA Part 3 (1996) pp 1220-1221
19138	06	Cation Exchange Capacity (NH4-Sat.)	0.41	meq/100g	MSA Part 3 (1996) pp 1220-1221

Report reviewed and approved by our professional agronomy staff.

SOILMISC

ANALYTICAL REPORT

February 22, 2021

PDC Laboratory, Inc.

Sample Delivery Group:	L1313806
Samples Received:	02/04/2021
Project Number:	EA04863
Description:	
Report To:	Gail Schindler 2231 W. Altorfer Drive Peoria, IL 61615

Entire Report Reviewed By:

Mark W. Beasley
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
EA04870-01 L1313806-01	5
EA04870-02 L1313806-02	6
EA04870-03 L1313806-03	7
EA04870-04 L1313806-04	8
EA04870-06 L1313806-05	9
Qc: Quality Control Summary	10
Radiochemistry by Method 9320	10
Radiochemistry by Method SM7500Ra B M	11
Gl: Glossary of Terms	12
Al: Accreditations & Locations	13
Sc: Sample Chain of Custody	14

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

EA04870-01 L1313806-01 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
	01/28/21 16:00	02/04/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 9320	WG1617956	1	02/08/21 11:32	02/17/21 10:35	SNR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN

EA04870-02 L1313806-02 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
	01/28/21 16:30	02/04/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 9320	WG1617956	1	02/08/21 11:32	02/17/21 10:35	SNR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN

EA04870-03 L1313806-03 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
	01/29/21 11:00	02/04/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 9320	WG1617956	1	02/08/21 11:32	02/17/21 10:35	SNR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN

EA04870-04 L1313806-04 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
	01/29/21 11:00	02/04/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 9320	WG1617956	1	02/08/21 11:32	02/17/21 10:35	SNR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN

EA04870-06 L1313806-05 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
	01/29/21 11:15	02/04/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 9320	WG1617956	1	02/08/21 11:32	02/17/21 10:35	SNR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1617957	1	02/11/21 09:30	02/20/21 11:20	RGT	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley
Project Manager

Radiochemistry by Method 9320

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-228	0.653		0.231	0.401	02/17/2021 10:35	WG1617956
(T) Barium	*103*			*62.0-143*	*02/17/2021 10:35*	WG1617956
(T) Yttrium	*99.0*			*79.0-136*	*02/17/2021 10:35*	WG1617956

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	1.03		0.346	0.449	02/20/2021 11:20	WG1617957

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-226	0.376		0.115	0.0478	02/20/2021 11:20	WG1617957
(T) Barium-133	*97.0*			*30.0-143*	*02/20/2021 11:20*	WG1617957

Radiochemistry by Method 9320

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-228	1.34		0.232	0.383	02/17/2021 10:35	WG1617956
(T) Barium	*112*			*62.0-143*	*02/17/2021 10:35*	WG1617956
(T) Yttrium	*97.6*			*79.0-136*	*02/17/2021 10:35*	WG1617956

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	1.74		0.367	0.472	02/20/2021 11:20	WG1617957

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-226	0.402		0.135	0.0888	02/20/2021 11:20	WG1617957
(T) Barium-133	*92.0*			*30.0-143*	*02/20/2021 11:20*	WG1617957

Radiochemistry by Method 9320

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-228	0.807		0.234	0.402	02/17/2021 10:35	WG1617956
(T) Barium	*114*			*62.0-143*	*02/17/2021 10:35*	WG1617956
(T) Yttrium	*95.4*			*79.0-136*	*02/17/2021 10:35*	WG1617956

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	1.25		0.373	0.476	02/20/2021 11:20	WG1617957

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-226	0.445		0.139	0.074	02/20/2021 11:20	WG1617957
(T) Barium-133	*92.0*			*30.0-143*	*02/20/2021 11:20*	WG1617957

Radiochemistry by Method 9320

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-228	0.726		0.244	0.422	02/17/2021 10:35	WG1617956
(T) Barium	*113*			*62.0-143*	*02/17/2021 10:35*	WG1617956
(T) Yttrium	*99.7*			*79.0-136*	*02/17/2021 10:35*	WG1617956

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	1.33		0.405	0.489	02/20/2021 11:20	WG1617957

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-226	0.606		0.161	0.0671	02/20/2021 11:20	WG1617957
(T) Barium-133	*91.0*			*30.0-143*	*02/20/2021 11:20*	WG1617957

Radiochemistry by Method 9320

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-228	-0.226	U	0.210	0.388	02/17/2021 10:35	WG1617956
(T) Barium	*97.9*			*62.0-143*	*02/17/2021 10:35*	WG1617956
(T) Yttrium	*99.3*			*79.0-136*	*02/17/2021 10:35*	WG1617956

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.202	J	0.299	0.456	02/20/2021 11:20	WG1617957

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
RADIUM-226	0.202		0.0894	0.0682	02/20/2021 11:20	WG1617957
(T) Barium-133	*99.2*			*30.0-143*	*02/20/2021 11:20*	WG1617957

Method Blank (MB)

(MB) R3623477-1 02/17/21 10:35

Analyte	MB Result pCi/g	MB Qualifier	MB MDA pCi/g
Radium-228	-0.305	U	0.492
(T) Barium	*106*		
(T) Yttrium	*90.3*		

Original Sample (OS) • Duplicate (DUP)

(OS) • (DUP) R3623477-5 02/17/21 10:35

Analyte	Original Result	DUP Result pCi/g	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228		0.756	1	37.2	0.918		20	3
(T) Barium		*103*						
(T) Yttrium		*99.2*						

Laboratory Control Sample (LCS)

(LCS) R3623477-2 02/17/21 10:35

Analyte	Spike Amount pCi/g	LCS Result pCi/g	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.42	88.4	80.0-120	
(T) Barium			*105*		
(T) Yttrium			*94.8*		

Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3623477-3 02/17/21 10:35 • (MSD) R3623477-4 02/17/21 10:35

Analyte	Spike Amount pCi/g	Original Result	MS Result pCi/g	MSD Result pCi/g	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	4.75		4.90	4.96	91.5	92.9	1	70.0-130			1.32		20
(T) Barium					*101*	*103*							
(T) Yttrium					*105*	*101*							

Method Blank (MB)

(MB) R3623849-1 02/20/21 11:20

Analyte	MB Result pCi/g	MB Qualifier	MB MDA pCi/g
Radium-226	0.0275	J	0.0453
(T) Barium-133	*91.5*		

L1313806-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1313806-05 02/20/21 11:20 • (DUP) R3623849-5 02/20/21 11:20

Analyte	Original Result pCi/g	DUP Result pCi/g	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.202	0.138	1	37.8	0.564		20	3
(T) Barium-133	*99.2*	*103*						

Laboratory Control Sample (LCS)

(LCS) R3623849-2 02/20/21 11:20

Analyte	Spike Amount pCi/g	LCS Result pCi/g	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.51	110	60.0-144	
(T) Barium-133			*94.7*		

L1313791-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1313791-01 02/20/21 11:20 • (MS) R3623849-3 02/20/21 11:20 • (MSD) R3623849-4 02/20/21 11:20

Analyte	Spike Amount pCi/g	Original Result pCi/g	MS Result pCi/g	MSD Result pCi/g	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	5.01	0.619	5.53	5.79	98.0	103	1	65.0-135			4.61		20
(T) Barium-133		*99.4*			*99.7*	*102*							

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
U	Below Detectable Limits: Indicates that the analyte was not detected.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN, 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

Pace Analytical National 1313 Point Mallard Parkway SE Suite B Decatur, AL, 35601

Alabama	40160
ANSI National Accreditation Board	L2239

Pace Analytical National 660 Bercut Dr. Ste. C Sacramento, CA, 95811

California	2961	Oregon	CA300002
Minnesota	006-999-465	Washington	C926
North Dakota	R-214		

Pace Analytical National 6000 South Eastern Avenue Ste 9A Las Vegas, NV, 89119

Nevada	NV009412021-1

Pace Analytical National 1606 E. Brazos Street Suite D Victoria, TX, 77901

Texas	T104704328-20-18

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

SUBCONTRACT ORDER
Transfer Chain of Custody

H044

13B806

PDC Laboratories, Inc.

EA04870

SENDING LABORATORY

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

RECEIVING LABORATORY

Pace Analytical - Mt Juliet, Tn
12065 Lebanon Rd
Mt Juliet, TN 37122
(615) 758-5858

Sample: EA04870-01 -01
Name: G275D - S1
Sampled: 01/28/21 16:00
Matrix: Soil
Preservative: Cool <6

Analysis	Due	Expires	Comments
01-Radium 226/228 combined	02/09/21 16:00	07/27/21 16:00	

Sample: EA04870-02 02
Name: G275D - S2
Sampled: 01/28/21 16:30
Matrix: Soil
Preservative: Cool <6

Analysis	Due	Expires	Comments
01-Radium 226/228 combined	02/09/21 16:00	07/27/21 16:30	

Sample: EA04870-03 03
Name: G275D - S3
Sampled: 01/29/21 11:00
Matrix: Soil
Preservative: Cool <6

Analysis	Due	Expires	Comments
01-Radium 226/228 combined	02/09/21 16:00	07/28/21 11:00	

Sample: EA04870-04 04
Name: G275D - S3
Sampled: 01/29/21 11:00
Matrix: Soil
Preservative: Cool <6

Analysis	Due	Expires	Comments
01-Radium 226/228 combined	02/09/21 16:00	07/28/21 11:00	

Sample: EA04870-06 05
Name: GYPSUM
Sampled: 01/29/21 11:15
Matrix: Soil
Preservative: Cool <6

Analysis	Due	Expires	Comments
-Radium 226/228 combined	02/09/21 16:00	07/28/21 11:15	

1313806

SUBCONTRACT ORDER
Transfer Chain of Custody

PDC Laboratories, Inc.

EA04870

5 total

7727 9603 7950

Sample Receipt Checklist

COC Seal Present/Intact:	Y X N	If Applicable	
COC Signed/Accurate:	Y N	VOA Zero Headspace:	Y N
Bottles arrive intact:	Y N	Pres.Correct/Check:	Y N
Correct bottles used:	Y N		
Sufficient volume sent:	Y N		
RAD Screen <0.5 mR/hr:	X Y N		

All Cont <500 CPM

Please email results to Gail Schindler at gschindler@pdclab.com

Date Shipped: 2-2-21 Total # of Containers: 5 Sample Origin (State): IL PO #: 11508

Turn-Around Time Requested ☑ NORMAL ☐ RUSH Date Results Needed: _____

Relinquished By	Date/Time	Received By	Date/Time
[signature]	2-2-21 11:00	NPappas	2-4-21 9:00

Sample Temperature Upon Receipt	5.2-2.2 SP °C
Sample(s) Received on Ice	Y or N
Proper Bottles Received in Good Condition	Y or N
Bottles Filled with Adequate Volume	Y or N
Samples Received Within Hold Time	Y or N
Date/Time Taken From Sample Bottle	Y or N

PDC LABORATORIES, INC.
WWW.PDCLAB.COM

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

CHAIN OF CUSTODY RECORD

STATE WHERE SAMPLE COLLECTED IL

EA04870-07

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

(1) CLIENT: HANSON PROFESSIONAL SERVICES

PROJECT NUMBER: COFFEEN GMF

PROJECT LOCATION:

PURCHASE ORDER #:

ADDRESS: 1525 S 6TH STREET

PHONE NUMBER:

E-MAIL:

DATE SHIPPED:

CITY / STATE / ZIP: SPRINGFIELD IL 62703-6801

SAMPLER (PLEASE PRINT): COLIN WINTER

CONTACT PERSON: MR RHON HASENYAGER

SAMPLER'S SIGNATURE: [signature]

MATRIX TYPES:
WW- WASTEWATER
DW- DRINKING WATER
GW- GROUND WATER
WWSL- SLUDGE
NAS- NON AQUEOUS SOLID
LCHT-LEACHATE
OIL-OIL
SO-SOIL
SOL-SOLID

(3) ANALYSIS REQUESTED

(4) (FOR LAB USE ONLY)
LOGIN # EA04870-07
LOGGED BY: KEG
CLIENT: HANSON PROFESSIONAL SERVICES
PROJECT: HANSON VISTRA COFFEEN GMF SOIL
PRJ. MGR.: GJ SCHINDLER

(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)	SB, AS, BA, BE, B, CD, CA, CR,	CO, FE, PB, LI, MG, MN, MO, K	SE, NA, S, TL, CL, F, SO4, TN	FE OXIDE, MN OXIDE	RAD 226/228	TOC	CEC	REMARKS
G275D-S1	1/28/21	SEE JARS		X	SO	3									3-4pm 1/29/21 DCW
G275D-S2	⊥	⊥		X		3									4-4:30pm 1/29/21 DCW
G275D-S3	1/28+29/21	3:5PM/8-11AM		X		4									8-11am 1/29/21 DCW
G275D-S3 (MS/MSD/~~EQUIP BLANK~~ FIELD DUP)	⊥	⊥		X	⊥	3									8-11am 1/29/21 DCW
G275D-S21 (EQUIP BLANK)	1/29/21	9AM ~~SEE JARS~~	X		N/A	8									9am 1/29/21 DCW
															11:15am 1/29/21 DCW
GYPSUM	1/29/21	11AM	X		SOL	4									

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
DATE RESULTS NEEDED:
EMAIL IF DIFFERENT FROM ABOVE:
PHONE # IF DIFFERENT FROM ABOVE:

(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)

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	DATE / TIME
[signature]	1/29/21 12:30PM	[signature]	1/29/21 12:30PM
[signature]	1/29/21 16:12		
		[signature]	1/29/21 1612

(8) COMMENTS: (FOR LAB USE ONLY)

SAMPLE TEMPERATURE UPON RECEIPT 9.1 °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 _____

ANALYTICAL RESULTS

Sample: EC02226-02
Name: Coffeen Gypsum
Matrix: Soil - Grab

Sampled: 03/09/21 13:15
Received: 03/10/21 17:00

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	260	mg/kg		03/15/21 22:53	10	100	03/15/21 22:53	CRD	EPA 9056A
Fluoride	7.6	mg/kg		03/17/21 02:20	1	2.5	03/17/21 02:20	CRD	EPA 9056A
Sulfate	15000	mg/kg		03/17/21 02:39	250	2500	03/17/21 02:39	CRD	EPA 9056A
General Chemistry - PIA									
Solids - total solids (TS)	59	%		03/15/21 13:46	1	0.050	03/15/21 14:23	BMA	SM 2540G*
Total Nitrogen	880	mg/kg dry		03/17/21 12:57	1	84	03/17/21 13:28	BMS	(calc)
Nutrients - PIA									
Nitrate/Nitrite-N	8.6	mg/kg		03/17/21 12:57	1	0.20	03/17/21 13:28	CRS1	EPA 353.2 REV 2
Total Kjeldahl Nitrogen (TKN)	510	mg/kg		03/11/21 07:57	1	50	03/12/21 09:11	BMS	EPA 351.2 REV 2*
Total Metals - PIA									
Antimony	< 3.0	mg/kg		03/17/21 13:02	10	3.0	03/18/21 16:07	KMC	EPA 6020A
Arsenic	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Barium	13	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Beryllium	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/19/21 11:10	JMW	EPA 6020A
Boron	< 10	mg/kg		03/17/21 13:02	10	10	03/18/21 16:07	KMC	EPA 6020A*
Cadmium	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Calcium	130000	mg/kg		03/17/21 13:02	20	200	03/30/21 12:38	JMW	EPA 6020A*
Chromium	< 4.0	mg/kg		03/17/21 13:02	10	4.0	03/18/21 16:07	KMC	EPA 6020A
Cobalt	< 2.0	mg/kg		03/17/21 13:02	10	2.0	03/18/21 16:07	KMC	EPA 6020A
Iron	380	mg/kg		03/17/21 13:02	20	60	03/30/21 12:38	JMW	EPA 6020A*
Lead	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Magnesium	320	mg/kg		03/17/21 13:02	20	200	03/30/21 12:38	JMW	EPA 6020A*
Manganese	17	mg/kg		03/17/21 13:02	20	2.0	03/30/21 12:38	JMW	EPA 6020A
Molybdenum	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Potassium	< 200	mg/kg		03/17/21 13:02	20	200	03/30/21 12:38	JMW	EPA 6020A*
Selenium	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Sodium	240	mg/kg		03/17/21 13:02	20	200	03/31/21 10:23	JMW	EPA 6020A*
Thallium	< 1.0	mg/kg		03/17/21 13:02	10	1.0	03/18/21 16:07	KMC	EPA 6020A
Lithium	< 5.0	mg/kg		03/17/21 13:02	1	5.0	03/18/21 11:38	TJJ	EPA 6010B*
Sulfur	86000	mg/kg		03/17/21 13:02	100	1000	03/18/21 14:24	TJJ	EPA 6010B*

Attachment F
X-Ray Diffraction Analytical Data

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Environmental Services*
Project Number/ LIMS No.	*Custom XRD/MI4508-SEP21*
Sample Receipt:	*September 9, 2021*
Sample Analysis:	*September 24, 2021*
Reporting Date:	*October 22, 2021*

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

Contents:

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

Kim Gibbs, 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.

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

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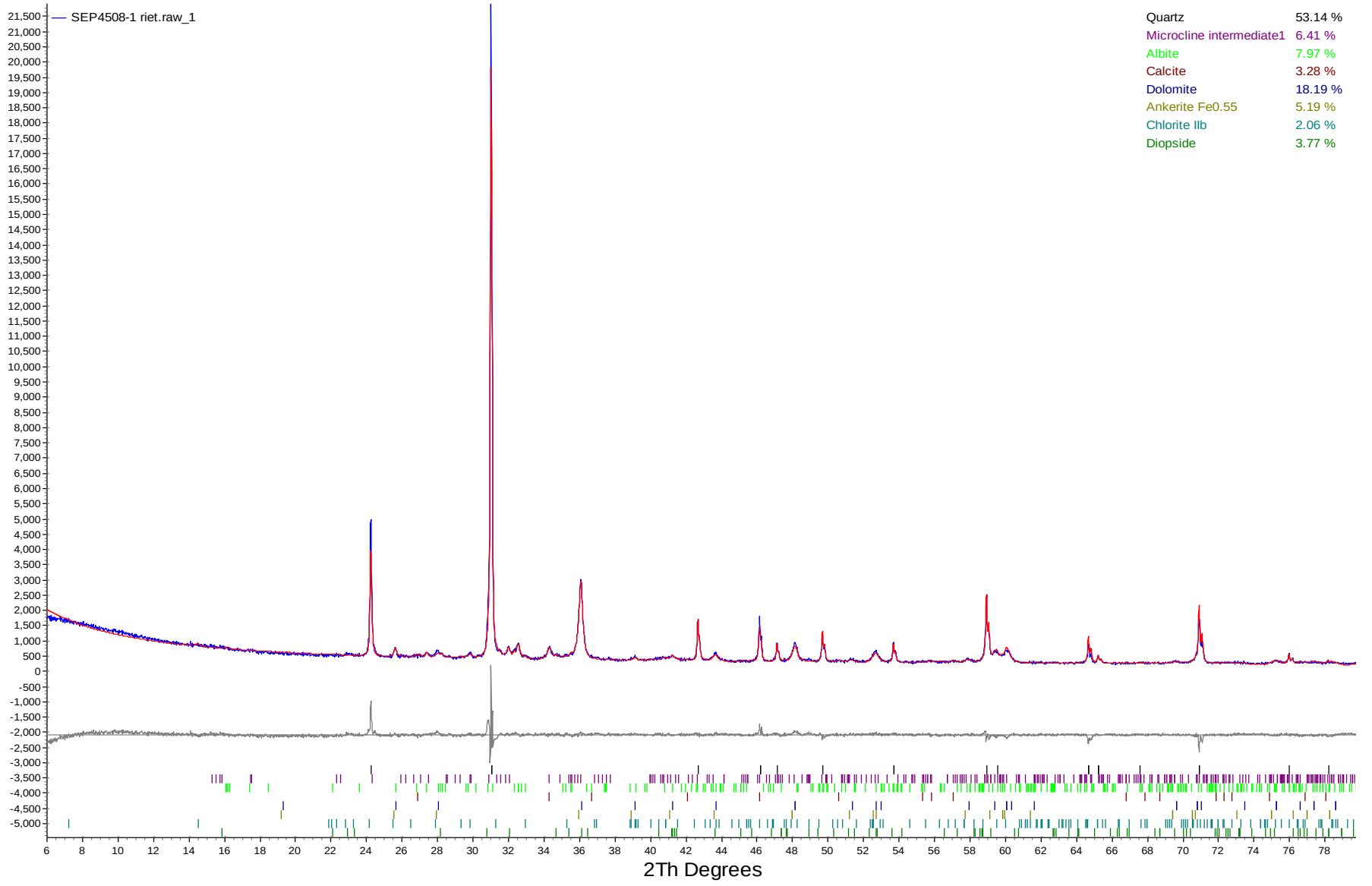
Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	SB-200-(14-15,15-18) SEP4508-01 (wt %)	SB-215-(23-24,24-24.5) SEP4508-02 (wt %)
Quartz	53.1	58.3
Microcline	6.4	6.2
Albite	8.0	9.0
Calcite	3.3	4.5
Dolomite	18.2	12.9
Ankerite	5.2	4.3
Chlorite	2.1	0.8
Diopside	3.8	4.1
TOTAL	100	100

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

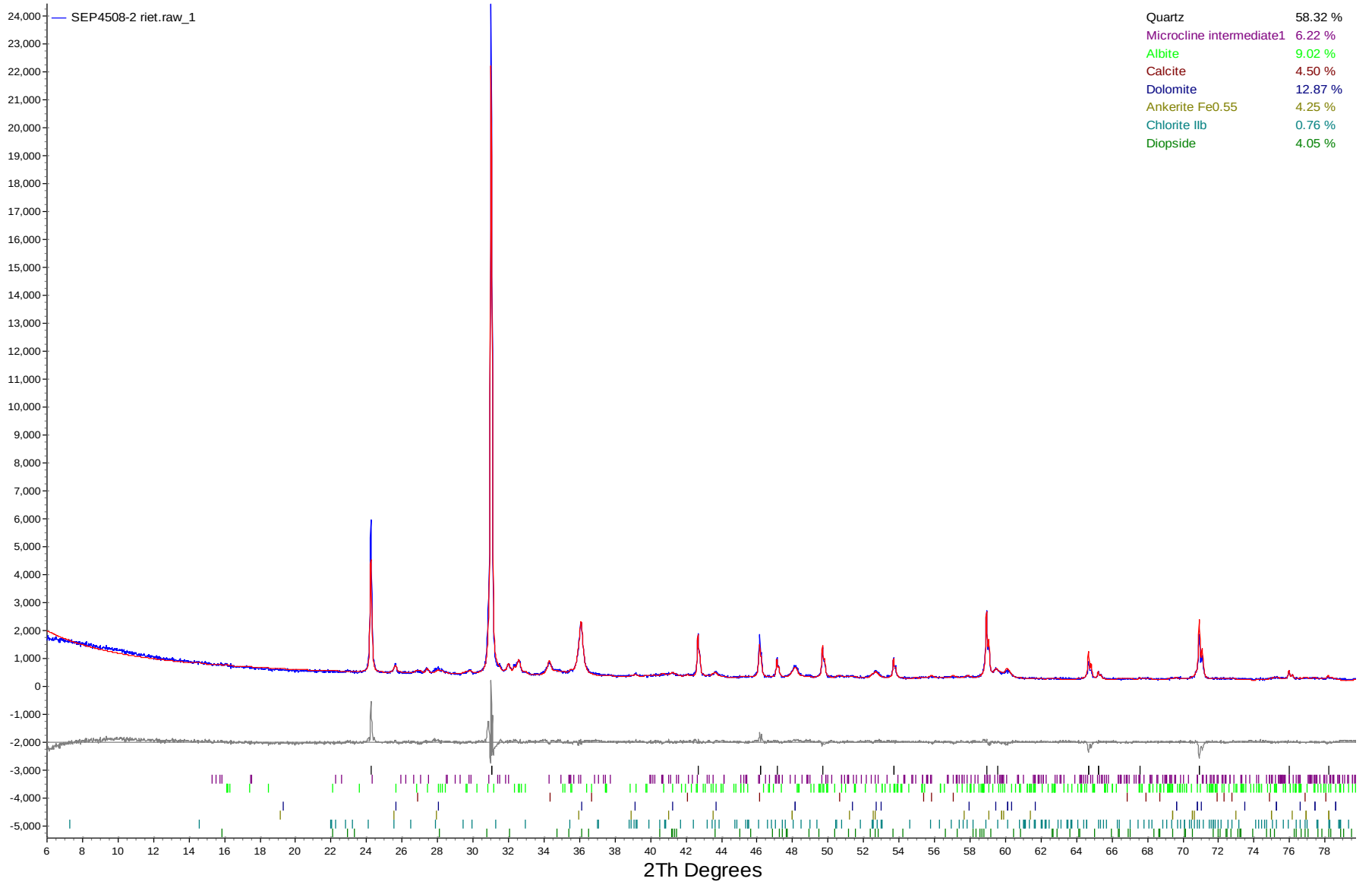
Mineral/Compound	Formula
Quartz	SiO_2
Microcline	$KAlSi_3O_8$
Albite	$NaAlSi_3O_8$
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Ankerite	$CaFe(CO_3)_2$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Diopside	$CaMgSi_2O_6$

SB-200-(14-15,15-18)



Quartz	53.14 %
Microcline intermediate1	6.41 %
Albite	7.97 %
Calcite	3.28 %
Dolomite	18.19 %
Ankerite Fe0.55	5.19 %
Chlorite IIb	2.06 %
Diopside	3.77 %

SB-215-(23-24,24-24.5)



Quartz	58.32 %
Microcline intermediate1	6.22 %
Albite	9.02 %
Calcite	4.50 %
Dolomite	12.87 %
Ankerite Fe0.55	4.25 %
Chlorite IIb	0.76 %
Diopside	4.05 %

Attachment G

Site Evaluation Aqueous Phase Data

Attachment G. Site Evaluation Aqueous Phase Data
Geochemical Conceptual Site Model
Coffeen GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

HSU	Location	Well Type	Date	Parameter	Unit	Result
DA	G206D	C	2021/03/30	pH (field)	SU	7.1
DA	G206D	C	2021/04/22	pH (field)	SU	7.2
DA	G206D	C	2021/05/05	pH (field)	SU	7.1
DA	G206D	C	2021/05/18	pH (field)	SU	7.2
DA	G206D	C	2021/07/27	pH (field)	SU	7.5
DA	G206D	C	2023/02/16	pH (field)	SU	7.5
DA	G206D	C	2023/06/09	pH (field)	SU	7.2
DA	G206D	C	2023/08/14	pH (field)	SU	6.9
DA	G206D	C	2023/11/17	pH (field)	SU	7.1
DA	G206D	C	2021/03/30	Oxidation Reduction Potential	mV	-9.60
DA	G206D	C	2021/04/22	Oxidation Reduction Potential	mV	44.2
DA	G206D	C	2021/05/05	Oxidation Reduction Potential	mV	97.6
DA	G206D	C	2021/05/18	Oxidation Reduction Potential	mV	-48.4
DA	G206D	C	2021/07/27	Oxidation Reduction Potential	mV	78.0
DA	G206D	C	2023/02/16	Oxidation Reduction Potential	mV	-95.0
DA	G206D	C	2023/06/09	Oxidation Reduction Potential	mV	-194
DA	G206D	C	2023/08/14	Oxidation Reduction Potential	mV	-48.0
DA	G206D	C	2023/11/17	Oxidation Reduction Potential	mV	-54.0
DA	G206D	C	2021/03/30	Eh	V	0.19
DA	G206D	C	2021/04/22	Eh	V	0.24
DA	G206D	C	2021/05/05	Eh	V	0.29
DA	G206D	C	2021/05/18	Eh	V	0.15
DA	G206D	C	2021/07/27	Eh	V	0.27
DA	G206D	C	2023/02/16	Eh	V	0.10
DA	G206D	C	2023/06/09	Eh	V	-0.00067
DA	G206D	C	2023/08/14	Eh	V	0.15
DA	G206D	C	2023/11/17	Eh	V	0.14
DA	G206D	C	2021/03/30	Alkalinity, bicarbonate	mg/L CaCO3	380
DA	G206D	C	2021/04/22	Alkalinity, bicarbonate	mg/L CaCO3	420
DA	G206D	C	2021/05/05	Alkalinity, bicarbonate	mg/L CaCO3	380
DA	G206D	C	2021/05/18	Alkalinity, bicarbonate	mg/L CaCO3	390
DA	G206D	C	2021/07/27	Alkalinity, bicarbonate	mg/L CaCO3	400
DA	G206D	C	2023/02/16	Alkalinity, bicarbonate	mg/L CaCO3	410
DA	G206D	C	2023/06/09	Alkalinity, bicarbonate	mg/L CaCO3	400
DA	G206D	C	2023/08/14	Alkalinity, bicarbonate	mg/L CaCO3	414
DA	G206D	C	2023/11/17	Alkalinity, bicarbonate	mg/L CaCO3	420
DA	G206D	C	2021/03/30	Barium, total	mg/L	0.140
DA	G206D	C	2021/04/22	Barium, total	mg/L	0.0890
DA	G206D	C	2021/05/05	Barium, total	mg/L	0.120
DA	G206D	C	2021/05/18	Barium, total	mg/L	0.120
DA	G206D	C	2021/07/27	Barium, total	mg/L	0.0790
DA	G206D	C	2023/02/16	Barium, total	mg/L	0.120
DA	G206D	C	2023/06/09	Barium, total	mg/L	0.170

DA	G206D	C	2023/08/14	Barium, total	mg/L	0.200
DA	G206D	C	2023/11/17	Barium, total	mg/L	0.183
DA	G206D	C	2021/03/30	Calcium, total	mg/L	140
DA	G206D	C	2021/04/22	Calcium, total	mg/L	120
DA	G206D	C	2021/05/05	Calcium, total	mg/L	130
DA	G206D	C	2021/05/18	Calcium, total	mg/L	130
DA	G206D	C	2021/07/27	Calcium, total	mg/L	110
DA	G206D	C	2023/02/16	Calcium, total	mg/L	89.0
DA	G206D	C	2023/06/09	Calcium, total	mg/L	86.0
DA	G206D	C	2023/08/14	Calcium, total	mg/L	84.9
DA	G206D	C	2023/11/17	Calcium, total	mg/L	80.3
DA	G206D	C	2021/03/30	Chloride, total	mg/L	70.0
DA	G206D	C	2021/04/22	Chloride, total	mg/L	67.0
DA	G206D	C	2021/05/05	Chloride, total	mg/L	56.0
DA	G206D	C	2021/05/18	Chloride, total	mg/L	52.0
DA	G206D	C	2021/07/27	Chloride, total	mg/L	42.0
DA	G206D	C	2023/02/16	Chloride, total	mg/L	29.0
DA	G206D	C	2023/06/09	Chloride, total	mg/L	25.0
DA	G206D	C	2023/08/14	Chloride, total	mg/L	23.0
DA	G206D	C	2023/11/17	Chloride, total	mg/L	22.0
DA	G206D	C	2023/06/09	Ferrous Iron, dissolved	mg/L	3.00
DA	G206D	C	2023/06/09	Iron, dissolved	mg/L	3.40
DA	G206D	C	2023/08/14	Iron, dissolved	mg/L	3.12
DA	G206D	C	2021/03/30	Magnesium, total	mg/L	56.0
DA	G206D	C	2021/04/22	Magnesium, total	mg/L	47.0
DA	G206D	C	2021/05/05	Magnesium, total	mg/L	49.0
DA	G206D	C	2021/05/18	Magnesium, total	mg/L	48.0
DA	G206D	C	2021/07/27	Magnesium, total	mg/L	39.0
DA	G206D	C	2023/02/16	Magnesium, total	mg/L	27.0
DA	G206D	C	2023/06/09	Magnesium, total	mg/L	31.0
DA	G206D	C	2023/08/14	Magnesium, total	mg/L	31.0
DA	G206D	C	2023/11/17	Magnesium, total	mg/L	29.7
DA	G206D	C	2023/06/09	Manganese, dissolved	mg/L	0.200
DA	G206D	C	2023/08/14	Manganese, dissolved	mg/L	0.176
DA	G206D	C	2023/08/14	Phosphate, dissolved	mg/L	0.448
DA	G206D	C	2021/03/30	Potassium, total	mg/L	2.70
DA	G206D	C	2021/04/22	Potassium, total	mg/L	1.70
DA	G206D	C	2021/05/05	Potassium, total	mg/L	1.60
DA	G206D	C	2021/05/18	Potassium, total	mg/L	1.50
DA	G206D	C	2021/07/27	Potassium, total	mg/L	1.50
DA	G206D	C	2023/02/16	Potassium, total	mg/L	1.20
DA	G206D	C	2023/06/09	Potassium, total	mg/L	1.10
DA	G206D	C	2023/08/14	Potassium, total	mg/L	1.30
DA	G206D	C	2023/11/17	Potassium, total	mg/L	1.21
DA	G206D	C	2023/06/09	Silicon, dissolved	mg/L	6.90
DA	G206D	C	2023/08/14	Silicon, dissolved	mg/L	5.86
DA	G206D	C	2021/03/30	Sodium, total	mg/L	240
DA	G206D	C	2021/04/22	Sodium, total	mg/L	240
DA	G206D	C	2021/05/05	Sodium, total	mg/L	240
DA	G206D	C	2021/05/18	Sodium, total	mg/L	220

DA	G206D	C	2021/07/27	Sodium, total	mg/L	230
DA	G206D	C	2023/02/16	Sodium, total	mg/L	120
DA	G206D	C	2023/06/09	Sodium, total	mg/L	120
DA	G206D	C	2023/08/14	Sodium, total	mg/L	128
DA	G206D	C	2023/11/17	Sodium, total	mg/L	116
DA	G206D	C	2021/03/30	Sulfate, total	mg/L	590
DA	G206D	C	2021/04/22	Sulfate, total	mg/L	600
DA	G206D	C	2021/05/05	Sulfate, total	mg/L	510
DA	G206D	C	2021/05/18	Sulfate, total	mg/L	250
DA	G206D	C	2021/07/27	Sulfate, total	mg/L	400
DA	G206D	C	2023/02/16	Sulfate, total	mg/L	160
DA	G206D	C	2023/06/09	Sulfate, total	mg/L	160
DA	G206D	C	2023/08/14	Sulfate, total	mg/L	155
DA	G206D	C	2023/11/17	Sulfate, total	mg/L	153
DA	G206D	C	2021/03/30	Temperature (Celsius)	degrees C	15.4
DA	G206D	C	2021/04/22	Temperature (Celsius)	degrees C	15.4
DA	G206D	C	2021/05/05	Temperature (Celsius)	degrees C	18.8
DA	G206D	C	2021/05/18	Temperature (Celsius)	degrees C	14.5
DA	G206D	C	2021/07/27	Temperature (Celsius)	degrees C	20.6
DA	G206D	C	2023/02/16	Temperature (Celsius)	degrees C	9.60
DA	G206D	C	2023/06/09	Temperature (Celsius)	degrees C	18.1
DA	G206D	C	2023/08/14	Temperature (Celsius)	degrees C	15.4
DA	G206D	C	2023/11/17	Temperature (Celsius)	degrees C	15.0
DA	G206D	C	2021/03/30	Total Dissolved Solids	mg/L	1,300
DA	G206D	C	2021/04/22	Total Dissolved Solids	mg/L	1,300
DA	G206D	C	2021/05/05	Total Dissolved Solids	mg/L	1,200
DA	G206D	C	2021/05/18	Total Dissolved Solids	mg/L	1,200
DA	G206D	C	2021/07/27	Total Dissolved Solids	mg/L	1,100
DA	G206D	C	2023/02/16	Total Dissolved Solids	mg/L	670
DA	G206D	C	2023/06/09	Total Dissolved Solids	mg/L	680
DA	G206D	C	2023/08/14	Total Dissolved Solids	mg/L	685
DA	G206D	C	2023/11/17	Total Dissolved Solids	mg/L	755
S	NE Riser	WLO	2021/03/31	pH (field)	SU	7.2
S	NE Riser	WLO	2021/04/21	pH (field)	SU	7.3
S	NE Riser	WLO	2021/05/05	pH (field)	SU	7.2
S	NE Riser	WLO	2021/05/18	pH (field)	SU	7.2
S	NE Riser	WLO	2021/07/27	pH (field)	SU	7.1
S	NE Riser	WLO	2022/03/21	pH (field)	SU	7.2
S	NE Riser	WLO	2022/06/15	pH (field)	SU	7.9
S	NE Riser	WLO	2022/08/25	pH (field)	SU	6.9
S	NE Riser	WLO	2023/02/15	pH (field)	SU	6.9
S	NE Riser	WLO	2021/03/31	Oxidation Reduction Potential	mV	251
S	NE Riser	WLO	2021/04/21	Oxidation Reduction Potential	mV	179
S	NE Riser	WLO	2021/05/05	Oxidation Reduction Potential	mV	211
S	NE Riser	WLO	2021/05/18	Oxidation Reduction Potential	mV	93.1
S	NE Riser	WLO	2021/07/27	Oxidation Reduction Potential	mV	243
S	NE Riser	WLO	2022/03/21	Oxidation Reduction Potential	mV	56.8
S	NE Riser	WLO	2022/06/15	Oxidation Reduction Potential	mV	195
S	NE Riser	WLO	2022/08/25	Oxidation Reduction Potential	mV	176
S	NE Riser	WLO	2023/02/15	Oxidation Reduction Potential	mV	464

S	NE Riser	WLO	2021/03/31	Eh	V	0.45
S	NE Riser	WLO	2021/04/21	Eh	V	0.38
S	NE Riser	WLO	2021/05/05	Eh	V	0.40
S	NE Riser	WLO	2021/05/18	Eh	V	0.29
S	NE Riser	WLO	2021/07/27	Eh	V	0.44
S	NE Riser	WLO	2022/03/21	Eh	V	0.25
S	NE Riser	WLO	2022/06/15	Eh	V	0.38
S	NE Riser	WLO	2022/08/25	Eh	V	0.36
S	NE Riser	WLO	2023/02/15	Eh	V	0.66
S	NE Riser	WLO	2021/03/31	Alkalinity, bicarbonate	mg/L CaCO3	290
S	NE Riser	WLO	2021/04/21	Alkalinity, bicarbonate	mg/L CaCO3	290
S	NE Riser	WLO	2021/05/05	Alkalinity, bicarbonate	mg/L CaCO3	290
S	NE Riser	WLO	2021/05/18	Alkalinity, bicarbonate	mg/L CaCO3	310
S	NE Riser	WLO	2021/07/27	Alkalinity, bicarbonate	mg/L CaCO3	310
S	NE Riser	WLO	2022/03/21	Alkalinity, bicarbonate	mg/L CaCO3	290
S	NE Riser	WLO	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	250
S	NE Riser	WLO	2022/08/25	Alkalinity, bicarbonate	mg/L CaCO3	280
S	NE Riser	WLO	2023/02/15	Alkalinity, bicarbonate	mg/L CaCO3	150
S	NE Riser	WLO	2022/08/25	Alkalinity, carbonate	mg/L CaCO3	10.0
S	NE Riser	WLO	2021/03/31	Barium, total	mg/L	0.0460
S	NE Riser	WLO	2021/04/21	Barium, total	mg/L	0.0410
S	NE Riser	WLO	2021/05/05	Barium, total	mg/L	0.0410
S	NE Riser	WLO	2021/05/18	Barium, total	mg/L	0.0410
S	NE Riser	WLO	2021/07/27	Barium, total	mg/L	0.0420
S	NE Riser	WLO	2022/06/15	Barium, total	mg/L	0.0420
S	NE Riser	WLO	2022/08/25	Barium, total	mg/L	0.0410
S	NE Riser	WLO	2021/03/31	Calcium, total	mg/L	490
S	NE Riser	WLO	2021/04/21	Calcium, total	mg/L	530
S	NE Riser	WLO	2021/05/05	Calcium, total	mg/L	530
S	NE Riser	WLO	2021/05/18	Calcium, total	mg/L	550
S	NE Riser	WLO	2021/07/27	Calcium, total	mg/L	540
S	NE Riser	WLO	2022/03/21	Calcium, total	mg/L	520
S	NE Riser	WLO	2022/06/15	Calcium, total	mg/L	490
S	NE Riser	WLO	2022/08/25	Calcium, total	mg/L	520
S	NE Riser	WLO	2023/02/15	Calcium, total	mg/L	560
S	NE Riser	WLO	2021/03/31	Chloride, total	mg/L	1,300
S	NE Riser	WLO	2021/04/21	Chloride, total	mg/L	1,500
S	NE Riser	WLO	2021/05/05	Chloride, total	mg/L	1,600
S	NE Riser	WLO	2021/05/18	Chloride, total	mg/L	1,300
S	NE Riser	WLO	2021/07/27	Chloride, total	mg/L	1,400
S	NE Riser	WLO	2022/03/21	Chloride, total	mg/L	1,300
S	NE Riser	WLO	2022/06/15	Chloride, total	mg/L	1,400
S	NE Riser	WLO	2022/08/25	Chloride, total	mg/L	1,400
S	NE Riser	WLO	2023/02/15	Chloride, total	mg/L	1,200
S	NE Riser	WLO	2023/06/08	Ferrous Iron, dissolved	mg/L	0.180
S	NE Riser	WLO	2023/06/08	Iron, dissolved	mg/L	0.0380
S	NE Riser	WLO	2021/03/31	Magnesium, total	mg/L	910
S	NE Riser	WLO	2021/04/21	Magnesium, total	mg/L	1,200
S	NE Riser	WLO	2021/05/05	Magnesium, total	mg/L	1,200
S	NE Riser	WLO	2021/05/18	Magnesium, total	mg/L	1,200

S	NE Riser	WLO	2021/07/27	Magnesium, total	mg/L	1,300
S	NE Riser	WLO	2022/03/21	Magnesium, total	mg/L	1,200
S	NE Riser	WLO	2022/06/15	Magnesium, total	mg/L	1,100
S	NE Riser	WLO	2022/08/25	Magnesium, total	mg/L	1,200
S	NE Riser	WLO	2023/02/15	Magnesium, total	mg/L	920
S	NE Riser	WLO	2023/06/08	Manganese, dissolved	mg/L	6.30
S	NE Riser	WLO	2021/03/31	Potassium, total	mg/L	110
S	NE Riser	WLO	2021/04/21	Potassium, total	mg/L	120
S	NE Riser	WLO	2021/05/05	Potassium, total	mg/L	120
S	NE Riser	WLO	2021/05/18	Potassium, total	mg/L	130
S	NE Riser	WLO	2021/07/27	Potassium, total	mg/L	130
S	NE Riser	WLO	2022/03/21	Potassium, total	mg/L	120
S	NE Riser	WLO	2022/06/15	Potassium, total	mg/L	110
S	NE Riser	WLO	2022/08/25	Potassium, total	mg/L	120
S	NE Riser	WLO	2023/02/15	Potassium, total	mg/L	110
S	NE Riser	WLO	2023/06/08	Silicon, dissolved	mg/L	7.60
S	NE Riser	WLO	2021/03/31	Sodium, total	mg/L	310
S	NE Riser	WLO	2021/04/21	Sodium, total	mg/L	420
S	NE Riser	WLO	2021/05/05	Sodium, total	mg/L	430
S	NE Riser	WLO	2021/05/18	Sodium, total	mg/L	420
S	NE Riser	WLO	2021/07/27	Sodium, total	mg/L	410
S	NE Riser	WLO	2022/03/21	Sodium, total	mg/L	410
S	NE Riser	WLO	2022/06/15	Sodium, total	mg/L	330
S	NE Riser	WLO	2022/08/25	Sodium, total	mg/L	400
S	NE Riser	WLO	2023/02/15	Sodium, total	mg/L	310
S	NE Riser	WLO	2021/03/31	Sulfate, total	mg/L	10,000
S	NE Riser	WLO	2021/04/21	Sulfate, total	mg/L	10,000
S	NE Riser	WLO	2021/05/05	Sulfate, total	mg/L	12,000
S	NE Riser	WLO	2021/05/18	Sulfate, total	mg/L	12,000
S	NE Riser	WLO	2021/07/27	Sulfate, total	mg/L	11,000
S	NE Riser	WLO	2022/03/21	Sulfate, total	mg/L	11,000
S	NE Riser	WLO	2022/06/15	Sulfate, total	mg/L	10,000
S	NE Riser	WLO	2022/08/25	Sulfate, total	mg/L	10,000
S	NE Riser	WLO	2023/02/15	Sulfate, total	mg/L	8,800
S	NE Riser	WLO	2021/03/31	Temperature (Celsius)	degrees C	8.80
S	NE Riser	WLO	2021/04/21	Temperature (Celsius)	degrees C	13.5
S	NE Riser	WLO	2021/05/05	Temperature (Celsius)	degrees C	20.1
S	NE Riser	WLO	2021/05/18	Temperature (Celsius)	degrees C	16.3
S	NE Riser	WLO	2021/07/27	Temperature (Celsius)	degrees C	19.5
S	NE Riser	WLO	2022/03/21	Temperature (Celsius)	degrees C	16.6
S	NE Riser	WLO	2022/06/15	Temperature (Celsius)	degrees C	27.5
S	NE Riser	WLO	2022/08/25	Temperature (Celsius)	degrees C	24.5
S	NE Riser	WLO	2023/02/15	Temperature (Celsius)	degrees C	11.3
S	NE Riser	WLO	2021/03/31	Total Dissolved Solids	mg/L	13,000
S	NE Riser	WLO	2021/04/21	Total Dissolved Solids	mg/L	14,000
S	NE Riser	WLO	2021/05/05	Total Dissolved Solids	mg/L	9,700
S	NE Riser	WLO	2021/05/18	Total Dissolved Solids	mg/L	9,400
S	NE Riser	WLO	2021/07/27	Total Dissolved Solids	mg/L	14,000
S	NE Riser	WLO	2022/03/21	Total Dissolved Solids	mg/L	13,000
S	NE Riser	WLO	2022/06/15	Total Dissolved Solids	mg/L	13,000

S	NE Riser	WLO	2022/08/25	Total Dissolved Solids	mg/L	5,900
S	NE Riser	WLO	2023/02/15	Total Dissolved Solids	mg/L	10,000
UA	G200	B	2010/07/27	pH (field)	SU	7.7
UA	G200	B	2010/11/15	pH (field)	SU	7.7
UA	G200	B	2011/01/27	pH (field)	SU	7.3
UA	G200	B	2011/05/04	pH (field)	SU	7.0
UA	G200	B	2011/07/25	pH (field)	SU	7.1
UA	G200	B	2011/11/11	pH (field)	SU	7.5
UA	G200	B	2012/01/30	pH (field)	SU	7.5
UA	G200	B	2012/05/22	pH (field)	SU	7.2
UA	G200	B	2012/07/23	pH (field)	SU	7.0
UA	G200	B	2012/11/14	pH (field)	SU	7.4
UA	G200	B	2013/01/31	pH (field)	SU	7.2
UA	G200	B	2013/05/20	pH (field)	SU	7.1
UA	G200	B	2013/07/22	pH (field)	SU	7.1
UA	G200	B	2013/10/14	pH (field)	SU	7.3
UA	G200	B	2014/02/19	pH (field)	SU	7.5
UA	G200	B	2014/05/12	pH (field)	SU	7.6
UA	G200	B	2014/08/11	pH (field)	SU	7.1
UA	G200	B	2014/10/15	pH (field)	SU	7.3
UA	G200	B	2015/01/20	pH (field)	SU	7.4
UA	G200	B	2015/04/10	pH (field)	SU	7.0
UA	G200	B	2015/07/22	pH (field)	SU	7.0
UA	G200	B	2015/10/05	pH (field)	SU	7.1
UA	G200	B	2015/11/23	pH (field)	SU	7.2
UA	G200	B	2016/02/12	pH (field)	SU	7.2
UA	G200	B	2016/05/10	pH (field)	SU	7.1
UA	G200	B	2016/07/30	pH (field)	SU	7.1
UA	G200	B	2016/11/18	pH (field)	SU	7.2
UA	G200	B	2017/02/10	pH (field)	SU	7.1
UA	G200	B	2017/05/18	pH (field)	SU	7.0
UA	G200	B	2017/07/13	pH (field)	SU	7.1
UA	G200	B	2017/10/28	pH (field)	SU	7.2
UA	G200	B	2018/01/25	pH (field)	SU	7.2
UA	G200	B	2018/05/11	pH (field)	SU	7.0
UA	G200	B	2018/11/02	pH (field)	SU	7.0
UA	G200	B	2019/01/16	pH (field)	SU	7.1
UA	G200	B	2019/08/12	pH (field)	SU	7.0
UA	G200	B	2020/01/21	pH (field)	SU	7.2
UA	G200	B	2020/08/11	pH (field)	SU	7.2
UA	G200	B	2020/10/13	pH (field)	SU	7.1
UA	G200	B	2021/01/29	pH (field)	SU	7.3
UA	G200	B	2021/03/29	pH (field)	SU	7.3
UA	G200	B	2021/04/21	pH (field)	SU	7.2
UA	G200	B	2021/05/06	pH (field)	SU	7.1
UA	G200	B	2021/05/17	pH (field)	SU	7.2
UA	G200	B	2021/07/28	pH (field)	SU	7.0
UA	G200	B	2021/08/18	pH (field)	SU	7.2
UA	G200	B	2021/10/27	pH (field)	SU	7.2
UA	G200	B	2022/02/09	pH (field)	SU	7.1

UA	G200	B	2022/05/10	pH (field)	SU	7.1
UA	G200	B	2022/08/23	pH (field)	SU	7.1
UA	G200	B	2022/11/10	pH (field)	SU	7.0
UA	G200	B	2023/02/16	pH (field)	SU	6.7
UA	G200	B	2023/06/07	pH (field)	SU	7.1
UA	G200	B	2023/11/14	pH (field)	SU	7.2
UA	G200	B	2015/11/23	Oxidation Reduction Potential	mV	29.0
UA	G200	B	2016/02/12	Oxidation Reduction Potential	mV	134
UA	G200	B	2016/05/10	Oxidation Reduction Potential	mV	-33.0
UA	G200	B	2016/07/30	Oxidation Reduction Potential	mV	-62.0
UA	G200	B	2016/11/18	Oxidation Reduction Potential	mV	-76.0
UA	G200	B	2017/02/10	Oxidation Reduction Potential	mV	-72.0
UA	G200	B	2017/05/18	Oxidation Reduction Potential	mV	-66.0
UA	G200	B	2017/07/13	Oxidation Reduction Potential	mV	-63.0
UA	G200	B	2017/10/28	Oxidation Reduction Potential	mV	-65.0
UA	G200	B	2018/01/25	Oxidation Reduction Potential	mV	-77.0
UA	G200	B	2018/05/11	Oxidation Reduction Potential	mV	-55.0
UA	G200	B	2018/11/02	Oxidation Reduction Potential	mV	-58.0
UA	G200	B	2019/01/16	Oxidation Reduction Potential	mV	-61.0
UA	G200	B	2019/08/12	Oxidation Reduction Potential	mV	-63.0
UA	G200	B	2020/01/21	Oxidation Reduction Potential	mV	183
UA	G200	B	2020/08/11	Oxidation Reduction Potential	mV	104
UA	G200	B	2021/01/29	Oxidation Reduction Potential	mV	43.6
UA	G200	B	2021/03/29	Oxidation Reduction Potential	mV	28.1
UA	G200	B	2021/04/21	Oxidation Reduction Potential	mV	92.7
UA	G200	B	2021/05/06	Oxidation Reduction Potential	mV	10.8
UA	G200	B	2021/05/17	Oxidation Reduction Potential	mV	34.0
UA	G200	B	2021/07/28	Oxidation Reduction Potential	mV	-23.5
UA	G200	B	2021/08/18	Oxidation Reduction Potential	mV	42.6
UA	G200	B	2022/02/09	Oxidation Reduction Potential	mV	89.7
UA	G200	B	2022/05/10	Oxidation Reduction Potential	mV	40.5
UA	G200	B	2022/08/23	Oxidation Reduction Potential	mV	-146
UA	G200	B	2022/11/10	Oxidation Reduction Potential	mV	-57.4
UA	G200	B	2023/02/16	Oxidation Reduction Potential	mV	126
UA	G200	B	2023/06/07	Oxidation Reduction Potential	mV	26.0
UA	G200	B	2023/11/14	Oxidation Reduction Potential	mV	97.0
UA	G200	B	2015/11/23	Eh	V	0.22
UA	G200	B	2016/02/12	Eh	V	0.33
UA	G200	B	2016/05/10	Eh	V	0.16
UA	G200	B	2016/07/30	Eh	V	0.13
UA	G200	B	2016/11/18	Eh	V	0.12
UA	G200	B	2017/02/10	Eh	V	0.12
UA	G200	B	2017/05/18	Eh	V	0.13
UA	G200	B	2017/07/13	Eh	V	0.13
UA	G200	B	2017/10/28	Eh	V	0.13
UA	G200	B	2018/01/25	Eh	V	0.12
UA	G200	B	2018/05/11	Eh	V	0.14
UA	G200	B	2018/11/02	Eh	V	0.14
UA	G200	B	2019/01/16	Eh	V	0.14
UA	G200	B	2019/08/12	Eh	V	0.13

UA	G200	B	2020/01/21	Eh	V	0.38
UA	G200	B	2020/08/11	Eh	V	0.30
UA	G200	B	2021/01/29	Eh	V	0.24
UA	G200	B	2021/03/29	Eh	V	0.23
UA	G200	B	2021/04/21	Eh	V	0.29
UA	G200	B	2021/05/06	Eh	V	0.21
UA	G200	B	2021/05/17	Eh	V	0.23
UA	G200	B	2021/07/28	Eh	V	0.17
UA	G200	B	2021/08/18	Eh	V	0.23
UA	G200	B	2022/02/09	Eh	V	0.29
UA	G200	B	2022/05/10	Eh	V	0.23
UA	G200	B	2022/08/23	Eh	V	0.046
UA	G200	B	2022/11/10	Eh	V	0.14
UA	G200	B	2023/02/16	Eh	V	0.33
UA	G200	B	2023/06/07	Eh	V	0.21
UA	G200	B	2023/11/14	Eh	V	0.29
UA	G200	B	2008/03/11	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G200	B	2008/04/22	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	G200	B	2008/06/10	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G200	B	2008/08/14	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2008/10/14	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2008/12/02	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2010/02/11	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2011/01/27	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	G200	B	2012/01/30	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2013/01/31	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G200	B	2014/02/19	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G200	B	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G200	B	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G200	B	2015/01/20	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2015/04/10	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2017/07/13	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G200	B	2020/01/21	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2020/08/11	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G200	B	2021/01/29	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G200	B	2021/03/29	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2021/04/21	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2021/05/06	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2021/05/17	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G200	B	2021/07/28	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G200	B	2021/08/18	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2022/02/09	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G200	B	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G200	B	2023/02/16	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G200	B	2023/06/07	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G200	B	2023/11/14	Alkalinity, bicarbonate	mg/L CaCO3	281
UA	G200	B	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	2.00
UA	G200	B	2008/03/11	Barium, total	mg/L	0.110
UA	G200	B	2008/04/22	Barium, total	mg/L	0.0850

UA	G200	B	2008/06/10	Barium, total	mg/L	0.0740
UA	G200	B	2008/08/14	Barium, total	mg/L	0.0760
UA	G200	B	2008/10/14	Barium, total	mg/L	0.0750
UA	G200	B	2008/12/02	Barium, total	mg/L	0.0760
UA	G200	B	2010/02/11	Barium, total	mg/L	0.0610
UA	G200	B	2011/01/27	Barium, total	mg/L	0.110
UA	G200	B	2012/01/30	Barium, total	mg/L	0.0730
UA	G200	B	2013/01/31	Barium, total	mg/L	0.0580
UA	G200	B	2014/02/19	Barium, total	mg/L	0.0800
UA	G200	B	2015/04/10	Barium, total	mg/L	0.100
UA	G200	B	2015/07/22	Barium, total	mg/L	0.180
UA	G200	B	2015/10/05	Barium, total	mg/L	0.780
UA	G200	B	2015/11/23	Barium, total	mg/L	0.170
UA	G200	B	2016/02/12	Barium, total	mg/L	0.240
UA	G200	B	2016/05/10	Barium, total	mg/L	0.130
UA	G200	B	2016/07/30	Barium, total	mg/L	0.0590
UA	G200	B	2016/11/18	Barium, total	mg/L	0.0530
UA	G200	B	2017/02/10	Barium, total	mg/L	0.0740
UA	G200	B	2017/05/18	Barium, total	mg/L	0.0630
UA	G200	B	2017/07/13	Barium, total	mg/L	0.0570
UA	G200	B	2020/10/13	Barium, total	mg/L	0.0470
UA	G200	B	2021/01/29	Barium, total	mg/L	0.0430
UA	G200	B	2021/03/29	Barium, total	mg/L	0.0440
UA	G200	B	2021/04/21	Barium, total	mg/L	0.0470
UA	G200	B	2021/05/06	Barium, total	mg/L	0.0800
UA	G200	B	2021/05/17	Barium, total	mg/L	0.0550
UA	G200	B	2021/07/28	Barium, total	mg/L	0.0440
UA	G200	B	2021/08/18	Barium, total	mg/L	0.0400
UA	G200	B	2021/10/27	Barium, total	mg/L	0.0320
UA	G200	B	2022/02/09	Barium, total	mg/L	0.0570
UA	G200	B	2022/05/10	Barium, total	mg/L	0.0520
UA	G200	B	2022/08/23	Barium, total	mg/L	0.0520
UA	G200	B	2022/11/10	Barium, total	mg/L	0.0590
UA	G200	B	2023/02/16	Barium, total	mg/L	0.160
UA	G200	B	2023/06/07	Barium, total	mg/L	0.150
UA	G200	B	2023/11/14	Barium, total	mg/L	0.0818
UA	G200	B	2008/03/11	Calcium, total	mg/L	95.0
UA	G200	B	2008/04/22	Calcium, total	mg/L	80.0
UA	G200	B	2008/06/10	Calcium, total	mg/L	83.0
UA	G200	B	2008/08/14	Calcium, total	mg/L	79.0
UA	G200	B	2008/10/14	Calcium, total	mg/L	84.0
UA	G200	B	2008/12/02	Calcium, total	mg/L	83.0
UA	G200	B	2009/09/24	Calcium, total	mg/L	85.0
UA	G200	B	2009/11/12	Calcium, total	mg/L	82.0
UA	G200	B	2010/01/28	Calcium, total	mg/L	86.0
UA	G200	B	2010/07/27	Calcium, total	mg/L	95.0
UA	G200	B	2010/11/15	Calcium, total	mg/L	88.0
UA	G200	B	2011/01/27	Calcium, total	mg/L	100
UA	G200	B	2011/05/04	Calcium, total	mg/L	<100
UA	G200	B	2011/07/25	Calcium, total	mg/L	93.0

UA	G200	B	2011/11/11	Calcium, total	mg/L	75.0
UA	G200	B	2012/01/30	Calcium, total	mg/L	88.0
UA	G200	B	2012/05/22	Calcium, total	mg/L	90.0
UA	G200	B	2012/07/23	Calcium, total	mg/L	100
UA	G200	B	2012/11/14	Calcium, total	mg/L	73.0
UA	G200	B	2013/01/31	Calcium, total	mg/L	73.0
UA	G200	B	2013/05/20	Calcium, total	mg/L	92.0
UA	G200	B	2013/07/22	Calcium, total	mg/L	95.0
UA	G200	B	2013/10/14	Calcium, total	mg/L	92.0
UA	G200	B	2014/02/19	Calcium, total	mg/L	97.0
UA	G200	B	2014/05/12	Calcium, total	mg/L	98.0
UA	G200	B	2014/08/11	Calcium, total	mg/L	98.0
UA	G200	B	2014/10/15	Calcium, total	mg/L	92.0
UA	G200	B	2015/01/20	Calcium, total	mg/L	100
UA	G200	B	2015/04/10	Calcium, total	mg/L	110
UA	G200	B	2015/11/23	Calcium, total	mg/L	100
UA	G200	B	2016/02/12	Calcium, total	mg/L	150
UA	G200	B	2016/05/10	Calcium, total	mg/L	100
UA	G200	B	2016/07/30	Calcium, total	mg/L	88.0
UA	G200	B	2016/11/18	Calcium, total	mg/L	88.0
UA	G200	B	2017/02/10	Calcium, total	mg/L	85.0
UA	G200	B	2017/05/18	Calcium, total	mg/L	84.0
UA	G200	B	2017/07/13	Calcium, total	mg/L	87.0
UA	G200	B	2017/10/28	Calcium, total	mg/L	81.0
UA	G200	B	2018/05/11	Calcium, total	mg/L	90.0
UA	G200	B	2018/11/02	Calcium, total	mg/L	95.0
UA	G200	B	2019/01/16	Calcium, total	mg/L	350
UA	G200	B	2019/08/12	Calcium, total	mg/L	92.0
UA	G200	B	2020/01/21	Calcium, total	mg/L	110
UA	G200	B	2020/08/11	Calcium, total	mg/L	85.0
UA	G200	B	2021/01/29	Calcium, total	mg/L	81.0
UA	G200	B	2021/03/29	Calcium, total	mg/L	82.0
UA	G200	B	2021/04/21	Calcium, total	mg/L	88.0
UA	G200	B	2021/05/06	Calcium, total	mg/L	140
UA	G200	B	2021/05/17	Calcium, total	mg/L	91.0
UA	G200	B	2021/07/28	Calcium, total	mg/L	83.0
UA	G200	B	2021/08/18	Calcium, total	mg/L	87.0
UA	G200	B	2022/02/09	Calcium, total	mg/L	92.0
UA	G200	B	2022/05/10	Calcium, total	mg/L	94.0
UA	G200	B	2022/08/23	Calcium, total	mg/L	85.0
UA	G200	B	2023/02/16	Calcium, total	mg/L	120
UA	G200	B	2023/06/07	Calcium, total	mg/L	110
UA	G200	B	2023/11/14	Calcium, total	mg/L	80.3
UA	G200	B	2008/03/11	Chloride, total	mg/L	43.0
UA	G200	B	2008/04/22	Chloride, total	mg/L	46.0
UA	G200	B	2008/06/10	Chloride, total	mg/L	44.0
UA	G200	B	2008/08/14	Chloride, total	mg/L	45.0
UA	G200	B	2008/10/14	Chloride, total	mg/L	43.0
UA	G200	B	2008/12/02	Chloride, total	mg/L	49.0
UA	G200	B	2009/09/24	Chloride, total	mg/L	44.0

UA	G200	B	2009/11/12	Chloride, total	mg/L	58.0
UA	G200	B	2010/01/28	Chloride, total	mg/L	49.0
UA	G200	B	2010/07/27	Chloride, total	mg/L	54.0
UA	G200	B	2010/11/15	Chloride, total	mg/L	46.0
UA	G200	B	2011/01/27	Chloride, total	mg/L	48.0
UA	G200	B	2011/05/04	Chloride, total	mg/L	59.0
UA	G200	B	2011/07/25	Chloride, total	mg/L	48.0
UA	G200	B	2011/11/11	Chloride, total	mg/L	51.0
UA	G200	B	2012/01/30	Chloride, total	mg/L	54.0
UA	G200	B	2012/05/22	Chloride, total	mg/L	67.0
UA	G200	B	2012/07/23	Chloride, total	mg/L	64.0
UA	G200	B	2012/11/14	Chloride, total	mg/L	61.0
UA	G200	B	2013/01/31	Chloride, total	mg/L	66.0
UA	G200	B	2013/05/20	Chloride, total	mg/L	79.0
UA	G200	B	2013/07/22	Chloride, total	mg/L	73.0
UA	G200	B	2013/10/14	Chloride, total	mg/L	74.0
UA	G200	B	2014/02/19	Chloride, total	mg/L	68.0
UA	G200	B	2014/05/12	Chloride, total	mg/L	58.0
UA	G200	B	2014/08/11	Chloride, total	mg/L	59.0
UA	G200	B	2014/10/15	Chloride, total	mg/L	59.0
UA	G200	B	2015/01/20	Chloride, total	mg/L	80.0
UA	G200	B	2015/04/10	Chloride, total	mg/L	87.0
UA	G200	B	2015/07/22	Chloride, total	mg/L	96.0
UA	G200	B	2015/10/05	Chloride, total	mg/L	85.0
UA	G200	B	2015/11/23	Chloride, total	mg/L	75.0
UA	G200	B	2016/02/12	Chloride, total	mg/L	93.0
UA	G200	B	2016/05/10	Chloride, total	mg/L	96.0
UA	G200	B	2016/07/30	Chloride, total	mg/L	82.0
UA	G200	B	2016/11/18	Chloride, total	mg/L	75.0
UA	G200	B	2017/02/10	Chloride, total	mg/L	82.0
UA	G200	B	2017/05/18	Chloride, total	mg/L	96.0
UA	G200	B	2017/07/13	Chloride, total	mg/L	88.0
UA	G200	B	2017/10/28	Chloride, total	mg/L	65.0
UA	G200	B	2018/01/25	Chloride, total	mg/L	71.0
UA	G200	B	2018/05/11	Chloride, total	mg/L	85.0
UA	G200	B	2018/11/02	Chloride, total	mg/L	61.0
UA	G200	B	2019/01/16	Chloride, total	mg/L	54.0
UA	G200	B	2019/08/12	Chloride, total	mg/L	58.0
UA	G200	B	2020/01/21	Chloride, total	mg/L	100
UA	G200	B	2020/08/11	Chloride, total	mg/L	63.0
UA	G200	B	2020/10/13	Chloride, total	mg/L	51.0
UA	G200	B	2021/01/29	Chloride, total	mg/L	53.0
UA	G200	B	2021/03/29	Chloride, total	mg/L	50.0
UA	G200	B	2021/04/21	Chloride, total	mg/L	63.0
UA	G200	B	2021/05/06	Chloride, total	mg/L	73.0
UA	G200	B	2021/05/17	Chloride, total	mg/L	78.0
UA	G200	B	2021/07/28	Chloride, total	mg/L	51.0
UA	G200	B	2021/08/18	Chloride, total	mg/L	44.0
UA	G200	B	2021/10/27	Chloride, total	mg/L	63.0
UA	G200	B	2022/02/09	Chloride, total	mg/L	80.0

UA	G200	B	2022/05/10	Chloride, total	mg/L	110
UA	G200	B	2022/08/23	Chloride, total	mg/L	61.0
UA	G200	B	2022/11/10	Chloride, total	mg/L	63.0
UA	G200	B	2023/02/16	Chloride, total	mg/L	50.0
UA	G200	B	2023/06/07	Chloride, total	mg/L	65.0
UA	G200	B	2023/11/14	Chloride, total	mg/L	43.0
UA	G200	B	2023/06/07	Ferrous Iron, dissolved	mg/L	0.240
UA	G200	B	2008/03/11	Iron, dissolved	mg/L	<0.5
UA	G200	B	2008/04/22	Iron, dissolved	mg/L	<0.1
UA	G200	B	2008/06/10	Iron, dissolved	mg/L	<0.1
UA	G200	B	2008/08/14	Iron, dissolved	mg/L	<0.1
UA	G200	B	2008/10/14	Iron, dissolved	mg/L	<0.1
UA	G200	B	2008/12/02	Iron, dissolved	mg/L	<0.1
UA	G200	B	2009/09/24	Iron, dissolved	mg/L	<0.1
UA	G200	B	2009/11/12	Iron, dissolved	mg/L	<0.1
UA	G200	B	2010/01/28	Iron, dissolved	mg/L	<0.1
UA	G200	B	2010/07/27	Iron, dissolved	mg/L	<0.01
UA	G200	B	2010/11/15	Iron, dissolved	mg/L	<0.01
UA	G200	B	2011/01/27	Iron, dissolved	mg/L	0.0230
UA	G200	B	2011/05/04	Iron, dissolved	mg/L	0.0200
UA	G200	B	2011/07/25	Iron, dissolved	mg/L	<0.01
UA	G200	B	2011/11/11	Iron, dissolved	mg/L	0.0290
UA	G200	B	2012/01/30	Iron, dissolved	mg/L	0.0160
UA	G200	B	2012/05/22	Iron, dissolved	mg/L	0.0130
UA	G200	B	2012/07/23	Iron, dissolved	mg/L	<0.01
UA	G200	B	2012/11/14	Iron, dissolved	mg/L	<0.01
UA	G200	B	2013/01/31	Iron, dissolved	mg/L	0.0420
UA	G200	B	2013/05/20	Iron, dissolved	mg/L	0.0120
UA	G200	B	2013/07/22	Iron, dissolved	mg/L	<0.01
UA	G200	B	2013/10/14	Iron, dissolved	mg/L	1.10
UA	G200	B	2014/02/19	Iron, dissolved	mg/L	<0.01
UA	G200	B	2014/05/12	Iron, dissolved	mg/L	0.0120
UA	G200	B	2014/08/11	Iron, dissolved	mg/L	<0.01
UA	G200	B	2014/10/15	Iron, dissolved	mg/L	0.0180
UA	G200	B	2015/01/20	Iron, dissolved	mg/L	<0.01
UA	G200	B	2015/04/10	Iron, dissolved	mg/L	0.0140
UA	G200	B	2015/07/22	Iron, dissolved	mg/L	0.0950
UA	G200	B	2015/10/05	Iron, dissolved	mg/L	0.0510
UA	G200	B	2016/02/12	Iron, dissolved	mg/L	0.0560
UA	G200	B	2016/05/10	Iron, dissolved	mg/L	0.0200
UA	G200	B	2016/07/26	Iron, dissolved	mg/L	0.470
UA	G200	B	2016/11/18	Iron, dissolved	mg/L	0.210
UA	G200	B	2017/02/13	Iron, dissolved	mg/L	0.0190
UA	G200	B	2017/05/19	Iron, dissolved	mg/L	<0.01
UA	G200	B	2017/07/13	Iron, dissolved	mg/L	0.0160
UA	G200	B	2017/10/28	Iron, dissolved	mg/L	0.0150
UA	G200	B	2018/01/30	Iron, dissolved	mg/L	0.0940
UA	G200	B	2018/05/11	Iron, dissolved	mg/L	0.100
UA	G200	B	2018/08/08	Iron, dissolved	mg/L	0.0490
UA	G200	B	2018/11/02	Iron, dissolved	mg/L	<0.1

UA	G200	B	2019/01/16	Iron, dissolved	mg/L	0.0930
UA	G200	B	2019/05/01	Iron, dissolved	mg/L	0.0200
UA	G200	B	2019/08/12	Iron, dissolved	mg/L	0.0140
UA	G200	B	2019/10/23	Iron, dissolved	mg/L	0.0140
UA	G200	B	2020/01/21	Iron, dissolved	mg/L	0.0200
UA	G200	B	2020/05/05	Iron, dissolved	mg/L	<0.01
UA	G200	B	2020/08/11	Iron, dissolved	mg/L	<0.01
UA	G200	B	2020/10/13	Iron, dissolved	mg/L	<0.01
UA	G200	B	2021/01/29	Iron, dissolved	mg/L	0.0200
UA	G200	B	2021/04/21	Iron, dissolved	mg/L	<0.01
UA	G200	B	2021/08/18	Iron, dissolved	mg/L	<0.01
UA	G200	B	2021/10/27	Iron, dissolved	mg/L	0.0110
UA	G200	B	2022/02/09	Iron, dissolved	mg/L	<0.01
UA	G200	B	2022/05/10	Iron, dissolved	mg/L	0.00390
UA	G200	B	2022/08/23	Iron, dissolved	mg/L	3.20
UA	G200	B	2022/11/10	Iron, dissolved	mg/L	0.370
UA	G200	B	2023/02/16	Iron, dissolved	mg/L	<0.00072
UA	G200	B	2023/06/07	Iron, dissolved	mg/L	<0.00072
UA	G200	B	2023/11/14	Iron, dissolved	mg/L	<0.0115
UA	G200	B	2008/03/11	Magnesium, total	mg/L	51.0
UA	G200	B	2008/04/22	Magnesium, total	mg/L	40.0
UA	G200	B	2008/06/10	Magnesium, total	mg/L	41.0
UA	G200	B	2008/08/14	Magnesium, total	mg/L	39.0
UA	G200	B	2008/10/14	Magnesium, total	mg/L	41.0
UA	G200	B	2008/12/02	Magnesium, total	mg/L	40.0
UA	G200	B	2010/02/11	Magnesium, total	mg/L	43.0
UA	G200	B	2011/01/27	Magnesium, total	mg/L	49.0
UA	G200	B	2012/01/30	Magnesium, total	mg/L	42.0
UA	G200	B	2013/01/31	Magnesium, total	mg/L	36.0
UA	G200	B	2014/02/19	Magnesium, total	mg/L	45.0
UA	G200	B	2015/04/10	Magnesium, total	mg/L	54.0
UA	G200	B	2017/07/13	Magnesium, total	mg/L	44.0
UA	G200	B	2020/01/21	Magnesium, total	mg/L	51.0
UA	G200	B	2020/08/11	Magnesium, total	mg/L	40.0
UA	G200	B	2021/01/29	Magnesium, total	mg/L	40.0
UA	G200	B	2021/03/29	Magnesium, total	mg/L	41.0
UA	G200	B	2021/04/21	Magnesium, total	mg/L	43.0
UA	G200	B	2021/05/06	Magnesium, total	mg/L	62.0
UA	G200	B	2021/05/17	Magnesium, total	mg/L	45.0
UA	G200	B	2021/07/28	Magnesium, total	mg/L	42.0
UA	G200	B	2021/08/18	Magnesium, total	mg/L	40.0
UA	G200	B	2022/02/09	Magnesium, total	mg/L	43.0
UA	G200	B	2022/05/10	Magnesium, total	mg/L	46.0
UA	G200	B	2022/08/23	Magnesium, total	mg/L	39.0
UA	G200	B	2023/02/16	Magnesium, total	mg/L	54.0
UA	G200	B	2023/06/07	Magnesium, total	mg/L	53.0
UA	G200	B	2023/11/14	Magnesium, total	mg/L	38.6
UA	G200	B	2008/03/11	Manganese, dissolved	mg/L	0.450
UA	G200	B	2008/04/22	Manganese, dissolved	mg/L	0.330
UA	G200	B	2008/06/10	Manganese, dissolved	mg/L	0.300

UA	G200	B	2008/08/14	Manganese, dissolved	mg/L	0.340
UA	G200	B	2008/10/14	Manganese, dissolved	mg/L	0.310
UA	G200	B	2008/12/02	Manganese, dissolved	mg/L	0.260
UA	G200	B	2009/09/24	Manganese, dissolved	mg/L	0.190
UA	G200	B	2009/11/12	Manganese, dissolved	mg/L	0.130
UA	G200	B	2010/01/28	Manganese, dissolved	mg/L	0.0590
UA	G200	B	2010/07/27	Manganese, dissolved	mg/L	0.0310
UA	G200	B	2010/11/15	Manganese, dissolved	mg/L	0.0240
UA	G200	B	2011/01/27	Manganese, dissolved	mg/L	0.0710
UA	G200	B	2011/05/04	Manganese, dissolved	mg/L	0.00650
UA	G200	B	2011/07/25	Manganese, dissolved	mg/L	0.0150
UA	G200	B	2011/11/11	Manganese, dissolved	mg/L	0.150
UA	G200	B	2012/01/30	Manganese, dissolved	mg/L	0.0720
UA	G200	B	2012/05/22	Manganese, dissolved	mg/L	0.0210
UA	G200	B	2012/07/23	Manganese, dissolved	mg/L	0.00550
UA	G200	B	2012/11/14	Manganese, dissolved	mg/L	0.0890
UA	G200	B	2013/01/31	Manganese, dissolved	mg/L	0.0230
UA	G200	B	2013/05/20	Manganese, dissolved	mg/L	0.0530
UA	G200	B	2013/07/22	Manganese, dissolved	mg/L	0.0420
UA	G200	B	2013/10/14	Manganese, dissolved	mg/L	0.0270
UA	G200	B	2014/02/19	Manganese, dissolved	mg/L	0.0110
UA	G200	B	2014/05/12	Manganese, dissolved	mg/L	0.0450
UA	G200	B	2014/08/11	Manganese, dissolved	mg/L	0.0590
UA	G200	B	2014/10/15	Manganese, dissolved	mg/L	0.100
UA	G200	B	2015/01/20	Manganese, dissolved	mg/L	0.0130
UA	G200	B	2015/04/10	Manganese, dissolved	mg/L	0.00300
UA	G200	B	2015/07/22	Manganese, dissolved	mg/L	0.0500
UA	G200	B	2015/10/05	Manganese, dissolved	mg/L	0.120
UA	G200	B	2016/02/12	Manganese, dissolved	mg/L	0.0230
UA	G200	B	2016/05/10	Manganese, dissolved	mg/L	0.0390
UA	G200	B	2016/07/26	Manganese, dissolved	mg/L	1.00
UA	G200	B	2016/11/18	Manganese, dissolved	mg/L	0.350
UA	G200	B	2017/02/13	Manganese, dissolved	mg/L	0.00250
UA	G200	B	2017/05/19	Manganese, dissolved	mg/L	0.00420
UA	G200	B	2017/07/13	Manganese, dissolved	mg/L	0.140
UA	G200	B	2017/10/28	Manganese, dissolved	mg/L	0.750
UA	G200	B	2018/01/30	Manganese, dissolved	mg/L	0.0130
UA	G200	B	2018/05/11	Manganese, dissolved	mg/L	0.0120
UA	G200	B	2018/08/08	Manganese, dissolved	mg/L	0.0810
UA	G200	B	2018/11/02	Manganese, dissolved	mg/L	0.0560
UA	G200	B	2019/01/16	Manganese, dissolved	mg/L	0.0240
UA	G200	B	2019/05/01	Manganese, dissolved	mg/L	0.0240
UA	G200	B	2019/08/12	Manganese, dissolved	mg/L	0.0700
UA	G200	B	2019/10/23	Manganese, dissolved	mg/L	0.0380
UA	G200	B	2020/01/21	Manganese, dissolved	mg/L	0.0260
UA	G200	B	2020/05/05	Manganese, dissolved	mg/L	0.0330
UA	G200	B	2020/08/11	Manganese, dissolved	mg/L	0.0380
UA	G200	B	2020/10/13	Manganese, dissolved	mg/L	0.0640
UA	G200	B	2021/01/29	Manganese, dissolved	mg/L	0.0390
UA	G200	B	2021/04/21	Manganese, dissolved	mg/L	0.00520

UA	G200	B	2021/08/18	Manganese, dissolved	mg/L	0.0470
UA	G200	B	2021/10/27	Manganese, dissolved	mg/L	0.0370
UA	G200	B	2022/02/09	Manganese, dissolved	mg/L	0.0190
UA	G200	B	2022/05/10	Manganese, dissolved	mg/L	0.0170
UA	G200	B	2022/08/23	Manganese, dissolved	mg/L	1.10
UA	G200	B	2022/11/10	Manganese, dissolved	mg/L	0.130
UA	G200	B	2023/02/16	Manganese, dissolved	mg/L	0.0170
UA	G200	B	2023/06/07	Manganese, dissolved	mg/L	0.100
UA	G200	B	2023/11/14	Manganese, dissolved	mg/L	0.147
UA	G200	B	2008/03/11	Potassium, total	mg/L	<2.5
UA	G200	B	2008/04/22	Potassium, total	mg/L	0.710
UA	G200	B	2008/06/10	Potassium, total	mg/L	1.10
UA	G200	B	2008/08/14	Potassium, total	mg/L	0.540
UA	G200	B	2008/10/14	Potassium, total	mg/L	0.560
UA	G200	B	2008/12/02	Potassium, total	mg/L	0.680
UA	G200	B	2010/02/11	Potassium, total	mg/L	0.530
UA	G200	B	2011/01/27	Potassium, total	mg/L	2.20
UA	G200	B	2012/01/30	Potassium, total	mg/L	0.600
UA	G200	B	2013/01/31	Potassium, total	mg/L	1.20
UA	G200	B	2014/02/19	Potassium, total	mg/L	1.10
UA	G200	B	2015/04/10	Potassium, total	mg/L	0.900
UA	G200	B	2017/07/13	Potassium, total	mg/L	1.00
UA	G200	B	2020/01/21	Potassium, total	mg/L	0.850
UA	G200	B	2020/08/11	Potassium, total	mg/L	0.720
UA	G200	B	2021/01/29	Potassium, total	mg/L	1.10
UA	G200	B	2021/03/29	Potassium, total	mg/L	0.590
UA	G200	B	2021/04/21	Potassium, total	mg/L	0.460
UA	G200	B	2021/05/06	Potassium, total	mg/L	1.70
UA	G200	B	2021/05/17	Potassium, total	mg/L	0.520
UA	G200	B	2021/07/28	Potassium, total	mg/L	0.860
UA	G200	B	2021/08/18	Potassium, total	mg/L	0.550
UA	G200	B	2022/02/09	Potassium, total	mg/L	0.500
UA	G200	B	2022/05/10	Potassium, total	mg/L	0.500
UA	G200	B	2022/08/23	Potassium, total	mg/L	0.610
UA	G200	B	2023/02/16	Potassium, total	mg/L	1.90
UA	G200	B	2023/06/07	Potassium, total	mg/L	1.90
UA	G200	B	2023/11/14	Potassium, total	mg/L	0.969
UA	G200	B	2023/06/07	Silicon, dissolved	mg/L	7.70
UA	G200	B	2008/03/11	Sodium, total	mg/L	47.0
UA	G200	B	2008/04/22	Sodium, total	mg/L	47.0
UA	G200	B	2008/06/10	Sodium, total	mg/L	46.0
UA	G200	B	2008/08/14	Sodium, total	mg/L	44.0
UA	G200	B	2008/10/14	Sodium, total	mg/L	48.0
UA	G200	B	2008/12/02	Sodium, total	mg/L	44.0
UA	G200	B	2010/02/11	Sodium, total	mg/L	48.0
UA	G200	B	2011/01/27	Sodium, total	mg/L	42.0
UA	G200	B	2012/01/30	Sodium, total	mg/L	52.0
UA	G200	B	2013/01/31	Sodium, total	mg/L	62.0
UA	G200	B	2014/02/19	Sodium, total	mg/L	53.0
UA	G200	B	2015/04/10	Sodium, total	mg/L	58.0

UA	G200	B	2017/07/13	Sodium, total	mg/L	63.0
UA	G200	B	2020/01/21	Sodium, total	mg/L	65.0
UA	G200	B	2020/08/11	Sodium, total	mg/L	64.0
UA	G200	B	2021/01/29	Sodium, total	mg/L	78.0
UA	G200	B	2021/03/29	Sodium, total	mg/L	56.0
UA	G200	B	2021/04/21	Sodium, total	mg/L	52.0
UA	G200	B	2021/05/06	Sodium, total	mg/L	68.0
UA	G200	B	2021/05/17	Sodium, total	mg/L	56.0
UA	G200	B	2021/07/28	Sodium, total	mg/L	58.0
UA	G200	B	2021/08/18	Sodium, total	mg/L	67.0
UA	G200	B	2022/02/09	Sodium, total	mg/L	60.0
UA	G200	B	2022/05/10	Sodium, total	mg/L	62.0
UA	G200	B	2022/08/23	Sodium, total	mg/L	58.0
UA	G200	B	2023/02/16	Sodium, total	mg/L	65.0
UA	G200	B	2023/06/07	Sodium, total	mg/L	56.0
UA	G200	B	2023/11/14	Sodium, total	mg/L	53.1
UA	G200	B	2008/03/11	Sulfate, total	mg/L	73.0
UA	G200	B	2008/04/22	Sulfate, total	mg/L	69.0
UA	G200	B	2008/06/10	Sulfate, total	mg/L	71.0
UA	G200	B	2008/08/14	Sulfate, total	mg/L	85.0
UA	G200	B	2008/10/14	Sulfate, total	mg/L	77.0
UA	G200	B	2008/12/02	Sulfate, total	mg/L	85.0
UA	G200	B	2009/09/24	Sulfate, total	mg/L	64.0
UA	G200	B	2009/11/12	Sulfate, total	mg/L	64.0
UA	G200	B	2010/01/28	Sulfate, total	mg/L	72.0
UA	G200	B	2010/07/27	Sulfate, total	mg/L	90.0
UA	G200	B	2010/11/15	Sulfate, total	mg/L	74.0
UA	G200	B	2011/01/27	Sulfate, total	mg/L	75.0
UA	G200	B	2011/05/04	Sulfate, total	mg/L	74.0
UA	G200	B	2011/07/25	Sulfate, total	mg/L	72.0
UA	G200	B	2011/11/11	Sulfate, total	mg/L	74.0
UA	G200	B	2012/01/30	Sulfate, total	mg/L	73.0
UA	G200	B	2012/05/22	Sulfate, total	mg/L	87.0
UA	G200	B	2012/07/23	Sulfate, total	mg/L	90.0
UA	G200	B	2012/11/14	Sulfate, total	mg/L	74.0
UA	G200	B	2013/01/31	Sulfate, total	mg/L	84.0
UA	G200	B	2013/05/20	Sulfate, total	mg/L	91.0
UA	G200	B	2013/07/22	Sulfate, total	mg/L	110
UA	G200	B	2013/10/14	Sulfate, total	mg/L	110
UA	G200	B	2014/02/19	Sulfate, total	mg/L	99.0
UA	G200	B	2014/05/12	Sulfate, total	mg/L	110
UA	G200	B	2014/08/11	Sulfate, total	mg/L	120
UA	G200	B	2014/10/15	Sulfate, total	mg/L	97.0
UA	G200	B	2015/01/20	Sulfate, total	mg/L	100
UA	G200	B	2015/04/10	Sulfate, total	mg/L	87.0
UA	G200	B	2015/07/22	Sulfate, total	mg/L	88.0
UA	G200	B	2015/10/05	Sulfate, total	mg/L	90.0
UA	G200	B	2015/11/23	Sulfate, total	mg/L	94.0
UA	G200	B	2016/02/12	Sulfate, total	mg/L	97.0
UA	G200	B	2016/05/10	Sulfate, total	mg/L	100

UA	G200	B	2016/07/30	Sulfate, total	mg/L	100
UA	G200	B	2016/11/18	Sulfate, total	mg/L	110
UA	G200	B	2017/02/10	Sulfate, total	mg/L	100
UA	G200	B	2017/05/18	Sulfate, total	mg/L	90.0
UA	G200	B	2017/07/13	Sulfate, total	mg/L	110
UA	G200	B	2017/10/28	Sulfate, total	mg/L	100
UA	G200	B	2018/05/11	Sulfate, total	mg/L	100
UA	G200	B	2018/11/02	Sulfate, total	mg/L	100
UA	G200	B	2019/01/16	Sulfate, total	mg/L	110
UA	G200	B	2019/08/12	Sulfate, total	mg/L	110
UA	G200	B	2020/01/21	Sulfate, total	mg/L	120
UA	G200	B	2020/08/11	Sulfate, total	mg/L	110
UA	G200	B	2020/10/13	Sulfate, total	mg/L	100
UA	G200	B	2021/01/29	Sulfate, total	mg/L	110
UA	G200	B	2021/03/29	Sulfate, total	mg/L	100
UA	G200	B	2021/04/21	Sulfate, total	mg/L	95.0
UA	G200	B	2021/05/06	Sulfate, total	mg/L	100
UA	G200	B	2021/05/17	Sulfate, total	mg/L	110
UA	G200	B	2021/07/28	Sulfate, total	mg/L	100
UA	G200	B	2021/08/18	Sulfate, total	mg/L	100
UA	G200	B	2021/10/27	Sulfate, total	mg/L	110
UA	G200	B	2022/02/09	Sulfate, total	mg/L	110
UA	G200	B	2022/05/10	Sulfate, total	mg/L	110
UA	G200	B	2022/08/23	Sulfate, total	mg/L	110
UA	G200	B	2022/11/10	Sulfate, total	mg/L	95.0
UA	G200	B	2023/02/16	Sulfate, total	mg/L	100
UA	G200	B	2023/06/07	Sulfate, total	mg/L	110
UA	G200	B	2023/11/14	Sulfate, total	mg/L	106
UA	G200	B	2015/11/23	Temperature (Celsius)	degrees C	15.7
UA	G200	B	2016/02/12	Temperature (Celsius)	degrees C	9.30
UA	G200	B	2016/05/10	Temperature (Celsius)	degrees C	18.3
UA	G200	B	2016/07/30	Temperature (Celsius)	degrees C	19.2
UA	G200	B	2016/11/18	Temperature (Celsius)	degrees C	16.3
UA	G200	B	2017/02/10	Temperature (Celsius)	degrees C	15.7
UA	G200	B	2017/05/18	Temperature (Celsius)	degrees C	15.4
UA	G200	B	2017/07/13	Temperature (Celsius)	degrees C	18.1
UA	G200	B	2017/10/28	Temperature (Celsius)	degrees C	13.0
UA	G200	B	2018/01/25	Temperature (Celsius)	degrees C	12.1
UA	G200	B	2018/05/11	Temperature (Celsius)	degrees C	13.2
UA	G200	B	2018/11/02	Temperature (Celsius)	degrees C	13.8
UA	G200	B	2019/01/16	Temperature (Celsius)	degrees C	12.3
UA	G200	B	2019/08/12	Temperature (Celsius)	degrees C	17.0
UA	G200	B	2020/01/21	Temperature (Celsius)	degrees C	10.4
UA	G200	B	2020/08/11	Temperature (Celsius)	degrees C	19.1
UA	G200	B	2021/01/29	Temperature (Celsius)	degrees C	9.10
UA	G200	B	2021/03/29	Temperature (Celsius)	degrees C	12.8
UA	G200	B	2021/04/21	Temperature (Celsius)	degrees C	10.6
UA	G200	B	2021/05/06	Temperature (Celsius)	degrees C	11.9
UA	G200	B	2021/05/17	Temperature (Celsius)	degrees C	14.2
UA	G200	B	2021/07/28	Temperature (Celsius)	degrees C	19.3

UA	G200	B	2021/08/18	Temperature (Celsius)	degrees C	22.3
UA	G200	B	2022/02/09	Temperature (Celsius)	degrees C	9.10
UA	G200	B	2022/05/10	Temperature (Celsius)	degrees C	17.5
UA	G200	B	2022/08/23	Temperature (Celsius)	degrees C	20.6
UA	G200	B	2022/11/10	Temperature (Celsius)	degrees C	15.6
UA	G200	B	2023/02/16	Temperature (Celsius)	degrees C	7.80
UA	G200	B	2023/06/07	Temperature (Celsius)	degrees C	25.4
UA	G200	B	2023/11/14	Temperature (Celsius)	degrees C	16.0
UA	G200	B	2008/03/11	Total Dissolved Solids	mg/L	490
UA	G200	B	2008/04/22	Total Dissolved Solids	mg/L	470
UA	G200	B	2008/06/10	Total Dissolved Solids	mg/L	480
UA	G200	B	2008/08/14	Total Dissolved Solids	mg/L	480
UA	G200	B	2008/10/14	Total Dissolved Solids	mg/L	480
UA	G200	B	2008/12/02	Total Dissolved Solids	mg/L	450
UA	G200	B	2009/09/24	Total Dissolved Solids	mg/L	520
UA	G200	B	2009/11/12	Total Dissolved Solids	mg/L	500
UA	G200	B	2010/01/28	Total Dissolved Solids	mg/L	500
UA	G200	B	2010/02/11	Total Dissolved Solids	mg/L	510
UA	G200	B	2010/07/27	Total Dissolved Solids	mg/L	550
UA	G200	B	2010/11/15	Total Dissolved Solids	mg/L	550
UA	G200	B	2011/01/27	Total Dissolved Solids	mg/L	510
UA	G200	B	2011/05/04	Total Dissolved Solids	mg/L	510
UA	G200	B	2011/07/25	Total Dissolved Solids	mg/L	550
UA	G200	B	2011/11/11	Total Dissolved Solids	mg/L	500
UA	G200	B	2012/01/30	Total Dissolved Solids	mg/L	510
UA	G200	B	2012/05/22	Total Dissolved Solids	mg/L	510
UA	G200	B	2012/07/23	Total Dissolved Solids	mg/L	560
UA	G200	B	2012/11/14	Total Dissolved Solids	mg/L	540
UA	G200	B	2013/01/31	Total Dissolved Solids	mg/L	530
UA	G200	B	2013/05/20	Total Dissolved Solids	mg/L	520
UA	G200	B	2013/07/22	Total Dissolved Solids	mg/L	540
UA	G200	B	2013/10/14	Total Dissolved Solids	mg/L	520
UA	G200	B	2014/02/19	Total Dissolved Solids	mg/L	520
UA	G200	B	2014/05/12	Total Dissolved Solids	mg/L	540
UA	G200	B	2014/08/11	Total Dissolved Solids	mg/L	530
UA	G200	B	2014/10/15	Total Dissolved Solids	mg/L	530
UA	G200	B	2015/01/20	Total Dissolved Solids	mg/L	570
UA	G200	B	2015/04/10	Total Dissolved Solids	mg/L	580
UA	G200	B	2015/07/22	Total Dissolved Solids	mg/L	630
UA	G200	B	2015/10/05	Total Dissolved Solids	mg/L	660
UA	G200	B	2015/11/23	Total Dissolved Solids	mg/L	520
UA	G200	B	2016/02/12	Total Dissolved Solids	mg/L	540
UA	G200	B	2016/05/10	Total Dissolved Solids	mg/L	480
UA	G200	B	2016/07/30	Total Dissolved Solids	mg/L	520
UA	G200	B	2016/11/18	Total Dissolved Solids	mg/L	520
UA	G200	B	2017/02/10	Total Dissolved Solids	mg/L	700
UA	G200	B	2017/05/18	Total Dissolved Solids	mg/L	620
UA	G200	B	2017/07/13	Total Dissolved Solids	mg/L	540
UA	G200	B	2017/10/28	Total Dissolved Solids	mg/L	520
UA	G200	B	2018/05/11	Total Dissolved Solids	mg/L	460

UA	G200	B	2018/11/02	Total Dissolved Solids	mg/L	480
UA	G200	B	2019/01/16	Total Dissolved Solids	mg/L	700
UA	G200	B	2019/08/12	Total Dissolved Solids	mg/L	540
UA	G200	B	2020/01/21	Total Dissolved Solids	mg/L	520
UA	G200	B	2020/08/11	Total Dissolved Solids	mg/L	530
UA	G200	B	2020/10/13	Total Dissolved Solids	mg/L	560
UA	G200	B	2021/01/29	Total Dissolved Solids	mg/L	580
UA	G200	B	2021/03/29	Total Dissolved Solids	mg/L	460
UA	G200	B	2021/04/21	Total Dissolved Solids	mg/L	570
UA	G200	B	2021/05/06	Total Dissolved Solids	mg/L	570
UA	G200	B	2021/05/17	Total Dissolved Solids	mg/L	560
UA	G200	B	2021/07/28	Total Dissolved Solids	mg/L	500
UA	G200	B	2021/08/18	Total Dissolved Solids	mg/L	540
UA	G200	B	2021/10/27	Total Dissolved Solids	mg/L	470
UA	G200	B	2022/02/09	Total Dissolved Solids	mg/L	500
UA	G200	B	2022/05/10	Total Dissolved Solids	mg/L	750
UA	G200	B	2022/08/23	Total Dissolved Solids	mg/L	540
UA	G200	B	2022/11/10	Total Dissolved Solids	mg/L	480
UA	G200	B	2023/02/16	Total Dissolved Solids	mg/L	440
UA	G200	B	2023/06/07	Total Dissolved Solids	mg/L	630
UA	G200	B	2023/11/14	Total Dissolved Solids	mg/L	455
UA	R201	B	2010/11/15	pH (field)	SU	7.5
UA	R201	B	2011/01/27	pH (field)	SU	7.2
UA	R201	B	2011/05/04	pH (field)	SU	6.9
UA	R201	B	2011/07/25	pH (field)	SU	6.9
UA	R201	B	2011/11/11	pH (field)	SU	7.2
UA	R201	B	2012/01/30	pH (field)	SU	7.3
UA	R201	B	2012/05/22	pH (field)	SU	7.0
UA	R201	B	2012/07/23	pH (field)	SU	6.8
UA	R201	B	2012/11/14	pH (field)	SU	7.2
UA	R201	B	2013/01/31	pH (field)	SU	7.0
UA	R201	B	2013/05/20	pH (field)	SU	7.0
UA	R201	B	2013/07/22	pH (field)	SU	6.9
UA	R201	B	2013/10/14	pH (field)	SU	7.1
UA	R201	B	2014/02/19	pH (field)	SU	7.1
UA	R201	B	2014/05/12	pH (field)	SU	7.3
UA	R201	B	2014/08/11	pH (field)	SU	6.9
UA	R201	B	2014/10/15	pH (field)	SU	7.2
UA	R201	B	2015/01/20	pH (field)	SU	7.2
UA	R201	B	2015/04/10	pH (field)	SU	6.8
UA	R201	B	2015/07/22	pH (field)	SU	6.9
UA	R201	B	2015/10/05	pH (field)	SU	7.0
UA	R201	B	2015/11/23	pH (field)	SU	7.3
UA	R201	B	2016/02/12	pH (field)	SU	7.0
UA	R201	B	2016/05/10	pH (field)	SU	7.0
UA	R201	B	2016/07/30	pH (field)	SU	7.1
UA	R201	B	2016/11/18	pH (field)	SU	7.2
UA	R201	B	2017/02/11	pH (field)	SU	7.1
UA	R201	B	2017/05/18	pH (field)	SU	7.2
UA	R201	B	2017/07/13	pH (field)	SU	7.0

UA	R201	B	2017/10/28	pH (field)	SU	7.1
UA	R201	B	2018/01/25	pH (field)	SU	7.0
UA	R201	B	2018/05/11	pH (field)	SU	7.1
UA	R201	B	2018/11/02	pH (field)	SU	7.1
UA	R201	B	2019/01/16	pH (field)	SU	7.1
UA	R201	B	2019/08/12	pH (field)	SU	7.1
UA	R201	B	2020/01/21	pH (field)	SU	7.2
UA	R201	B	2020/08/11	pH (field)	SU	6.9
UA	R201	B	2020/10/13	pH (field)	SU	6.9
UA	R201	B	2021/01/29	pH (field)	SU	7.0
UA	R201	B	2021/03/29	pH (field)	SU	7.0
UA	R201	B	2021/04/21	pH (field)	SU	6.9
UA	R201	B	2021/05/06	pH (field)	SU	7.2
UA	R201	B	2021/05/17	pH (field)	SU	7.0
UA	R201	B	2021/06/14	pH (field)	SU	7.0
UA	R201	B	2021/06/29	pH (field)	SU	7.1
UA	R201	B	2021/07/13	pH (field)	SU	7.0
UA	R201	B	2021/07/28	pH (field)	SU	7.2
UA	R201	B	2021/08/18	pH (field)	SU	7.0
UA	R201	B	2021/10/27	pH (field)	SU	7.0
UA	R201	B	2022/02/09	pH (field)	SU	7.1
UA	R201	B	2022/05/11	pH (field)	SU	7.0
UA	R201	B	2022/08/23	pH (field)	SU	7.0
UA	R201	B	2022/11/10	pH (field)	SU	6.8
UA	R201	B	2023/02/16	pH (field)	SU	7.1
UA	R201	B	2023/06/07	pH (field)	SU	7.3
UA	R201	B	2023/11/14	pH (field)	SU	7.0
UA	R201	B	2015/11/23	Oxidation Reduction Potential	mV	-69.0
UA	R201	B	2016/02/12	Oxidation Reduction Potential	mV	101
UA	R201	B	2016/05/10	Oxidation Reduction Potential	mV	-106
UA	R201	B	2016/07/30	Oxidation Reduction Potential	mV	-96.0
UA	R201	B	2016/11/18	Oxidation Reduction Potential	mV	-78.0
UA	R201	B	2017/02/11	Oxidation Reduction Potential	mV	-57.0
UA	R201	B	2017/05/18	Oxidation Reduction Potential	mV	-59.0
UA	R201	B	2017/07/13	Oxidation Reduction Potential	mV	-98.0
UA	R201	B	2017/10/28	Oxidation Reduction Potential	mV	-99.0
UA	R201	B	2018/01/25	Oxidation Reduction Potential	mV	56.0
UA	R201	B	2018/05/11	Oxidation Reduction Potential	mV	-88.0
UA	R201	B	2018/11/02	Oxidation Reduction Potential	mV	-91.0
UA	R201	B	2019/01/16	Oxidation Reduction Potential	mV	-94.0
UA	R201	B	2019/08/12	Oxidation Reduction Potential	mV	-93.0
UA	R201	B	2020/01/21	Oxidation Reduction Potential	mV	-115
UA	R201	B	2020/08/11	Oxidation Reduction Potential	mV	-80.1
UA	R201	B	2021/01/29	Oxidation Reduction Potential	mV	-32.1
UA	R201	B	2021/03/29	Oxidation Reduction Potential	mV	-56.5
UA	R201	B	2021/04/21	Oxidation Reduction Potential	mV	-44.5
UA	R201	B	2021/05/06	Oxidation Reduction Potential	mV	-42.4
UA	R201	B	2021/05/17	Oxidation Reduction Potential	mV	-109
UA	R201	B	2021/06/14	Oxidation Reduction Potential	mV	-120
UA	R201	B	2021/06/29	Oxidation Reduction Potential	mV	-116

UA	R201	B	2021/07/13	Oxidation Reduction Potential	mV	-27.1
UA	R201	B	2021/07/28	Oxidation Reduction Potential	mV	-122
UA	R201	B	2021/08/18	Oxidation Reduction Potential	mV	-82.1
UA	R201	B	2022/02/09	Oxidation Reduction Potential	mV	-66.0
UA	R201	B	2022/05/11	Oxidation Reduction Potential	mV	-88.7
UA	R201	B	2022/08/23	Oxidation Reduction Potential	mV	-109
UA	R201	B	2022/11/10	Oxidation Reduction Potential	mV	-87.9
UA	R201	B	2023/02/16	Oxidation Reduction Potential	mV	-15.0
UA	R201	B	2023/06/07	Oxidation Reduction Potential	mV	-123
UA	R201	B	2023/11/14	Oxidation Reduction Potential	mV	-97.0
UA	R201	B	2015/11/23	Eh	V	0.13
UA	R201	B	2016/02/12	Eh	V	0.30
UA	R201	B	2016/05/10	Eh	V	0.089
UA	R201	B	2016/07/30	Eh	V	0.098
UA	R201	B	2016/11/18	Eh	V	0.12
UA	R201	B	2017/02/11	Eh	V	0.14
UA	R201	B	2017/05/18	Eh	V	0.14
UA	R201	B	2017/07/13	Eh	V	0.096
UA	R201	B	2017/10/28	Eh	V	0.098
UA	R201	B	2018/01/25	Eh	V	0.25
UA	R201	B	2018/05/11	Eh	V	0.11
UA	R201	B	2018/11/02	Eh	V	0.11
UA	R201	B	2019/01/16	Eh	V	0.10
UA	R201	B	2019/08/12	Eh	V	0.10
UA	R201	B	2020/01/21	Eh	V	0.085
UA	R201	B	2020/08/11	Eh	V	0.11
UA	R201	B	2021/01/29	Eh	V	0.17
UA	R201	B	2021/03/29	Eh	V	0.14
UA	R201	B	2021/04/21	Eh	V	0.15
UA	R201	B	2021/05/06	Eh	V	0.16
UA	R201	B	2021/05/17	Eh	V	0.087
UA	R201	B	2021/06/14	Eh	V	0.072
UA	R201	B	2021/06/29	Eh	V	0.074
UA	R201	B	2021/07/13	Eh	V	0.17
UA	R201	B	2021/07/28	Eh	V	0.070
UA	R201	B	2021/08/18	Eh	V	0.11
UA	R201	B	2022/02/09	Eh	V	0.13
UA	R201	B	2022/05/11	Eh	V	0.10
UA	R201	B	2022/08/23	Eh	V	0.083
UA	R201	B	2022/11/10	Eh	V	0.11
UA	R201	B	2023/02/16	Eh	V	0.19
UA	R201	B	2023/06/07	Eh	V	0.070
UA	R201	B	2023/11/14	Eh	V	0.098
UA	R201	B	2011/01/27	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	R201	B	2012/01/30	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	R201	B	2013/01/31	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	R201	B	2014/02/19	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	420
UA	R201	B	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	R201	B	2015/01/20	Alkalinity, bicarbonate	mg/L CaCO3	390

UA	R201	B	2015/04/10	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	R201	B	2017/07/13	Alkalinity, bicarbonate	mg/L CaCO3	440
UA	R201	B	2020/01/21	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	R201	B	2020/08/11	Alkalinity, bicarbonate	mg/L CaCO3	410
UA	R201	B	2021/01/29	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2021/03/29	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	R201	B	2021/04/21	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	R201	B	2021/05/06	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	R201	B	2021/05/17	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2021/06/14	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	R201	B	2021/06/29	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2021/07/13	Alkalinity, bicarbonate	mg/L CaCO3	350
UA	R201	B	2021/07/28	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	R201	B	2021/08/18	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	R201	B	2022/02/09	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	R201	B	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	R201	B	2023/02/16	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	R201	B	2023/06/07	Alkalinity, bicarbonate	mg/L CaCO3	420
UA	R201	B	2023/11/14	Alkalinity, bicarbonate	mg/L CaCO3	364
UA	R201	B	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	R201	B	2011/01/27	Barium, total	mg/L	0.0780
UA	R201	B	2012/01/30	Barium, total	mg/L	0.0830
UA	R201	B	2013/01/31	Barium, total	mg/L	0.0650
UA	R201	B	2014/02/19	Barium, total	mg/L	0.100
UA	R201	B	2015/04/10	Barium, total	mg/L	0.0840
UA	R201	B	2015/07/22	Barium, total	mg/L	0.0990
UA	R201	B	2015/10/05	Barium, total	mg/L	0.0810
UA	R201	B	2015/11/23	Barium, total	mg/L	0.0780
UA	R201	B	2016/02/12	Barium, total	mg/L	0.0840
UA	R201	B	2016/05/10	Barium, total	mg/L	0.0840
UA	R201	B	2016/07/30	Barium, total	mg/L	0.0920
UA	R201	B	2016/11/18	Barium, total	mg/L	0.0580
UA	R201	B	2017/02/11	Barium, total	mg/L	0.0860
UA	R201	B	2017/05/18	Barium, total	mg/L	0.0870
UA	R201	B	2017/07/13	Barium, total	mg/L	0.170
UA	R201	B	2020/10/13	Barium, total	mg/L	0.110
UA	R201	B	2021/01/29	Barium, total	mg/L	0.0740
UA	R201	B	2021/03/29	Barium, total	mg/L	0.0730
UA	R201	B	2021/04/21	Barium, total	mg/L	0.0710
UA	R201	B	2021/05/06	Barium, total	mg/L	0.0780
UA	R201	B	2021/05/17	Barium, total	mg/L	0.0780
UA	R201	B	2021/06/14	Barium, total	mg/L	0.0820
UA	R201	B	2021/06/29	Barium, total	mg/L	0.130
UA	R201	B	2021/07/13	Barium, total	mg/L	0.0690
UA	R201	B	2021/07/28	Barium, total	mg/L	0.0810
UA	R201	B	2021/08/18	Barium, total	mg/L	0.0670
UA	R201	B	2021/10/27	Barium, total	mg/L	0.0700
UA	R201	B	2022/02/09	Barium, total	mg/L	0.0800
UA	R201	B	2022/05/11	Barium, total	mg/L	0.110

UA	R201	B	2022/08/23	Barium, total	mg/L	0.0910
UA	R201	B	2022/11/10	Barium, total	mg/L	0.0870
UA	R201	B	2023/02/16	Barium, total	mg/L	0.0760
UA	R201	B	2023/06/07	Barium, total	mg/L	0.0780
UA	R201	B	2023/11/14	Barium, total	mg/L	0.0879
UA	R201	B	2010/11/15	Calcium, total	mg/L	140
UA	R201	B	2011/01/27	Calcium, total	mg/L	110
UA	R201	B	2011/05/04	Calcium, total	mg/L	130
UA	R201	B	2011/07/25	Calcium, total	mg/L	130
UA	R201	B	2011/11/11	Calcium, total	mg/L	110
UA	R201	B	2012/01/30	Calcium, total	mg/L	120
UA	R201	B	2012/05/22	Calcium, total	mg/L	130
UA	R201	B	2012/07/23	Calcium, total	mg/L	130
UA	R201	B	2012/11/14	Calcium, total	mg/L	100
UA	R201	B	2013/01/31	Calcium, total	mg/L	100
UA	R201	B	2013/05/20	Calcium, total	mg/L	130
UA	R201	B	2013/07/22	Calcium, total	mg/L	110
UA	R201	B	2013/10/14	Calcium, total	mg/L	120
UA	R201	B	2014/02/19	Calcium, total	mg/L	100
UA	R201	B	2014/05/12	Calcium, total	mg/L	130
UA	R201	B	2014/08/11	Calcium, total	mg/L	120
UA	R201	B	2014/10/15	Calcium, total	mg/L	89.0
UA	R201	B	2015/01/20	Calcium, total	mg/L	110
UA	R201	B	2015/04/10	Calcium, total	mg/L	130
UA	R201	B	2015/11/23	Calcium, total	mg/L	85.0
UA	R201	B	2016/02/12	Calcium, total	mg/L	120
UA	R201	B	2016/05/10	Calcium, total	mg/L	120
UA	R201	B	2016/07/30	Calcium, total	mg/L	120
UA	R201	B	2016/11/18	Calcium, total	mg/L	81.0
UA	R201	B	2017/02/11	Calcium, total	mg/L	100
UA	R201	B	2017/05/18	Calcium, total	mg/L	120
UA	R201	B	2017/07/13	Calcium, total	mg/L	120
UA	R201	B	2017/10/28	Calcium, total	mg/L	93.0
UA	R201	B	2018/05/11	Calcium, total	mg/L	87.0
UA	R201	B	2018/11/02	Calcium, total	mg/L	82.0
UA	R201	B	2019/01/16	Calcium, total	mg/L	100
UA	R201	B	2019/08/12	Calcium, total	mg/L	120
UA	R201	B	2020/01/21	Calcium, total	mg/L	130
UA	R201	B	2020/08/11	Calcium, total	mg/L	120
UA	R201	B	2021/01/29	Calcium, total	mg/L	94.0
UA	R201	B	2021/03/29	Calcium, total	mg/L	97.0
UA	R201	B	2021/04/21	Calcium, total	mg/L	100
UA	R201	B	2021/05/06	Calcium, total	mg/L	110
UA	R201	B	2021/05/17	Calcium, total	mg/L	110
UA	R201	B	2021/06/14	Calcium, total	mg/L	120
UA	R201	B	2021/06/29	Calcium, total	mg/L	140
UA	R201	B	2021/07/13	Calcium, total	mg/L	97.0
UA	R201	B	2021/07/28	Calcium, total	mg/L	110
UA	R201	B	2021/08/18	Calcium, total	mg/L	110
UA	R201	B	2022/02/09	Calcium, total	mg/L	120

UA	R201	B	2022/05/11	Calcium, total	mg/L	130
UA	R201	B	2022/08/23	Calcium, total	mg/L	140
UA	R201	B	2023/02/16	Calcium, total	mg/L	97.0
UA	R201	B	2023/06/07	Calcium, total	mg/L	120
UA	R201	B	2023/11/14	Calcium, total	mg/L	103
UA	R201	B	2010/11/15	Chloride, total	mg/L	99.0
UA	R201	B	2011/01/27	Chloride, total	mg/L	90.0
UA	R201	B	2011/05/04	Chloride, total	mg/L	76.0
UA	R201	B	2011/07/25	Chloride, total	mg/L	90.0
UA	R201	B	2011/11/11	Chloride, total	mg/L	78.0
UA	R201	B	2012/01/30	Chloride, total	mg/L	94.0
UA	R201	B	2012/05/22	Chloride, total	mg/L	86.0
UA	R201	B	2012/07/23	Chloride, total	mg/L	89.0
UA	R201	B	2012/11/14	Chloride, total	mg/L	51.0
UA	R201	B	2013/01/31	Chloride, total	mg/L	56.0
UA	R201	B	2013/05/20	Chloride, total	mg/L	65.0
UA	R201	B	2013/07/22	Chloride, total	mg/L	70.0
UA	R201	B	2013/10/14	Chloride, total	mg/L	77.0
UA	R201	B	2014/02/19	Chloride, total	mg/L	44.0
UA	R201	B	2014/05/12	Chloride, total	mg/L	73.0
UA	R201	B	2014/08/11	Chloride, total	mg/L	81.0
UA	R201	B	2014/10/15	Chloride, total	mg/L	34.0
UA	R201	B	2015/01/20	Chloride, total	mg/L	53.0
UA	R201	B	2015/04/10	Chloride, total	mg/L	66.0
UA	R201	B	2015/07/22	Chloride, total	mg/L	78.0
UA	R201	B	2015/10/05	Chloride, total	mg/L	74.0
UA	R201	B	2015/11/23	Chloride, total	mg/L	37.0
UA	R201	B	2016/02/12	Chloride, total	mg/L	75.0
UA	R201	B	2016/05/10	Chloride, total	mg/L	85.0
UA	R201	B	2016/07/30	Chloride, total	mg/L	85.0
UA	R201	B	2016/11/18	Chloride, total	mg/L	39.0
UA	R201	B	2017/02/11	Chloride, total	mg/L	79.0
UA	R201	B	2017/05/18	Chloride, total	mg/L	74.0
UA	R201	B	2017/07/13	Chloride, total	mg/L	81.0
UA	R201	B	2017/10/28	Chloride, total	mg/L	30.0
UA	R201	B	2018/01/25	Chloride, total	mg/L	31.0
UA	R201	B	2018/05/11	Chloride, total	mg/L	54.0
UA	R201	B	2018/11/02	Chloride, total	mg/L	24.0
UA	R201	B	2019/01/16	Chloride, total	mg/L	48.0
UA	R201	B	2019/08/12	Chloride, total	mg/L	71.0
UA	R201	B	2020/01/21	Chloride, total	mg/L	66.0
UA	R201	B	2020/08/11	Chloride, total	mg/L	87.0
UA	R201	B	2020/10/13	Chloride, total	mg/L	83.0
UA	R201	B	2021/01/29	Chloride, total	mg/L	46.0
UA	R201	B	2021/03/29	Chloride, total	mg/L	55.0
UA	R201	B	2021/04/21	Chloride, total	mg/L	63.0
UA	R201	B	2021/05/06	Chloride, total	mg/L	67.0
UA	R201	B	2021/05/17	Chloride, total	mg/L	76.0
UA	R201	B	2021/06/14	Chloride, total	mg/L	68.0
UA	R201	B	2021/06/29	Chloride, total	mg/L	81.0

UA	R201	B	2021/07/13	Chloride, total	mg/L	58.0
UA	R201	B	2021/07/28	Chloride, total	mg/L	79.0
UA	R201	B	2021/08/18	Chloride, total	mg/L	88.0
UA	R201	B	2021/10/27	Chloride, total	mg/L	100
UA	R201	B	2022/02/09	Chloride, total	mg/L	83.0
UA	R201	B	2022/05/11	Chloride, total	mg/L	80.0
UA	R201	B	2022/08/23	Chloride, total	mg/L	86.0
UA	R201	B	2022/11/10	Chloride, total	mg/L	140
UA	R201	B	2023/02/16	Chloride, total	mg/L	51.0
UA	R201	B	2023/06/07	Chloride, total	mg/L	89.0
UA	R201	B	2023/11/14	Chloride, total	mg/L	60.0
UA	R201	B	2023/06/07	Ferrous Iron, dissolved	mg/L	3.90
UA	R201	B	2010/11/15	Iron, dissolved	mg/L	1.20
UA	R201	B	2011/01/27	Iron, dissolved	mg/L	<0.01
UA	R201	B	2011/05/04	Iron, dissolved	mg/L	1.40
UA	R201	B	2011/07/25	Iron, dissolved	mg/L	0.890
UA	R201	B	2011/11/11	Iron, dissolved	mg/L	0.0320
UA	R201	B	2012/01/30	Iron, dissolved	mg/L	<0.01
UA	R201	B	2012/05/22	Iron, dissolved	mg/L	0.250
UA	R201	B	2012/07/23	Iron, dissolved	mg/L	1.60
UA	R201	B	2012/11/14	Iron, dissolved	mg/L	0.0370
UA	R201	B	2013/01/31	Iron, dissolved	mg/L	0.0140
UA	R201	B	2013/05/20	Iron, dissolved	mg/L	0.0260
UA	R201	B	2013/07/22	Iron, dissolved	mg/L	0.110
UA	R201	B	2013/10/14	Iron, dissolved	mg/L	0.200
UA	R201	B	2014/02/19	Iron, dissolved	mg/L	0.0140
UA	R201	B	2014/05/12	Iron, dissolved	mg/L	0.180
UA	R201	B	2014/08/11	Iron, dissolved	mg/L	0.450
UA	R201	B	2014/10/15	Iron, dissolved	mg/L	1.30
UA	R201	B	2015/01/20	Iron, dissolved	mg/L	0.110
UA	R201	B	2015/04/10	Iron, dissolved	mg/L	0.350
UA	R201	B	2015/07/22	Iron, dissolved	mg/L	2.30
UA	R201	B	2015/10/05	Iron, dissolved	mg/L	3.50
UA	R201	B	2016/02/12	Iron, dissolved	mg/L	0.350
UA	R201	B	2016/05/10	Iron, dissolved	mg/L	2.40
UA	R201	B	2016/07/26	Iron, dissolved	mg/L	0.850
UA	R201	B	2016/11/18	Iron, dissolved	mg/L	2.10
UA	R201	B	2017/02/13	Iron, dissolved	mg/L	47.0
UA	R201	B	2017/05/19	Iron, dissolved	mg/L	7.50
UA	R201	B	2017/07/13	Iron, dissolved	mg/L	2.70
UA	R201	B	2017/10/28	Iron, dissolved	mg/L	1.10
UA	R201	B	2018/01/30	Iron, dissolved	mg/L	3.90
UA	R201	B	2018/05/11	Iron, dissolved	mg/L	2.20
UA	R201	B	2018/08/08	Iron, dissolved	mg/L	2.00
UA	R201	B	2018/11/02	Iron, dissolved	mg/L	1.50
UA	R201	B	2019/01/16	Iron, dissolved	mg/L	3.50
UA	R201	B	2019/05/01	Iron, dissolved	mg/L	0.300
UA	R201	B	2019/08/12	Iron, dissolved	mg/L	1.00
UA	R201	B	2019/10/23	Iron, dissolved	mg/L	0.0200
UA	R201	B	2020/01/21	Iron, dissolved	mg/L	1.80

UA	R201	B	2020/08/11	Iron, dissolved	mg/L	2.60
UA	R201	B	2020/10/13	Iron, dissolved	mg/L	2.50
UA	R201	B	2021/01/29	Iron, dissolved	mg/L	0.370
UA	R201	B	2021/04/21	Iron, dissolved	mg/L	1.10
UA	R201	B	2021/08/18	Iron, dissolved	mg/L	2.50
UA	R201	B	2021/10/27	Iron, dissolved	mg/L	2.40
UA	R201	B	2022/02/09	Iron, dissolved	mg/L	1.20
UA	R201	B	2022/05/11	Iron, dissolved	mg/L	2.70
UA	R201	B	2022/08/23	Iron, dissolved	mg/L	2.20
UA	R201	B	2022/11/10	Iron, dissolved	mg/L	2.70
UA	R201	B	2023/02/16	Iron, dissolved	mg/L	8.00
UA	R201	B	2023/06/07	Iron, dissolved	mg/L	3.30
UA	R201	B	2023/11/14	Iron, dissolved	mg/L	2.66
UA	R201	B	2011/01/27	Magnesium, total	mg/L	52.0
UA	R201	B	2012/01/30	Magnesium, total	mg/L	54.0
UA	R201	B	2013/01/31	Magnesium, total	mg/L	46.0
UA	R201	B	2014/02/19	Magnesium, total	mg/L	44.0
UA	R201	B	2015/04/10	Magnesium, total	mg/L	54.0
UA	R201	B	2017/07/13	Magnesium, total	mg/L	54.0
UA	R201	B	2020/01/21	Magnesium, total	mg/L	53.0
UA	R201	B	2020/08/11	Magnesium, total	mg/L	50.0
UA	R201	B	2021/01/29	Magnesium, total	mg/L	41.0
UA	R201	B	2021/03/29	Magnesium, total	mg/L	43.0
UA	R201	B	2021/04/21	Magnesium, total	mg/L	45.0
UA	R201	B	2021/05/06	Magnesium, total	mg/L	45.0
UA	R201	B	2021/05/17	Magnesium, total	mg/L	48.0
UA	R201	B	2021/06/14	Magnesium, total	mg/L	48.0
UA	R201	B	2021/06/29	Magnesium, total	mg/L	60.0
UA	R201	B	2021/07/13	Magnesium, total	mg/L	42.0
UA	R201	B	2021/07/28	Magnesium, total	mg/L	45.0
UA	R201	B	2021/08/18	Magnesium, total	mg/L	45.0
UA	R201	B	2022/02/09	Magnesium, total	mg/L	49.0
UA	R201	B	2022/05/11	Magnesium, total	mg/L	53.0
UA	R201	B	2022/08/23	Magnesium, total	mg/L	58.0
UA	R201	B	2023/02/16	Magnesium, total	mg/L	42.0
UA	R201	B	2023/06/07	Magnesium, total	mg/L	46.0
UA	R201	B	2023/11/14	Magnesium, total	mg/L	40.4
UA	R201	B	2010/11/15	Manganese, dissolved	mg/L	0.600
UA	R201	B	2011/01/27	Manganese, dissolved	mg/L	0.0670
UA	R201	B	2011/05/04	Manganese, dissolved	mg/L	0.280
UA	R201	B	2011/07/25	Manganese, dissolved	mg/L	0.270
UA	R201	B	2011/11/11	Manganese, dissolved	mg/L	0.230
UA	R201	B	2012/01/30	Manganese, dissolved	mg/L	0.170
UA	R201	B	2012/05/22	Manganese, dissolved	mg/L	0.510
UA	R201	B	2012/07/23	Manganese, dissolved	mg/L	0.380
UA	R201	B	2012/11/14	Manganese, dissolved	mg/L	0.270
UA	R201	B	2013/01/31	Manganese, dissolved	mg/L	0.210
UA	R201	B	2013/05/20	Manganese, dissolved	mg/L	0.440
UA	R201	B	2013/07/22	Manganese, dissolved	mg/L	0.330
UA	R201	B	2013/10/14	Manganese, dissolved	mg/L	0.560

UA	R201	B	2014/02/19	Manganese, dissolved	mg/L	0.110
UA	R201	B	2014/05/12	Manganese, dissolved	mg/L	0.380
UA	R201	B	2014/08/11	Manganese, dissolved	mg/L	1.80
UA	R201	B	2014/10/15	Manganese, dissolved	mg/L	0.550
UA	R201	B	2015/01/20	Manganese, dissolved	mg/L	0.210
UA	R201	B	2015/04/10	Manganese, dissolved	mg/L	0.280
UA	R201	B	2015/07/22	Manganese, dissolved	mg/L	1.60
UA	R201	B	2015/10/05	Manganese, dissolved	mg/L	0.900
UA	R201	B	2016/02/12	Manganese, dissolved	mg/L	0.150
UA	R201	B	2016/05/10	Manganese, dissolved	mg/L	0.300
UA	R201	B	2016/07/26	Manganese, dissolved	mg/L	0.260
UA	R201	B	2016/11/18	Manganese, dissolved	mg/L	0.200
UA	R201	B	2017/02/13	Manganese, dissolved	mg/L	0.510
UA	R201	B	2017/05/19	Manganese, dissolved	mg/L	0.360
UA	R201	B	2017/07/13	Manganese, dissolved	mg/L	0.230
UA	R201	B	2017/10/28	Manganese, dissolved	mg/L	0.170
UA	R201	B	2018/01/30	Manganese, dissolved	mg/L	0.240
UA	R201	B	2018/05/11	Manganese, dissolved	mg/L	2.70
UA	R201	B	2018/08/08	Manganese, dissolved	mg/L	0.650
UA	R201	B	2018/11/02	Manganese, dissolved	mg/L	0.450
UA	R201	B	2019/01/16	Manganese, dissolved	mg/L	0.900
UA	R201	B	2019/05/01	Manganese, dissolved	mg/L	0.380
UA	R201	B	2019/08/12	Manganese, dissolved	mg/L	0.380
UA	R201	B	2019/10/23	Manganese, dissolved	mg/L	0.350
UA	R201	B	2020/01/21	Manganese, dissolved	mg/L	0.320
UA	R201	B	2020/08/11	Manganese, dissolved	mg/L	0.290
UA	R201	B	2020/10/13	Manganese, dissolved	mg/L	0.280
UA	R201	B	2021/01/29	Manganese, dissolved	mg/L	0.240
UA	R201	B	2021/04/21	Manganese, dissolved	mg/L	0.480
UA	R201	B	2021/08/18	Manganese, dissolved	mg/L	0.330
UA	R201	B	2021/10/27	Manganese, dissolved	mg/L	0.350
UA	R201	B	2022/02/09	Manganese, dissolved	mg/L	0.180
UA	R201	B	2022/05/11	Manganese, dissolved	mg/L	0.220
UA	R201	B	2022/08/23	Manganese, dissolved	mg/L	0.290
UA	R201	B	2022/11/10	Manganese, dissolved	mg/L	0.230
UA	R201	B	2023/02/16	Manganese, dissolved	mg/L	0.280
UA	R201	B	2023/06/07	Manganese, dissolved	mg/L	0.240
UA	R201	B	2023/11/14	Manganese, dissolved	mg/L	0.378
UA	R201	B	2011/01/27	Potassium, total	mg/L	0.770
UA	R201	B	2012/01/30	Potassium, total	mg/L	0.840
UA	R201	B	2013/01/31	Potassium, total	mg/L	0.620
UA	R201	B	2014/02/19	Potassium, total	mg/L	0.900
UA	R201	B	2015/04/10	Potassium, total	mg/L	0.920
UA	R201	B	2017/07/13	Potassium, total	mg/L	1.20
UA	R201	B	2020/01/21	Potassium, total	mg/L	1.30
UA	R201	B	2020/08/11	Potassium, total	mg/L	1.10
UA	R201	B	2021/01/29	Potassium, total	mg/L	0.650
UA	R201	B	2021/03/29	Potassium, total	mg/L	0.640
UA	R201	B	2021/04/21	Potassium, total	mg/L	0.640
UA	R201	B	2021/05/06	Potassium, total	mg/L	0.740

UA	R201	B	2021/05/17	Potassium, total	mg/L	0.650
UA	R201	B	2021/06/14	Potassium, total	mg/L	0.750
UA	R201	B	2021/06/29	Potassium, total	mg/L	1.20
UA	R201	B	2021/07/13	Potassium, total	mg/L	0.720
UA	R201	B	2021/07/28	Potassium, total	mg/L	0.740
UA	R201	B	2021/08/18	Potassium, total	mg/L	0.710
UA	R201	B	2022/02/09	Potassium, total	mg/L	0.840
UA	R201	B	2022/05/11	Potassium, total	mg/L	0.860
UA	R201	B	2022/08/23	Potassium, total	mg/L	0.940
UA	R201	B	2023/02/16	Potassium, total	mg/L	0.840
UA	R201	B	2023/06/07	Potassium, total	mg/L	0.840
UA	R201	B	2023/11/14	Potassium, total	mg/L	1.03
UA	R201	B	2023/06/07	Silicon, dissolved	mg/L	8.10
UA	R201	B	2011/01/27	Sodium, total	mg/L	73.0
UA	R201	B	2012/01/30	Sodium, total	mg/L	91.0
UA	R201	B	2013/01/31	Sodium, total	mg/L	93.0
UA	R201	B	2014/02/19	Sodium, total	mg/L	89.0
UA	R201	B	2015/04/10	Sodium, total	mg/L	120
UA	R201	B	2017/07/13	Sodium, total	mg/L	140
UA	R201	B	2020/01/21	Sodium, total	mg/L	120
UA	R201	B	2020/08/11	Sodium, total	mg/L	120
UA	R201	B	2021/01/29	Sodium, total	mg/L	110
UA	R201	B	2021/03/29	Sodium, total	mg/L	100
UA	R201	B	2021/04/21	Sodium, total	mg/L	110
UA	R201	B	2021/05/06	Sodium, total	mg/L	110
UA	R201	B	2021/05/17	Sodium, total	mg/L	120
UA	R201	B	2021/06/14	Sodium, total	mg/L	120
UA	R201	B	2021/06/29	Sodium, total	mg/L	120
UA	R201	B	2021/07/13	Sodium, total	mg/L	100
UA	R201	B	2021/07/28	Sodium, total	mg/L	110
UA	R201	B	2021/08/18	Sodium, total	mg/L	120
UA	R201	B	2022/02/09	Sodium, total	mg/L	130
UA	R201	B	2022/05/11	Sodium, total	mg/L	130
UA	R201	B	2022/08/23	Sodium, total	mg/L	130
UA	R201	B	2023/02/16	Sodium, total	mg/L	110
UA	R201	B	2023/06/07	Sodium, total	mg/L	120
UA	R201	B	2023/11/14	Sodium, total	mg/L	101
UA	R201	B	2010/11/15	Sulfate, total	mg/L	250
UA	R201	B	2011/01/27	Sulfate, total	mg/L	190
UA	R201	B	2011/05/04	Sulfate, total	mg/L	230
UA	R201	B	2011/07/25	Sulfate, total	mg/L	230
UA	R201	B	2011/11/11	Sulfate, total	mg/L	190
UA	R201	B	2012/01/30	Sulfate, total	mg/L	190
UA	R201	B	2012/05/22	Sulfate, total	mg/L	240
UA	R201	B	2012/07/23	Sulfate, total	mg/L	250
UA	R201	B	2012/11/14	Sulfate, total	mg/L	190
UA	R201	B	2013/01/31	Sulfate, total	mg/L	180
UA	R201	B	2013/05/20	Sulfate, total	mg/L	220
UA	R201	B	2013/07/22	Sulfate, total	mg/L	210
UA	R201	B	2013/10/14	Sulfate, total	mg/L	230

UA	R201	B	2014/02/19	Sulfate, total	mg/L	170
UA	R201	B	2014/05/12	Sulfate, total	mg/L	200
UA	R201	B	2014/08/11	Sulfate, total	mg/L	240
UA	R201	B	2014/10/15	Sulfate, total	mg/L	150
UA	R201	B	2015/01/20	Sulfate, total	mg/L	210
UA	R201	B	2015/04/10	Sulfate, total	mg/L	220
UA	R201	B	2015/07/22	Sulfate, total	mg/L	250
UA	R201	B	2015/10/05	Sulfate, total	mg/L	210
UA	R201	B	2015/11/23	Sulfate, total	mg/L	150
UA	R201	B	2016/02/12	Sulfate, total	mg/L	240
UA	R201	B	2016/05/10	Sulfate, total	mg/L	260
UA	R201	B	2016/07/30	Sulfate, total	mg/L	260
UA	R201	B	2016/11/18	Sulfate, total	mg/L	160
UA	R201	B	2017/02/11	Sulfate, total	mg/L	230
UA	R201	B	2017/05/18	Sulfate, total	mg/L	300
UA	R201	B	2017/07/13	Sulfate, total	mg/L	250
UA	R201	B	2017/10/28	Sulfate, total	mg/L	89.0
UA	R201	B	2018/05/11	Sulfate, total	mg/L	190
UA	R201	B	2018/11/02	Sulfate, total	mg/L	110
UA	R201	B	2019/01/16	Sulfate, total	mg/L	150
UA	R201	B	2019/08/12	Sulfate, total	mg/L	220
UA	R201	B	2020/01/21	Sulfate, total	mg/L	210
UA	R201	B	2020/08/11	Sulfate, total	mg/L	240
UA	R201	B	2020/10/13	Sulfate, total	mg/L	240
UA	R201	B	2021/01/29	Sulfate, total	mg/L	160
UA	R201	B	2021/03/29	Sulfate, total	mg/L	190
UA	R201	B	2021/04/21	Sulfate, total	mg/L	200
UA	R201	B	2021/05/06	Sulfate, total	mg/L	210
UA	R201	B	2021/05/17	Sulfate, total	mg/L	210
UA	R201	B	2021/06/14	Sulfate, total	mg/L	230
UA	R201	B	2021/06/29	Sulfate, total	mg/L	220
UA	R201	B	2021/07/13	Sulfate, total	mg/L	170
UA	R201	B	2021/07/28	Sulfate, total	mg/L	370
UA	R201	B	2021/08/18	Sulfate, total	mg/L	180
UA	R201	B	2021/10/27	Sulfate, total	mg/L	230
UA	R201	B	2022/02/09	Sulfate, total	mg/L	240
UA	R201	B	2022/05/11	Sulfate, total	mg/L	260
UA	R201	B	2022/08/23	Sulfate, total	mg/L	240
UA	R201	B	2022/11/10	Sulfate, total	mg/L	220
UA	R201	B	2023/02/16	Sulfate, total	mg/L	160
UA	R201	B	2023/06/07	Sulfate, total	mg/L	220
UA	R201	B	2023/11/14	Sulfate, total	mg/L	167
UA	R201	B	2015/11/23	Temperature (Celsius)	degrees C	15.6
UA	R201	B	2016/02/12	Temperature (Celsius)	degrees C	10.3
UA	R201	B	2016/05/10	Temperature (Celsius)	degrees C	15.5
UA	R201	B	2016/07/30	Temperature (Celsius)	degrees C	16.9
UA	R201	B	2016/11/18	Temperature (Celsius)	degrees C	15.3
UA	R201	B	2017/02/11	Temperature (Celsius)	degrees C	15.0
UA	R201	B	2017/05/18	Temperature (Celsius)	degrees C	14.8
UA	R201	B	2017/07/13	Temperature (Celsius)	degrees C	17.0

UA	R201	B	2017/10/28	Temperature (Celsius)	degrees C	12.6
UA	R201	B	2018/01/25	Temperature (Celsius)	degrees C	11.5
UA	R201	B	2018/05/11	Temperature (Celsius)	degrees C	13.9
UA	R201	B	2018/11/02	Temperature (Celsius)	degrees C	14.0
UA	R201	B	2019/01/16	Temperature (Celsius)	degrees C	12.7
UA	R201	B	2019/08/12	Temperature (Celsius)	degrees C	17.4
UA	R201	B	2020/01/21	Temperature (Celsius)	degrees C	9.00
UA	R201	B	2020/08/11	Temperature (Celsius)	degrees C	18.4
UA	R201	B	2021/01/29	Temperature (Celsius)	degrees C	8.50
UA	R201	B	2021/03/29	Temperature (Celsius)	degrees C	13.3
UA	R201	B	2021/04/21	Temperature (Celsius)	degrees C	11.0
UA	R201	B	2021/05/06	Temperature (Celsius)	degrees C	11.9
UA	R201	B	2021/05/17	Temperature (Celsius)	degrees C	13.7
UA	R201	B	2021/06/14	Temperature (Celsius)	degrees C	19.9
UA	R201	B	2021/06/29	Temperature (Celsius)	degrees C	23.3
UA	R201	B	2021/07/13	Temperature (Celsius)	degrees C	15.8
UA	R201	B	2021/07/28	Temperature (Celsius)	degrees C	20.0
UA	R201	B	2021/08/18	Temperature (Celsius)	degrees C	21.1
UA	R201	B	2022/02/09	Temperature (Celsius)	degrees C	9.80
UA	R201	B	2022/05/11	Temperature (Celsius)	degrees C	18.3
UA	R201	B	2022/08/23	Temperature (Celsius)	degrees C	20.0
UA	R201	B	2022/11/10	Temperature (Celsius)	degrees C	15.8
UA	R201	B	2023/02/16	Temperature (Celsius)	degrees C	8.50
UA	R201	B	2023/06/07	Temperature (Celsius)	degrees C	19.0
UA	R201	B	2023/11/14	Temperature (Celsius)	degrees C	16.0
UA	R201	B	2010/11/15	Total Dissolved Solids	mg/L	970
UA	R201	B	2011/01/27	Total Dissolved Solids	mg/L	780
UA	R201	B	2011/05/04	Total Dissolved Solids	mg/L	910
UA	R201	B	2011/07/25	Total Dissolved Solids	mg/L	900
UA	R201	B	2011/11/11	Total Dissolved Solids	mg/L	690
UA	R201	B	2012/01/30	Total Dissolved Solids	mg/L	780
UA	R201	B	2012/05/22	Total Dissolved Solids	mg/L	820
UA	R201	B	2012/07/23	Total Dissolved Solids	mg/L	880
UA	R201	B	2012/11/14	Total Dissolved Solids	mg/L	730
UA	R201	B	2013/01/31	Total Dissolved Solids	mg/L	650
UA	R201	B	2013/05/20	Total Dissolved Solids	mg/L	680
UA	R201	B	2013/07/22	Total Dissolved Solids	mg/L	760
UA	R201	B	2013/10/14	Total Dissolved Solids	mg/L	790
UA	R201	B	2014/02/19	Total Dissolved Solids	mg/L	660
UA	R201	B	2014/05/12	Total Dissolved Solids	mg/L	740
UA	R201	B	2014/08/11	Total Dissolved Solids	mg/L	810
UA	R201	B	2014/10/15	Total Dissolved Solids	mg/L	600
UA	R201	B	2015/01/20	Total Dissolved Solids	mg/L	750
UA	R201	B	2015/04/10	Total Dissolved Solids	mg/L	760
UA	R201	B	2015/07/22	Total Dissolved Solids	mg/L	930
UA	R201	B	2015/10/05	Total Dissolved Solids	mg/L	840
UA	R201	B	2015/11/23	Total Dissolved Solids	mg/L	560
UA	R201	B	2016/02/12	Total Dissolved Solids	mg/L	740
UA	R201	B	2016/05/10	Total Dissolved Solids	mg/L	840
UA	R201	B	2016/07/30	Total Dissolved Solids	mg/L	750

UA	R201	B	2016/11/18	Total Dissolved Solids	mg/L	580
UA	R201	B	2017/02/11	Total Dissolved Solids	mg/L	900
UA	R201	B	2017/05/18	Total Dissolved Solids	mg/L	820
UA	R201	B	2017/07/13	Total Dissolved Solids	mg/L	780
UA	R201	B	2017/10/28	Total Dissolved Solids	mg/L	660
UA	R201	B	2018/05/11	Total Dissolved Solids	mg/L	640
UA	R201	B	2018/11/02	Total Dissolved Solids	mg/L	470
UA	R201	B	2019/01/16	Total Dissolved Solids	mg/L	790
UA	R201	B	2019/08/12	Total Dissolved Solids	mg/L	760
UA	R201	B	2020/01/21	Total Dissolved Solids	mg/L	770
UA	R201	B	2020/08/11	Total Dissolved Solids	mg/L	790
UA	R201	B	2020/10/13	Total Dissolved Solids	mg/L	860
UA	R201	B	2021/01/29	Total Dissolved Solids	mg/L	710
UA	R201	B	2021/03/29	Total Dissolved Solids	mg/L	660
UA	R201	B	2021/04/21	Total Dissolved Solids	mg/L	810
UA	R201	B	2021/05/06	Total Dissolved Solids	mg/L	730
UA	R201	B	2021/05/17	Total Dissolved Solids	mg/L	770
UA	R201	B	2021/06/14	Total Dissolved Solids	mg/L	820
UA	R201	B	2021/06/29	Total Dissolved Solids	mg/L	560
UA	R201	B	2021/07/13	Total Dissolved Solids	mg/L	710
UA	R201	B	2021/07/28	Total Dissolved Solids	mg/L	750
UA	R201	B	2021/08/18	Total Dissolved Solids	mg/L	740
UA	R201	B	2021/10/27	Total Dissolved Solids	mg/L	760
UA	R201	B	2022/02/09	Total Dissolved Solids	mg/L	760
UA	R201	B	2022/05/11	Total Dissolved Solids	mg/L	870
UA	R201	B	2022/08/23	Total Dissolved Solids	mg/L	840
UA	R201	B	2022/11/10	Total Dissolved Solids	mg/L	820
UA	R201	B	2023/02/16	Total Dissolved Solids	mg/L	750
UA	R201	B	2023/06/07	Total Dissolved Solids	mg/L	930
UA	R201	B	2023/11/14	Total Dissolved Solids	mg/L	705
UA	G206	C	2010/11/22	pH (field)	SU	7.3
UA	G206	C	2011/01/24	pH (field)	SU	7.3
UA	G206	C	2011/03/08	pH (field)	SU	7.2
UA	G206	C	2011/05/04	pH (field)	SU	9.6
UA	G206	C	2011/07/26	pH (field)	SU	7.3
UA	G206	C	2011/09/19	pH (field)	SU	7.4
UA	G206	C	2011/11/11	pH (field)	SU	7.2
UA	G206	C	2012/01/30	pH (field)	SU	7.4
UA	G206	C	2012/05/23	pH (field)	SU	7.4
UA	G206	C	2012/07/23	pH (field)	SU	7.1
UA	G206	C	2012/11/14	pH (field)	SU	7.4
UA	G206	C	2013/01/29	pH (field)	SU	7.7
UA	G206	C	2013/05/21	pH (field)	SU	6.8
UA	G206	C	2013/07/23	pH (field)	SU	7.2
UA	G206	C	2013/10/14	pH (field)	SU	7.3
UA	G206	C	2014/02/20	pH (field)	SU	7.2
UA	G206	C	2014/05/13	pH (field)	SU	8.0
UA	G206	C	2014/08/11	pH (field)	SU	7.3
UA	G206	C	2014/10/15	pH (field)	SU	7.5
UA	G206	C	2015/01/21	pH (field)	SU	7.3

UA	G206	C	2015/04/09	pH (field)	SU	7.0
UA	G206	C	2015/07/22	pH (field)	SU	7.0
UA	G206	C	2015/10/07	pH (field)	SU	6.8
UA	G206	C	2015/11/18	pH (field)	SU	7.1
UA	G206	C	2016/02/24	pH (field)	SU	6.7
UA	G206	C	2016/06/27	pH (field)	SU	6.2
UA	G206	C	2016/08/06	pH (field)	SU	7.1
UA	G206	C	2016/11/22	pH (field)	SU	7.1
UA	G206	C	2017/02/11	pH (field)	SU	7.2
UA	G206	C	2017/05/18	pH (field)	SU	7.0
UA	G206	C	2017/07/15	pH (field)	SU	7.1
UA	G206	C	2017/10/30	pH (field)	SU	7.2
UA	G206	C	2018/05/15	pH (field)	SU	7.0
UA	G206	C	2018/11/02	pH (field)	SU	7.0
UA	G206	C	2019/01/17	pH (field)	SU	7.1
UA	G206	C	2019/08/14	pH (field)	SU	7.1
UA	G206	C	2020/01/21	pH (field)	SU	7.5
UA	G206	C	2020/05/05	pH (field)	SU	7.5
UA	G206	C	2020/08/13	pH (field)	SU	7.4
UA	G206	C	2020/10/13	pH (field)	SU	7.1
UA	G206	C	2021/01/27	pH (field)	SU	7.1
UA	G206	C	2021/05/19	pH (field)	SU	7.3
UA	G206	C	2021/08/20	pH (field)	SU	7.2
UA	G206	C	2021/10/27	pH (field)	SU	7.2
UA	G206	C	2021/11/29	pH (field)	SU	7.2
UA	G206	C	2022/02/10	pH (field)	SU	7.0
UA	G206	C	2022/05/10	pH (field)	SU	7.1
UA	G206	C	2022/08/23	pH (field)	SU	6.9
UA	G206	C	2022/11/08	pH (field)	SU	6.9
UA	G206	C	2023/02/16	pH (field)	SU	7.4
UA	G206	C	2023/06/09	pH (field)	SU	7.1
UA	G206	C	2023/08/14	pH (field)	SU	6.9
UA	G206	C	2023/11/15	pH (field)	SU	7.5
UA	G206	C	2015/11/18	Oxidation Reduction Potential	mV	-165
UA	G206	C	2016/02/24	Oxidation Reduction Potential	mV	22.0
UA	G206	C	2016/06/27	Oxidation Reduction Potential	mV	-31.0
UA	G206	C	2016/08/06	Oxidation Reduction Potential	mV	103
UA	G206	C	2016/11/22	Oxidation Reduction Potential	mV	91.0
UA	G206	C	2017/02/11	Oxidation Reduction Potential	mV	123
UA	G206	C	2017/05/18	Oxidation Reduction Potential	mV	93.0
UA	G206	C	2017/07/15	Oxidation Reduction Potential	mV	85.0
UA	G206	C	2017/10/30	Oxidation Reduction Potential	mV	105
UA	G206	C	2018/05/15	Oxidation Reduction Potential	mV	91.0
UA	G206	C	2018/11/02	Oxidation Reduction Potential	mV	98.0
UA	G206	C	2019/01/17	Oxidation Reduction Potential	mV	101
UA	G206	C	2019/08/14	Oxidation Reduction Potential	mV	99.0
UA	G206	C	2020/01/21	Oxidation Reduction Potential	mV	16.8
UA	G206	C	2020/05/05	Oxidation Reduction Potential	mV	176
UA	G206	C	2020/08/13	Oxidation Reduction Potential	mV	202
UA	G206	C	2021/01/27	Oxidation Reduction Potential	mV	39.1

UA	G206	C	2021/08/20	Oxidation Reduction Potential	mV	67.9
UA	G206	C	2021/11/29	Oxidation Reduction Potential	mV	-1.80
UA	G206	C	2022/02/10	Oxidation Reduction Potential	mV	124
UA	G206	C	2022/05/10	Oxidation Reduction Potential	mV	107
UA	G206	C	2022/08/23	Oxidation Reduction Potential	mV	-178
UA	G206	C	2022/11/08	Oxidation Reduction Potential	mV	-112
UA	G206	C	2023/02/16	Oxidation Reduction Potential	mV	188
UA	G206	C	2023/06/09	Oxidation Reduction Potential	mV	-232
UA	G206	C	2023/08/14	Oxidation Reduction Potential	mV	-188
UA	G206	C	2023/11/15	Oxidation Reduction Potential	mV	-256
UA	G206	C	2015/11/18	Eh	V	0.029
UA	G206	C	2016/02/24	Eh	V	0.22
UA	G206	C	2016/06/27	Eh	V	0.16
UA	G206	C	2016/08/06	Eh	V	0.30
UA	G206	C	2016/11/22	Eh	V	0.29
UA	G206	C	2017/02/11	Eh	V	0.32
UA	G206	C	2017/05/18	Eh	V	0.29
UA	G206	C	2017/07/15	Eh	V	0.28
UA	G206	C	2017/10/30	Eh	V	0.30
UA	G206	C	2018/05/15	Eh	V	0.29
UA	G206	C	2018/11/02	Eh	V	0.29
UA	G206	C	2019/01/17	Eh	V	0.30
UA	G206	C	2019/08/14	Eh	V	0.29
UA	G206	C	2020/01/21	Eh	V	0.21
UA	G206	C	2020/05/05	Eh	V	0.37
UA	G206	C	2020/08/13	Eh	V	0.40
UA	G206	C	2021/01/27	Eh	V	0.24
UA	G206	C	2021/08/20	Eh	V	0.26
UA	G206	C	2021/11/29	Eh	V	0.19
UA	G206	C	2022/02/10	Eh	V	0.32
UA	G206	C	2022/05/10	Eh	V	0.30
UA	G206	C	2022/08/23	Eh	V	0.014
UA	G206	C	2022/11/08	Eh	V	0.082
UA	G206	C	2023/02/16	Eh	V	0.39
UA	G206	C	2023/06/09	Eh	V	-0.039
UA	G206	C	2023/08/14	Eh	V	0.0067
UA	G206	C	2023/11/15	Eh	V	-0.062
UA	G206	C	2010/12/21	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G206	C	2011/01/24	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2011/03/08	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G206	C	2011/05/04	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G206	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G206	C	2011/09/19	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2012/01/30	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G206	C	2013/01/29	Alkalinity, bicarbonate	mg/L CaCO3	270
UA	G206	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	220
UA	G206	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2015/04/09	Alkalinity, bicarbonate	mg/L CaCO3	270

UA	G206	C	2017/07/15	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G206	C	2020/01/21	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G206	C	2020/08/13	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G206	C	2021/01/27	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2021/08/20	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G206	C	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G206	C	2022/06/16	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G206	C	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G206	C	2023/02/16	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G206	C	2023/06/09	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G206	C	2023/08/14	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G206	C	2023/11/15	Alkalinity, bicarbonate	mg/L CaCO3	293
UA	G206	C	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	G206	C	2010/11/22	Barium, total	mg/L	0.120
UA	G206	C	2011/01/24	Barium, total	mg/L	0.0540
UA	G206	C	2011/03/08	Barium, total	mg/L	0.0410
UA	G206	C	2011/05/04	Barium, total	mg/L	<0.001
UA	G206	C	2011/07/26	Barium, total	mg/L	0.0350
UA	G206	C	2011/09/19	Barium, total	mg/L	0.00380
UA	G206	C	2012/01/30	Barium, total	mg/L	0.0400
UA	G206	C	2013/01/29	Barium, total	mg/L	0.0440
UA	G206	C	2014/02/20	Barium, total	mg/L	0.0430
UA	G206	C	2015/04/09	Barium, total	mg/L	0.0520
UA	G206	C	2015/07/22	Barium, total	mg/L	0.0940
UA	G206	C	2015/10/07	Barium, total	mg/L	0.0650
UA	G206	C	2015/11/18	Barium, total	mg/L	0.0620
UA	G206	C	2016/02/24	Barium, total	mg/L	0.0560
UA	G206	C	2016/06/27	Barium, total	mg/L	0.0620
UA	G206	C	2016/08/06	Barium, total	mg/L	0.0640
UA	G206	C	2016/11/22	Barium, total	mg/L	0.0480
UA	G206	C	2017/02/11	Barium, total	mg/L	0.0520
UA	G206	C	2017/05/18	Barium, total	mg/L	0.0430
UA	G206	C	2017/07/15	Barium, total	mg/L	0.0550
UA	G206	C	2020/10/13	Barium, total	mg/L	0.0450
UA	G206	C	2021/01/27	Barium, total	mg/L	0.0370
UA	G206	C	2021/05/19	Barium, total	mg/L	0.0480
UA	G206	C	2021/08/20	Barium, total	mg/L	0.0470
UA	G206	C	2021/10/27	Barium, total	mg/L	0.0480
UA	G206	C	2022/02/10	Barium, total	mg/L	0.0510
UA	G206	C	2022/05/10	Barium, total	mg/L	0.0470
UA	G206	C	2022/08/23	Barium, total	mg/L	0.0510
UA	G206	C	2022/11/08	Barium, total	mg/L	0.0420
UA	G206	C	2023/02/16	Barium, total	mg/L	0.0570
UA	G206	C	2023/06/09	Barium, total	mg/L	0.0500
UA	G206	C	2023/08/14	Barium, total	mg/L	0.0581
UA	G206	C	2023/11/15	Barium, total	mg/L	0.0534
UA	G206	C	2010/11/22	Calcium, total	mg/L	98.0
UA	G206	C	2011/01/24	Calcium, total	mg/L	75.0
UA	G206	C	2011/03/08	Calcium, total	mg/L	75.0
UA	G206	C	2011/05/04	Calcium, total	mg/L	<100

UA	G206	C	2011/07/26	Calcium, total	mg/L	69.0
UA	G206	C	2011/09/19	Calcium, total	mg/L	7.10
UA	G206	C	2011/11/11	Calcium, total	mg/L	70.0
UA	G206	C	2012/01/30	Calcium, total	mg/L	96.0
UA	G206	C	2012/05/23	Calcium, total	mg/L	74.0
UA	G206	C	2012/07/23	Calcium, total	mg/L	78.0
UA	G206	C	2012/11/14	Calcium, total	mg/L	71.0
UA	G206	C	2013/01/29	Calcium, total	mg/L	78.0
UA	G206	C	2013/05/21	Calcium, total	mg/L	74.0
UA	G206	C	2013/07/23	Calcium, total	mg/L	73.0
UA	G206	C	2013/10/14	Calcium, total	mg/L	76.0
UA	G206	C	2014/02/20	Calcium, total	mg/L	79.0
UA	G206	C	2014/05/13	Calcium, total	mg/L	90.0
UA	G206	C	2014/08/11	Calcium, total	mg/L	84.0
UA	G206	C	2014/10/15	Calcium, total	mg/L	98.0
UA	G206	C	2015/01/21	Calcium, total	mg/L	84.0
UA	G206	C	2015/04/09	Calcium, total	mg/L	92.0
UA	G206	C	2015/11/18	Calcium, total	mg/L	79.0
UA	G206	C	2016/02/24	Calcium, total	mg/L	78.0
UA	G206	C	2016/06/27	Calcium, total	mg/L	94.0
UA	G206	C	2016/08/06	Calcium, total	mg/L	90.0
UA	G206	C	2016/11/22	Calcium, total	mg/L	63.0
UA	G206	C	2017/02/11	Calcium, total	mg/L	70.0
UA	G206	C	2017/05/18	Calcium, total	mg/L	66.0
UA	G206	C	2017/07/15	Calcium, total	mg/L	61.0
UA	G206	C	2017/10/30	Calcium, total	mg/L	90.0
UA	G206	C	2018/05/15	Calcium, total	mg/L	73.0
UA	G206	C	2018/11/02	Calcium, total	mg/L	85.0
UA	G206	C	2019/01/17	Calcium, total	mg/L	81.0
UA	G206	C	2019/08/14	Calcium, total	mg/L	120
UA	G206	C	2020/01/21	Calcium, total	mg/L	84.0
UA	G206	C	2020/08/13	Calcium, total	mg/L	81.0
UA	G206	C	2021/01/27	Calcium, total	mg/L	65.0
UA	G206	C	2021/08/20	Calcium, total	mg/L	83.0
UA	G206	C	2022/02/10	Calcium, total	mg/L	82.0
UA	G206	C	2022/05/10	Calcium, total	mg/L	79.0
UA	G206	C	2022/08/23	Calcium, total	mg/L	92.0
UA	G206	C	2023/02/16	Calcium, total	mg/L	87.0
UA	G206	C	2023/06/09	Calcium, total	mg/L	86.0
UA	G206	C	2023/08/14	Calcium, total	mg/L	86.8
UA	G206	C	2023/11/15	Calcium, total	mg/L	83.3
UA	G206	C	2010/11/22	Chloride, total	mg/L	42.0
UA	G206	C	2011/01/24	Chloride, total	mg/L	36.0
UA	G206	C	2011/03/08	Chloride, total	mg/L	39.0
UA	G206	C	2011/05/04	Chloride, total	mg/L	37.0
UA	G206	C	2011/07/26	Chloride, total	mg/L	36.0
UA	G206	C	2011/09/19	Chloride, total	mg/L	37.0
UA	G206	C	2011/11/11	Chloride, total	mg/L	40.0
UA	G206	C	2012/01/30	Chloride, total	mg/L	39.0
UA	G206	C	2012/05/23	Chloride, total	mg/L	39.0

UA	G206	C	2012/07/23	Chloride, total	mg/L	41.0
UA	G206	C	2012/11/14	Chloride, total	mg/L	34.0
UA	G206	C	2013/01/29	Chloride, total	mg/L	36.0
UA	G206	C	2013/05/21	Chloride, total	mg/L	30.0
UA	G206	C	2013/07/23	Chloride, total	mg/L	42.0
UA	G206	C	2013/10/14	Chloride, total	mg/L	29.0
UA	G206	C	2014/02/20	Chloride, total	mg/L	30.0
UA	G206	C	2014/05/13	Chloride, total	mg/L	28.0
UA	G206	C	2014/08/11	Chloride, total	mg/L	33.0
UA	G206	C	2014/10/15	Chloride, total	mg/L	32.0
UA	G206	C	2015/01/21	Chloride, total	mg/L	28.0
UA	G206	C	2015/04/09	Chloride, total	mg/L	29.0
UA	G206	C	2015/07/22	Chloride, total	mg/L	24.0
UA	G206	C	2015/10/07	Chloride, total	mg/L	34.0
UA	G206	C	2015/11/18	Chloride, total	mg/L	32.0
UA	G206	C	2016/02/24	Chloride, total	mg/L	26.0
UA	G206	C	2016/06/27	Chloride, total	mg/L	25.0
UA	G206	C	2016/08/06	Chloride, total	mg/L	27.0
UA	G206	C	2016/11/22	Chloride, total	mg/L	30.0
UA	G206	C	2017/02/11	Chloride, total	mg/L	29.0
UA	G206	C	2017/05/18	Chloride, total	mg/L	29.0
UA	G206	C	2017/07/15	Chloride, total	mg/L	31.0
UA	G206	C	2017/10/30	Chloride, total	mg/L	30.0
UA	G206	C	2018/05/15	Chloride, total	mg/L	26.0
UA	G206	C	2018/11/02	Chloride, total	mg/L	25.0
UA	G206	C	2019/01/17	Chloride, total	mg/L	27.0
UA	G206	C	2019/08/14	Chloride, total	mg/L	22.0
UA	G206	C	2020/01/21	Chloride, total	mg/L	24.0
UA	G206	C	2020/08/13	Chloride, total	mg/L	23.0
UA	G206	C	2020/10/13	Chloride, total	mg/L	22.0
UA	G206	C	2021/01/27	Chloride, total	mg/L	22.0
UA	G206	C	2021/05/19	Chloride, total	mg/L	25.0
UA	G206	C	2021/08/20	Chloride, total	mg/L	21.0
UA	G206	C	2021/10/27	Chloride, total	mg/L	22.0
UA	G206	C	2022/02/10	Chloride, total	mg/L	23.0
UA	G206	C	2022/05/10	Chloride, total	mg/L	22.0
UA	G206	C	2022/08/23	Chloride, total	mg/L	21.0
UA	G206	C	2022/11/08	Chloride, total	mg/L	19.0
UA	G206	C	2023/02/16	Chloride, total	mg/L	23.0
UA	G206	C	2023/06/09	Chloride, total	mg/L	22.0
UA	G206	C	2023/08/14	Chloride, total	mg/L	23.0
UA	G206	C	2023/11/15	Chloride, total	mg/L	23.0
UA	G206	C	2023/06/09	Ferrous Iron, dissolved	mg/L	0.990
UA	G206	C	2010/11/22	Iron, dissolved	mg/L	<0.1
UA	G206	C	2011/01/24	Iron, dissolved	mg/L	0.0240
UA	G206	C	2011/03/08	Iron, dissolved	mg/L	0.0350
UA	G206	C	2011/05/04	Iron, dissolved	mg/L	0.0180
UA	G206	C	2011/07/26	Iron, dissolved	mg/L	<0.01
UA	G206	C	2011/09/19	Iron, dissolved	mg/L	<0.01
UA	G206	C	2011/11/11	Iron, dissolved	mg/L	<0.01

UA	G206	C	2012/01/30	Iron, dissolved	mg/L	0.0260
UA	G206	C	2012/05/23	Iron, dissolved	mg/L	0.0160
UA	G206	C	2012/07/23	Iron, dissolved	mg/L	<0.01
UA	G206	C	2012/11/14	Iron, dissolved	mg/L	<0.01
UA	G206	C	2013/01/29	Iron, dissolved	mg/L	<0.01
UA	G206	C	2013/05/21	Iron, dissolved	mg/L	0.0140
UA	G206	C	2013/07/23	Iron, dissolved	mg/L	0.0130
UA	G206	C	2013/10/14	Iron, dissolved	mg/L	<0.01
UA	G206	C	2014/02/20	Iron, dissolved	mg/L	0.0110
UA	G206	C	2014/05/13	Iron, dissolved	mg/L	0.0130
UA	G206	C	2014/08/11	Iron, dissolved	mg/L	0.0130
UA	G206	C	2014/10/15	Iron, dissolved	mg/L	0.0170
UA	G206	C	2015/01/21	Iron, dissolved	mg/L	0.0160
UA	G206	C	2015/04/09	Iron, dissolved	mg/L	<0.01
UA	G206	C	2015/07/22	Iron, dissolved	mg/L	1.80
UA	G206	C	2015/10/07	Iron, dissolved	mg/L	0.0970
UA	G206	C	2016/02/24	Iron, dissolved	mg/L	0.400
UA	G206	C	2016/06/27	Iron, dissolved	mg/L	0.300
UA	G206	C	2016/07/26	Iron, dissolved	mg/L	0.460
UA	G206	C	2016/11/22	Iron, dissolved	mg/L	<0.01
UA	G206	C	2017/02/13	Iron, dissolved	mg/L	<0.01
UA	G206	C	2017/05/21	Iron, dissolved	mg/L	0.0300
UA	G206	C	2017/07/24	Iron, dissolved	mg/L	0.240
UA	G206	C	2017/10/30	Iron, dissolved	mg/L	0.260
UA	G206	C	2018/01/25	Iron, dissolved	mg/L	0.0690
UA	G206	C	2018/05/15	Iron, dissolved	mg/L	<0.01
UA	G206	C	2018/08/08	Iron, dissolved	mg/L	0.0170
UA	G206	C	2018/11/02	Iron, dissolved	mg/L	<0.1
UA	G206	C	2019/01/17	Iron, dissolved	mg/L	2.80
UA	G206	C	2019/05/03	Iron, dissolved	mg/L	<0.01
UA	G206	C	2019/08/14	Iron, dissolved	mg/L	0.400
UA	G206	C	2019/10/23	Iron, dissolved	mg/L	0.240
UA	G206	C	2020/01/21	Iron, dissolved	mg/L	0.0130
UA	G206	C	2020/05/05	Iron, dissolved	mg/L	<0.01
UA	G206	C	2020/08/13	Iron, dissolved	mg/L	<0.01
UA	G206	C	2020/10/13	Iron, dissolved	mg/L	<0.01
UA	G206	C	2021/01/27	Iron, dissolved	mg/L	<0.01
UA	G206	C	2021/05/19	Iron, dissolved	mg/L	<0.01
UA	G206	C	2021/08/20	Iron, dissolved	mg/L	<0.01
UA	G206	C	2021/10/27	Iron, dissolved	mg/L	<0.01
UA	G206	C	2022/02/10	Iron, dissolved	mg/L	<0.01
UA	G206	C	2022/05/10	Iron, dissolved	mg/L	0.160
UA	G206	C	2022/08/23	Iron, dissolved	mg/L	0.270
UA	G206	C	2022/11/08	Iron, dissolved	mg/L	0.300
UA	G206	C	2023/02/16	Iron, dissolved	mg/L	<0.00072
UA	G206	C	2023/06/09	Iron, dissolved	mg/L	0.840
UA	G206	C	2023/08/14	Iron, dissolved	mg/L	0.285
UA	G206	C	2023/11/15	Iron, dissolved	mg/L	0.309
UA	G206	C	2010/11/22	Magnesium, total	mg/L	42.0
UA	G206	C	2011/01/24	Magnesium, total	mg/L	30.0

UA	G206	C	2011/03/08	Magnesium, total	mg/L	33.0
UA	G206	C	2011/05/04	Magnesium, total	mg/L	<100
UA	G206	C	2011/07/26	Magnesium, total	mg/L	29.0
UA	G206	C	2011/09/19	Magnesium, total	mg/L	2.90
UA	G206	C	2012/01/30	Magnesium, total	mg/L	31.0
UA	G206	C	2013/01/29	Magnesium, total	mg/L	32.0
UA	G206	C	2014/02/20	Magnesium, total	mg/L	32.0
UA	G206	C	2015/04/09	Magnesium, total	mg/L	37.0
UA	G206	C	2017/07/15	Magnesium, total	mg/L	33.0
UA	G206	C	2020/01/21	Magnesium, total	mg/L	34.0
UA	G206	C	2020/08/13	Magnesium, total	mg/L	33.0
UA	G206	C	2021/01/27	Magnesium, total	mg/L	35.0
UA	G206	C	2021/08/20	Magnesium, total	mg/L	38.0
UA	G206	C	2022/02/10	Magnesium, total	mg/L	34.0
UA	G206	C	2022/05/10	Magnesium, total	mg/L	34.0
UA	G206	C	2022/08/23	Magnesium, total	mg/L	40.0
UA	G206	C	2023/02/16	Magnesium, total	mg/L	32.0
UA	G206	C	2023/06/09	Magnesium, total	mg/L	37.0
UA	G206	C	2023/08/14	Magnesium, total	mg/L	35.9
UA	G206	C	2023/11/15	Magnesium, total	mg/L	35.2
UA	G206	C	2010/11/22	Manganese, dissolved	mg/L	0.0530
UA	G206	C	2011/01/24	Manganese, dissolved	mg/L	0.0390
UA	G206	C	2011/03/08	Manganese, dissolved	mg/L	0.0100
UA	G206	C	2011/05/04	Manganese, dissolved	mg/L	0.0370
UA	G206	C	2011/07/26	Manganese, dissolved	mg/L	0.0270
UA	G206	C	2011/09/19	Manganese, dissolved	mg/L	0.0280
UA	G206	C	2011/11/11	Manganese, dissolved	mg/L	0.0120
UA	G206	C	2012/01/30	Manganese, dissolved	mg/L	0.0240
UA	G206	C	2012/05/23	Manganese, dissolved	mg/L	0.0110
UA	G206	C	2012/07/23	Manganese, dissolved	mg/L	0.00960
UA	G206	C	2012/11/14	Manganese, dissolved	mg/L	0.0140
UA	G206	C	2013/01/29	Manganese, dissolved	mg/L	0.0500
UA	G206	C	2013/05/21	Manganese, dissolved	mg/L	0.00120
UA	G206	C	2013/07/23	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2013/10/14	Manganese, dissolved	mg/L	0.00110
UA	G206	C	2014/02/20	Manganese, dissolved	mg/L	0.00340
UA	G206	C	2014/05/13	Manganese, dissolved	mg/L	0.00450
UA	G206	C	2014/08/11	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2014/10/15	Manganese, dissolved	mg/L	0.00250
UA	G206	C	2015/01/21	Manganese, dissolved	mg/L	0.00480
UA	G206	C	2015/04/09	Manganese, dissolved	mg/L	<0.002
UA	G206	C	2015/07/22	Manganese, dissolved	mg/L	0.130
UA	G206	C	2015/10/07	Manganese, dissolved	mg/L	1.10
UA	G206	C	2016/02/24	Manganese, dissolved	mg/L	0.0900
UA	G206	C	2016/06/27	Manganese, dissolved	mg/L	0.640
UA	G206	C	2016/07/26	Manganese, dissolved	mg/L	0.240
UA	G206	C	2016/11/22	Manganese, dissolved	mg/L	0.0520
UA	G206	C	2017/02/13	Manganese, dissolved	mg/L	0.00180
UA	G206	C	2017/05/21	Manganese, dissolved	mg/L	0.0290
UA	G206	C	2017/07/24	Manganese, dissolved	mg/L	0.680

UA	G206	C	2017/10/30	Manganese, dissolved	mg/L	0.220
UA	G206	C	2018/01/25	Manganese, dissolved	mg/L	0.0130
UA	G206	C	2018/05/15	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2018/08/08	Manganese, dissolved	mg/L	0.00840
UA	G206	C	2018/11/02	Manganese, dissolved	mg/L	0.0160
UA	G206	C	2019/01/17	Manganese, dissolved	mg/L	0.190
UA	G206	C	2019/05/03	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2019/08/14	Manganese, dissolved	mg/L	0.180
UA	G206	C	2019/10/23	Manganese, dissolved	mg/L	0.150
UA	G206	C	2020/01/21	Manganese, dissolved	mg/L	0.00400
UA	G206	C	2020/05/05	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2020/08/13	Manganese, dissolved	mg/L	0.00720
UA	G206	C	2020/10/13	Manganese, dissolved	mg/L	0.0170
UA	G206	C	2021/01/27	Manganese, dissolved	mg/L	0.00790
UA	G206	C	2021/05/19	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2021/08/20	Manganese, dissolved	mg/L	0.0110
UA	G206	C	2021/10/27	Manganese, dissolved	mg/L	0.0210
UA	G206	C	2022/02/10	Manganese, dissolved	mg/L	<0.001
UA	G206	C	2022/05/10	Manganese, dissolved	mg/L	0.00210
UA	G206	C	2022/08/23	Manganese, dissolved	mg/L	0.110
UA	G206	C	2022/11/08	Manganese, dissolved	mg/L	0.120
UA	G206	C	2023/02/16	Manganese, dissolved	mg/L	0.00720
UA	G206	C	2023/06/09	Manganese, dissolved	mg/L	0.250
UA	G206	C	2023/08/14	Manganese, dissolved	mg/L	0.164
UA	G206	C	2023/11/15	Manganese, dissolved	mg/L	0.156
UA	G206	C	2023/08/14	Phosphate, dissolved	mg/L	0.706
UA	G206	C	2010/11/22	Potassium, total	mg/L	3.00
UA	G206	C	2011/01/24	Potassium, total	mg/L	1.10
UA	G206	C	2011/03/08	Potassium, total	mg/L	0.580
UA	G206	C	2011/05/04	Potassium, total	mg/L	0.190
UA	G206	C	2011/07/26	Potassium, total	mg/L	0.630
UA	G206	C	2011/09/19	Potassium, total	mg/L	0.0600
UA	G206	C	2012/01/30	Potassium, total	mg/L	0.730
UA	G206	C	2013/01/29	Potassium, total	mg/L	0.360
UA	G206	C	2014/02/20	Potassium, total	mg/L	0.370
UA	G206	C	2015/04/09	Potassium, total	mg/L	0.400
UA	G206	C	2017/07/15	Potassium, total	mg/L	0.650
UA	G206	C	2020/01/21	Potassium, total	mg/L	0.350
UA	G206	C	2020/08/13	Potassium, total	mg/L	0.250
UA	G206	C	2021/01/27	Potassium, total	mg/L	0.250
UA	G206	C	2021/08/20	Potassium, total	mg/L	0.330
UA	G206	C	2022/02/10	Potassium, total	mg/L	0.540
UA	G206	C	2022/05/10	Potassium, total	mg/L	0.370
UA	G206	C	2022/08/23	Potassium, total	mg/L	0.910
UA	G206	C	2023/02/16	Potassium, total	mg/L	0.370
UA	G206	C	2023/06/09	Potassium, total	mg/L	0.850
UA	G206	C	2023/08/14	Potassium, total	mg/L	0.870
UA	G206	C	2023/11/15	Potassium, total	mg/L	0.625
UA	G206	C	2023/06/09	Silicon, dissolved	mg/L	8.50
UA	G206	C	2023/08/14	Silicon, dissolved	mg/L	7.11

UA	G206	C	2010/11/22	Sodium, total	mg/L	48.0
UA	G206	C	2011/01/24	Sodium, total	mg/L	44.0
UA	G206	C	2011/03/08	Sodium, total	mg/L	48.0
UA	G206	C	2011/05/04	Sodium, total	mg/L	<100
UA	G206	C	2011/07/26	Sodium, total	mg/L	45.0
UA	G206	C	2011/09/19	Sodium, total	mg/L	4.10
UA	G206	C	2012/01/30	Sodium, total	mg/L	67.0
UA	G206	C	2013/01/29	Sodium, total	mg/L	48.0
UA	G206	C	2014/02/20	Sodium, total	mg/L	45.0
UA	G206	C	2015/04/09	Sodium, total	mg/L	53.0
UA	G206	C	2017/07/15	Sodium, total	mg/L	44.0
UA	G206	C	2020/01/21	Sodium, total	mg/L	55.0
UA	G206	C	2020/08/13	Sodium, total	mg/L	52.0
UA	G206	C	2021/01/27	Sodium, total	mg/L	42.0
UA	G206	C	2021/08/20	Sodium, total	mg/L	52.0
UA	G206	C	2022/02/10	Sodium, total	mg/L	54.0
UA	G206	C	2022/05/10	Sodium, total	mg/L	51.0
UA	G206	C	2022/08/23	Sodium, total	mg/L	55.0
UA	G206	C	2023/02/16	Sodium, total	mg/L	47.0
UA	G206	C	2023/06/09	Sodium, total	mg/L	50.0
UA	G206	C	2023/08/14	Sodium, total	mg/L	52.6
UA	G206	C	2023/11/15	Sodium, total	mg/L	49.8
UA	G206	C	2010/11/22	Sulfate, total	mg/L	77.0
UA	G206	C	2011/01/24	Sulfate, total	mg/L	62.0
UA	G206	C	2011/03/08	Sulfate, total	mg/L	58.0
UA	G206	C	2011/05/04	Sulfate, total	mg/L	64.0
UA	G206	C	2011/07/26	Sulfate, total	mg/L	59.0
UA	G206	C	2011/09/19	Sulfate, total	mg/L	60.0
UA	G206	C	2011/11/11	Sulfate, total	mg/L	57.0
UA	G206	C	2012/01/30	Sulfate, total	mg/L	63.0
UA	G206	C	2012/05/23	Sulfate, total	mg/L	60.0
UA	G206	C	2012/07/23	Sulfate, total	mg/L	58.0
UA	G206	C	2012/11/14	Sulfate, total	mg/L	61.0
UA	G206	C	2013/01/29	Sulfate, total	mg/L	69.0
UA	G206	C	2013/05/21	Sulfate, total	mg/L	93.0
UA	G206	C	2013/07/23	Sulfate, total	mg/L	100
UA	G206	C	2013/10/14	Sulfate, total	mg/L	96.0
UA	G206	C	2014/02/20	Sulfate, total	mg/L	110
UA	G206	C	2014/05/13	Sulfate, total	mg/L	130
UA	G206	C	2014/08/11	Sulfate, total	mg/L	130
UA	G206	C	2014/10/15	Sulfate, total	mg/L	120
UA	G206	C	2015/01/21	Sulfate, total	mg/L	130
UA	G206	C	2015/04/09	Sulfate, total	mg/L	130
UA	G206	C	2015/07/22	Sulfate, total	mg/L	32.0
UA	G206	C	2015/10/07	Sulfate, total	mg/L	110
UA	G206	C	2015/11/18	Sulfate, total	mg/L	95.0
UA	G206	C	2016/02/24	Sulfate, total	mg/L	150
UA	G206	C	2016/06/27	Sulfate, total	mg/L	130
UA	G206	C	2016/08/06	Sulfate, total	mg/L	130
UA	G206	C	2016/11/22	Sulfate, total	mg/L	130

UA	G206	C	2017/02/11	Sulfate, total	mg/L	150
UA	G206	C	2017/05/18	Sulfate, total	mg/L	120
UA	G206	C	2017/07/15	Sulfate, total	mg/L	100
UA	G206	C	2017/10/30	Sulfate, total	mg/L	120
UA	G206	C	2018/05/15	Sulfate, total	mg/L	130
UA	G206	C	2018/11/02	Sulfate, total	mg/L	120
UA	G206	C	2019/01/17	Sulfate, total	mg/L	110
UA	G206	C	2019/08/14	Sulfate, total	mg/L	120
UA	G206	C	2020/01/21	Sulfate, total	mg/L	120
UA	G206	C	2020/08/13	Sulfate, total	mg/L	130
UA	G206	C	2020/10/13	Sulfate, total	mg/L	130
UA	G206	C	2021/01/27	Sulfate, total	mg/L	130
UA	G206	C	2021/05/19	Sulfate, total	mg/L	130
UA	G206	C	2021/08/20	Sulfate, total	mg/L	130
UA	G206	C	2021/10/27	Sulfate, total	mg/L	120
UA	G206	C	2022/02/10	Sulfate, total	mg/L	130
UA	G206	C	2022/05/10	Sulfate, total	mg/L	130
UA	G206	C	2022/08/23	Sulfate, total	mg/L	140
UA	G206	C	2022/11/08	Sulfate, total	mg/L	130
UA	G206	C	2023/02/16	Sulfate, total	mg/L	140
UA	G206	C	2023/06/09	Sulfate, total	mg/L	140
UA	G206	C	2023/08/14	Sulfate, total	mg/L	138
UA	G206	C	2023/11/15	Sulfate, total	mg/L	132
UA	G206	C	2015/11/18	Temperature (Celsius)	degrees C	16.6
UA	G206	C	2016/02/24	Temperature (Celsius)	degrees C	12.9
UA	G206	C	2016/06/27	Temperature (Celsius)	degrees C	23.5
UA	G206	C	2016/08/06	Temperature (Celsius)	degrees C	19.3
UA	G206	C	2016/11/22	Temperature (Celsius)	degrees C	14.9
UA	G206	C	2017/02/11	Temperature (Celsius)	degrees C	15.0
UA	G206	C	2017/05/18	Temperature (Celsius)	degrees C	15.7
UA	G206	C	2017/07/15	Temperature (Celsius)	degrees C	18.5
UA	G206	C	2017/10/30	Temperature (Celsius)	degrees C	12.8
UA	G206	C	2018/05/15	Temperature (Celsius)	degrees C	15.5
UA	G206	C	2018/11/02	Temperature (Celsius)	degrees C	15.1
UA	G206	C	2019/01/17	Temperature (Celsius)	degrees C	12.4
UA	G206	C	2019/08/14	Temperature (Celsius)	degrees C	17.0
UA	G206	C	2020/01/21	Temperature (Celsius)	degrees C	13.0
UA	G206	C	2020/05/05	Temperature (Celsius)	degrees C	13.0
UA	G206	C	2020/08/13	Temperature (Celsius)	degrees C	17.8
UA	G206	C	2021/01/27	Temperature (Celsius)	degrees C	12.0
UA	G206	C	2021/08/20	Temperature (Celsius)	degrees C	20.6
UA	G206	C	2021/11/29	Temperature (Celsius)	degrees C	14.6
UA	G206	C	2022/02/10	Temperature (Celsius)	degrees C	11.9
UA	G206	C	2022/05/10	Temperature (Celsius)	degrees C	17.3
UA	G206	C	2022/08/23	Temperature (Celsius)	degrees C	20.0
UA	G206	C	2022/11/08	Temperature (Celsius)	degrees C	17.5
UA	G206	C	2023/02/16	Temperature (Celsius)	degrees C	11.7
UA	G206	C	2023/06/09	Temperature (Celsius)	degrees C	18.3
UA	G206	C	2023/08/14	Temperature (Celsius)	degrees C	16.1
UA	G206	C	2023/11/15	Temperature (Celsius)	degrees C	17.6

UA	G206	C	2010/11/22	Total Dissolved Solids	mg/L	400
UA	G206	C	2011/01/24	Total Dissolved Solids	mg/L	440
UA	G206	C	2011/03/08	Total Dissolved Solids	mg/L	430
UA	G206	C	2011/05/04	Total Dissolved Solids	mg/L	440
UA	G206	C	2011/07/26	Total Dissolved Solids	mg/L	440
UA	G206	C	2011/09/19	Total Dissolved Solids	mg/L	420
UA	G206	C	2011/11/11	Total Dissolved Solids	mg/L	410
UA	G206	C	2012/01/30	Total Dissolved Solids	mg/L	380
UA	G206	C	2012/05/23	Total Dissolved Solids	mg/L	420
UA	G206	C	2012/07/23	Total Dissolved Solids	mg/L	430
UA	G206	C	2012/11/14	Total Dissolved Solids	mg/L	400
UA	G206	C	2013/01/29	Total Dissolved Solids	mg/L	430
UA	G206	C	2013/05/21	Total Dissolved Solids	mg/L	410
UA	G206	C	2013/07/23	Total Dissolved Solids	mg/L	440
UA	G206	C	2013/10/14	Total Dissolved Solids	mg/L	420
UA	G206	C	2014/02/20	Total Dissolved Solids	mg/L	440
UA	G206	C	2014/05/13	Total Dissolved Solids	mg/L	470
UA	G206	C	2014/08/11	Total Dissolved Solids	mg/L	500
UA	G206	C	2014/10/15	Total Dissolved Solids	mg/L	470
UA	G206	C	2015/01/21	Total Dissolved Solids	mg/L	480
UA	G206	C	2015/04/09	Total Dissolved Solids	mg/L	480
UA	G206	C	2015/07/22	Total Dissolved Solids	mg/L	380
UA	G206	C	2015/10/07	Total Dissolved Solids	mg/L	480
UA	G206	C	2015/11/18	Total Dissolved Solids	mg/L	460
UA	G206	C	2016/02/24	Total Dissolved Solids	mg/L	500
UA	G206	C	2016/06/27	Total Dissolved Solids	mg/L	420
UA	G206	C	2016/08/06	Total Dissolved Solids	mg/L	420
UA	G206	C	2016/11/22	Total Dissolved Solids	mg/L	480
UA	G206	C	2017/02/11	Total Dissolved Solids	mg/L	680
UA	G206	C	2017/05/18	Total Dissolved Solids	mg/L	460
UA	G206	C	2017/07/15	Total Dissolved Solids	mg/L	480
UA	G206	C	2017/10/30	Total Dissolved Solids	mg/L	460
UA	G206	C	2018/05/15	Total Dissolved Solids	mg/L	450
UA	G206	C	2018/11/02	Total Dissolved Solids	mg/L	440
UA	G206	C	2019/01/17	Total Dissolved Solids	mg/L	480
UA	G206	C	2019/08/14	Total Dissolved Solids	mg/L	470
UA	G206	C	2020/01/21	Total Dissolved Solids	mg/L	470
UA	G206	C	2020/08/13	Total Dissolved Solids	mg/L	500
UA	G206	C	2020/10/13	Total Dissolved Solids	mg/L	530
UA	G206	C	2021/01/27	Total Dissolved Solids	mg/L	480
UA	G206	C	2021/05/19	Total Dissolved Solids	mg/L	580
UA	G206	C	2021/08/20	Total Dissolved Solids	mg/L	560
UA	G206	C	2021/10/27	Total Dissolved Solids	mg/L	500
UA	G206	C	2022/02/10	Total Dissolved Solids	mg/L	540
UA	G206	C	2022/05/10	Total Dissolved Solids	mg/L	490
UA	G206	C	2022/08/23	Total Dissolved Solids	mg/L	540
UA	G206	C	2022/11/08	Total Dissolved Solids	mg/L	450
UA	G206	C	2023/02/16	Total Dissolved Solids	mg/L	460
UA	G206	C	2023/06/09	Total Dissolved Solids	mg/L	600
UA	G206	C	2023/08/14	Total Dissolved Solids	mg/L	548

UA	G206	C	2023/11/15	Total Dissolved Solids	mg/L	485
UA	G209	C	2010/11/22	pH (field)	SU	7.1
UA	G209	C	2011/01/25	pH (field)	SU	7.3
UA	G209	C	2011/03/08	pH (field)	SU	7.0
UA	G209	C	2011/05/04	pH (field)	SU	7.0
UA	G209	C	2011/07/26	pH (field)	SU	7.2
UA	G209	C	2011/09/19	pH (field)	SU	7.0
UA	G209	C	2011/11/11	pH (field)	SU	7.1
UA	G209	C	2012/01/31	pH (field)	SU	7.3
UA	G209	C	2012/05/23	pH (field)	SU	7.1
UA	G209	C	2012/07/25	pH (field)	SU	6.7
UA	G209	C	2012/11/14	pH (field)	SU	7.2
UA	G209	C	2013/01/30	pH (field)	SU	7.3
UA	G209	C	2013/05/21	pH (field)	SU	6.4
UA	G209	C	2013/07/23	pH (field)	SU	7.0
UA	G209	C	2013/10/14	pH (field)	SU	7.1
UA	G209	C	2014/02/20	pH (field)	SU	7.1
UA	G209	C	2014/05/13	pH (field)	SU	7.1
UA	G209	C	2014/08/11	pH (field)	SU	7.1
UA	G209	C	2014/10/15	pH (field)	SU	7.1
UA	G209	C	2015/01/21	pH (field)	SU	7.4
UA	G209	C	2015/04/09	pH (field)	SU	6.9
UA	G209	C	2015/07/22	pH (field)	SU	7.0
UA	G209	C	2015/10/07	pH (field)	SU	7.1
UA	G209	C	2015/11/18	pH (field)	SU	7.0
UA	G209	C	2016/02/23	pH (field)	SU	7.0
UA	G209	C	2016/05/11	pH (field)	SU	7.1
UA	G209	C	2016/08/06	pH (field)	SU	7.2
UA	G209	C	2016/11/22	pH (field)	SU	7.1
UA	G209	C	2017/02/11	pH (field)	SU	7.0
UA	G209	C	2017/05/18	pH (field)	SU	7.2
UA	G209	C	2017/07/15	pH (field)	SU	7.3
UA	G209	C	2017/10/31	pH (field)	SU	7.1
UA	G209	C	2018/01/25	pH (field)	SU	7.0
UA	G209	C	2018/05/15	pH (field)	SU	7.2
UA	G209	C	2018/11/02	pH (field)	SU	7.2
UA	G209	C	2019/01/17	pH (field)	SU	7.1
UA	G209	C	2019/05/03	pH (field)	SU	7.7
UA	G209	C	2019/08/14	pH (field)	SU	7.2
UA	G209	C	2020/01/22	pH (field)	SU	6.9
UA	G209	C	2020/05/05	pH (field)	SU	7.2
UA	G209	C	2020/08/13	pH (field)	SU	7.2
UA	G209	C	2020/10/13	pH (field)	SU	7.0
UA	G209	C	2021/01/27	pH (field)	SU	7.1
UA	G209	C	2021/05/19	pH (field)	SU	7.2
UA	G209	C	2021/08/20	pH (field)	SU	6.8
UA	G209	C	2021/10/27	pH (field)	SU	6.8
UA	G209	C	2021/11/29	pH (field)	SU	7.0
UA	G209	C	2022/02/10	pH (field)	SU	7.2
UA	G209	C	2022/05/11	pH (field)	SU	6.9

UA	G209	C	2022/08/23	pH (field)	SU	6.8
UA	G209	C	2022/11/08	pH (field)	SU	7.1
UA	G209	C	2023/02/15	pH (field)	SU	7.3
UA	G209	C	2023/06/09	pH (field)	SU	7.0
UA	G209	C	2023/08/14	pH (field)	SU	6.6
UA	G209	C	2023/11/16	pH (field)	SU	7.0
UA	G209	C	2015/11/18	Oxidation Reduction Potential	mV	-98.0
UA	G209	C	2016/02/23	Oxidation Reduction Potential	mV	76.0
UA	G209	C	2016/05/11	Oxidation Reduction Potential	mV	144
UA	G209	C	2016/08/06	Oxidation Reduction Potential	mV	149
UA	G209	C	2016/11/22	Oxidation Reduction Potential	mV	138
UA	G209	C	2017/02/11	Oxidation Reduction Potential	mV	-109
UA	G209	C	2017/05/18	Oxidation Reduction Potential	mV	-99.0
UA	G209	C	2017/07/15	Oxidation Reduction Potential	mV	161
UA	G209	C	2017/10/31	Oxidation Reduction Potential	mV	140
UA	G209	C	2018/01/25	Oxidation Reduction Potential	mV	101
UA	G209	C	2018/05/15	Oxidation Reduction Potential	mV	117
UA	G209	C	2018/11/02	Oxidation Reduction Potential	mV	148
UA	G209	C	2019/01/17	Oxidation Reduction Potential	mV	141
UA	G209	C	2019/05/03	Oxidation Reduction Potential	mV	159
UA	G209	C	2019/08/14	Oxidation Reduction Potential	mV	151
UA	G209	C	2020/01/22	Oxidation Reduction Potential	mV	-69.0
UA	G209	C	2020/05/05	Oxidation Reduction Potential	mV	-34.5
UA	G209	C	2020/08/13	Oxidation Reduction Potential	mV	-60.3
UA	G209	C	2021/01/27	Oxidation Reduction Potential	mV	47.8
UA	G209	C	2021/08/20	Oxidation Reduction Potential	mV	-82.5
UA	G209	C	2021/11/29	Oxidation Reduction Potential	mV	-14.0
UA	G209	C	2022/02/10	Oxidation Reduction Potential	mV	-53.8
UA	G209	C	2022/05/11	Oxidation Reduction Potential	mV	44.4
UA	G209	C	2022/08/23	Oxidation Reduction Potential	mV	-120
UA	G209	C	2022/11/08	Oxidation Reduction Potential	mV	-76.9
UA	G209	C	2023/02/15	Oxidation Reduction Potential	mV	128
UA	G209	C	2023/06/09	Oxidation Reduction Potential	mV	-33.0
UA	G209	C	2023/08/14	Oxidation Reduction Potential	mV	84.0
UA	G209	C	2023/11/16	Oxidation Reduction Potential	mV	-23.0
UA	G209	C	2015/11/18	Eh	V	0.096
UA	G209	C	2016/02/23	Eh	V	0.27
UA	G209	C	2016/05/11	Eh	V	0.34
UA	G209	C	2016/08/06	Eh	V	0.34
UA	G209	C	2016/11/22	Eh	V	0.33
UA	G209	C	2017/02/11	Eh	V	0.087
UA	G209	C	2017/05/18	Eh	V	0.096
UA	G209	C	2017/07/15	Eh	V	0.35
UA	G209	C	2017/10/31	Eh	V	0.34
UA	G209	C	2018/01/25	Eh	V	0.30
UA	G209	C	2018/05/15	Eh	V	0.31
UA	G209	C	2018/11/02	Eh	V	0.34
UA	G209	C	2019/01/17	Eh	V	0.34
UA	G209	C	2019/05/03	Eh	V	0.35
UA	G209	C	2019/08/14	Eh	V	0.35

UA	G209	C	2020/01/22	Eh	V	0.13
UA	G209	C	2020/05/05	Eh	V	0.16
UA	G209	C	2020/08/13	Eh	V	0.13
UA	G209	C	2021/01/27	Eh	V	0.25
UA	G209	C	2021/08/20	Eh	V	0.11
UA	G209	C	2021/11/29	Eh	V	0.18
UA	G209	C	2022/02/10	Eh	V	0.14
UA	G209	C	2022/05/11	Eh	V	0.24
UA	G209	C	2022/08/23	Eh	V	0.072
UA	G209	C	2022/11/08	Eh	V	0.12
UA	G209	C	2023/02/15	Eh	V	0.32
UA	G209	C	2023/06/09	Eh	V	0.16
UA	G209	C	2023/08/14	Eh	V	0.28
UA	G209	C	2023/11/16	Eh	V	0.17
UA	G209	C	2010/12/14	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G209	C	2011/01/25	Alkalinity, bicarbonate	mg/L CaCO3	350
UA	G209	C	2011/03/08	Alkalinity, bicarbonate	mg/L CaCO3	410
UA	G209	C	2011/05/04	Alkalinity, bicarbonate	mg/L CaCO3	430
UA	G209	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	410
UA	G209	C	2011/09/19	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G209	C	2012/01/31	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G209	C	2013/01/30	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G209	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	420
UA	G209	C	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	420
UA	G209	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	430
UA	G209	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	420
UA	G209	C	2015/04/09	Alkalinity, bicarbonate	mg/L CaCO3	430
UA	G209	C	2017/07/15	Alkalinity, bicarbonate	mg/L CaCO3	590
UA	G209	C	2020/01/22	Alkalinity, bicarbonate	mg/L CaCO3	410
UA	G209	C	2020/08/13	Alkalinity, bicarbonate	mg/L CaCO3	410
UA	G209	C	2021/01/27	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G209	C	2021/08/20	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G209	C	2022/02/10	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	G209	C	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G209	C	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G209	C	2023/02/15	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G209	C	2023/06/09	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G209	C	2023/08/14	Alkalinity, bicarbonate	mg/L CaCO3	401
UA	G209	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	387
UA	G209	C	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	G209	C	2010/11/22	Barium, total	mg/L	0.100
UA	G209	C	2011/01/25	Barium, total	mg/L	0.0880
UA	G209	C	2011/03/08	Barium, total	mg/L	0.0900
UA	G209	C	2011/05/04	Barium, total	mg/L	0.0480
UA	G209	C	2011/07/26	Barium, total	mg/L	0.100
UA	G209	C	2011/09/19	Barium, total	mg/L	0.100
UA	G209	C	2012/01/31	Barium, total	mg/L	0.0990
UA	G209	C	2013/01/30	Barium, total	mg/L	0.110
UA	G209	C	2014/02/20	Barium, total	mg/L	0.0700
UA	G209	C	2015/04/09	Barium, total	mg/L	0.100

UA	G209	C	2015/07/22	Barium, total	mg/L	0.130
UA	G209	C	2015/10/07	Barium, total	mg/L	0.110
UA	G209	C	2015/11/18	Barium, total	mg/L	0.0720
UA	G209	C	2016/02/23	Barium, total	mg/L	0.0660
UA	G209	C	2016/05/11	Barium, total	mg/L	0.0610
UA	G209	C	2016/08/06	Barium, total	mg/L	0.0650
UA	G209	C	2016/11/22	Barium, total	mg/L	0.0450
UA	G209	C	2017/02/11	Barium, total	mg/L	0.0700
UA	G209	C	2017/05/18	Barium, total	mg/L	0.0770
UA	G209	C	2017/07/15	Barium, total	mg/L	0.0630
UA	G209	C	2020/10/13	Barium, total	mg/L	0.0520
UA	G209	C	2021/01/27	Barium, total	mg/L	0.0430
UA	G209	C	2021/05/19	Barium, total	mg/L	0.0600
UA	G209	C	2021/08/20	Barium, total	mg/L	0.0590
UA	G209	C	2021/10/27	Barium, total	mg/L	0.0620
UA	G209	C	2022/02/10	Barium, total	mg/L	0.0630
UA	G209	C	2022/05/11	Barium, total	mg/L	0.0940
UA	G209	C	2022/08/23	Barium, total	mg/L	0.0580
UA	G209	C	2022/11/08	Barium, total	mg/L	0.0540
UA	G209	C	2023/02/15	Barium, total	mg/L	0.0570
UA	G209	C	2023/06/09	Barium, total	mg/L	0.0700
UA	G209	C	2023/08/14	Barium, total	mg/L	0.0685
UA	G209	C	2023/11/16	Barium, total	mg/L	0.0599
UA	G209	C	2010/11/22	Calcium, total	mg/L	110
UA	G209	C	2011/01/25	Calcium, total	mg/L	150
UA	G209	C	2011/03/08	Calcium, total	mg/L	170
UA	G209	C	2011/05/04	Calcium, total	mg/L	<100
UA	G209	C	2011/07/26	Calcium, total	mg/L	160
UA	G209	C	2011/09/19	Calcium, total	mg/L	170
UA	G209	C	2011/11/11	Calcium, total	mg/L	160
UA	G209	C	2012/01/31	Calcium, total	mg/L	220
UA	G209	C	2012/05/23	Calcium, total	mg/L	170
UA	G209	C	2012/07/25	Calcium, total	mg/L	180
UA	G209	C	2012/11/14	Calcium, total	mg/L	170
UA	G209	C	2013/01/30	Calcium, total	mg/L	170
UA	G209	C	2013/05/21	Calcium, total	mg/L	170
UA	G209	C	2013/07/23	Calcium, total	mg/L	170
UA	G209	C	2013/10/14	Calcium, total	mg/L	170
UA	G209	C	2014/02/20	Calcium, total	mg/L	160
UA	G209	C	2014/05/13	Calcium, total	mg/L	170
UA	G209	C	2014/08/11	Calcium, total	mg/L	160
UA	G209	C	2014/10/15	Calcium, total	mg/L	170
UA	G209	C	2015/01/21	Calcium, total	mg/L	150
UA	G209	C	2015/04/09	Calcium, total	mg/L	180
UA	G209	C	2015/11/18	Calcium, total	mg/L	160
UA	G209	C	2016/02/23	Calcium, total	mg/L	150
UA	G209	C	2016/05/11	Calcium, total	mg/L	160
UA	G209	C	2016/08/06	Calcium, total	mg/L	160
UA	G209	C	2016/11/22	Calcium, total	mg/L	100
UA	G209	C	2017/02/11	Calcium, total	mg/L	120

UA	G209	C	2017/05/18	Calcium, total	mg/L	130
UA	G209	C	2017/07/15	Calcium, total	mg/L	120
UA	G209	C	2017/10/31	Calcium, total	mg/L	150
UA	G209	C	2018/01/25	Calcium, total	mg/L	120
UA	G209	C	2018/05/15	Calcium, total	mg/L	140
UA	G209	C	2018/11/02	Calcium, total	mg/L	160
UA	G209	C	2019/01/17	Calcium, total	mg/L	150
UA	G209	C	2019/05/03	Calcium, total	mg/L	150
UA	G209	C	2019/08/14	Calcium, total	mg/L	160
UA	G209	C	2020/01/22	Calcium, total	mg/L	150
UA	G209	C	2020/05/05	Calcium, total	mg/L	140
UA	G209	C	2020/08/13	Calcium, total	mg/L	150
UA	G209	C	2021/01/27	Calcium, total	mg/L	120
UA	G209	C	2021/08/20	Calcium, total	mg/L	150
UA	G209	C	2022/02/10	Calcium, total	mg/L	150
UA	G209	C	2022/05/11	Calcium, total	mg/L	150
UA	G209	C	2022/08/23	Calcium, total	mg/L	160
UA	G209	C	2023/02/15	Calcium, total	mg/L	150
UA	G209	C	2023/06/09	Calcium, total	mg/L	140
UA	G209	C	2023/08/14	Calcium, total	mg/L	149
UA	G209	C	2023/11/16	Calcium, total	mg/L	143
UA	G209	C	2010/11/22	Chloride, total	mg/L	60.0
UA	G209	C	2011/01/25	Chloride, total	mg/L	62.0
UA	G209	C	2011/03/08	Chloride, total	mg/L	69.0
UA	G209	C	2011/05/04	Chloride, total	mg/L	68.0
UA	G209	C	2011/07/26	Chloride, total	mg/L	72.0
UA	G209	C	2011/09/19	Chloride, total	mg/L	73.0
UA	G209	C	2011/11/11	Chloride, total	mg/L	71.0
UA	G209	C	2012/01/31	Chloride, total	mg/L	76.0
UA	G209	C	2012/05/23	Chloride, total	mg/L	78.0
UA	G209	C	2012/07/25	Chloride, total	mg/L	72.0
UA	G209	C	2012/11/14	Chloride, total	mg/L	71.0
UA	G209	C	2013/01/30	Chloride, total	mg/L	81.0
UA	G209	C	2013/05/21	Chloride, total	mg/L	100
UA	G209	C	2013/07/23	Chloride, total	mg/L	75.0
UA	G209	C	2013/10/14	Chloride, total	mg/L	63.0
UA	G209	C	2014/02/20	Chloride, total	mg/L	74.0
UA	G209	C	2014/05/13	Chloride, total	mg/L	70.0
UA	G209	C	2014/08/11	Chloride, total	mg/L	74.0
UA	G209	C	2014/10/15	Chloride, total	mg/L	76.0
UA	G209	C	2015/01/21	Chloride, total	mg/L	73.0
UA	G209	C	2015/04/09	Chloride, total	mg/L	69.0
UA	G209	C	2015/07/22	Chloride, total	mg/L	69.0
UA	G209	C	2015/10/07	Chloride, total	mg/L	59.0
UA	G209	C	2015/11/18	Chloride, total	mg/L	67.0
UA	G209	C	2016/02/23	Chloride, total	mg/L	70.0
UA	G209	C	2016/05/11	Chloride, total	mg/L	59.0
UA	G209	C	2016/08/06	Chloride, total	mg/L	67.0
UA	G209	C	2016/11/22	Chloride, total	mg/L	70.0
UA	G209	C	2017/02/11	Chloride, total	mg/L	60.0

UA	G209	C	2017/05/18	Chloride, total	mg/L	63.0
UA	G209	C	2017/07/15	Chloride, total	mg/L	72.0
UA	G209	C	2017/10/31	Chloride, total	mg/L	63.0
UA	G209	C	2018/05/15	Chloride, total	mg/L	65.0
UA	G209	C	2018/11/02	Chloride, total	mg/L	59.0
UA	G209	C	2019/01/17	Chloride, total	mg/L	68.0
UA	G209	C	2019/08/14	Chloride, total	mg/L	61.0
UA	G209	C	2020/01/22	Chloride, total	mg/L	59.0
UA	G209	C	2020/08/13	Chloride, total	mg/L	65.0
UA	G209	C	2020/10/13	Chloride, total	mg/L	63.0
UA	G209	C	2021/01/27	Chloride, total	mg/L	77.0
UA	G209	C	2021/05/19	Chloride, total	mg/L	62.0
UA	G209	C	2021/08/20	Chloride, total	mg/L	59.0
UA	G209	C	2021/10/27	Chloride, total	mg/L	100
UA	G209	C	2022/02/10	Chloride, total	mg/L	63.0
UA	G209	C	2022/05/11	Chloride, total	mg/L	59.0
UA	G209	C	2022/08/23	Chloride, total	mg/L	66.0
UA	G209	C	2022/11/08	Chloride, total	mg/L	81.0
UA	G209	C	2023/02/15	Chloride, total	mg/L	56.0
UA	G209	C	2023/06/09	Chloride, total	mg/L	61.0
UA	G209	C	2023/08/14	Chloride, total	mg/L	53.0
UA	G209	C	2023/11/16	Chloride, total	mg/L	52.0
UA	G209	C	2023/06/09	Ferrous Iron, dissolved	mg/L	1.10
UA	G209	C	2010/11/22	Iron, dissolved	mg/L	<0.1
UA	G209	C	2011/01/25	Iron, dissolved	mg/L	0.0150
UA	G209	C	2011/03/08	Iron, dissolved	mg/L	<0.01
UA	G209	C	2011/05/04	Iron, dissolved	mg/L	0.0110
UA	G209	C	2011/07/26	Iron, dissolved	mg/L	<0.01
UA	G209	C	2011/09/19	Iron, dissolved	mg/L	<0.01
UA	G209	C	2011/11/11	Iron, dissolved	mg/L	<0.01
UA	G209	C	2012/01/31	Iron, dissolved	mg/L	0.0330
UA	G209	C	2012/05/23	Iron, dissolved	mg/L	0.0270
UA	G209	C	2012/07/25	Iron, dissolved	mg/L	<0.01
UA	G209	C	2012/11/14	Iron, dissolved	mg/L	<0.01
UA	G209	C	2013/01/30	Iron, dissolved	mg/L	<0.01
UA	G209	C	2013/05/21	Iron, dissolved	mg/L	<0.01
UA	G209	C	2013/07/23	Iron, dissolved	mg/L	<0.01
UA	G209	C	2013/10/14	Iron, dissolved	mg/L	<0.01
UA	G209	C	2014/02/20	Iron, dissolved	mg/L	<0.01
UA	G209	C	2014/05/13	Iron, dissolved	mg/L	<0.01
UA	G209	C	2014/08/11	Iron, dissolved	mg/L	<0.01
UA	G209	C	2014/10/15	Iron, dissolved	mg/L	<0.01
UA	G209	C	2015/01/21	Iron, dissolved	mg/L	<0.01
UA	G209	C	2015/04/09	Iron, dissolved	mg/L	0.0380
UA	G209	C	2015/07/22	Iron, dissolved	mg/L	0.430
UA	G209	C	2015/10/07	Iron, dissolved	mg/L	0.430
UA	G209	C	2016/02/23	Iron, dissolved	mg/L	0.200
UA	G209	C	2016/05/11	Iron, dissolved	mg/L	<0.01
UA	G209	C	2016/07/26	Iron, dissolved	mg/L	0.960
UA	G209	C	2016/11/22	Iron, dissolved	mg/L	1.10

UA	G209	C	2017/02/13	Iron, dissolved	mg/L	0.0810
UA	G209	C	2017/05/21	Iron, dissolved	mg/L	0.320
UA	G209	C	2017/07/24	Iron, dissolved	mg/L	0.110
UA	G209	C	2017/10/31	Iron, dissolved	mg/L	0.410
UA	G209	C	2018/01/25	Iron, dissolved	mg/L	0.850
UA	G209	C	2018/05/15	Iron, dissolved	mg/L	1.30
UA	G209	C	2018/08/08	Iron, dissolved	mg/L	0.990
UA	G209	C	2018/11/02	Iron, dissolved	mg/L	1.30
UA	G209	C	2019/01/17	Iron, dissolved	mg/L	0.0460
UA	G209	C	2019/05/03	Iron, dissolved	mg/L	0.0640
UA	G209	C	2019/08/14	Iron, dissolved	mg/L	1.90
UA	G209	C	2019/10/23	Iron, dissolved	mg/L	3.10
UA	G209	C	2020/01/22	Iron, dissolved	mg/L	0.820
UA	G209	C	2020/05/05	Iron, dissolved	mg/L	0.770
UA	G209	C	2020/08/13	Iron, dissolved	mg/L	2.00
UA	G209	C	2020/10/13	Iron, dissolved	mg/L	1.70
UA	G209	C	2021/01/27	Iron, dissolved	mg/L	0.590
UA	G209	C	2021/05/19	Iron, dissolved	mg/L	0.720
UA	G209	C	2021/08/20	Iron, dissolved	mg/L	1.90
UA	G209	C	2021/10/27	Iron, dissolved	mg/L	2.20
UA	G209	C	2022/02/10	Iron, dissolved	mg/L	1.10
UA	G209	C	2022/05/11	Iron, dissolved	mg/L	1.20
UA	G209	C	2022/08/23	Iron, dissolved	mg/L	1.60
UA	G209	C	2022/11/08	Iron, dissolved	mg/L	1.10
UA	G209	C	2023/02/15	Iron, dissolved	mg/L	0.560
UA	G209	C	2023/06/09	Iron, dissolved	mg/L	0.880
UA	G209	C	2023/08/14	Iron, dissolved	mg/L	0.798
UA	G209	C	2023/11/16	Iron, dissolved	mg/L	0.704
UA	G209	C	2010/11/22	Magnesium, total	mg/L	38.0
UA	G209	C	2011/01/25	Magnesium, total	mg/L	50.0
UA	G209	C	2011/03/08	Magnesium, total	mg/L	59.0
UA	G209	C	2011/05/04	Magnesium, total	mg/L	<100
UA	G209	C	2011/07/26	Magnesium, total	mg/L	59.0
UA	G209	C	2011/09/19	Magnesium, total	mg/L	59.0
UA	G209	C	2012/01/31	Magnesium, total	mg/L	60.0
UA	G209	C	2013/01/30	Magnesium, total	mg/L	59.0
UA	G209	C	2014/02/20	Magnesium, total	mg/L	56.0
UA	G209	C	2015/04/09	Magnesium, total	mg/L	63.0
UA	G209	C	2017/07/15	Magnesium, total	mg/L	55.0
UA	G209	C	2020/01/22	Magnesium, total	mg/L	52.0
UA	G209	C	2020/08/13	Magnesium, total	mg/L	50.0
UA	G209	C	2021/01/27	Magnesium, total	mg/L	53.0
UA	G209	C	2021/08/20	Magnesium, total	mg/L	55.0
UA	G209	C	2022/02/10	Magnesium, total	mg/L	51.0
UA	G209	C	2022/05/11	Magnesium, total	mg/L	53.0
UA	G209	C	2022/08/23	Magnesium, total	mg/L	57.0
UA	G209	C	2023/02/15	Magnesium, total	mg/L	47.0
UA	G209	C	2023/06/09	Magnesium, total	mg/L	50.0
UA	G209	C	2023/08/14	Magnesium, total	mg/L	51.2
UA	G209	C	2023/11/16	Magnesium, total	mg/L	50.6

UA	G209	C	2010/11/22	Manganese, dissolved	mg/L	0.120
UA	G209	C	2011/01/25	Manganese, dissolved	mg/L	0.0490
UA	G209	C	2011/03/08	Manganese, dissolved	mg/L	0.120
UA	G209	C	2011/05/04	Manganese, dissolved	mg/L	0.0770
UA	G209	C	2011/07/26	Manganese, dissolved	mg/L	0.180
UA	G209	C	2011/09/19	Manganese, dissolved	mg/L	0.0940
UA	G209	C	2011/11/11	Manganese, dissolved	mg/L	0.100
UA	G209	C	2012/01/31	Manganese, dissolved	mg/L	0.110
UA	G209	C	2012/05/23	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2012/07/25	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2012/11/14	Manganese, dissolved	mg/L	0.0410
UA	G209	C	2013/01/30	Manganese, dissolved	mg/L	0.120
UA	G209	C	2013/05/21	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2013/07/23	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2013/10/14	Manganese, dissolved	mg/L	0.00230
UA	G209	C	2014/02/20	Manganese, dissolved	mg/L	0.0370
UA	G209	C	2014/05/13	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2014/08/11	Manganese, dissolved	mg/L	<0.001
UA	G209	C	2014/10/15	Manganese, dissolved	mg/L	0.00280
UA	G209	C	2015/01/21	Manganese, dissolved	mg/L	0.0650
UA	G209	C	2015/04/09	Manganese, dissolved	mg/L	0.00420
UA	G209	C	2015/07/22	Manganese, dissolved	mg/L	1.40
UA	G209	C	2015/10/07	Manganese, dissolved	mg/L	0.780
UA	G209	C	2016/02/23	Manganese, dissolved	mg/L	0.350
UA	G209	C	2016/05/11	Manganese, dissolved	mg/L	0.160
UA	G209	C	2016/07/26	Manganese, dissolved	mg/L	0.890
UA	G209	C	2016/11/22	Manganese, dissolved	mg/L	0.760
UA	G209	C	2017/02/13	Manganese, dissolved	mg/L	0.0650
UA	G209	C	2017/05/21	Manganese, dissolved	mg/L	0.960
UA	G209	C	2017/07/24	Manganese, dissolved	mg/L	0.830
UA	G209	C	2017/10/31	Manganese, dissolved	mg/L	0.720
UA	G209	C	2018/01/25	Manganese, dissolved	mg/L	0.400
UA	G209	C	2018/05/15	Manganese, dissolved	mg/L	0.550
UA	G209	C	2018/08/08	Manganese, dissolved	mg/L	0.300
UA	G209	C	2018/11/02	Manganese, dissolved	mg/L	0.470
UA	G209	C	2019/01/17	Manganese, dissolved	mg/L	0.0920
UA	G209	C	2019/05/03	Manganese, dissolved	mg/L	0.0250
UA	G209	C	2019/08/14	Manganese, dissolved	mg/L	0.290
UA	G209	C	2019/10/23	Manganese, dissolved	mg/L	0.420
UA	G209	C	2020/01/22	Manganese, dissolved	mg/L	0.250
UA	G209	C	2020/05/05	Manganese, dissolved	mg/L	0.150
UA	G209	C	2020/08/13	Manganese, dissolved	mg/L	0.440
UA	G209	C	2020/10/13	Manganese, dissolved	mg/L	0.250
UA	G209	C	2021/01/27	Manganese, dissolved	mg/L	0.190
UA	G209	C	2021/05/19	Manganese, dissolved	mg/L	0.220
UA	G209	C	2021/08/20	Manganese, dissolved	mg/L	0.320
UA	G209	C	2021/10/27	Manganese, dissolved	mg/L	0.430
UA	G209	C	2022/02/10	Manganese, dissolved	mg/L	0.430
UA	G209	C	2022/05/11	Manganese, dissolved	mg/L	0.420
UA	G209	C	2022/08/23	Manganese, dissolved	mg/L	0.470

UA	G209	C	2022/11/08	Manganese, dissolved	mg/L	0.370
UA	G209	C	2023/02/15	Manganese, dissolved	mg/L	0.370
UA	G209	C	2023/06/09	Manganese, dissolved	mg/L	0.500
UA	G209	C	2023/08/14	Manganese, dissolved	mg/L	0.276
UA	G209	C	2023/11/16	Manganese, dissolved	mg/L	0.237
UA	G209	C	2023/08/14	Phosphate, dissolved	mg/L	0.0550
UA	G209	C	2010/11/22	Potassium, total	mg/L	3.50
UA	G209	C	2011/01/25	Potassium, total	mg/L	1.60
UA	G209	C	2011/03/08	Potassium, total	mg/L	0.990
UA	G209	C	2011/05/04	Potassium, total	mg/L	0.670
UA	G209	C	2011/07/26	Potassium, total	mg/L	0.720
UA	G209	C	2011/09/19	Potassium, total	mg/L	1.00
UA	G209	C	2012/01/31	Potassium, total	mg/L	0.840
UA	G209	C	2013/01/30	Potassium, total	mg/L	0.860
UA	G209	C	2014/02/20	Potassium, total	mg/L	0.580
UA	G209	C	2015/04/09	Potassium, total	mg/L	1.20
UA	G209	C	2017/07/15	Potassium, total	mg/L	2.20
UA	G209	C	2020/01/22	Potassium, total	mg/L	0.470
UA	G209	C	2020/08/13	Potassium, total	mg/L	0.400
UA	G209	C	2021/01/27	Potassium, total	mg/L	0.360
UA	G209	C	2021/08/20	Potassium, total	mg/L	0.480
UA	G209	C	2022/02/10	Potassium, total	mg/L	0.630
UA	G209	C	2022/05/11	Potassium, total	mg/L	0.660
UA	G209	C	2022/08/23	Potassium, total	mg/L	0.470
UA	G209	C	2023/02/15	Potassium, total	mg/L	0.430
UA	G209	C	2023/06/09	Potassium, total	mg/L	0.450
UA	G209	C	2023/08/14	Potassium, total	mg/L	0.551
UA	G209	C	2023/11/16	Potassium, total	mg/L	0.581
UA	G209	C	2023/06/09	Silicon, dissolved	mg/L	7.90
UA	G209	C	2023/08/14	Silicon, dissolved	mg/L	6.81
UA	G209	C	2010/11/22	Sodium, total	mg/L	69.0
UA	G209	C	2011/01/25	Sodium, total	mg/L	73.0
UA	G209	C	2011/03/08	Sodium, total	mg/L	74.0
UA	G209	C	2011/05/04	Sodium, total	mg/L	<100
UA	G209	C	2011/07/26	Sodium, total	mg/L	78.0
UA	G209	C	2011/09/19	Sodium, total	mg/L	73.0
UA	G209	C	2012/01/31	Sodium, total	mg/L	110
UA	G209	C	2013/01/30	Sodium, total	mg/L	76.0
UA	G209	C	2014/02/20	Sodium, total	mg/L	72.0
UA	G209	C	2015/04/09	Sodium, total	mg/L	79.0
UA	G209	C	2017/07/15	Sodium, total	mg/L	69.0
UA	G209	C	2020/01/22	Sodium, total	mg/L	82.0
UA	G209	C	2020/08/13	Sodium, total	mg/L	78.0
UA	G209	C	2021/01/27	Sodium, total	mg/L	63.0
UA	G209	C	2021/08/20	Sodium, total	mg/L	77.0
UA	G209	C	2022/02/10	Sodium, total	mg/L	79.0
UA	G209	C	2022/05/11	Sodium, total	mg/L	78.0
UA	G209	C	2022/08/23	Sodium, total	mg/L	81.0
UA	G209	C	2023/02/15	Sodium, total	mg/L	70.0
UA	G209	C	2023/06/09	Sodium, total	mg/L	73.0

UA	G209	C	2023/08/14	Sodium, total	mg/L	77.6
UA	G209	C	2023/11/16	Sodium, total	mg/L	75.7
UA	G209	C	2010/11/22	Sulfate, total	mg/L	230
UA	G209	C	2011/01/25	Sulfate, total	mg/L	280
UA	G209	C	2011/03/08	Sulfate, total	mg/L	300
UA	G209	C	2011/05/04	Sulfate, total	mg/L	310
UA	G209	C	2011/07/26	Sulfate, total	mg/L	300
UA	G209	C	2011/09/19	Sulfate, total	mg/L	340
UA	G209	C	2011/11/11	Sulfate, total	mg/L	300
UA	G209	C	2012/01/31	Sulfate, total	mg/L	310
UA	G209	C	2012/05/23	Sulfate, total	mg/L	270
UA	G209	C	2012/07/25	Sulfate, total	mg/L	290
UA	G209	C	2012/11/14	Sulfate, total	mg/L	310
UA	G209	C	2013/01/30	Sulfate, total	mg/L	380
UA	G209	C	2013/05/21	Sulfate, total	mg/L	270
UA	G209	C	2013/07/23	Sulfate, total	mg/L	350
UA	G209	C	2013/10/14	Sulfate, total	mg/L	260
UA	G209	C	2014/02/20	Sulfate, total	mg/L	310
UA	G209	C	2014/05/13	Sulfate, total	mg/L	300
UA	G209	C	2014/08/11	Sulfate, total	mg/L	320
UA	G209	C	2014/10/15	Sulfate, total	mg/L	310
UA	G209	C	2015/01/21	Sulfate, total	mg/L	310
UA	G209	C	2015/04/09	Sulfate, total	mg/L	280
UA	G209	C	2015/07/22	Sulfate, total	mg/L	270
UA	G209	C	2015/10/07	Sulfate, total	mg/L	270
UA	G209	C	2015/11/18	Sulfate, total	mg/L	280
UA	G209	C	2016/02/23	Sulfate, total	mg/L	280
UA	G209	C	2016/05/11	Sulfate, total	mg/L	280
UA	G209	C	2016/08/06	Sulfate, total	mg/L	270
UA	G209	C	2016/11/22	Sulfate, total	mg/L	270
UA	G209	C	2017/02/11	Sulfate, total	mg/L	260
UA	G209	C	2017/05/18	Sulfate, total	mg/L	240
UA	G209	C	2017/07/15	Sulfate, total	mg/L	120
UA	G209	C	2017/10/31	Sulfate, total	mg/L	95.0
UA	G209	C	2018/05/15	Sulfate, total	mg/L	250
UA	G209	C	2018/11/02	Sulfate, total	mg/L	240
UA	G209	C	2019/01/17	Sulfate, total	mg/L	250
UA	G209	C	2019/08/14	Sulfate, total	mg/L	240
UA	G209	C	2020/01/22	Sulfate, total	mg/L	250
UA	G209	C	2020/08/13	Sulfate, total	mg/L	270
UA	G209	C	2020/10/13	Sulfate, total	mg/L	250
UA	G209	C	2021/01/27	Sulfate, total	mg/L	250
UA	G209	C	2021/05/19	Sulfate, total	mg/L	260
UA	G209	C	2021/08/20	Sulfate, total	mg/L	240
UA	G209	C	2021/10/27	Sulfate, total	mg/L	240
UA	G209	C	2022/02/10	Sulfate, total	mg/L	270
UA	G209	C	2022/05/11	Sulfate, total	mg/L	240
UA	G209	C	2022/08/23	Sulfate, total	mg/L	240
UA	G209	C	2022/11/08	Sulfate, total	mg/L	240
UA	G209	C	2023/02/15	Sulfate, total	mg/L	230

UA	G209	C	2023/06/09	Sulfate, total	mg/L	230
UA	G209	C	2023/08/14	Sulfate, total	mg/L	243
UA	G209	C	2023/11/16	Sulfate, total	mg/L	255
UA	G209	C	2015/11/18	Temperature (Celsius)	degrees C	16.5
UA	G209	C	2016/02/23	Temperature (Celsius)	degrees C	12.2
UA	G209	C	2016/05/11	Temperature (Celsius)	degrees C	19.0
UA	G209	C	2016/08/06	Temperature (Celsius)	degrees C	19.3
UA	G209	C	2016/11/22	Temperature (Celsius)	degrees C	15.1
UA	G209	C	2017/02/11	Temperature (Celsius)	degrees C	14.5
UA	G209	C	2017/05/18	Temperature (Celsius)	degrees C	15.5
UA	G209	C	2017/07/15	Temperature (Celsius)	degrees C	17.9
UA	G209	C	2017/10/31	Temperature (Celsius)	degrees C	12.9
UA	G209	C	2018/01/25	Temperature (Celsius)	degrees C	11.1
UA	G209	C	2018/05/15	Temperature (Celsius)	degrees C	13.5
UA	G209	C	2018/11/02	Temperature (Celsius)	degrees C	13.8
UA	G209	C	2019/01/17	Temperature (Celsius)	degrees C	12.9
UA	G209	C	2019/05/03	Temperature (Celsius)	degrees C	14.5
UA	G209	C	2019/08/14	Temperature (Celsius)	degrees C	17.1
UA	G209	C	2020/01/22	Temperature (Celsius)	degrees C	11.6
UA	G209	C	2020/05/05	Temperature (Celsius)	degrees C	13.0
UA	G209	C	2020/08/13	Temperature (Celsius)	degrees C	18.6
UA	G209	C	2021/01/27	Temperature (Celsius)	degrees C	9.10
UA	G209	C	2021/08/20	Temperature (Celsius)	degrees C	19.9
UA	G209	C	2021/11/29	Temperature (Celsius)	degrees C	14.4
UA	G209	C	2022/02/10	Temperature (Celsius)	degrees C	12.4
UA	G209	C	2022/05/11	Temperature (Celsius)	degrees C	17.4
UA	G209	C	2022/08/23	Temperature (Celsius)	degrees C	19.6
UA	G209	C	2022/11/08	Temperature (Celsius)	degrees C	16.9
UA	G209	C	2023/02/15	Temperature (Celsius)	degrees C	15.2
UA	G209	C	2023/06/09	Temperature (Celsius)	degrees C	16.1
UA	G209	C	2023/08/14	Temperature (Celsius)	degrees C	15.4
UA	G209	C	2023/11/16	Temperature (Celsius)	degrees C	16.3
UA	G209	C	2010/11/22	Total Dissolved Solids	mg/L	680
UA	G209	C	2011/01/25	Total Dissolved Solids	mg/L	860
UA	G209	C	2011/03/08	Total Dissolved Solids	mg/L	950
UA	G209	C	2011/05/04	Total Dissolved Solids	mg/L	980
UA	G209	C	2011/07/26	Total Dissolved Solids	mg/L	1,000
UA	G209	C	2011/09/19	Total Dissolved Solids	mg/L	930
UA	G209	C	2011/11/11	Total Dissolved Solids	mg/L	910
UA	G209	C	2012/01/31	Total Dissolved Solids	mg/L	920
UA	G209	C	2012/05/23	Total Dissolved Solids	mg/L	980
UA	G209	C	2012/07/25	Total Dissolved Solids	mg/L	970
UA	G209	C	2012/11/14	Total Dissolved Solids	mg/L	980
UA	G209	C	2013/01/30	Total Dissolved Solids	mg/L	950
UA	G209	C	2013/05/21	Total Dissolved Solids	mg/L	900
UA	G209	C	2013/07/23	Total Dissolved Solids	mg/L	970
UA	G209	C	2013/10/14	Total Dissolved Solids	mg/L	930
UA	G209	C	2014/02/20	Total Dissolved Solids	mg/L	900
UA	G209	C	2014/05/13	Total Dissolved Solids	mg/L	950
UA	G209	C	2014/08/11	Total Dissolved Solids	mg/L	950

UA	G209	C	2014/10/15	Total Dissolved Solids	mg/L	920
UA	G209	C	2015/01/21	Total Dissolved Solids	mg/L	940
UA	G209	C	2015/04/09	Total Dissolved Solids	mg/L	910
UA	G209	C	2015/07/22	Total Dissolved Solids	mg/L	970
UA	G209	C	2015/10/07	Total Dissolved Solids	mg/L	940
UA	G209	C	2015/11/18	Total Dissolved Solids	mg/L	810
UA	G209	C	2016/02/23	Total Dissolved Solids	mg/L	760
UA	G209	C	2016/05/11	Total Dissolved Solids	mg/L	800
UA	G209	C	2016/08/06	Total Dissolved Solids	mg/L	760
UA	G209	C	2016/11/22	Total Dissolved Solids	mg/L	750
UA	G209	C	2017/02/11	Total Dissolved Solids	mg/L	960
UA	G209	C	2017/05/18	Total Dissolved Solids	mg/L	820
UA	G209	C	2017/07/15	Total Dissolved Solids	mg/L	780
UA	G209	C	2017/10/31	Total Dissolved Solids	mg/L	730
UA	G209	C	2018/05/15	Total Dissolved Solids	mg/L	760
UA	G209	C	2018/11/02	Total Dissolved Solids	mg/L	740
UA	G209	C	2019/01/17	Total Dissolved Solids	mg/L	860
UA	G209	C	2019/08/14	Total Dissolved Solids	mg/L	830
UA	G209	C	2020/01/22	Total Dissolved Solids	mg/L	730
UA	G209	C	2020/08/13	Total Dissolved Solids	mg/L	800
UA	G209	C	2020/10/13	Total Dissolved Solids	mg/L	850
UA	G209	C	2021/01/27	Total Dissolved Solids	mg/L	810
UA	G209	C	2021/05/19	Total Dissolved Solids	mg/L	870
UA	G209	C	2021/08/20	Total Dissolved Solids	mg/L	840
UA	G209	C	2021/10/27	Total Dissolved Solids	mg/L	750
UA	G209	C	2022/02/10	Total Dissolved Solids	mg/L	810
UA	G209	C	2022/05/11	Total Dissolved Solids	mg/L	930
UA	G209	C	2022/08/23	Total Dissolved Solids	mg/L	880
UA	G209	C	2022/11/08	Total Dissolved Solids	mg/L	850
UA	G209	C	2023/02/15	Total Dissolved Solids	mg/L	930
UA	G209	C	2023/06/09	Total Dissolved Solids	mg/L	860
UA	G209	C	2023/08/14	Total Dissolved Solids	mg/L	878
UA	G209	C	2023/11/16	Total Dissolved Solids	mg/L	826
UA	G212	C	2010/11/18	pH (field)	SU	7.2
UA	G212	C	2011/01/26	pH (field)	SU	7.4
UA	G212	C	2011/03/10	pH (field)	SU	7.2
UA	G212	C	2011/05/05	pH (field)	SU	7.1
UA	G212	C	2011/07/26	pH (field)	SU	7.3
UA	G212	C	2011/09/20	pH (field)	SU	7.3
UA	G212	C	2011/11/11	pH (field)	SU	7.3
UA	G212	C	2012/01/31	pH (field)	SU	7.3
UA	G212	C	2012/05/23	pH (field)	SU	7.2
UA	G212	C	2012/07/25	pH (field)	SU	6.8
UA	G212	C	2012/11/15	pH (field)	SU	7.5
UA	G212	C	2013/02/04	pH (field)	SU	7.5
UA	G212	C	2013/05/20	pH (field)	SU	7.4
UA	G212	C	2013/07/23	pH (field)	SU	7.2
UA	G212	C	2013/10/14	pH (field)	SU	7.3
UA	G212	C	2014/02/20	pH (field)	SU	7.6
UA	G212	C	2014/05/14	pH (field)	SU	7.2

UA	G212	C	2014/08/11	pH (field)	SU	7.2
UA	G212	C	2014/10/15	pH (field)	SU	7.2
UA	G212	C	2015/01/21	pH (field)	SU	7.5
UA	G212	C	2015/04/09	pH (field)	SU	7.0
UA	G212	C	2015/07/22	pH (field)	SU	7.0
UA	G212	C	2015/10/07	pH (field)	SU	7.0
UA	G212	C	2015/11/18	pH (field)	SU	7.2
UA	G212	C	2016/02/19	pH (field)	SU	7.3
UA	G212	C	2016/05/11	pH (field)	SU	7.3
UA	G212	C	2016/08/06	pH (field)	SU	7.3
UA	G212	C	2016/11/23	pH (field)	SU	7.1
UA	G212	C	2017/02/15	pH (field)	SU	7.1
UA	G212	C	2017/05/22	pH (field)	SU	7.0
UA	G212	C	2017/07/15	pH (field)	SU	7.6
UA	G212	C	2017/10/31	pH (field)	SU	7.3
UA	G212	C	2018/05/14	pH (field)	SU	7.2
UA	G212	C	2018/11/02	pH (field)	SU	7.3
UA	G212	C	2019/01/16	pH (field)	SU	7.3
UA	G212	C	2019/08/14	pH (field)	SU	7.3
UA	G212	C	2020/01/22	pH (field)	SU	7.2
UA	G212	C	2020/08/13	pH (field)	SU	7.3
UA	G212	C	2020/10/13	pH (field)	SU	6.8
UA	G212	C	2021/01/26	pH (field)	SU	6.8
UA	G212	C	2021/05/19	pH (field)	SU	7.2
UA	G212	C	2021/06/29	pH (field)	SU	7.4
UA	G212	C	2021/08/19	pH (field)	SU	7.2
UA	G212	C	2021/10/27	pH (field)	SU	7.2
UA	G212	C	2022/02/11	pH (field)	SU	7.2
UA	G212	C	2022/05/11	pH (field)	SU	7.4
UA	G212	C	2022/08/24	pH (field)	SU	6.9
UA	G212	C	2022/11/08	pH (field)	SU	7.0
UA	G212	C	2023/02/14	pH (field)	SU	7.5
UA	G212	C	2023/06/07	pH (field)	SU	7.2
UA	G212	C	2023/08/10	pH (field)	SU	7.2
UA	G212	C	2023/11/16	pH (field)	SU	7.2
UA	G212	C	2015/11/18	Oxidation Reduction Potential	mV	-63.0
UA	G212	C	2016/02/19	Oxidation Reduction Potential	mV	128
UA	G212	C	2016/05/11	Oxidation Reduction Potential	mV	141
UA	G212	C	2016/08/06	Oxidation Reduction Potential	mV	130
UA	G212	C	2016/11/23	Oxidation Reduction Potential	mV	126
UA	G212	C	2017/02/15	Oxidation Reduction Potential	mV	114
UA	G212	C	2017/05/22	Oxidation Reduction Potential	mV	102
UA	G212	C	2017/07/15	Oxidation Reduction Potential	mV	130
UA	G212	C	2017/10/31	Oxidation Reduction Potential	mV	139
UA	G212	C	2018/05/14	Oxidation Reduction Potential	mV	122
UA	G212	C	2018/11/02	Oxidation Reduction Potential	mV	121
UA	G212	C	2019/01/16	Oxidation Reduction Potential	mV	131
UA	G212	C	2019/08/14	Oxidation Reduction Potential	mV	128
UA	G212	C	2020/01/22	Oxidation Reduction Potential	mV	154
UA	G212	C	2020/08/13	Oxidation Reduction Potential	mV	150

UA	G212	C	2021/01/26	Oxidation Reduction Potential	mV	152
UA	G212	C	2021/06/29	Oxidation Reduction Potential	mV	29.9
UA	G212	C	2021/08/19	Oxidation Reduction Potential	mV	210
UA	G212	C	2022/02/11	Oxidation Reduction Potential	mV	121
UA	G212	C	2022/05/11	Oxidation Reduction Potential	mV	49.1
UA	G212	C	2022/08/24	Oxidation Reduction Potential	mV	108
UA	G212	C	2022/11/08	Oxidation Reduction Potential	mV	130
UA	G212	C	2023/02/14	Oxidation Reduction Potential	mV	159
UA	G212	C	2023/06/07	Oxidation Reduction Potential	mV	110
UA	G212	C	2023/08/10	Oxidation Reduction Potential	mV	68.0
UA	G212	C	2023/11/16	Oxidation Reduction Potential	mV	102
UA	G212	C	2015/11/18	Eh	V	0.13
UA	G212	C	2016/02/19	Eh	V	0.32
UA	G212	C	2016/05/11	Eh	V	0.34
UA	G212	C	2016/08/06	Eh	V	0.32
UA	G212	C	2016/11/23	Eh	V	0.32
UA	G212	C	2017/02/15	Eh	V	0.31
UA	G212	C	2017/05/22	Eh	V	0.30
UA	G212	C	2017/07/15	Eh	V	0.32
UA	G212	C	2017/10/31	Eh	V	0.34
UA	G212	C	2018/05/14	Eh	V	0.32
UA	G212	C	2018/11/02	Eh	V	0.32
UA	G212	C	2019/01/16	Eh	V	0.33
UA	G212	C	2019/08/14	Eh	V	0.32
UA	G212	C	2020/01/22	Eh	V	0.35
UA	G212	C	2020/08/13	Eh	V	0.34
UA	G212	C	2021/01/26	Eh	V	0.35
UA	G212	C	2021/06/29	Eh	V	0.22
UA	G212	C	2021/08/19	Eh	V	0.40
UA	G212	C	2022/02/11	Eh	V	0.32
UA	G212	C	2022/05/11	Eh	V	0.24
UA	G212	C	2022/08/24	Eh	V	0.30
UA	G212	C	2022/11/08	Eh	V	0.32
UA	G212	C	2023/02/14	Eh	V	0.36
UA	G212	C	2023/06/07	Eh	V	0.30
UA	G212	C	2023/08/10	Eh	V	0.26
UA	G212	C	2023/11/16	Eh	V	0.30
UA	G212	C	2010/12/14	Alkalinity, bicarbonate	mg/L CaCO3	220
UA	G212	C	2011/01/26	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G212	C	2011/03/10	Alkalinity, bicarbonate	mg/L CaCO3	270
UA	G212	C	2011/05/05	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G212	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	1,300
UA	G212	C	2011/09/20	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G212	C	2012/01/31	Alkalinity, bicarbonate	mg/L CaCO3	270
UA	G212	C	2013/02/04	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G212	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	270
UA	G212	C	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G212	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G212	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G212	C	2015/04/09	Alkalinity, bicarbonate	mg/L CaCO3	260

UA	G212	C	2017/07/15	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G212	C	2020/01/22	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G212	C	2020/08/13	Alkalinity, bicarbonate	mg/L CaCO3	270
UA	G212	C	2021/01/26	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G212	C	2021/08/19	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G212	C	2022/02/11	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G212	C	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G212	C	2022/08/24	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G212	C	2023/02/14	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G212	C	2023/06/07	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G212	C	2023/08/10	Alkalinity, bicarbonate	mg/L CaCO3	234
UA	G212	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	236
UA	G212	C	2022/08/24	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	G212	C	2010/11/18	Barium, total	mg/L	0.0730
UA	G212	C	2011/01/26	Barium, total	mg/L	0.0480
UA	G212	C	2011/03/10	Barium, total	mg/L	0.0480
UA	G212	C	2011/05/05	Barium, total	mg/L	0.0490
UA	G212	C	2011/07/26	Barium, total	mg/L	0.0450
UA	G212	C	2011/09/20	Barium, total	mg/L	0.0500
UA	G212	C	2012/01/31	Barium, total	mg/L	0.0470
UA	G212	C	2013/02/04	Barium, total	mg/L	0.0500
UA	G212	C	2014/02/20	Barium, total	mg/L	0.0810
UA	G212	C	2015/04/09	Barium, total	mg/L	0.0560
UA	G212	C	2015/07/22	Barium, total	mg/L	0.0570
UA	G212	C	2015/10/07	Barium, total	mg/L	0.0570
UA	G212	C	2015/11/18	Barium, total	mg/L	0.0520
UA	G212	C	2016/02/19	Barium, total	mg/L	0.0500
UA	G212	C	2016/05/11	Barium, total	mg/L	0.0500
UA	G212	C	2016/08/06	Barium, total	mg/L	0.0590
UA	G212	C	2016/11/23	Barium, total	mg/L	0.0490
UA	G212	C	2017/02/15	Barium, total	mg/L	0.0580
UA	G212	C	2017/05/22	Barium, total	mg/L	0.0610
UA	G212	C	2017/07/15	Barium, total	mg/L	0.0520
UA	G212	C	2020/10/13	Barium, total	mg/L	0.0510
UA	G212	C	2021/01/26	Barium, total	mg/L	0.0460
UA	G212	C	2021/05/19	Barium, total	mg/L	0.0500
UA	G212	C	2021/08/19	Barium, total	mg/L	0.0470
UA	G212	C	2021/10/27	Barium, total	mg/L	0.0480
UA	G212	C	2022/02/11	Barium, total	mg/L	0.0480
UA	G212	C	2022/05/11	Barium, total	mg/L	0.0490
UA	G212	C	2022/08/24	Barium, total	mg/L	0.0460
UA	G212	C	2022/11/08	Barium, total	mg/L	0.0430
UA	G212	C	2023/02/14	Barium, total	mg/L	0.0510
UA	G212	C	2023/06/07	Barium, total	mg/L	0.0510
UA	G212	C	2023/08/10	Barium, total	mg/L	0.0529
UA	G212	C	2023/11/16	Barium, total	mg/L	0.0630
UA	G212	C	2010/11/18	Calcium, total	mg/L	57.0
UA	G212	C	2011/01/26	Calcium, total	mg/L	56.0
UA	G212	C	2011/03/10	Calcium, total	mg/L	57.0
UA	G212	C	2011/05/05	Calcium, total	mg/L	<100

UA	G212	C	2011/07/26	Calcium, total	mg/L	59.0
UA	G212	C	2011/09/20	Calcium, total	mg/L	58.0
UA	G212	C	2011/11/11	Calcium, total	mg/L	54.0
UA	G212	C	2012/01/31	Calcium, total	mg/L	75.0
UA	G212	C	2012/05/23	Calcium, total	mg/L	56.0
UA	G212	C	2012/07/25	Calcium, total	mg/L	68.0
UA	G212	C	2012/11/15	Calcium, total	mg/L	58.0
UA	G212	C	2013/02/04	Calcium, total	mg/L	55.0
UA	G212	C	2013/05/20	Calcium, total	mg/L	55.0
UA	G212	C	2013/07/23	Calcium, total	mg/L	55.0
UA	G212	C	2013/10/14	Calcium, total	mg/L	53.0
UA	G212	C	2014/02/20	Calcium, total	mg/L	57.0
UA	G212	C	2014/05/14	Calcium, total	mg/L	71.0
UA	G212	C	2014/08/11	Calcium, total	mg/L	58.0
UA	G212	C	2014/10/15	Calcium, total	mg/L	59.0
UA	G212	C	2015/01/21	Calcium, total	mg/L	62.0
UA	G212	C	2015/04/09	Calcium, total	mg/L	60.0
UA	G212	C	2015/11/18	Calcium, total	mg/L	55.0
UA	G212	C	2016/02/19	Calcium, total	mg/L	58.0
UA	G212	C	2016/05/11	Calcium, total	mg/L	58.0
UA	G212	C	2016/08/06	Calcium, total	mg/L	59.0
UA	G212	C	2016/11/23	Calcium, total	mg/L	51.0
UA	G212	C	2017/02/15	Calcium, total	mg/L	53.0
UA	G212	C	2017/05/22	Calcium, total	mg/L	46.0
UA	G212	C	2017/07/15	Calcium, total	mg/L	46.0
UA	G212	C	2017/10/31	Calcium, total	mg/L	50.0
UA	G212	C	2018/05/14	Calcium, total	mg/L	51.0
UA	G212	C	2018/11/02	Calcium, total	mg/L	53.0
UA	G212	C	2019/01/16	Calcium, total	mg/L	56.0
UA	G212	C	2019/08/14	Calcium, total	mg/L	53.0
UA	G212	C	2020/01/22	Calcium, total	mg/L	61.0
UA	G212	C	2020/08/13	Calcium, total	mg/L	54.0
UA	G212	C	2021/01/26	Calcium, total	mg/L	56.0
UA	G212	C	2021/08/19	Calcium, total	mg/L	54.0
UA	G212	C	2022/02/11	Calcium, total	mg/L	57.0
UA	G212	C	2022/05/11	Calcium, total	mg/L	53.0
UA	G212	C	2022/08/24	Calcium, total	mg/L	59.0
UA	G212	C	2023/02/14	Calcium, total	mg/L	60.0
UA	G212	C	2023/06/07	Calcium, total	mg/L	56.0
UA	G212	C	2023/08/10	Calcium, total	mg/L	53.6
UA	G212	C	2023/11/16	Calcium, total	mg/L	54.6
UA	G212	C	2010/11/18	Chloride, total	mg/L	38.0
UA	G212	C	2011/01/26	Chloride, total	mg/L	38.0
UA	G212	C	2011/03/10	Chloride, total	mg/L	43.0
UA	G212	C	2011/05/05	Chloride, total	mg/L	50.0
UA	G212	C	2011/07/26	Chloride, total	mg/L	40.0
UA	G212	C	2011/09/20	Chloride, total	mg/L	39.0
UA	G212	C	2011/11/11	Chloride, total	mg/L	38.0
UA	G212	C	2012/01/31	Chloride, total	mg/L	39.0
UA	G212	C	2012/05/23	Chloride, total	mg/L	43.0

UA	G212	C	2012/07/25	Chloride, total	mg/L	36.0
UA	G212	C	2012/11/15	Chloride, total	mg/L	41.0
UA	G212	C	2013/02/04	Chloride, total	mg/L	37.0
UA	G212	C	2013/05/20	Chloride, total	mg/L	39.0
UA	G212	C	2013/07/23	Chloride, total	mg/L	51.0
UA	G212	C	2013/10/14	Chloride, total	mg/L	3.90
UA	G212	C	2014/02/20	Chloride, total	mg/L	38.0
UA	G212	C	2014/05/14	Chloride, total	mg/L	37.0
UA	G212	C	2014/08/11	Chloride, total	mg/L	38.0
UA	G212	C	2014/10/15	Chloride, total	mg/L	43.0
UA	G212	C	2015/01/21	Chloride, total	mg/L	39.0
UA	G212	C	2015/04/09	Chloride, total	mg/L	44.0
UA	G212	C	2015/07/22	Chloride, total	mg/L	38.0
UA	G212	C	2015/10/07	Chloride, total	mg/L	43.0
UA	G212	C	2015/11/18	Chloride, total	mg/L	38.0
UA	G212	C	2016/02/19	Chloride, total	mg/L	41.0
UA	G212	C	2016/05/11	Chloride, total	mg/L	37.0
UA	G212	C	2016/08/06	Chloride, total	mg/L	37.0
UA	G212	C	2016/11/23	Chloride, total	mg/L	42.0
UA	G212	C	2017/02/15	Chloride, total	mg/L	37.0
UA	G212	C	2017/05/22	Chloride, total	mg/L	39.0
UA	G212	C	2017/07/15	Chloride, total	mg/L	44.0
UA	G212	C	2017/10/31	Chloride, total	mg/L	42.0
UA	G212	C	2018/05/14	Chloride, total	mg/L	40.0
UA	G212	C	2018/11/02	Chloride, total	mg/L	43.0
UA	G212	C	2019/01/16	Chloride, total	mg/L	43.0
UA	G212	C	2019/08/14	Chloride, total	mg/L	43.0
UA	G212	C	2020/01/22	Chloride, total	mg/L	42.0
UA	G212	C	2020/08/13	Chloride, total	mg/L	42.0
UA	G212	C	2020/10/13	Chloride, total	mg/L	48.0
UA	G212	C	2021/01/26	Chloride, total	mg/L	41.0
UA	G212	C	2021/05/19	Chloride, total	mg/L	44.0
UA	G212	C	2021/08/19	Chloride, total	mg/L	41.0
UA	G212	C	2021/10/27	Chloride, total	mg/L	38.0
UA	G212	C	2022/02/11	Chloride, total	mg/L	46.0
UA	G212	C	2022/05/11	Chloride, total	mg/L	47.0
UA	G212	C	2022/08/24	Chloride, total	mg/L	43.0
UA	G212	C	2022/11/08	Chloride, total	mg/L	48.0
UA	G212	C	2023/02/14	Chloride, total	mg/L	45.0
UA	G212	C	2023/06/07	Chloride, total	mg/L	41.0
UA	G212	C	2023/08/10	Chloride, total	mg/L	46.0
UA	G212	C	2023/11/16	Chloride, total	mg/L	47.0
UA	G212	C	2023/06/07	Ferrous Iron, dissolved	mg/L	0.120
UA	G212	C	2010/11/18	Iron, dissolved	mg/L	<0.1
UA	G212	C	2011/01/26	Iron, dissolved	mg/L	0.0180
UA	G212	C	2011/03/10	Iron, dissolved	mg/L	<0.01
UA	G212	C	2011/05/05	Iron, dissolved	mg/L	<0.01
UA	G212	C	2011/07/26	Iron, dissolved	mg/L	<0.01
UA	G212	C	2011/09/20	Iron, dissolved	mg/L	<0.01
UA	G212	C	2011/11/11	Iron, dissolved	mg/L	<0.01

UA	G212	C	2012/01/31	Iron, dissolved	mg/L	0.0110
UA	G212	C	2012/05/23	Iron, dissolved	mg/L	0.0190
UA	G212	C	2012/07/25	Iron, dissolved	mg/L	<0.01
UA	G212	C	2012/11/15	Iron, dissolved	mg/L	0.0120
UA	G212	C	2013/02/04	Iron, dissolved	mg/L	0.0150
UA	G212	C	2013/05/20	Iron, dissolved	mg/L	<0.01
UA	G212	C	2013/07/23	Iron, dissolved	mg/L	<0.01
UA	G212	C	2013/10/14	Iron, dissolved	mg/L	<0.01
UA	G212	C	2014/02/20	Iron, dissolved	mg/L	0.0240
UA	G212	C	2014/05/14	Iron, dissolved	mg/L	<0.01
UA	G212	C	2014/08/11	Iron, dissolved	mg/L	<0.01
UA	G212	C	2014/10/15	Iron, dissolved	mg/L	<0.01
UA	G212	C	2015/01/21	Iron, dissolved	mg/L	<0.01
UA	G212	C	2015/04/09	Iron, dissolved	mg/L	<0.01
UA	G212	C	2015/07/22	Iron, dissolved	mg/L	<0.01
UA	G212	C	2015/10/07	Iron, dissolved	mg/L	<0.01
UA	G212	C	2016/02/19	Iron, dissolved	mg/L	0.0240
UA	G212	C	2016/05/11	Iron, dissolved	mg/L	<0.01
UA	G212	C	2016/07/26	Iron, dissolved	mg/L	0.0160
UA	G212	C	2016/11/23	Iron, dissolved	mg/L	<0.01
UA	G212	C	2017/02/13	Iron, dissolved	mg/L	<0.01
UA	G212	C	2017/05/21	Iron, dissolved	mg/L	0.0170
UA	G212	C	2017/07/24	Iron, dissolved	mg/L	<0.01
UA	G212	C	2017/10/31	Iron, dissolved	mg/L	0.260
UA	G212	C	2018/01/27	Iron, dissolved	mg/L	0.110
UA	G212	C	2018/05/14	Iron, dissolved	mg/L	0.0210
UA	G212	C	2018/08/08	Iron, dissolved	mg/L	0.0160
UA	G212	C	2018/11/02	Iron, dissolved	mg/L	<0.1
UA	G212	C	2019/01/16	Iron, dissolved	mg/L	<0.01
UA	G212	C	2019/05/02	Iron, dissolved	mg/L	<0.01
UA	G212	C	2019/08/14	Iron, dissolved	mg/L	<0.01
UA	G212	C	2019/10/23	Iron, dissolved	mg/L	<0.01
UA	G212	C	2020/01/22	Iron, dissolved	mg/L	0.0110
UA	G212	C	2020/05/04	Iron, dissolved	mg/L	<0.01
UA	G212	C	2020/08/13	Iron, dissolved	mg/L	<0.01
UA	G212	C	2020/10/13	Iron, dissolved	mg/L	<0.01
UA	G212	C	2021/01/26	Iron, dissolved	mg/L	<0.01
UA	G212	C	2021/05/19	Iron, dissolved	mg/L	<0.01
UA	G212	C	2021/08/19	Iron, dissolved	mg/L	<0.01
UA	G212	C	2021/10/27	Iron, dissolved	mg/L	<0.01
UA	G212	C	2022/02/11	Iron, dissolved	mg/L	<0.01
UA	G212	C	2022/05/11	Iron, dissolved	mg/L	<0.00072
UA	G212	C	2022/08/24	Iron, dissolved	mg/L	<0.00072
UA	G212	C	2022/11/08	Iron, dissolved	mg/L	<0.00072
UA	G212	C	2023/02/14	Iron, dissolved	mg/L	<0.00072
UA	G212	C	2023/06/07	Iron, dissolved	mg/L	<0.00072
UA	G212	C	2023/08/10	Iron, dissolved	mg/L	<0.0115
UA	G212	C	2023/11/16	Iron, dissolved	mg/L	<0.0115
UA	G212	C	2010/11/18	Magnesium, total	mg/L	25.0
UA	G212	C	2011/01/26	Magnesium, total	mg/L	26.0

UA	G212	C	2011/03/10	Magnesium, total	mg/L	28.0
UA	G212	C	2011/05/05	Magnesium, total	mg/L	<100
UA	G212	C	2011/07/26	Magnesium, total	mg/L	29.0
UA	G212	C	2011/09/20	Magnesium, total	mg/L	27.0
UA	G212	C	2012/01/31	Magnesium, total	mg/L	27.0
UA	G212	C	2013/02/04	Magnesium, total	mg/L	27.0
UA	G212	C	2014/02/20	Magnesium, total	mg/L	27.0
UA	G212	C	2015/04/09	Magnesium, total	mg/L	30.0
UA	G212	C	2017/07/15	Magnesium, total	mg/L	27.0
UA	G212	C	2020/01/22	Magnesium, total	mg/L	29.0
UA	G212	C	2020/08/13	Magnesium, total	mg/L	26.0
UA	G212	C	2021/01/26	Magnesium, total	mg/L	29.0
UA	G212	C	2021/08/19	Magnesium, total	mg/L	28.0
UA	G212	C	2022/02/11	Magnesium, total	mg/L	28.0
UA	G212	C	2022/05/11	Magnesium, total	mg/L	26.0
UA	G212	C	2022/08/24	Magnesium, total	mg/L	30.0
UA	G212	C	2023/02/14	Magnesium, total	mg/L	27.0
UA	G212	C	2023/06/07	Magnesium, total	mg/L	27.0
UA	G212	C	2023/08/10	Magnesium, total	mg/L	26.3
UA	G212	C	2023/11/16	Magnesium, total	mg/L	26.6
UA	G212	C	2010/11/18	Manganese, dissolved	mg/L	0.0150
UA	G212	C	2011/01/26	Manganese, dissolved	mg/L	0.0200
UA	G212	C	2011/03/10	Manganese, dissolved	mg/L	0.00830
UA	G212	C	2011/05/05	Manganese, dissolved	mg/L	0.00170
UA	G212	C	2011/07/26	Manganese, dissolved	mg/L	0.00150
UA	G212	C	2011/09/20	Manganese, dissolved	mg/L	0.00280
UA	G212	C	2011/11/11	Manganese, dissolved	mg/L	0.00150
UA	G212	C	2012/01/31	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2012/05/23	Manganese, dissolved	mg/L	0.00310
UA	G212	C	2012/07/25	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2012/11/15	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2013/02/04	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2013/05/20	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2013/07/23	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2013/10/14	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2014/02/20	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2014/05/14	Manganese, dissolved	mg/L	0.0350
UA	G212	C	2014/08/11	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2014/10/15	Manganese, dissolved	mg/L	0.0110
UA	G212	C	2015/01/21	Manganese, dissolved	mg/L	0.00230
UA	G212	C	2015/04/09	Manganese, dissolved	mg/L	<0.002
UA	G212	C	2015/07/22	Manganese, dissolved	mg/L	0.0250
UA	G212	C	2015/10/07	Manganese, dissolved	mg/L	0.00410
UA	G212	C	2016/02/19	Manganese, dissolved	mg/L	0.00280
UA	G212	C	2016/05/11	Manganese, dissolved	mg/L	0.00210
UA	G212	C	2016/07/26	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2016/11/23	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2017/02/13	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2017/05/21	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2017/07/24	Manganese, dissolved	mg/L	<0.001

UA	G212	C	2017/10/31	Manganese, dissolved	mg/L	0.0190
UA	G212	C	2018/01/27	Manganese, dissolved	mg/L	0.00810
UA	G212	C	2018/05/14	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2018/08/08	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2018/11/02	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2019/01/16	Manganese, dissolved	mg/L	0.00550
UA	G212	C	2019/05/02	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2019/08/14	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2019/10/23	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2020/01/22	Manganese, dissolved	mg/L	0.00130
UA	G212	C	2020/05/04	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2020/08/13	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2020/10/13	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2021/01/26	Manganese, dissolved	mg/L	0.00540
UA	G212	C	2021/05/19	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2021/08/19	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2021/10/27	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2022/02/11	Manganese, dissolved	mg/L	<0.001
UA	G212	C	2022/05/11	Manganese, dissolved	mg/L	<0.00023
UA	G212	C	2022/08/24	Manganese, dissolved	mg/L	0.00110
UA	G212	C	2022/11/08	Manganese, dissolved	mg/L	<0.00023
UA	G212	C	2023/02/14	Manganese, dissolved	mg/L	<0.00023
UA	G212	C	2023/06/07	Manganese, dissolved	mg/L	<0.00023
UA	G212	C	2023/08/10	Manganese, dissolved	mg/L	0.00240
UA	G212	C	2023/11/16	Manganese, dissolved	mg/L	0.00240
UA	G212	C	2023/08/10	Phosphate, dissolved	mg/L	0.0340
UA	G212	C	2010/11/18	Potassium, total	mg/L	2.00
UA	G212	C	2011/01/26	Potassium, total	mg/L	0.490
UA	G212	C	2011/03/10	Potassium, total	mg/L	0.270
UA	G212	C	2011/05/05	Potassium, total	mg/L	0.360
UA	G212	C	2011/07/26	Potassium, total	mg/L	0.440
UA	G212	C	2011/09/20	Potassium, total	mg/L	0.550
UA	G212	C	2012/01/31	Potassium, total	mg/L	0.380
UA	G212	C	2013/02/04	Potassium, total	mg/L	0.430
UA	G212	C	2014/02/20	Potassium, total	mg/L	1.30
UA	G212	C	2015/04/09	Potassium, total	mg/L	0.370
UA	G212	C	2017/07/15	Potassium, total	mg/L	0.390
UA	G212	C	2020/01/22	Potassium, total	mg/L	0.340
UA	G212	C	2020/08/13	Potassium, total	mg/L	0.200
UA	G212	C	2021/01/26	Potassium, total	mg/L	0.240
UA	G212	C	2021/08/19	Potassium, total	mg/L	0.260
UA	G212	C	2022/02/11	Potassium, total	mg/L	0.650
UA	G212	C	2022/05/11	Potassium, total	mg/L	0.210
UA	G212	C	2022/08/24	Potassium, total	mg/L	0.230
UA	G212	C	2023/02/14	Potassium, total	mg/L	0.260
UA	G212	C	2023/06/07	Potassium, total	mg/L	0.250
UA	G212	C	2023/08/10	Potassium, total	mg/L	0.278
UA	G212	C	2023/11/16	Potassium, total	mg/L	0.301
UA	G212	C	2023/06/07	Silicon, dissolved	mg/L	7.90
UA	G212	C	2023/08/10	Silicon, dissolved	mg/L	7.27

UA	G212	C	2010/11/18	Sodium, total	mg/L	53.0
UA	G212	C	2011/01/26	Sodium, total	mg/L	58.0
UA	G212	C	2011/03/10	Sodium, total	mg/L	60.0
UA	G212	C	2011/05/05	Sodium, total	mg/L	<100
UA	G212	C	2011/07/26	Sodium, total	mg/L	59.0
UA	G212	C	2011/09/20	Sodium, total	mg/L	59.0
UA	G212	C	2012/01/31	Sodium, total	mg/L	83.0
UA	G212	C	2013/02/04	Sodium, total	mg/L	57.0
UA	G212	C	2014/02/20	Sodium, total	mg/L	63.0
UA	G212	C	2015/04/09	Sodium, total	mg/L	67.0
UA	G212	C	2017/07/15	Sodium, total	mg/L	57.0
UA	G212	C	2020/01/22	Sodium, total	mg/L	59.0
UA	G212	C	2020/08/13	Sodium, total	mg/L	63.0
UA	G212	C	2021/01/26	Sodium, total	mg/L	63.0
UA	G212	C	2021/08/19	Sodium, total	mg/L	62.0
UA	G212	C	2022/02/11	Sodium, total	mg/L	68.0
UA	G212	C	2022/05/11	Sodium, total	mg/L	60.0
UA	G212	C	2022/08/24	Sodium, total	mg/L	66.0
UA	G212	C	2023/02/14	Sodium, total	mg/L	59.0
UA	G212	C	2023/06/07	Sodium, total	mg/L	58.0
UA	G212	C	2023/08/10	Sodium, total	mg/L	59.6
UA	G212	C	2023/11/16	Sodium, total	mg/L	59.7
UA	G212	C	2010/11/18	Sulfate, total	mg/L	53.0
UA	G212	C	2011/01/26	Sulfate, total	mg/L	53.0
UA	G212	C	2011/03/10	Sulfate, total	mg/L	55.0
UA	G212	C	2011/05/05	Sulfate, total	mg/L	74.0
UA	G212	C	2011/07/26	Sulfate, total	mg/L	55.0
UA	G212	C	2011/09/20	Sulfate, total	mg/L	53.0
UA	G212	C	2011/11/11	Sulfate, total	mg/L	51.0
UA	G212	C	2012/01/31	Sulfate, total	mg/L	51.0
UA	G212	C	2012/05/23	Sulfate, total	mg/L	58.0
UA	G212	C	2012/07/25	Sulfate, total	mg/L	50.0
UA	G212	C	2012/11/15	Sulfate, total	mg/L	54.0
UA	G212	C	2013/02/04	Sulfate, total	mg/L	51.0
UA	G212	C	2013/05/20	Sulfate, total	mg/L	54.0
UA	G212	C	2013/07/23	Sulfate, total	mg/L	65.0
UA	G212	C	2013/10/14	Sulfate, total	mg/L	5.50
UA	G212	C	2014/02/20	Sulfate, total	mg/L	53.0
UA	G212	C	2014/05/14	Sulfate, total	mg/L	54.0
UA	G212	C	2014/08/11	Sulfate, total	mg/L	54.0
UA	G212	C	2014/10/15	Sulfate, total	mg/L	73.0
UA	G212	C	2015/01/21	Sulfate, total	mg/L	59.0
UA	G212	C	2015/04/09	Sulfate, total	mg/L	66.0
UA	G212	C	2015/07/22	Sulfate, total	mg/L	56.0
UA	G212	C	2015/10/07	Sulfate, total	mg/L	65.0
UA	G212	C	2015/11/18	Sulfate, total	mg/L	54.0
UA	G212	C	2016/02/19	Sulfate, total	mg/L	59.0
UA	G212	C	2016/05/11	Sulfate, total	mg/L	59.0
UA	G212	C	2016/08/06	Sulfate, total	mg/L	55.0
UA	G212	C	2016/11/23	Sulfate, total	mg/L	54.0

UA	G212	C	2017/02/15	Sulfate, total	mg/L	55.0
UA	G212	C	2017/05/22	Sulfate, total	mg/L	57.0
UA	G212	C	2017/07/15	Sulfate, total	mg/L	53.0
UA	G212	C	2017/10/31	Sulfate, total	mg/L	55.0
UA	G212	C	2018/05/14	Sulfate, total	mg/L	52.0
UA	G212	C	2018/11/02	Sulfate, total	mg/L	49.0
UA	G212	C	2019/01/16	Sulfate, total	mg/L	53.0
UA	G212	C	2019/08/14	Sulfate, total	mg/L	51.0
UA	G212	C	2020/01/22	Sulfate, total	mg/L	58.0
UA	G212	C	2020/08/13	Sulfate, total	mg/L	53.0
UA	G212	C	2020/10/13	Sulfate, total	mg/L	54.0
UA	G212	C	2021/01/26	Sulfate, total	mg/L	55.0
UA	G212	C	2021/05/19	Sulfate, total	mg/L	55.0
UA	G212	C	2021/08/19	Sulfate, total	mg/L	51.0
UA	G212	C	2021/10/27	Sulfate, total	mg/L	50.0
UA	G212	C	2022/02/11	Sulfate, total	mg/L	57.0
UA	G212	C	2022/05/11	Sulfate, total	mg/L	53.0
UA	G212	C	2022/08/24	Sulfate, total	mg/L	54.0
UA	G212	C	2022/11/08	Sulfate, total	mg/L	53.0
UA	G212	C	2023/02/14	Sulfate, total	mg/L	54.0
UA	G212	C	2023/06/07	Sulfate, total	mg/L	54.0
UA	G212	C	2023/08/10	Sulfate, total	mg/L	65.0
UA	G212	C	2023/11/16	Sulfate, total	mg/L	63.0
UA	G212	C	2015/11/18	Temperature (Celsius)	degrees C	16.4
UA	G212	C	2016/02/19	Temperature (Celsius)	degrees C	13.9
UA	G212	C	2016/05/11	Temperature (Celsius)	degrees C	16.7
UA	G212	C	2016/08/06	Temperature (Celsius)	degrees C	18.0
UA	G212	C	2016/11/23	Temperature (Celsius)	degrees C	13.7
UA	G212	C	2017/02/15	Temperature (Celsius)	degrees C	15.0
UA	G212	C	2017/05/22	Temperature (Celsius)	degrees C	15.6
UA	G212	C	2017/07/15	Temperature (Celsius)	degrees C	17.0
UA	G212	C	2017/10/31	Temperature (Celsius)	degrees C	12.6
UA	G212	C	2018/05/14	Temperature (Celsius)	degrees C	13.8
UA	G212	C	2018/11/02	Temperature (Celsius)	degrees C	14.7
UA	G212	C	2019/01/16	Temperature (Celsius)	degrees C	12.3
UA	G212	C	2019/08/14	Temperature (Celsius)	degrees C	17.0
UA	G212	C	2020/01/22	Temperature (Celsius)	degrees C	11.7
UA	G212	C	2020/08/13	Temperature (Celsius)	degrees C	18.7
UA	G212	C	2021/01/26	Temperature (Celsius)	degrees C	11.4
UA	G212	C	2021/06/29	Temperature (Celsius)	degrees C	17.9
UA	G212	C	2021/08/19	Temperature (Celsius)	degrees C	19.5
UA	G212	C	2022/02/11	Temperature (Celsius)	degrees C	10.2
UA	G212	C	2022/05/11	Temperature (Celsius)	degrees C	18.0
UA	G212	C	2022/08/24	Temperature (Celsius)	degrees C	19.2
UA	G212	C	2022/11/08	Temperature (Celsius)	degrees C	17.1
UA	G212	C	2023/02/14	Temperature (Celsius)	degrees C	13.0
UA	G212	C	2023/06/07	Temperature (Celsius)	degrees C	16.4
UA	G212	C	2023/08/10	Temperature (Celsius)	degrees C	17.6
UA	G212	C	2023/11/16	Temperature (Celsius)	degrees C	16.8
UA	G212	C	2010/11/18	Total Dissolved Solids	mg/L	360

UA	G212	C	2011/01/26	Total Dissolved Solids	mg/L	390
UA	G212	C	2011/03/10	Total Dissolved Solids	mg/L	430
UA	G212	C	2011/05/05	Total Dissolved Solids	mg/L	430
UA	G212	C	2011/07/26	Total Dissolved Solids	mg/L	410
UA	G212	C	2011/09/20	Total Dissolved Solids	mg/L	420
UA	G212	C	2011/11/11	Total Dissolved Solids	mg/L	420
UA	G212	C	2012/01/31	Total Dissolved Solids	mg/L	410
UA	G212	C	2012/05/23	Total Dissolved Solids	mg/L	410
UA	G212	C	2012/07/25	Total Dissolved Solids	mg/L	410
UA	G212	C	2012/11/15	Total Dissolved Solids	mg/L	420
UA	G212	C	2013/02/04	Total Dissolved Solids	mg/L	420
UA	G212	C	2013/05/20	Total Dissolved Solids	mg/L	360
UA	G212	C	2013/07/23	Total Dissolved Solids	mg/L	390
UA	G212	C	2013/10/14	Total Dissolved Solids	mg/L	380
UA	G212	C	2014/02/20	Total Dissolved Solids	mg/L	440
UA	G212	C	2014/05/14	Total Dissolved Solids	mg/L	580
UA	G212	C	2014/08/11	Total Dissolved Solids	mg/L	410
UA	G212	C	2014/10/15	Total Dissolved Solids	mg/L	400
UA	G212	C	2015/01/21	Total Dissolved Solids	mg/L	400
UA	G212	C	2015/04/09	Total Dissolved Solids	mg/L	410
UA	G212	C	2015/07/22	Total Dissolved Solids	mg/L	460
UA	G212	C	2015/10/07	Total Dissolved Solids	mg/L	410
UA	G212	C	2015/11/18	Total Dissolved Solids	mg/L	380
UA	G212	C	2016/02/19	Total Dissolved Solids	mg/L	380
UA	G212	C	2016/05/11	Total Dissolved Solids	mg/L	400
UA	G212	C	2016/08/06	Total Dissolved Solids	mg/L	330
UA	G212	C	2016/11/23	Total Dissolved Solids	mg/L	340
UA	G212	C	2017/02/15	Total Dissolved Solids	mg/L	420
UA	G212	C	2017/05/22	Total Dissolved Solids	mg/L	360
UA	G212	C	2017/07/15	Total Dissolved Solids	mg/L	430
UA	G212	C	2017/10/31	Total Dissolved Solids	mg/L	340
UA	G212	C	2018/05/14	Total Dissolved Solids	mg/L	350
UA	G212	C	2018/11/02	Total Dissolved Solids	mg/L	600
UA	G212	C	2019/01/16	Total Dissolved Solids	mg/L	440
UA	G212	C	2019/08/14	Total Dissolved Solids	mg/L	380
UA	G212	C	2020/01/22	Total Dissolved Solids	mg/L	340
UA	G212	C	2020/08/13	Total Dissolved Solids	mg/L	430
UA	G212	C	2020/10/13	Total Dissolved Solids	mg/L	410
UA	G212	C	2021/01/26	Total Dissolved Solids	mg/L	400
UA	G212	C	2021/05/19	Total Dissolved Solids	mg/L	520
UA	G212	C	2021/08/19	Total Dissolved Solids	mg/L	420
UA	G212	C	2021/10/27	Total Dissolved Solids	mg/L	380
UA	G212	C	2022/02/11	Total Dissolved Solids	mg/L	330
UA	G212	C	2022/05/11	Total Dissolved Solids	mg/L	400
UA	G212	C	2022/08/24	Total Dissolved Solids	mg/L	530
UA	G212	C	2022/11/08	Total Dissolved Solids	mg/L	400
UA	G212	C	2023/02/14	Total Dissolved Solids	mg/L	520
UA	G212	C	2023/06/07	Total Dissolved Solids	mg/L	480
UA	G212	C	2023/08/10	Total Dissolved Solids	mg/L	412
UA	G212	C	2023/11/16	Total Dissolved Solids	mg/L	434

UA	G213	C	2010/11/18	pH (field)	SU	7.2
UA	G213	C	2011/01/26	pH (field)	SU	7.3
UA	G213	C	2011/03/10	pH (field)	SU	7.3
UA	G213	C	2011/05/05	pH (field)	SU	7.2
UA	G213	C	2011/07/26	pH (field)	SU	7.3
UA	G213	C	2011/09/20	pH (field)	SU	7.2
UA	G213	C	2011/11/11	pH (field)	SU	7.3
UA	G213	C	2012/01/30	pH (field)	SU	7.5
UA	G213	C	2012/05/23	pH (field)	SU	7.2
UA	G213	C	2012/07/25	pH (field)	SU	6.7
UA	G213	C	2012/11/15	pH (field)	SU	7.4
UA	G213	C	2013/02/04	pH (field)	SU	7.4
UA	G213	C	2013/05/20	pH (field)	SU	7.6
UA	G213	C	2013/07/23	pH (field)	SU	7.0
UA	G213	C	2013/10/14	pH (field)	SU	7.2
UA	G213	C	2014/02/20	pH (field)	SU	7.5
UA	G213	C	2014/05/14	pH (field)	SU	7.1
UA	G213	C	2014/08/11	pH (field)	SU	7.1
UA	G213	C	2014/10/15	pH (field)	SU	7.2
UA	G213	C	2015/01/21	pH (field)	SU	7.5
UA	G213	C	2015/04/09	pH (field)	SU	7.0
UA	G213	C	2015/07/22	pH (field)	SU	7.0
UA	G213	C	2015/10/07	pH (field)	SU	7.0
UA	G213	C	2020/10/13	pH (field)	SU	6.7
UA	G213	C	2021/01/27	pH (field)	SU	7.2
UA	G213	C	2021/05/19	pH (field)	SU	7.2
UA	G213	C	2021/08/19	pH (field)	SU	7.2
UA	G213	C	2021/10/27	pH (field)	SU	7.2
UA	G213	C	2022/02/09	pH (field)	SU	7.0
UA	G213	C	2022/05/11	pH (field)	SU	7.2
UA	G213	C	2022/08/24	pH (field)	SU	6.9
UA	G213	C	2022/11/08	pH (field)	SU	6.9
UA	G213	C	2023/02/15	pH (field)	SU	7.5
UA	G213	C	2023/06/07	pH (field)	SU	7.2
UA	G213	C	2023/08/10	pH (field)	SU	7.2
UA	G213	C	2023/11/16	pH (field)	SU	7.1
UA	G213	C	2022/02/09	Oxidation Reduction Potential	mV	62.8
UA	G213	C	2022/05/11	Oxidation Reduction Potential	mV	61.7
UA	G213	C	2022/08/24	Oxidation Reduction Potential	mV	111
UA	G213	C	2022/11/08	Oxidation Reduction Potential	mV	146
UA	G213	C	2023/02/15	Oxidation Reduction Potential	mV	140
UA	G213	C	2023/06/07	Oxidation Reduction Potential	mV	-1.50
UA	G213	C	2023/08/10	Oxidation Reduction Potential	mV	102
UA	G213	C	2023/11/16	Oxidation Reduction Potential	mV	84.0
UA	G213	C	2022/02/09	Eh	V	0.26
UA	G213	C	2022/05/11	Eh	V	0.26
UA	G213	C	2022/08/24	Eh	V	0.30
UA	G213	C	2022/11/08	Eh	V	0.34
UA	G213	C	2023/02/15	Eh	V	0.34
UA	G213	C	2023/06/07	Eh	V	0.19

UA	G213	C	2023/08/10	Eh	V	0.30
UA	G213	C	2023/11/16	Eh	V	0.28
UA	G213	C	2010/12/14	Alkalinity, bicarbonate	mg/L CaCO3	220
UA	G213	C	2011/01/26	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G213	C	2011/03/10	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G213	C	2011/05/05	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G213	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	1,200
UA	G213	C	2011/09/20	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G213	C	2012/01/30	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G213	C	2013/02/04	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G213	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G213	C	2014/08/11	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G213	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G213	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	260
UA	G213	C	2015/04/09	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G213	C	2023/02/15	Alkalinity, bicarbonate	mg/L CaCO3	250
UA	G213	C	2023/06/07	Alkalinity, bicarbonate	mg/L CaCO3	240
UA	G213	C	2023/08/10	Alkalinity, bicarbonate	mg/L CaCO3	228
UA	G213	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	226
UA	G213	C	2010/11/18	Barium, total	mg/L	0.240
UA	G213	C	2011/01/26	Barium, total	mg/L	0.0480
UA	G213	C	2011/03/10	Barium, total	mg/L	0.0420
UA	G213	C	2011/05/05	Barium, total	mg/L	0.0420
UA	G213	C	2011/07/26	Barium, total	mg/L	0.0400
UA	G213	C	2011/09/20	Barium, total	mg/L	0.0490
UA	G213	C	2012/01/30	Barium, total	mg/L	0.0440
UA	G213	C	2013/02/04	Barium, total	mg/L	0.0510
UA	G213	C	2014/02/20	Barium, total	mg/L	0.120
UA	G213	C	2015/04/09	Barium, total	mg/L	0.0640
UA	G213	C	2015/07/22	Barium, total	mg/L	0.160
UA	G213	C	2015/10/07	Barium, total	mg/L	0.100
UA	G213	C	2020/10/13	Barium, total	mg/L	0.0470
UA	G213	C	2021/01/27	Barium, total	mg/L	0.0390
UA	G213	C	2021/05/19	Barium, total	mg/L	0.0590
UA	G213	C	2021/08/19	Barium, total	mg/L	0.0450
UA	G213	C	2021/10/27	Barium, total	mg/L	0.0490
UA	G213	C	2022/02/09	Barium, total	mg/L	0.0550
UA	G213	C	2022/05/11	Barium, total	mg/L	0.0530
UA	G213	C	2022/08/24	Barium, total	mg/L	0.0460
UA	G213	C	2022/11/08	Barium, total	mg/L	0.0430
UA	G213	C	2023/02/15	Barium, total	mg/L	0.0550
UA	G213	C	2023/06/07	Barium, total	mg/L	0.0540
UA	G213	C	2023/08/10	Barium, total	mg/L	0.0541
UA	G213	C	2023/11/16	Barium, total	mg/L	0.0469
UA	G213	C	2010/11/18	Calcium, total	mg/L	74.0
UA	G213	C	2011/01/26	Calcium, total	mg/L	65.0
UA	G213	C	2011/03/10	Calcium, total	mg/L	63.0
UA	G213	C	2011/05/05	Calcium, total	mg/L	<100
UA	G213	C	2011/07/26	Calcium, total	mg/L	62.0
UA	G213	C	2011/09/20	Calcium, total	mg/L	66.0

UA	G213	C	2011/11/11	Calcium, total	mg/L	64.0
UA	G213	C	2012/01/30	Calcium, total	mg/L	84.0
UA	G213	C	2012/05/23	Calcium, total	mg/L	63.0
UA	G213	C	2012/07/25	Calcium, total	mg/L	69.0
UA	G213	C	2012/11/15	Calcium, total	mg/L	72.0
UA	G213	C	2013/02/04	Calcium, total	mg/L	60.0
UA	G213	C	2013/05/20	Calcium, total	mg/L	66.0
UA	G213	C	2013/07/23	Calcium, total	mg/L	62.0
UA	G213	C	2013/10/14	Calcium, total	mg/L	63.0
UA	G213	C	2014/02/20	Calcium, total	mg/L	68.0
UA	G213	C	2014/05/14	Calcium, total	mg/L	75.0
UA	G213	C	2014/08/11	Calcium, total	mg/L	68.0
UA	G213	C	2014/10/15	Calcium, total	mg/L	64.0
UA	G213	C	2015/01/21	Calcium, total	mg/L	66.0
UA	G213	C	2015/04/09	Calcium, total	mg/L	70.0
UA	G213	C	2023/02/15	Calcium, total	mg/L	68.0
UA	G213	C	2023/06/07	Calcium, total	mg/L	65.0
UA	G213	C	2023/08/10	Calcium, total	mg/L	65.6
UA	G213	C	2023/11/16	Calcium, total	mg/L	64.7
UA	G213	C	2010/11/18	Chloride, total	mg/L	41.0
UA	G213	C	2011/01/26	Chloride, total	mg/L	40.0
UA	G213	C	2011/03/10	Chloride, total	mg/L	39.0
UA	G213	C	2011/05/05	Chloride, total	mg/L	40.0
UA	G213	C	2011/07/26	Chloride, total	mg/L	39.0
UA	G213	C	2011/09/20	Chloride, total	mg/L	40.0
UA	G213	C	2011/11/11	Chloride, total	mg/L	38.0
UA	G213	C	2012/01/30	Chloride, total	mg/L	38.0
UA	G213	C	2012/05/23	Chloride, total	mg/L	43.0
UA	G213	C	2012/07/25	Chloride, total	mg/L	37.0
UA	G213	C	2012/11/15	Chloride, total	mg/L	43.0
UA	G213	C	2013/02/04	Chloride, total	mg/L	40.0
UA	G213	C	2013/05/20	Chloride, total	mg/L	42.0
UA	G213	C	2013/07/23	Chloride, total	mg/L	56.0
UA	G213	C	2013/10/14	Chloride, total	mg/L	4.40
UA	G213	C	2014/02/20	Chloride, total	mg/L	42.0
UA	G213	C	2014/05/14	Chloride, total	mg/L	42.0
UA	G213	C	2014/08/11	Chloride, total	mg/L	41.0
UA	G213	C	2014/10/15	Chloride, total	mg/L	41.0
UA	G213	C	2015/01/21	Chloride, total	mg/L	44.0
UA	G213	C	2015/04/09	Chloride, total	mg/L	47.0
UA	G213	C	2015/07/22	Chloride, total	mg/L	42.0
UA	G213	C	2015/10/07	Chloride, total	mg/L	40.0
UA	G213	C	2020/10/13	Chloride, total	mg/L	44.0
UA	G213	C	2021/01/27	Chloride, total	mg/L	45.0
UA	G213	C	2021/05/19	Chloride, total	mg/L	41.0
UA	G213	C	2021/08/19	Chloride, total	mg/L	41.0
UA	G213	C	2021/10/27	Chloride, total	mg/L	40.0
UA	G213	C	2022/02/09	Chloride, total	mg/L	46.0
UA	G213	C	2022/05/11	Chloride, total	mg/L	45.0
UA	G213	C	2022/08/24	Chloride, total	mg/L	44.0

UA	G213	C	2022/11/08	Chloride, total	mg/L	44.0
UA	G213	C	2023/02/15	Chloride, total	mg/L	39.0
UA	G213	C	2023/06/07	Chloride, total	mg/L	45.0
UA	G213	C	2023/08/10	Chloride, total	mg/L	46.0
UA	G213	C	2023/11/16	Chloride, total	mg/L	52.0
UA	G213	C	2023/06/07	Ferrous Iron, dissolved	mg/L	0.0730
UA	G213	C	2010/11/18	Iron, dissolved	mg/L	<0.1
UA	G213	C	2011/01/26	Iron, dissolved	mg/L	<0.01
UA	G213	C	2011/03/10	Iron, dissolved	mg/L	0.0300
UA	G213	C	2011/05/05	Iron, dissolved	mg/L	<0.01
UA	G213	C	2011/07/26	Iron, dissolved	mg/L	<0.01
UA	G213	C	2011/09/20	Iron, dissolved	mg/L	<0.01
UA	G213	C	2011/11/11	Iron, dissolved	mg/L	<0.01
UA	G213	C	2012/01/30	Iron, dissolved	mg/L	0.0110
UA	G213	C	2012/05/23	Iron, dissolved	mg/L	0.0240
UA	G213	C	2012/07/25	Iron, dissolved	mg/L	<0.01
UA	G213	C	2012/11/15	Iron, dissolved	mg/L	0.0240
UA	G213	C	2013/02/04	Iron, dissolved	mg/L	0.0180
UA	G213	C	2013/05/20	Iron, dissolved	mg/L	0.0160
UA	G213	C	2013/07/23	Iron, dissolved	mg/L	0.0130
UA	G213	C	2013/10/14	Iron, dissolved	mg/L	0.0120
UA	G213	C	2014/02/20	Iron, dissolved	mg/L	0.0350
UA	G213	C	2014/05/14	Iron, dissolved	mg/L	0.0170
UA	G213	C	2014/08/11	Iron, dissolved	mg/L	0.0170
UA	G213	C	2014/10/15	Iron, dissolved	mg/L	0.0300
UA	G213	C	2015/01/21	Iron, dissolved	mg/L	0.0250
UA	G213	C	2015/04/09	Iron, dissolved	mg/L	0.0380
UA	G213	C	2015/07/22	Iron, dissolved	mg/L	<0.01
UA	G213	C	2015/10/07	Iron, dissolved	mg/L	0.0160
UA	G213	C	2016/02/09	Iron, dissolved	mg/L	0.0290
UA	G213	C	2016/05/11	Iron, dissolved	mg/L	<0.01
UA	G213	C	2016/07/26	Iron, dissolved	mg/L	0.0190
UA	G213	C	2016/11/23	Iron, dissolved	mg/L	0.0140
UA	G213	C	2017/02/14	Iron, dissolved	mg/L	<0.01
UA	G213	C	2017/05/21	Iron, dissolved	mg/L	0.0580
UA	G213	C	2017/07/24	Iron, dissolved	mg/L	0.0230
UA	G213	C	2017/10/31	Iron, dissolved	mg/L	0.140
UA	G213	C	2018/01/27	Iron, dissolved	mg/L	0.0570
UA	G213	C	2018/05/15	Iron, dissolved	mg/L	0.0150
UA	G213	C	2018/08/08	Iron, dissolved	mg/L	0.0380
UA	G213	C	2018/11/01	Iron, dissolved	mg/L	<0.1
UA	G213	C	2019/01/16	Iron, dissolved	mg/L	0.0130
UA	G213	C	2019/05/02	Iron, dissolved	mg/L	0.0290
UA	G213	C	2019/08/26	Iron, dissolved	mg/L	<0.01
UA	G213	C	2019/10/23	Iron, dissolved	mg/L	<0.01
UA	G213	C	2020/01/23	Iron, dissolved	mg/L	<0.01
UA	G213	C	2020/05/04	Iron, dissolved	mg/L	<0.01
UA	G213	C	2020/08/13	Iron, dissolved	mg/L	<0.01
UA	G213	C	2020/10/13	Iron, dissolved	mg/L	<0.01
UA	G213	C	2021/01/27	Iron, dissolved	mg/L	<0.01

UA	G213	C	2021/05/19	Iron, dissolved	mg/L	<0.01
UA	G213	C	2021/08/19	Iron, dissolved	mg/L	<0.01
UA	G213	C	2021/10/27	Iron, dissolved	mg/L	<0.01
UA	G213	C	2022/02/09	Iron, dissolved	mg/L	<0.01
UA	G213	C	2022/05/11	Iron, dissolved	mg/L	0.000860
UA	G213	C	2022/08/24	Iron, dissolved	mg/L	<0.00072
UA	G213	C	2022/11/08	Iron, dissolved	mg/L	0.00440
UA	G213	C	2023/02/15	Iron, dissolved	mg/L	<0.00072
UA	G213	C	2023/06/07	Iron, dissolved	mg/L	0.0210
UA	G213	C	2023/08/10	Iron, dissolved	mg/L	0.0220
UA	G213	C	2023/11/16	Iron, dissolved	mg/L	<0.0115
UA	G213	C	2010/11/18	Magnesium, total	mg/L	38.0
UA	G213	C	2011/01/26	Magnesium, total	mg/L	31.0
UA	G213	C	2011/03/10	Magnesium, total	mg/L	31.0
UA	G213	C	2011/05/05	Magnesium, total	mg/L	<100
UA	G213	C	2011/07/26	Magnesium, total	mg/L	31.0
UA	G213	C	2011/09/20	Magnesium, total	mg/L	30.0
UA	G213	C	2012/01/30	Magnesium, total	mg/L	32.0
UA	G213	C	2013/02/04	Magnesium, total	mg/L	30.0
UA	G213	C	2014/02/20	Magnesium, total	mg/L	32.0
UA	G213	C	2015/04/09	Magnesium, total	mg/L	34.0
UA	G213	C	2023/02/15	Magnesium, total	mg/L	29.0
UA	G213	C	2023/06/07	Magnesium, total	mg/L	30.0
UA	G213	C	2023/08/10	Magnesium, total	mg/L	29.3
UA	G213	C	2023/11/16	Magnesium, total	mg/L	30.1
UA	G213	C	2010/11/18	Manganese, dissolved	mg/L	0.0140
UA	G213	C	2011/01/26	Manganese, dissolved	mg/L	0.00710
UA	G213	C	2011/03/10	Manganese, dissolved	mg/L	0.00280
UA	G213	C	2011/05/05	Manganese, dissolved	mg/L	0.00320
UA	G213	C	2011/07/26	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2011/09/20	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2011/11/11	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2012/01/30	Manganese, dissolved	mg/L	0.00120
UA	G213	C	2012/05/23	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2012/07/25	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2012/11/15	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2013/02/04	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2013/05/20	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2013/07/23	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2013/10/14	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2014/02/20	Manganese, dissolved	mg/L	0.00110
UA	G213	C	2014/05/14	Manganese, dissolved	mg/L	0.0380
UA	G213	C	2014/08/11	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2014/10/15	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2015/01/21	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2015/04/09	Manganese, dissolved	mg/L	0.00250
UA	G213	C	2015/07/22	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2015/10/07	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2016/02/09	Manganese, dissolved	mg/L	0.00360
UA	G213	C	2016/05/11	Manganese, dissolved	mg/L	0.00220

UA	G213	C	2016/07/26	Manganese, dissolved	mg/L	0.00330
UA	G213	C	2016/11/23	Manganese, dissolved	mg/L	0.0170
UA	G213	C	2017/02/14	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2017/05/21	Manganese, dissolved	mg/L	0.0410
UA	G213	C	2017/07/24	Manganese, dissolved	mg/L	0.00670
UA	G213	C	2017/10/31	Manganese, dissolved	mg/L	0.00960
UA	G213	C	2018/01/27	Manganese, dissolved	mg/L	0.00600
UA	G213	C	2018/05/15	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2018/08/08	Manganese, dissolved	mg/L	0.0120
UA	G213	C	2018/11/01	Manganese, dissolved	mg/L	0.00140
UA	G213	C	2019/01/16	Manganese, dissolved	mg/L	0.0240
UA	G213	C	2019/05/02	Manganese, dissolved	mg/L	0.00120
UA	G213	C	2019/08/26	Manganese, dissolved	mg/L	0.00310
UA	G213	C	2019/10/23	Manganese, dissolved	mg/L	0.00110
UA	G213	C	2020/01/23	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2020/05/04	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2020/08/13	Manganese, dissolved	mg/L	0.00180
UA	G213	C	2020/10/13	Manganese, dissolved	mg/L	0.00190
UA	G213	C	2021/01/27	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2021/05/19	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2021/08/19	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2021/10/27	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2022/02/09	Manganese, dissolved	mg/L	<0.001
UA	G213	C	2022/05/11	Manganese, dissolved	mg/L	<0.00023
UA	G213	C	2022/08/24	Manganese, dissolved	mg/L	0.000660
UA	G213	C	2022/11/08	Manganese, dissolved	mg/L	0.000970
UA	G213	C	2023/02/15	Manganese, dissolved	mg/L	<0.00023
UA	G213	C	2023/06/07	Manganese, dissolved	mg/L	0.0210
UA	G213	C	2023/08/10	Manganese, dissolved	mg/L	0.00590
UA	G213	C	2023/11/16	Manganese, dissolved	mg/L	0.00470
UA	G213	C	2023/08/10	Phosphate, dissolved	mg/L	0.0250
UA	G213	C	2010/11/18	Potassium, total	mg/L	4.90
UA	G213	C	2011/01/26	Potassium, total	mg/L	0.580
UA	G213	C	2011/03/10	Potassium, total	mg/L	0.330
UA	G213	C	2011/05/05	Potassium, total	mg/L	0.420
UA	G213	C	2011/07/26	Potassium, total	mg/L	0.440
UA	G213	C	2011/09/20	Potassium, total	mg/L	0.640
UA	G213	C	2012/01/30	Potassium, total	mg/L	1.50
UA	G213	C	2013/02/04	Potassium, total	mg/L	0.570
UA	G213	C	2014/02/20	Potassium, total	mg/L	2.70
UA	G213	C	2015/04/09	Potassium, total	mg/L	0.700
UA	G213	C	2023/02/15	Potassium, total	mg/L	0.340
UA	G213	C	2023/06/07	Potassium, total	mg/L	0.370
UA	G213	C	2023/08/10	Potassium, total	mg/L	0.468
UA	G213	C	2023/11/16	Potassium, total	mg/L	0.429
UA	G213	C	2023/06/07	Silicon, dissolved	mg/L	9.00
UA	G213	C	2023/08/10	Silicon, dissolved	mg/L	8.38
UA	G213	C	2010/11/18	Sodium, total	mg/L	31.0
UA	G213	C	2011/01/26	Sodium, total	mg/L	42.0
UA	G213	C	2011/03/10	Sodium, total	mg/L	43.0

UA	G213	C	2011/05/05	Sodium, total	mg/L	<100
UA	G213	C	2011/07/26	Sodium, total	mg/L	43.0
UA	G213	C	2011/09/20	Sodium, total	mg/L	41.0
UA	G213	C	2012/01/30	Sodium, total	mg/L	72.0
UA	G213	C	2013/02/04	Sodium, total	mg/L	38.0
UA	G213	C	2014/02/20	Sodium, total	mg/L	44.0
UA	G213	C	2015/04/09	Sodium, total	mg/L	43.0
UA	G213	C	2023/02/15	Sodium, total	mg/L	34.0
UA	G213	C	2023/06/07	Sodium, total	mg/L	37.0
UA	G213	C	2023/08/10	Sodium, total	mg/L	36.6
UA	G213	C	2023/11/16	Sodium, total	mg/L	35.7
UA	G213	C	2010/11/18	Sulfate, total	mg/L	51.0
UA	G213	C	2011/01/26	Sulfate, total	mg/L	47.0
UA	G213	C	2011/03/10	Sulfate, total	mg/L	46.0
UA	G213	C	2011/05/05	Sulfate, total	mg/L	47.0
UA	G213	C	2011/07/26	Sulfate, total	mg/L	48.0
UA	G213	C	2011/09/20	Sulfate, total	mg/L	48.0
UA	G213	C	2011/11/11	Sulfate, total	mg/L	46.0
UA	G213	C	2012/01/30	Sulfate, total	mg/L	45.0
UA	G213	C	2012/05/23	Sulfate, total	mg/L	52.0
UA	G213	C	2012/07/25	Sulfate, total	mg/L	48.0
UA	G213	C	2012/11/15	Sulfate, total	mg/L	50.0
UA	G213	C	2013/02/04	Sulfate, total	mg/L	49.0
UA	G213	C	2013/05/20	Sulfate, total	mg/L	50.0
UA	G213	C	2013/07/23	Sulfate, total	mg/L	61.0
UA	G213	C	2013/10/14	Sulfate, total	mg/L	5.30
UA	G213	C	2014/02/20	Sulfate, total	mg/L	51.0
UA	G213	C	2014/05/14	Sulfate, total	mg/L	52.0
UA	G213	C	2014/08/11	Sulfate, total	mg/L	50.0
UA	G213	C	2014/10/15	Sulfate, total	mg/L	50.0
UA	G213	C	2015/01/21	Sulfate, total	mg/L	55.0
UA	G213	C	2015/04/09	Sulfate, total	mg/L	57.0
UA	G213	C	2015/07/22	Sulfate, total	mg/L	50.0
UA	G213	C	2015/10/07	Sulfate, total	mg/L	51.0
UA	G213	C	2020/10/13	Sulfate, total	mg/L	55.0
UA	G213	C	2021/01/27	Sulfate, total	mg/L	55.0
UA	G213	C	2021/05/19	Sulfate, total	mg/L	56.0
UA	G213	C	2021/08/19	Sulfate, total	mg/L	54.0
UA	G213	C	2021/10/27	Sulfate, total	mg/L	57.0
UA	G213	C	2022/02/09	Sulfate, total	mg/L	59.0
UA	G213	C	2022/05/11	Sulfate, total	mg/L	61.0
UA	G213	C	2022/08/24	Sulfate, total	mg/L	57.0
UA	G213	C	2022/11/08	Sulfate, total	mg/L	56.0
UA	G213	C	2023/02/15	Sulfate, total	mg/L	54.0
UA	G213	C	2023/06/07	Sulfate, total	mg/L	59.0
UA	G213	C	2023/08/10	Sulfate, total	mg/L	68.0
UA	G213	C	2023/11/16	Sulfate, total	mg/L	79.0
UA	G213	C	2022/02/09	Temperature (Celsius)	degrees C	12.2
UA	G213	C	2022/05/11	Temperature (Celsius)	degrees C	17.8
UA	G213	C	2022/08/24	Temperature (Celsius)	degrees C	18.9

UA	G213	C	2022/11/08	Temperature (Celsius)	degrees C	17.6
UA	G213	C	2023/02/15	Temperature (Celsius)	degrees C	13.4
UA	G213	C	2023/06/07	Temperature (Celsius)	degrees C	17.6
UA	G213	C	2023/08/10	Temperature (Celsius)	degrees C	17.6
UA	G213	C	2023/11/16	Temperature (Celsius)	degrees C	16.5
UA	G213	C	2010/11/18	Total Dissolved Solids	mg/L	400
UA	G213	C	2011/01/26	Total Dissolved Solids	mg/L	410
UA	G213	C	2011/03/10	Total Dissolved Solids	mg/L	410
UA	G213	C	2011/05/05	Total Dissolved Solids	mg/L	380
UA	G213	C	2011/07/26	Total Dissolved Solids	mg/L	390
UA	G213	C	2011/09/20	Total Dissolved Solids	mg/L	390
UA	G213	C	2011/11/11	Total Dissolved Solids	mg/L	390
UA	G213	C	2012/01/30	Total Dissolved Solids	mg/L	380
UA	G213	C	2012/05/23	Total Dissolved Solids	mg/L	390
UA	G213	C	2012/07/25	Total Dissolved Solids	mg/L	390
UA	G213	C	2012/11/15	Total Dissolved Solids	mg/L	410
UA	G213	C	2013/02/04	Total Dissolved Solids	mg/L	420
UA	G213	C	2013/05/20	Total Dissolved Solids	mg/L	380
UA	G213	C	2013/07/23	Total Dissolved Solids	mg/L	370
UA	G213	C	2013/10/14	Total Dissolved Solids	mg/L	380
UA	G213	C	2014/02/20	Total Dissolved Solids	mg/L	400
UA	G213	C	2014/05/14	Total Dissolved Solids	mg/L	460
UA	G213	C	2014/08/11	Total Dissolved Solids	mg/L	390
UA	G213	C	2014/10/15	Total Dissolved Solids	mg/L	400
UA	G213	C	2015/01/21	Total Dissolved Solids	mg/L	390
UA	G213	C	2015/04/09	Total Dissolved Solids	mg/L	420
UA	G213	C	2015/07/22	Total Dissolved Solids	mg/L	440
UA	G213	C	2015/10/07	Total Dissolved Solids	mg/L	400
UA	G213	C	2020/10/13	Total Dissolved Solids	mg/L	360
UA	G213	C	2021/01/27	Total Dissolved Solids	mg/L	400
UA	G213	C	2021/05/19	Total Dissolved Solids	mg/L	560
UA	G213	C	2021/08/19	Total Dissolved Solids	mg/L	410
UA	G213	C	2021/10/27	Total Dissolved Solids	mg/L	330
UA	G213	C	2022/02/09	Total Dissolved Solids	mg/L	360
UA	G213	C	2022/05/11	Total Dissolved Solids	mg/L	390
UA	G213	C	2022/08/24	Total Dissolved Solids	mg/L	470
UA	G213	C	2022/11/08	Total Dissolved Solids	mg/L	360
UA	G213	C	2023/02/15	Total Dissolved Solids	mg/L	510
UA	G213	C	2023/06/07	Total Dissolved Solids	mg/L	500
UA	G213	C	2023/08/10	Total Dissolved Solids	mg/L	402
UA	G213	C	2023/11/16	Total Dissolved Solids	mg/L	420
UA	G215	C	2010/11/18	pH (field)	SU	7.2
UA	G215	C	2011/01/27	pH (field)	SU	7.2
UA	G215	C	2011/03/10	pH (field)	SU	7.2
UA	G215	C	2011/05/05	pH (field)	SU	7.0
UA	G215	C	2011/07/26	pH (field)	SU	7.0
UA	G215	C	2011/09/20	pH (field)	SU	7.2
UA	G215	C	2011/11/11	pH (field)	SU	7.3
UA	G215	C	2012/01/26	pH (field)	SU	7.4
UA	G215	C	2012/05/23	pH (field)	SU	7.0

UA	G215	C	2012/07/25	pH (field)	SU	6.7
UA	G215	C	2012/11/15	pH (field)	SU	7.4
UA	G215	C	2013/02/04	pH (field)	SU	7.3
UA	G215	C	2013/05/21	pH (field)	SU	7.1
UA	G215	C	2013/07/23	pH (field)	SU	7.0
UA	G215	C	2013/10/15	pH (field)	SU	7.2
UA	G215	C	2014/02/20	pH (field)	SU	6.9
UA	G215	C	2014/05/14	pH (field)	SU	7.0
UA	G215	C	2014/08/12	pH (field)	SU	7.4
UA	G215	C	2014/10/15	pH (field)	SU	7.3
UA	G215	C	2015/01/21	pH (field)	SU	7.3
UA	G215	C	2015/04/09	pH (field)	SU	6.8
UA	G215	C	2015/07/22	pH (field)	SU	6.9
UA	G215	C	2015/10/07	pH (field)	SU	6.8
UA	G215	C	2015/11/24	pH (field)	SU	7.2
UA	G215	C	2016/02/18	pH (field)	SU	7.2
UA	G215	C	2016/05/11	pH (field)	SU	6.9
UA	G215	C	2016/07/30	pH (field)	SU	6.9
UA	G215	C	2016/11/23	pH (field)	SU	6.9
UA	G215	C	2017/02/18	pH (field)	SU	7.3
UA	G215	C	2017/05/22	pH (field)	SU	7.4
UA	G215	C	2017/07/15	pH (field)	SU	7.0
UA	G215	C	2017/10/31	pH (field)	SU	7.2
UA	G215	C	2018/05/15	pH (field)	SU	6.9
UA	G215	C	2018/11/02	pH (field)	SU	6.8
UA	G215	C	2019/01/16	pH (field)	SU	6.9
UA	G215	C	2019/08/14	pH (field)	SU	7.0
UA	G215	C	2020/01/22	pH (field)	SU	7.1
UA	G215	C	2020/08/13	pH (field)	SU	7.2
UA	G215	C	2020/10/14	pH (field)	SU	7.0
UA	G215	C	2021/01/26	pH (field)	SU	6.8
UA	G215	C	2021/05/19	pH (field)	SU	7.0
UA	G215	C	2021/06/29	pH (field)	SU	7.1
UA	G215	C	2021/08/19	pH (field)	SU	7.0
UA	G215	C	2021/10/27	pH (field)	SU	7.0
UA	G215	C	2021/11/29	pH (field)	SU	6.9
UA	G215	C	2022/02/09	pH (field)	SU	6.9
UA	G215	C	2022/05/11	pH (field)	SU	7.0
UA	G215	C	2022/08/23	pH (field)	SU	6.8
UA	G215	C	2022/11/07	pH (field)	SU	6.9
UA	G215	C	2023/02/15	pH (field)	SU	7.1
UA	G215	C	2023/06/01	pH (field)	SU	7.0
UA	G215	C	2023/08/10	pH (field)	SU	7.0
UA	G215	C	2023/11/16	pH (field)	SU	6.9
UA	G215	C	2015/11/24	Oxidation Reduction Potential	mV	-59.0
UA	G215	C	2016/02/18	Oxidation Reduction Potential	mV	-2.00
UA	G215	C	2016/05/11	Oxidation Reduction Potential	mV	5.00
UA	G215	C	2016/07/30	Oxidation Reduction Potential	mV	56.0
UA	G215	C	2016/11/23	Oxidation Reduction Potential	mV	61.0
UA	G215	C	2017/02/18	Oxidation Reduction Potential	mV	71.0

UA	G215	C	2017/05/22	Oxidation Reduction Potential	mV	84.0
UA	G215	C	2017/07/15	Oxidation Reduction Potential	mV	61.0
UA	G215	C	2017/10/31	Oxidation Reduction Potential	mV	129
UA	G215	C	2018/05/15	Oxidation Reduction Potential	mV	42.0
UA	G215	C	2018/11/02	Oxidation Reduction Potential	mV	52.0
UA	G215	C	2019/01/16	Oxidation Reduction Potential	mV	61.0
UA	G215	C	2019/08/14	Oxidation Reduction Potential	mV	56.0
UA	G215	C	2020/01/22	Oxidation Reduction Potential	mV	0.500
UA	G215	C	2020/08/13	Oxidation Reduction Potential	mV	-35.2
UA	G215	C	2021/01/26	Oxidation Reduction Potential	mV	-2.90
UA	G215	C	2021/06/29	Oxidation Reduction Potential	mV	-34.2
UA	G215	C	2021/08/19	Oxidation Reduction Potential	mV	-26.4
UA	G215	C	2021/11/29	Oxidation Reduction Potential	mV	-14.2
UA	G215	C	2022/02/09	Oxidation Reduction Potential	mV	26.2
UA	G215	C	2022/05/11	Oxidation Reduction Potential	mV	-11.7
UA	G215	C	2022/08/23	Oxidation Reduction Potential	mV	-40.0
UA	G215	C	2022/11/07	Oxidation Reduction Potential	mV	7.80
UA	G215	C	2023/02/15	Oxidation Reduction Potential	mV	-31.0
UA	G215	C	2023/06/01	Oxidation Reduction Potential	mV	-16.0
UA	G215	C	2023/08/10	Oxidation Reduction Potential	mV	93.0
UA	G215	C	2023/11/16	Oxidation Reduction Potential	mV	-12.0
UA	G215	C	2015/11/24	Eh	V	0.14
UA	G215	C	2016/02/18	Eh	V	0.19
UA	G215	C	2016/05/11	Eh	V	0.20
UA	G215	C	2016/07/30	Eh	V	0.25
UA	G215	C	2016/11/23	Eh	V	0.26
UA	G215	C	2017/02/18	Eh	V	0.27
UA	G215	C	2017/05/22	Eh	V	0.28
UA	G215	C	2017/07/15	Eh	V	0.25
UA	G215	C	2017/10/31	Eh	V	0.33
UA	G215	C	2018/05/15	Eh	V	0.24
UA	G215	C	2018/11/02	Eh	V	0.25
UA	G215	C	2019/01/16	Eh	V	0.26
UA	G215	C	2019/08/14	Eh	V	0.25
UA	G215	C	2020/01/22	Eh	V	0.20
UA	G215	C	2020/08/13	Eh	V	0.16
UA	G215	C	2021/01/26	Eh	V	0.19
UA	G215	C	2021/06/29	Eh	V	0.16
UA	G215	C	2021/08/19	Eh	V	0.16
UA	G215	C	2021/11/29	Eh	V	0.18
UA	G215	C	2022/02/09	Eh	V	0.22
UA	G215	C	2022/05/11	Eh	V	0.18
UA	G215	C	2022/08/23	Eh	V	0.15
UA	G215	C	2022/11/07	Eh	V	0.20
UA	G215	C	2023/02/15	Eh	V	0.17
UA	G215	C	2023/06/01	Eh	V	0.18
UA	G215	C	2023/08/10	Eh	V	0.29
UA	G215	C	2023/11/16	Eh	V	0.18
UA	G215	C	2010/12/21	Alkalinity, bicarbonate	mg/L CaCO3	280
UA	G215	C	2011/01/27	Alkalinity, bicarbonate	mg/L CaCO3	340

UA	G215	C	2011/03/10	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G215	C	2011/05/05	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G215	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	1,800
UA	G215	C	2011/09/20	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G215	C	2012/01/26	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G215	C	2013/02/04	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2014/08/12	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	G215	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	G215	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G215	C	2015/04/09	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G215	C	2017/07/15	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2020/01/22	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2020/08/13	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G215	C	2021/01/26	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2021/08/19	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G215	C	2022/02/09	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G215	C	2022/05/11	Alkalinity, bicarbonate	mg/L CaCO3	450
UA	G215	C	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G215	C	2023/02/15	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G215	C	2023/06/01	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G215	C	2023/08/10	Alkalinity, bicarbonate	mg/L CaCO3	333
UA	G215	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	343
UA	G215	C	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	G215	C	2010/11/18	Barium, total	mg/L	0.140
UA	G215	C	2011/01/27	Barium, total	mg/L	0.0880
UA	G215	C	2011/03/10	Barium, total	mg/L	0.0830
UA	G215	C	2011/05/05	Barium, total	mg/L	0.0880
UA	G215	C	2011/07/26	Barium, total	mg/L	0.0950
UA	G215	C	2011/09/20	Barium, total	mg/L	0.0950
UA	G215	C	2012/01/26	Barium, total	mg/L	0.0890
UA	G215	C	2013/02/04	Barium, total	mg/L	0.0850
UA	G215	C	2014/02/20	Barium, total	mg/L	0.110
UA	G215	C	2015/04/09	Barium, total	mg/L	0.170
UA	G215	C	2015/07/22	Barium, total	mg/L	0.170
UA	G215	C	2015/10/07	Barium, total	mg/L	0.150
UA	G215	C	2015/11/24	Barium, total	mg/L	0.230
UA	G215	C	2016/02/18	Barium, total	mg/L	0.0950
UA	G215	C	2016/05/11	Barium, total	mg/L	0.0880
UA	G215	C	2016/07/30	Barium, total	mg/L	0.0960
UA	G215	C	2016/11/23	Barium, total	mg/L	0.0820
UA	G215	C	2017/02/18	Barium, total	mg/L	0.0950
UA	G215	C	2017/05/22	Barium, total	mg/L	0.150
UA	G215	C	2017/07/15	Barium, total	mg/L	0.130
UA	G215	C	2020/10/14	Barium, total	mg/L	0.120
UA	G215	C	2021/01/26	Barium, total	mg/L	0.100
UA	G215	C	2021/05/19	Barium, total	mg/L	0.0840
UA	G215	C	2021/08/19	Barium, total	mg/L	0.0580
UA	G215	C	2021/10/27	Barium, total	mg/L	0.0540
UA	G215	C	2022/02/09	Barium, total	mg/L	0.0510

UA	G215	C	2022/05/11	Barium, total	mg/L	0.0440
UA	G215	C	2022/08/23	Barium, total	mg/L	0.0440
UA	G215	C	2022/11/07	Barium, total	mg/L	0.0430
UA	G215	C	2023/02/15	Barium, total	mg/L	0.0410
UA	G215	C	2023/06/01	Barium, total	mg/L	0.0450
UA	G215	C	2023/08/10	Barium, total	mg/L	0.0402
UA	G215	C	2023/11/16	Barium, total	mg/L	0.0585
UA	G215	C	2010/11/18	Calcium, total	mg/L	130
UA	G215	C	2011/01/27	Calcium, total	mg/L	96.0
UA	G215	C	2011/03/10	Calcium, total	mg/L	85.0
UA	G215	C	2011/05/05	Calcium, total	mg/L	<100
UA	G215	C	2011/07/26	Calcium, total	mg/L	84.0
UA	G215	C	2011/09/20	Calcium, total	mg/L	91.0
UA	G215	C	2011/11/11	Calcium, total	mg/L	84.0
UA	G215	C	2012/01/26	Calcium, total	mg/L	86.0
UA	G215	C	2012/05/23	Calcium, total	mg/L	95.0
UA	G215	C	2012/07/25	Calcium, total	mg/L	91.0
UA	G215	C	2012/11/15	Calcium, total	mg/L	90.0
UA	G215	C	2013/02/04	Calcium, total	mg/L	87.0
UA	G215	C	2013/05/21	Calcium, total	mg/L	89.0
UA	G215	C	2013/07/23	Calcium, total	mg/L	88.0
UA	G215	C	2013/10/15	Calcium, total	mg/L	98.0
UA	G215	C	2014/02/20	Calcium, total	mg/L	96.0
UA	G215	C	2014/05/14	Calcium, total	mg/L	120
UA	G215	C	2014/08/12	Calcium, total	mg/L	100
UA	G215	C	2014/10/15	Calcium, total	mg/L	110
UA	G215	C	2015/01/21	Calcium, total	mg/L	110
UA	G215	C	2015/04/09	Calcium, total	mg/L	120
UA	G215	C	2015/11/24	Calcium, total	mg/L	110
UA	G215	C	2016/02/18	Calcium, total	mg/L	100
UA	G215	C	2016/05/11	Calcium, total	mg/L	89.0
UA	G215	C	2016/07/30	Calcium, total	mg/L	89.0
UA	G215	C	2016/11/23	Calcium, total	mg/L	68.0
UA	G215	C	2017/02/18	Calcium, total	mg/L	86.0
UA	G215	C	2017/05/22	Calcium, total	mg/L	82.0
UA	G215	C	2017/07/15	Calcium, total	mg/L	79.0
UA	G215	C	2017/10/31	Calcium, total	mg/L	90.0
UA	G215	C	2018/05/15	Calcium, total	mg/L	130
UA	G215	C	2018/11/02	Calcium, total	mg/L	120
UA	G215	C	2019/01/16	Calcium, total	mg/L	120
UA	G215	C	2019/08/14	Calcium, total	mg/L	100
UA	G215	C	2020/01/22	Calcium, total	mg/L	99.0
UA	G215	C	2020/08/13	Calcium, total	mg/L	110
UA	G215	C	2021/01/26	Calcium, total	mg/L	180
UA	G215	C	2021/06/29	Calcium, total	mg/L	180
UA	G215	C	2021/08/19	Calcium, total	mg/L	180
UA	G215	C	2022/02/09	Calcium, total	mg/L	190
UA	G215	C	2022/05/11	Calcium, total	mg/L	200
UA	G215	C	2022/08/23	Calcium, total	mg/L	190
UA	G215	C	2023/02/15	Calcium, total	mg/L	200

UA	G215	C	2023/06/01	Calcium, total	mg/L	180
UA	G215	C	2023/08/10	Calcium, total	mg/L	171
UA	G215	C	2023/11/16	Calcium, total	mg/L	180
UA	G215	C	2010/11/18	Chloride, total	mg/L	73.0
UA	G215	C	2011/01/27	Chloride, total	mg/L	78.0
UA	G215	C	2011/03/10	Chloride, total	mg/L	63.0
UA	G215	C	2011/05/05	Chloride, total	mg/L	68.0
UA	G215	C	2011/07/26	Chloride, total	mg/L	69.0
UA	G215	C	2011/09/20	Chloride, total	mg/L	61.0
UA	G215	C	2011/11/11	Chloride, total	mg/L	56.0
UA	G215	C	2012/01/26	Chloride, total	mg/L	56.0
UA	G215	C	2012/05/23	Chloride, total	mg/L	41.0
UA	G215	C	2012/07/25	Chloride, total	mg/L	40.0
UA	G215	C	2012/11/15	Chloride, total	mg/L	41.0
UA	G215	C	2013/02/04	Chloride, total	mg/L	43.0
UA	G215	C	2013/05/21	Chloride, total	mg/L	38.0
UA	G215	C	2013/07/23	Chloride, total	mg/L	44.0
UA	G215	C	2013/10/15	Chloride, total	mg/L	48.0
UA	G215	C	2014/02/20	Chloride, total	mg/L	56.0
UA	G215	C	2014/05/14	Chloride, total	mg/L	50.0
UA	G215	C	2014/08/12	Chloride, total	mg/L	52.0
UA	G215	C	2014/10/15	Chloride, total	mg/L	54.0
UA	G215	C	2015/01/21	Chloride, total	mg/L	60.0
UA	G215	C	2015/04/09	Chloride, total	mg/L	53.0
UA	G215	C	2015/07/22	Chloride, total	mg/L	45.0
UA	G215	C	2015/10/07	Chloride, total	mg/L	46.0
UA	G215	C	2015/11/24	Chloride, total	mg/L	47.0
UA	G215	C	2016/02/18	Chloride, total	mg/L	52.0
UA	G215	C	2016/05/11	Chloride, total	mg/L	43.0
UA	G215	C	2016/07/30	Chloride, total	mg/L	47.0
UA	G215	C	2016/11/23	Chloride, total	mg/L	48.0
UA	G215	C	2017/02/18	Chloride, total	mg/L	46.0
UA	G215	C	2017/05/22	Chloride, total	mg/L	42.0
UA	G215	C	2017/07/15	Chloride, total	mg/L	55.0
UA	G215	C	2017/10/31	Chloride, total	mg/L	48.0
UA	G215	C	2018/05/15	Chloride, total	mg/L	70.0
UA	G215	C	2018/11/02	Chloride, total	mg/L	55.0
UA	G215	C	2019/01/16	Chloride, total	mg/L	61.0
UA	G215	C	2019/08/14	Chloride, total	mg/L	49.0
UA	G215	C	2020/01/22	Chloride, total	mg/L	48.0
UA	G215	C	2020/08/13	Chloride, total	mg/L	70.0
UA	G215	C	2020/10/14	Chloride, total	mg/L	8.00
UA	G215	C	2021/01/26	Chloride, total	mg/L	120
UA	G215	C	2021/05/19	Chloride, total	mg/L	130
UA	G215	C	2021/06/29	Chloride, total	mg/L	110
UA	G215	C	2021/08/19	Chloride, total	mg/L	110
UA	G215	C	2021/10/27	Chloride, total	mg/L	140
UA	G215	C	2022/02/09	Chloride, total	mg/L	130
UA	G215	C	2022/05/11	Chloride, total	mg/L	130
UA	G215	C	2022/08/23	Chloride, total	mg/L	150

UA	G215	C	2022/11/07	Chloride, total	mg/L	120
UA	G215	C	2023/02/15	Chloride, total	mg/L	130
UA	G215	C	2023/06/01	Chloride, total	mg/L	130
UA	G215	C	2023/08/10	Chloride, total	mg/L	127
UA	G215	C	2023/11/16	Chloride, total	mg/L	138
UA	G215	C	2023/06/01	Ferrous Iron, dissolved	mg/L	0.920
UA	G215	C	2010/11/18	Iron, dissolved	mg/L	<0.1
UA	G215	C	2011/01/27	Iron, dissolved	mg/L	<0.01
UA	G215	C	2011/03/10	Iron, dissolved	mg/L	0.0220
UA	G215	C	2011/05/05	Iron, dissolved	mg/L	0.0960
UA	G215	C	2011/07/26	Iron, dissolved	mg/L	0.150
UA	G215	C	2011/09/20	Iron, dissolved	mg/L	0.200
UA	G215	C	2011/11/11	Iron, dissolved	mg/L	0.280
UA	G215	C	2012/01/26	Iron, dissolved	mg/L	0.430
UA	G215	C	2012/05/23	Iron, dissolved	mg/L	0.160
UA	G215	C	2012/07/25	Iron, dissolved	mg/L	0.400
UA	G215	C	2012/11/15	Iron, dissolved	mg/L	1.20
UA	G215	C	2013/02/04	Iron, dissolved	mg/L	0.260
UA	G215	C	2013/05/21	Iron, dissolved	mg/L	0.210
UA	G215	C	2013/07/23	Iron, dissolved	mg/L	3.20
UA	G215	C	2013/10/15	Iron, dissolved	mg/L	0.230
UA	G215	C	2014/02/20	Iron, dissolved	mg/L	0.300
UA	G215	C	2014/05/14	Iron, dissolved	mg/L	0.310
UA	G215	C	2014/08/12	Iron, dissolved	mg/L	0.380
UA	G215	C	2014/10/15	Iron, dissolved	mg/L	0.440
UA	G215	C	2015/01/21	Iron, dissolved	mg/L	0.490
UA	G215	C	2015/04/09	Iron, dissolved	mg/L	0.0760
UA	G215	C	2015/07/22	Iron, dissolved	mg/L	0.250
UA	G215	C	2015/10/07	Iron, dissolved	mg/L	0.390
UA	G215	C	2016/02/18	Iron, dissolved	mg/L	0.460
UA	G215	C	2016/05/11	Iron, dissolved	mg/L	0.0250
UA	G215	C	2016/07/25	Iron, dissolved	mg/L	0.240
UA	G215	C	2016/11/23	Iron, dissolved	mg/L	0.490
UA	G215	C	2017/02/14	Iron, dissolved	mg/L	2.90
UA	G215	C	2017/05/24	Iron, dissolved	mg/L	0.170
UA	G215	C	2017/07/25	Iron, dissolved	mg/L	0.150
UA	G215	C	2017/10/31	Iron, dissolved	mg/L	6.10
UA	G215	C	2018/01/27	Iron, dissolved	mg/L	2.60
UA	G215	C	2018/05/15	Iron, dissolved	mg/L	1.20
UA	G215	C	2018/08/08	Iron, dissolved	mg/L	0.610
UA	G215	C	2018/11/02	Iron, dissolved	mg/L	0.760
UA	G215	C	2019/01/16	Iron, dissolved	mg/L	0.0280
UA	G215	C	2019/05/02	Iron, dissolved	mg/L	0.0290
UA	G215	C	2019/08/14	Iron, dissolved	mg/L	0.520
UA	G215	C	2019/10/23	Iron, dissolved	mg/L	0.510
UA	G215	C	2020/01/22	Iron, dissolved	mg/L	0.300
UA	G215	C	2020/05/04	Iron, dissolved	mg/L	0.370
UA	G215	C	2020/08/13	Iron, dissolved	mg/L	<0.01
UA	G215	C	2020/10/14	Iron, dissolved	mg/L	0.830
UA	G215	C	2021/01/26	Iron, dissolved	mg/L	1.20

UA	G215	C	2021/05/19	Iron, dissolved	mg/L	0.590
UA	G215	C	2021/08/19	Iron, dissolved	mg/L	1.10
UA	G215	C	2021/10/27	Iron, dissolved	mg/L	<0.01
UA	G215	C	2022/02/09	Iron, dissolved	mg/L	0.870
UA	G215	C	2022/05/11	Iron, dissolved	mg/L	0.620
UA	G215	C	2022/08/23	Iron, dissolved	mg/L	0.890
UA	G215	C	2022/11/07	Iron, dissolved	mg/L	1.00
UA	G215	C	2023/02/15	Iron, dissolved	mg/L	1.00
UA	G215	C	2023/06/01	Iron, dissolved	mg/L	0.720
UA	G215	C	2023/08/10	Iron, dissolved	mg/L	0.882
UA	G215	C	2023/11/16	Iron, dissolved	mg/L	0.700
UA	G215	C	2010/11/18	Magnesium, total	mg/L	45.0
UA	G215	C	2011/01/27	Magnesium, total	mg/L	36.0
UA	G215	C	2011/03/10	Magnesium, total	mg/L	36.0
UA	G215	C	2011/05/05	Magnesium, total	mg/L	<100
UA	G215	C	2011/07/26	Magnesium, total	mg/L	38.0
UA	G215	C	2011/09/20	Magnesium, total	mg/L	38.0
UA	G215	C	2012/01/26	Magnesium, total	mg/L	39.0
UA	G215	C	2013/02/04	Magnesium, total	mg/L	38.0
UA	G215	C	2014/02/20	Magnesium, total	mg/L	44.0
UA	G215	C	2015/04/09	Magnesium, total	mg/L	50.0
UA	G215	C	2017/07/15	Magnesium, total	mg/L	35.0
UA	G215	C	2020/01/22	Magnesium, total	mg/L	41.0
UA	G215	C	2020/08/13	Magnesium, total	mg/L	45.0
UA	G215	C	2021/01/26	Magnesium, total	mg/L	74.0
UA	G215	C	2021/08/19	Magnesium, total	mg/L	84.0
UA	G215	C	2022/02/09	Magnesium, total	mg/L	89.0
UA	G215	C	2022/05/11	Magnesium, total	mg/L	90.0
UA	G215	C	2022/08/23	Magnesium, total	mg/L	93.0
UA	G215	C	2023/02/15	Magnesium, total	mg/L	89.0
UA	G215	C	2023/06/01	Magnesium, total	mg/L	88.0
UA	G215	C	2023/08/10	Magnesium, total	mg/L	86.5
UA	G215	C	2023/11/16	Magnesium, total	mg/L	95.3
UA	G215	C	2010/11/18	Manganese, dissolved	mg/L	0.430
UA	G215	C	2011/01/27	Manganese, dissolved	mg/L	0.230
UA	G215	C	2011/03/10	Manganese, dissolved	mg/L	0.320
UA	G215	C	2011/05/05	Manganese, dissolved	mg/L	0.240
UA	G215	C	2011/07/26	Manganese, dissolved	mg/L	0.310
UA	G215	C	2011/09/20	Manganese, dissolved	mg/L	0.310
UA	G215	C	2011/11/11	Manganese, dissolved	mg/L	0.300
UA	G215	C	2012/01/26	Manganese, dissolved	mg/L	0.280
UA	G215	C	2012/05/23	Manganese, dissolved	mg/L	0.180
UA	G215	C	2012/07/25	Manganese, dissolved	mg/L	0.310
UA	G215	C	2012/11/15	Manganese, dissolved	mg/L	0.340
UA	G215	C	2013/02/04	Manganese, dissolved	mg/L	0.180
UA	G215	C	2013/05/21	Manganese, dissolved	mg/L	0.130
UA	G215	C	2013/07/23	Manganese, dissolved	mg/L	0.350
UA	G215	C	2013/10/15	Manganese, dissolved	mg/L	0.180
UA	G215	C	2014/02/20	Manganese, dissolved	mg/L	0.320
UA	G215	C	2014/05/14	Manganese, dissolved	mg/L	0.320

UA	G215	C	2014/08/12	Manganese, dissolved	mg/L	0.270
UA	G215	C	2014/10/15	Manganese, dissolved	mg/L	0.260
UA	G215	C	2015/01/21	Manganese, dissolved	mg/L	0.290
UA	G215	C	2015/04/09	Manganese, dissolved	mg/L	0.240
UA	G215	C	2015/07/22	Manganese, dissolved	mg/L	0.790
UA	G215	C	2015/10/07	Manganese, dissolved	mg/L	0.240
UA	G215	C	2016/02/18	Manganese, dissolved	mg/L	0.260
UA	G215	C	2016/05/11	Manganese, dissolved	mg/L	0.290
UA	G215	C	2016/07/25	Manganese, dissolved	mg/L	0.120
UA	G215	C	2016/11/23	Manganese, dissolved	mg/L	0.230
UA	G215	C	2017/02/14	Manganese, dissolved	mg/L	0.120
UA	G215	C	2017/05/24	Manganese, dissolved	mg/L	0.140
UA	G215	C	2017/07/25	Manganese, dissolved	mg/L	0.0680
UA	G215	C	2017/10/31	Manganese, dissolved	mg/L	0.210
UA	G215	C	2018/01/27	Manganese, dissolved	mg/L	0.290
UA	G215	C	2018/05/15	Manganese, dissolved	mg/L	0.330
UA	G215	C	2018/08/08	Manganese, dissolved	mg/L	0.320
UA	G215	C	2018/11/02	Manganese, dissolved	mg/L	0.340
UA	G215	C	2019/01/16	Manganese, dissolved	mg/L	0.280
UA	G215	C	2019/05/02	Manganese, dissolved	mg/L	0.310
UA	G215	C	2019/08/14	Manganese, dissolved	mg/L	0.280
UA	G215	C	2019/10/23	Manganese, dissolved	mg/L	0.260
UA	G215	C	2020/01/22	Manganese, dissolved	mg/L	0.280
UA	G215	C	2020/05/04	Manganese, dissolved	mg/L	0.260
UA	G215	C	2020/08/13	Manganese, dissolved	mg/L	<0.001
UA	G215	C	2020/10/14	Manganese, dissolved	mg/L	0.410
UA	G215	C	2021/01/26	Manganese, dissolved	mg/L	0.500
UA	G215	C	2021/05/19	Manganese, dissolved	mg/L	0.530
UA	G215	C	2021/08/19	Manganese, dissolved	mg/L	0.510
UA	G215	C	2021/10/27	Manganese, dissolved	mg/L	<0.001
UA	G215	C	2022/02/09	Manganese, dissolved	mg/L	0.560
UA	G215	C	2022/05/11	Manganese, dissolved	mg/L	0.590
UA	G215	C	2022/08/23	Manganese, dissolved	mg/L	0.550
UA	G215	C	2022/11/07	Manganese, dissolved	mg/L	0.580
UA	G215	C	2023/02/15	Manganese, dissolved	mg/L	0.590
UA	G215	C	2023/06/01	Manganese, dissolved	mg/L	0.520
UA	G215	C	2023/08/10	Manganese, dissolved	mg/L	0.605
UA	G215	C	2023/11/16	Manganese, dissolved	mg/L	0.489
UA	G215	C	2023/08/10	Phosphate, dissolved	mg/L	0.0150
UA	G215	C	2010/11/18	Potassium, total	mg/L	5.10
UA	G215	C	2011/01/27	Potassium, total	mg/L	2.20
UA	G215	C	2011/03/10	Potassium, total	mg/L	1.20
UA	G215	C	2011/05/05	Potassium, total	mg/L	0.710
UA	G215	C	2011/07/26	Potassium, total	mg/L	1.10
UA	G215	C	2011/09/20	Potassium, total	mg/L	0.640
UA	G215	C	2012/01/26	Potassium, total	mg/L	0.530
UA	G215	C	2013/02/04	Potassium, total	mg/L	0.470
UA	G215	C	2014/02/20	Potassium, total	mg/L	0.640
UA	G215	C	2015/04/09	Potassium, total	mg/L	0.530
UA	G215	C	2017/07/15	Potassium, total	mg/L	0.490

UA	G215	C	2020/01/22	Potassium, total	mg/L	0.430
UA	G215	C	2020/08/13	Potassium, total	mg/L	0.360
UA	G215	C	2021/01/26	Potassium, total	mg/L	0.600
UA	G215	C	2021/08/19	Potassium, total	mg/L	0.780
UA	G215	C	2022/02/09	Potassium, total	mg/L	1.30
UA	G215	C	2022/05/11	Potassium, total	mg/L	1.80
UA	G215	C	2022/08/23	Potassium, total	mg/L	3.10
UA	G215	C	2023/02/15	Potassium, total	mg/L	4.10
UA	G215	C	2023/06/01	Potassium, total	mg/L	4.20
UA	G215	C	2023/08/10	Potassium, total	mg/L	4.50
UA	G215	C	2023/11/16	Potassium, total	mg/L	4.73
UA	G215	C	2023/06/01	Silicon, dissolved	mg/L	6.80
UA	G215	C	2023/08/10	Silicon, dissolved	mg/L	6.28
UA	G215	C	2010/11/18	Sodium, total	mg/L	54.0
UA	G215	C	2011/01/27	Sodium, total	mg/L	59.0
UA	G215	C	2011/03/10	Sodium, total	mg/L	63.0
UA	G215	C	2011/05/05	Sodium, total	mg/L	<100
UA	G215	C	2011/07/26	Sodium, total	mg/L	64.0
UA	G215	C	2011/09/20	Sodium, total	mg/L	63.0
UA	G215	C	2012/01/26	Sodium, total	mg/L	59.0
UA	G215	C	2013/02/04	Sodium, total	mg/L	50.0
UA	G215	C	2014/02/20	Sodium, total	mg/L	57.0
UA	G215	C	2015/04/09	Sodium, total	mg/L	63.0
UA	G215	C	2017/07/15	Sodium, total	mg/L	43.0
UA	G215	C	2020/01/22	Sodium, total	mg/L	55.0
UA	G215	C	2020/08/13	Sodium, total	mg/L	61.0
UA	G215	C	2021/01/26	Sodium, total	mg/L	87.0
UA	G215	C	2021/08/19	Sodium, total	mg/L	89.0
UA	G215	C	2022/02/09	Sodium, total	mg/L	100
UA	G215	C	2022/05/11	Sodium, total	mg/L	93.0
UA	G215	C	2022/08/23	Sodium, total	mg/L	98.0
UA	G215	C	2023/02/15	Sodium, total	mg/L	90.0
UA	G215	C	2023/06/01	Sodium, total	mg/L	96.0
UA	G215	C	2023/08/10	Sodium, total	mg/L	91.8
UA	G215	C	2023/11/16	Sodium, total	mg/L	95.4
UA	G215	C	2010/11/18	Sulfate, total	mg/L	61.0
UA	G215	C	2011/01/27	Sulfate, total	mg/L	71.0
UA	G215	C	2011/03/10	Sulfate, total	mg/L	57.0
UA	G215	C	2011/05/05	Sulfate, total	mg/L	56.0
UA	G215	C	2011/07/26	Sulfate, total	mg/L	66.0
UA	G215	C	2011/09/20	Sulfate, total	mg/L	78.0
UA	G215	C	2011/11/11	Sulfate, total	mg/L	88.0
UA	G215	C	2012/01/26	Sulfate, total	mg/L	97.0
UA	G215	C	2012/05/23	Sulfate, total	mg/L	91.0
UA	G215	C	2012/07/25	Sulfate, total	mg/L	110
UA	G215	C	2012/11/15	Sulfate, total	mg/L	110
UA	G215	C	2013/02/04	Sulfate, total	mg/L	120
UA	G215	C	2013/05/21	Sulfate, total	mg/L	100
UA	G215	C	2013/07/23	Sulfate, total	mg/L	110
UA	G215	C	2013/10/15	Sulfate, total	mg/L	130

UA	G215	C	2014/02/20	Sulfate, total	mg/L	160
UA	G215	C	2014/05/14	Sulfate, total	mg/L	130
UA	G215	C	2014/08/12	Sulfate, total	mg/L	140
UA	G215	C	2014/10/15	Sulfate, total	mg/L	130
UA	G215	C	2015/01/21	Sulfate, total	mg/L	170
UA	G215	C	2015/04/09	Sulfate, total	mg/L	140
UA	G215	C	2015/07/22	Sulfate, total	mg/L	110
UA	G215	C	2015/10/07	Sulfate, total	mg/L	110
UA	G215	C	2015/11/24	Sulfate, total	mg/L	110
UA	G215	C	2016/02/18	Sulfate, total	mg/L	130
UA	G215	C	2016/05/11	Sulfate, total	mg/L	110
UA	G215	C	2016/07/30	Sulfate, total	mg/L	110
UA	G215	C	2016/11/23	Sulfate, total	mg/L	100
UA	G215	C	2017/02/18	Sulfate, total	mg/L	110
UA	G215	C	2017/05/22	Sulfate, total	mg/L	100
UA	G215	C	2017/07/15	Sulfate, total	mg/L	110
UA	G215	C	2017/10/31	Sulfate, total	mg/L	110
UA	G215	C	2018/05/15	Sulfate, total	mg/L	220
UA	G215	C	2018/11/02	Sulfate, total	mg/L	170
UA	G215	C	2019/01/16	Sulfate, total	mg/L	180
UA	G215	C	2019/08/14	Sulfate, total	mg/L	120
UA	G215	C	2020/01/22	Sulfate, total	mg/L	130
UA	G215	C	2020/08/13	Sulfate, total	mg/L	210
UA	G215	C	2020/10/14	Sulfate, total	mg/L	310
UA	G215	C	2021/01/26	Sulfate, total	mg/L	490
UA	G215	C	2021/05/19	Sulfate, total	mg/L	480
UA	G215	C	2021/06/29	Sulfate, total	mg/L	470
UA	G215	C	2021/08/19	Sulfate, total	mg/L	440
UA	G215	C	2021/10/27	Sulfate, total	mg/L	470
UA	G215	C	2022/02/09	Sulfate, total	mg/L	520
UA	G215	C	2022/05/11	Sulfate, total	mg/L	540
UA	G215	C	2022/08/23	Sulfate, total	mg/L	470
UA	G215	C	2022/11/07	Sulfate, total	mg/L	510
UA	G215	C	2023/02/15	Sulfate, total	mg/L	560
UA	G215	C	2023/06/01	Sulfate, total	mg/L	540
UA	G215	C	2023/08/10	Sulfate, total	mg/L	481
UA	G215	C	2023/11/16	Sulfate, total	mg/L	512
UA	G215	C	2015/11/24	Temperature (Celsius)	degrees C	16.0
UA	G215	C	2016/02/18	Temperature (Celsius)	degrees C	12.9
UA	G215	C	2016/05/11	Temperature (Celsius)	degrees C	16.9
UA	G215	C	2016/07/30	Temperature (Celsius)	degrees C	18.3
UA	G215	C	2016/11/23	Temperature (Celsius)	degrees C	15.9
UA	G215	C	2017/02/18	Temperature (Celsius)	degrees C	14.5
UA	G215	C	2017/05/22	Temperature (Celsius)	degrees C	15.2
UA	G215	C	2017/07/15	Temperature (Celsius)	degrees C	17.5
UA	G215	C	2017/10/31	Temperature (Celsius)	degrees C	13.3
UA	G215	C	2018/05/15	Temperature (Celsius)	degrees C	15.2
UA	G215	C	2018/11/02	Temperature (Celsius)	degrees C	14.2
UA	G215	C	2019/01/16	Temperature (Celsius)	degrees C	12.6
UA	G215	C	2019/08/14	Temperature (Celsius)	degrees C	17.2

UA	G215	C	2020/01/22	Temperature (Celsius)	degrees C	11.1
UA	G215	C	2020/08/13	Temperature (Celsius)	degrees C	20.3
UA	G215	C	2021/01/26	Temperature (Celsius)	degrees C	12.0
UA	G215	C	2021/06/29	Temperature (Celsius)	degrees C	19.1
UA	G215	C	2021/08/19	Temperature (Celsius)	degrees C	21.0
UA	G215	C	2021/11/29	Temperature (Celsius)	degrees C	14.6
UA	G215	C	2022/02/09	Temperature (Celsius)	degrees C	12.4
UA	G215	C	2022/05/11	Temperature (Celsius)	degrees C	21.4
UA	G215	C	2022/08/23	Temperature (Celsius)	degrees C	20.8
UA	G215	C	2022/11/07	Temperature (Celsius)	degrees C	15.9
UA	G215	C	2023/02/15	Temperature (Celsius)	degrees C	13.7
UA	G215	C	2023/06/01	Temperature (Celsius)	degrees C	20.9
UA	G215	C	2023/08/10	Temperature (Celsius)	degrees C	15.6
UA	G215	C	2023/11/16	Temperature (Celsius)	degrees C	17.3
UA	G215	C	2010/11/18	Total Dissolved Solids	mg/L	470
UA	G215	C	2011/01/27	Total Dissolved Solids	mg/L	540
UA	G215	C	2011/03/10	Total Dissolved Solids	mg/L	520
UA	G215	C	2011/05/05	Total Dissolved Solids	mg/L	500
UA	G215	C	2011/07/26	Total Dissolved Solids	mg/L	500
UA	G215	C	2011/09/20	Total Dissolved Solids	mg/L	520
UA	G215	C	2011/11/11	Total Dissolved Solids	mg/L	500
UA	G215	C	2012/01/26	Total Dissolved Solids	mg/L	490
UA	G215	C	2012/05/23	Total Dissolved Solids	mg/L	570
UA	G215	C	2012/07/25	Total Dissolved Solids	mg/L	520
UA	G215	C	2012/11/15	Total Dissolved Solids	mg/L	540
UA	G215	C	2013/02/04	Total Dissolved Solids	mg/L	560
UA	G215	C	2013/05/21	Total Dissolved Solids	mg/L	490
UA	G215	C	2013/07/23	Total Dissolved Solids	mg/L	520
UA	G215	C	2013/10/15	Total Dissolved Solids	mg/L	520
UA	G215	C	2014/02/20	Total Dissolved Solids	mg/L	620
UA	G215	C	2014/05/14	Total Dissolved Solids	mg/L	390
UA	G215	C	2014/08/12	Total Dissolved Solids	mg/L	570
UA	G215	C	2014/10/15	Total Dissolved Solids	mg/L	560
UA	G215	C	2015/01/21	Total Dissolved Solids	mg/L	640
UA	G215	C	2015/04/09	Total Dissolved Solids	mg/L	620
UA	G215	C	2015/07/22	Total Dissolved Solids	mg/L	660
UA	G215	C	2015/10/07	Total Dissolved Solids	mg/L	550
UA	G215	C	2015/11/24	Total Dissolved Solids	mg/L	500
UA	G215	C	2016/02/18	Total Dissolved Solids	mg/L	520
UA	G215	C	2016/05/11	Total Dissolved Solids	mg/L	460
UA	G215	C	2016/07/30	Total Dissolved Solids	mg/L	480
UA	G215	C	2016/11/23	Total Dissolved Solids	mg/L	500
UA	G215	C	2017/02/18	Total Dissolved Solids	mg/L	510
UA	G215	C	2017/05/22	Total Dissolved Solids	mg/L	470
UA	G215	C	2017/07/15	Total Dissolved Solids	mg/L	550
UA	G215	C	2017/10/31	Total Dissolved Solids	mg/L	470
UA	G215	C	2018/05/15	Total Dissolved Solids	mg/L	660
UA	G215	C	2018/11/02	Total Dissolved Solids	mg/L	480
UA	G215	C	2019/01/16	Total Dissolved Solids	mg/L	800
UA	G215	C	2019/08/14	Total Dissolved Solids	mg/L	520

UA	G215	C	2020/01/22	Total Dissolved Solids	mg/L	460
UA	G215	C	2020/08/13	Total Dissolved Solids	mg/L	710
UA	G215	C	2020/10/14	Total Dissolved Solids	mg/L	870
UA	G215	C	2021/01/26	Total Dissolved Solids	mg/L	1,100
UA	G215	C	2021/05/19	Total Dissolved Solids	mg/L	1,500
UA	G215	C	2021/06/29	Total Dissolved Solids	mg/L	950
UA	G215	C	2021/08/19	Total Dissolved Solids	mg/L	1,300
UA	G215	C	2021/10/27	Total Dissolved Solids	mg/L	1,100
UA	G215	C	2022/02/09	Total Dissolved Solids	mg/L	1,200
UA	G215	C	2022/05/11	Total Dissolved Solids	mg/L	1,300
UA	G215	C	2022/08/23	Total Dissolved Solids	mg/L	1,300
UA	G215	C	2022/11/07	Total Dissolved Solids	mg/L	1,200
UA	G215	C	2023/02/15	Total Dissolved Solids	mg/L	1,500
UA	G215	C	2023/06/01	Total Dissolved Solids	mg/L	1,200
UA	G215	C	2023/08/10	Total Dissolved Solids	mg/L	1,270
UA	G215	C	2023/11/16	Total Dissolved Solids	mg/L	1,250
UA	G217	C	2010/11/17	pH (field)	SU	6.8
UA	G217	C	2011/01/27	pH (field)	SU	6.8
UA	G217	C	2011/03/09	pH (field)	SU	6.8
UA	G217	C	2011/05/05	pH (field)	SU	6.7
UA	G217	C	2011/07/26	pH (field)	SU	6.6
UA	G217	C	2011/09/20	pH (field)	SU	6.8
UA	G217	C	2011/11/11	pH (field)	SU	6.9
UA	G217	C	2012/01/26	pH (field)	SU	7.0
UA	G217	C	2012/05/23	pH (field)	SU	6.9
UA	G217	C	2012/07/24	pH (field)	SU	6.8
UA	G217	C	2012/11/15	pH (field)	SU	7.0
UA	G217	C	2013/02/04	pH (field)	SU	6.7
UA	G217	C	2013/05/21	pH (field)	SU	6.9
UA	G217	C	2013/07/23	pH (field)	SU	6.8
UA	G217	C	2013/10/15	pH (field)	SU	6.9
UA	G217	C	2014/02/20	pH (field)	SU	6.7
UA	G217	C	2014/05/14	pH (field)	SU	6.9
UA	G217	C	2014/08/12	pH (field)	SU	7.2
UA	G217	C	2014/10/15	pH (field)	SU	7.2
UA	G217	C	2015/01/21	pH (field)	SU	7.2
UA	G217	C	2015/04/10	pH (field)	SU	6.8
UA	G217	C	2015/07/22	pH (field)	SU	7.0
UA	G217	C	2015/10/07	pH (field)	SU	7.1
UA	G217	C	2020/10/14	pH (field)	SU	6.8
UA	G217	C	2021/01/28	pH (field)	SU	6.8
UA	G217	C	2021/05/20	pH (field)	SU	7.1
UA	G217	C	2021/08/19	pH (field)	SU	7.1
UA	G217	C	2021/10/26	pH (field)	SU	7.1
UA	G217	C	2022/02/09	pH (field)	SU	6.8
UA	G217	C	2022/05/10	pH (field)	SU	6.8
UA	G217	C	2022/08/23	pH (field)	SU	6.8
UA	G217	C	2022/11/08	pH (field)	SU	6.8
UA	G217	C	2023/02/15	pH (field)	SU	7.2
UA	G217	C	2023/06/08	pH (field)	SU	6.7

UA	G217	C	2023/08/10	pH (field)	SU	6.9
UA	G217	C	2023/11/16	pH (field)	SU	6.9
UA	G217	C	2022/02/09	Oxidation Reduction Potential	mV	26.1
UA	G217	C	2022/05/10	Oxidation Reduction Potential	mV	67.6
UA	G217	C	2022/08/23	Oxidation Reduction Potential	mV	-68.0
UA	G217	C	2022/11/08	Oxidation Reduction Potential	mV	-0.900
UA	G217	C	2023/02/15	Oxidation Reduction Potential	mV	13.0
UA	G217	C	2023/06/08	Oxidation Reduction Potential	mV	2.00
UA	G217	C	2023/08/10	Oxidation Reduction Potential	mV	77.0
UA	G217	C	2023/11/16	Oxidation Reduction Potential	mV	16.0
UA	G217	C	2022/02/09	Eh	V	0.22
UA	G217	C	2022/05/10	Eh	V	0.26
UA	G217	C	2022/08/23	Eh	V	0.12
UA	G217	C	2022/11/08	Eh	V	0.19
UA	G217	C	2023/02/15	Eh	V	0.21
UA	G217	C	2023/06/08	Eh	V	0.19
UA	G217	C	2023/08/10	Eh	V	0.27
UA	G217	C	2023/11/16	Eh	V	0.21
UA	G217	C	2010/12/15	Alkalinity, bicarbonate	mg/L CaCO3	520
UA	G217	C	2011/01/27	Alkalinity, bicarbonate	mg/L CaCO3	540
UA	G217	C	2011/03/09	Alkalinity, bicarbonate	mg/L CaCO3	590
UA	G217	C	2011/05/05	Alkalinity, bicarbonate	mg/L CaCO3	570
UA	G217	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	2,600
UA	G217	C	2011/09/20	Alkalinity, bicarbonate	mg/L CaCO3	540
UA	G217	C	2012/01/26	Alkalinity, bicarbonate	mg/L CaCO3	470
UA	G217	C	2013/02/04	Alkalinity, bicarbonate	mg/L CaCO3	440
UA	G217	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G217	C	2014/08/12	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	G217	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	G217	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G217	C	2015/04/10	Alkalinity, bicarbonate	mg/L CaCO3	380
UA	G217	C	2023/02/15	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G217	C	2023/06/08	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G217	C	2023/08/10	Alkalinity, bicarbonate	mg/L CaCO3	303
UA	G217	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	288
UA	G217	C	2011/01/27	Barium, total	mg/L	0.140
UA	G217	C	2011/03/09	Barium, total	mg/L	0.160
UA	G217	C	2011/05/05	Barium, total	mg/L	0.160
UA	G217	C	2011/07/26	Barium, total	mg/L	0.140
UA	G217	C	2011/09/20	Barium, total	mg/L	0.150
UA	G217	C	2012/01/26	Barium, total	mg/L	0.120
UA	G217	C	2013/02/04	Barium, total	mg/L	0.100
UA	G217	C	2014/02/20	Barium, total	mg/L	0.0860
UA	G217	C	2015/04/10	Barium, total	mg/L	0.0880
UA	G217	C	2015/07/22	Barium, total	mg/L	0.160
UA	G217	C	2015/10/07	Barium, total	mg/L	0.110
UA	G217	C	2020/10/14	Barium, total	mg/L	0.0950
UA	G217	C	2021/01/28	Barium, total	mg/L	0.0900
UA	G217	C	2021/05/20	Barium, total	mg/L	0.0970
UA	G217	C	2021/08/19	Barium, total	mg/L	0.100

UA	G217	C	2021/10/26	Barium, total	mg/L	0.0970
UA	G217	C	2022/02/09	Barium, total	mg/L	0.120
UA	G217	C	2022/05/10	Barium, total	mg/L	0.110
UA	G217	C	2022/08/23	Barium, total	mg/L	0.100
UA	G217	C	2022/11/08	Barium, total	mg/L	0.0890
UA	G217	C	2023/02/15	Barium, total	mg/L	0.0960
UA	G217	C	2023/06/08	Barium, total	mg/L	0.110
UA	G217	C	2023/08/10	Barium, total	mg/L	0.107
UA	G217	C	2023/11/16	Barium, total	mg/L	0.127
UA	G217	C	2010/11/17	Calcium, total	mg/L	180
UA	G217	C	2011/01/27	Calcium, total	mg/L	190
UA	G217	C	2011/03/09	Calcium, total	mg/L	200
UA	G217	C	2011/05/05	Calcium, total	mg/L	190
UA	G217	C	2011/07/26	Calcium, total	mg/L	180
UA	G217	C	2011/09/20	Calcium, total	mg/L	190
UA	G217	C	2011/11/11	Calcium, total	mg/L	170
UA	G217	C	2012/01/26	Calcium, total	mg/L	160
UA	G217	C	2012/05/23	Calcium, total	mg/L	150
UA	G217	C	2012/07/24	Calcium, total	mg/L	150
UA	G217	C	2012/11/15	Calcium, total	mg/L	140
UA	G217	C	2013/02/04	Calcium, total	mg/L	130
UA	G217	C	2013/05/21	Calcium, total	mg/L	130
UA	G217	C	2013/07/23	Calcium, total	mg/L	130
UA	G217	C	2013/10/15	Calcium, total	mg/L	130
UA	G217	C	2014/02/20	Calcium, total	mg/L	120
UA	G217	C	2014/05/14	Calcium, total	mg/L	140
UA	G217	C	2014/08/12	Calcium, total	mg/L	62.0
UA	G217	C	2014/10/15	Calcium, total	mg/L	130
UA	G217	C	2015/01/21	Calcium, total	mg/L	110
UA	G217	C	2015/04/10	Calcium, total	mg/L	130
UA	G217	C	2023/02/15	Calcium, total	mg/L	160
UA	G217	C	2023/06/08	Calcium, total	mg/L	180
UA	G217	C	2023/08/10	Calcium, total	mg/L	175
UA	G217	C	2023/11/16	Calcium, total	mg/L	177
UA	G217	C	2010/11/17	Chloride, total	mg/L	160
UA	G217	C	2011/01/27	Chloride, total	mg/L	170
UA	G217	C	2011/03/09	Chloride, total	mg/L	200
UA	G217	C	2011/05/05	Chloride, total	mg/L	160
UA	G217	C	2011/07/26	Chloride, total	mg/L	160
UA	G217	C	2011/09/20	Chloride, total	mg/L	140
UA	G217	C	2011/11/11	Chloride, total	mg/L	130
UA	G217	C	2012/01/26	Chloride, total	mg/L	120
UA	G217	C	2012/05/23	Chloride, total	mg/L	91.0
UA	G217	C	2012/07/24	Chloride, total	mg/L	98.0
UA	G217	C	2012/11/15	Chloride, total	mg/L	94.0
UA	G217	C	2013/02/04	Chloride, total	mg/L	110
UA	G217	C	2013/05/21	Chloride, total	mg/L	83.0
UA	G217	C	2013/07/23	Chloride, total	mg/L	91.0
UA	G217	C	2013/10/15	Chloride, total	mg/L	86.0
UA	G217	C	2014/02/20	Chloride, total	mg/L	82.0

UA	G217	C	2014/05/14	Chloride, total	mg/L	87.0
UA	G217	C	2014/08/12	Chloride, total	mg/L	77.0
UA	G217	C	2014/10/15	Chloride, total	mg/L	79.0
UA	G217	C	2015/01/21	Chloride, total	mg/L	82.0
UA	G217	C	2015/04/10	Chloride, total	mg/L	77.0
UA	G217	C	2015/07/22	Chloride, total	mg/L	78.0
UA	G217	C	2015/10/07	Chloride, total	mg/L	76.0
UA	G217	C	2020/10/14	Chloride, total	mg/L	84.0
UA	G217	C	2021/01/28	Chloride, total	mg/L	82.0
UA	G217	C	2021/05/20	Chloride, total	mg/L	94.0
UA	G217	C	2021/08/19	Chloride, total	mg/L	87.0
UA	G217	C	2021/10/26	Chloride, total	mg/L	79.0
UA	G217	C	2022/02/09	Chloride, total	mg/L	91.0
UA	G217	C	2022/05/10	Chloride, total	mg/L	95.0
UA	G217	C	2022/08/23	Chloride, total	mg/L	110
UA	G217	C	2022/11/08	Chloride, total	mg/L	110
UA	G217	C	2023/02/15	Chloride, total	mg/L	93.0
UA	G217	C	2023/06/08	Chloride, total	mg/L	130
UA	G217	C	2023/08/10	Chloride, total	mg/L	109
UA	G217	C	2023/11/16	Chloride, total	mg/L	123
UA	G217	C	2023/06/08	Ferrous Iron, dissolved	mg/L	0.440
UA	G217	C	2010/11/17	Iron, dissolved	mg/L	<0.1
UA	G217	C	2011/01/27	Iron, dissolved	mg/L	0.180
UA	G217	C	2011/03/09	Iron, dissolved	mg/L	0.220
UA	G217	C	2011/05/05	Iron, dissolved	mg/L	0.0860
UA	G217	C	2011/07/26	Iron, dissolved	mg/L	0.250
UA	G217	C	2011/09/20	Iron, dissolved	mg/L	0.180
UA	G217	C	2011/11/11	Iron, dissolved	mg/L	0.270
UA	G217	C	2012/01/26	Iron, dissolved	mg/L	0.260
UA	G217	C	2012/05/23	Iron, dissolved	mg/L	0.170
UA	G217	C	2012/07/24	Iron, dissolved	mg/L	0.210
UA	G217	C	2012/11/15	Iron, dissolved	mg/L	0.320
UA	G217	C	2013/02/04	Iron, dissolved	mg/L	0.270
UA	G217	C	2013/05/21	Iron, dissolved	mg/L	0.0730
UA	G217	C	2013/07/23	Iron, dissolved	mg/L	0.120
UA	G217	C	2013/10/15	Iron, dissolved	mg/L	0.120
UA	G217	C	2014/02/20	Iron, dissolved	mg/L	0.100
UA	G217	C	2014/05/14	Iron, dissolved	mg/L	0.0250
UA	G217	C	2014/08/12	Iron, dissolved	mg/L	0.0960
UA	G217	C	2014/10/15	Iron, dissolved	mg/L	0.100
UA	G217	C	2015/01/21	Iron, dissolved	mg/L	0.110
UA	G217	C	2015/04/10	Iron, dissolved	mg/L	<0.01
UA	G217	C	2015/07/22	Iron, dissolved	mg/L	<0.01
UA	G217	C	2015/10/07	Iron, dissolved	mg/L	0.0790
UA	G217	C	2016/02/10	Iron, dissolved	mg/L	0.0280
UA	G217	C	2016/05/11	Iron, dissolved	mg/L	<0.01
UA	G217	C	2016/07/25	Iron, dissolved	mg/L	1.60
UA	G217	C	2016/11/23	Iron, dissolved	mg/L	0.350
UA	G217	C	2017/02/14	Iron, dissolved	mg/L	1.70
UA	G217	C	2017/05/24	Iron, dissolved	mg/L	0.110

UA	G217	C	2017/07/25	Iron, dissolved	mg/L	0.350
UA	G217	C	2017/10/31	Iron, dissolved	mg/L	1.40
UA	G217	C	2018/01/27	Iron, dissolved	mg/L	0.150
UA	G217	C	2018/05/15	Iron, dissolved	mg/L	<0.01
UA	G217	C	2018/08/08	Iron, dissolved	mg/L	0.0790
UA	G217	C	2018/11/01	Iron, dissolved	mg/L	<0.1
UA	G217	C	2019/01/16	Iron, dissolved	mg/L	0.0780
UA	G217	C	2019/05/02	Iron, dissolved	mg/L	0.0220
UA	G217	C	2019/08/15	Iron, dissolved	mg/L	0.360
UA	G217	C	2019/10/22	Iron, dissolved	mg/L	0.470
UA	G217	C	2020/01/23	Iron, dissolved	mg/L	0.190
UA	G217	C	2020/05/04	Iron, dissolved	mg/L	0.180
UA	G217	C	2020/08/13	Iron, dissolved	mg/L	0.340
UA	G217	C	2020/10/14	Iron, dissolved	mg/L	0.390
UA	G217	C	2021/01/28	Iron, dissolved	mg/L	0.170
UA	G217	C	2021/05/20	Iron, dissolved	mg/L	0.0890
UA	G217	C	2021/08/19	Iron, dissolved	mg/L	0.340
UA	G217	C	2021/10/26	Iron, dissolved	mg/L	0.340
UA	G217	C	2022/02/09	Iron, dissolved	mg/L	0.230
UA	G217	C	2022/05/10	Iron, dissolved	mg/L	0.0990
UA	G217	C	2022/08/23	Iron, dissolved	mg/L	0.310
UA	G217	C	2022/11/08	Iron, dissolved	mg/L	0.350
UA	G217	C	2023/02/15	Iron, dissolved	mg/L	0.220
UA	G217	C	2023/06/08	Iron, dissolved	mg/L	0.270
UA	G217	C	2023/08/10	Iron, dissolved	mg/L	0.320
UA	G217	C	2023/11/16	Iron, dissolved	mg/L	0.256
UA	G217	C	2011/01/27	Magnesium, total	mg/L	74.0
UA	G217	C	2011/03/09	Magnesium, total	mg/L	77.0
UA	G217	C	2011/05/05	Magnesium, total	mg/L	<100
UA	G217	C	2011/07/26	Magnesium, total	mg/L	69.0
UA	G217	C	2011/09/20	Magnesium, total	mg/L	67.0
UA	G217	C	2012/01/26	Magnesium, total	mg/L	63.0
UA	G217	C	2013/02/04	Magnesium, total	mg/L	51.0
UA	G217	C	2014/02/20	Magnesium, total	mg/L	49.0
UA	G217	C	2015/04/10	Magnesium, total	mg/L	49.0
UA	G217	C	2023/02/15	Magnesium, total	mg/L	57.0
UA	G217	C	2023/06/08	Magnesium, total	mg/L	68.0
UA	G217	C	2023/08/10	Magnesium, total	mg/L	67.7
UA	G217	C	2023/11/16	Magnesium, total	mg/L	71.4
UA	G217	C	2010/11/17	Manganese, dissolved	mg/L	0.330
UA	G217	C	2011/01/27	Manganese, dissolved	mg/L	0.580
UA	G217	C	2011/03/09	Manganese, dissolved	mg/L	0.610
UA	G217	C	2011/05/05	Manganese, dissolved	mg/L	0.310
UA	G217	C	2011/07/26	Manganese, dissolved	mg/L	0.290
UA	G217	C	2011/09/20	Manganese, dissolved	mg/L	0.310
UA	G217	C	2011/11/11	Manganese, dissolved	mg/L	0.330
UA	G217	C	2012/01/26	Manganese, dissolved	mg/L	0.270
UA	G217	C	2012/05/23	Manganese, dissolved	mg/L	0.210
UA	G217	C	2012/07/24	Manganese, dissolved	mg/L	0.360
UA	G217	C	2012/11/15	Manganese, dissolved	mg/L	0.230

UA	G217	C	2013/02/04	Manganese, dissolved	mg/L	0.210
UA	G217	C	2013/05/21	Manganese, dissolved	mg/L	0.0720
UA	G217	C	2013/07/23	Manganese, dissolved	mg/L	0.140
UA	G217	C	2013/10/15	Manganese, dissolved	mg/L	0.190
UA	G217	C	2014/02/20	Manganese, dissolved	mg/L	0.100
UA	G217	C	2014/05/14	Manganese, dissolved	mg/L	0.100
UA	G217	C	2014/08/12	Manganese, dissolved	mg/L	0.120
UA	G217	C	2014/10/15	Manganese, dissolved	mg/L	0.160
UA	G217	C	2015/01/21	Manganese, dissolved	mg/L	0.140
UA	G217	C	2015/04/10	Manganese, dissolved	mg/L	0.0150
UA	G217	C	2015/07/22	Manganese, dissolved	mg/L	0.00250
UA	G217	C	2015/10/07	Manganese, dissolved	mg/L	0.170
UA	G217	C	2016/02/10	Manganese, dissolved	mg/L	0.100
UA	G217	C	2016/05/11	Manganese, dissolved	mg/L	0.00370
UA	G217	C	2016/07/25	Manganese, dissolved	mg/L	0.240
UA	G217	C	2016/11/23	Manganese, dissolved	mg/L	0.160
UA	G217	C	2017/02/14	Manganese, dissolved	mg/L	0.0380
UA	G217	C	2017/05/24	Manganese, dissolved	mg/L	0.0880
UA	G217	C	2017/07/25	Manganese, dissolved	mg/L	0.130
UA	G217	C	2017/10/31	Manganese, dissolved	mg/L	0.210
UA	G217	C	2018/01/27	Manganese, dissolved	mg/L	0.0850
UA	G217	C	2018/05/15	Manganese, dissolved	mg/L	0.00250
UA	G217	C	2018/08/08	Manganese, dissolved	mg/L	0.200
UA	G217	C	2018/11/01	Manganese, dissolved	mg/L	0.0340
UA	G217	C	2019/01/16	Manganese, dissolved	mg/L	0.830
UA	G217	C	2019/05/02	Manganese, dissolved	mg/L	0.0290
UA	G217	C	2019/08/15	Manganese, dissolved	mg/L	0.170
UA	G217	C	2019/10/22	Manganese, dissolved	mg/L	0.170
UA	G217	C	2020/01/23	Manganese, dissolved	mg/L	0.130
UA	G217	C	2020/05/04	Manganese, dissolved	mg/L	0.250
UA	G217	C	2020/08/13	Manganese, dissolved	mg/L	0.180
UA	G217	C	2020/10/14	Manganese, dissolved	mg/L	0.160
UA	G217	C	2021/01/28	Manganese, dissolved	mg/L	0.110
UA	G217	C	2021/05/20	Manganese, dissolved	mg/L	0.140
UA	G217	C	2021/08/19	Manganese, dissolved	mg/L	0.230
UA	G217	C	2021/10/26	Manganese, dissolved	mg/L	0.230
UA	G217	C	2022/02/09	Manganese, dissolved	mg/L	0.170
UA	G217	C	2022/05/10	Manganese, dissolved	mg/L	0.120
UA	G217	C	2022/08/23	Manganese, dissolved	mg/L	0.310
UA	G217	C	2022/11/08	Manganese, dissolved	mg/L	0.320
UA	G217	C	2023/02/15	Manganese, dissolved	mg/L	0.230
UA	G217	C	2023/06/08	Manganese, dissolved	mg/L	0.380
UA	G217	C	2023/08/10	Manganese, dissolved	mg/L	0.444
UA	G217	C	2023/11/16	Manganese, dissolved	mg/L	0.384
UA	G217	C	2023/08/10	Phosphate, dissolved	mg/L	0.0400
UA	G217	C	2011/01/27	Potassium, total	mg/L	1.10
UA	G217	C	2011/03/09	Potassium, total	mg/L	1.00
UA	G217	C	2011/05/05	Potassium, total	mg/L	0.600
UA	G217	C	2011/07/26	Potassium, total	mg/L	0.920
UA	G217	C	2011/09/20	Potassium, total	mg/L	0.800

UA	G217	C	2012/01/26	Potassium, total	mg/L	0.770
UA	G217	C	2013/02/04	Potassium, total	mg/L	0.590
UA	G217	C	2014/02/20	Potassium, total	mg/L	0.540
UA	G217	C	2015/04/10	Potassium, total	mg/L	0.440
UA	G217	C	2023/02/15	Potassium, total	mg/L	0.430
UA	G217	C	2023/06/08	Potassium, total	mg/L	0.710
UA	G217	C	2023/08/10	Potassium, total	mg/L	0.659
UA	G217	C	2023/11/16	Potassium, total	mg/L	0.626
UA	G217	C	2023/06/08	Silicon, dissolved	mg/L	7.80
UA	G217	C	2023/08/10	Silicon, dissolved	mg/L	6.97
UA	G217	C	2011/01/27	Sodium, total	mg/L	79.0
UA	G217	C	2011/03/09	Sodium, total	mg/L	87.0
UA	G217	C	2011/05/05	Sodium, total	mg/L	<100
UA	G217	C	2011/07/26	Sodium, total	mg/L	78.0
UA	G217	C	2011/09/20	Sodium, total	mg/L	74.0
UA	G217	C	2012/01/26	Sodium, total	mg/L	69.0
UA	G217	C	2013/02/04	Sodium, total	mg/L	55.0
UA	G217	C	2014/02/20	Sodium, total	mg/L	52.0
UA	G217	C	2015/04/10	Sodium, total	mg/L	53.0
UA	G217	C	2023/02/15	Sodium, total	mg/L	63.0
UA	G217	C	2023/06/08	Sodium, total	mg/L	69.0
UA	G217	C	2023/08/10	Sodium, total	mg/L	74.0
UA	G217	C	2023/11/16	Sodium, total	mg/L	73.6
UA	G217	C	2010/11/17	Sulfate, total	mg/L	150
UA	G217	C	2011/01/27	Sulfate, total	mg/L	170
UA	G217	C	2011/03/09	Sulfate, total	mg/L	190
UA	G217	C	2011/05/05	Sulfate, total	mg/L	170
UA	G217	C	2011/07/26	Sulfate, total	mg/L	160
UA	G217	C	2011/09/20	Sulfate, total	mg/L	160
UA	G217	C	2011/11/11	Sulfate, total	mg/L	150
UA	G217	C	2012/01/26	Sulfate, total	mg/L	130
UA	G217	C	2012/05/23	Sulfate, total	mg/L	110
UA	G217	C	2012/07/24	Sulfate, total	mg/L	120
UA	G217	C	2012/11/15	Sulfate, total	mg/L	110
UA	G217	C	2013/02/04	Sulfate, total	mg/L	120
UA	G217	C	2013/05/21	Sulfate, total	mg/L	110
UA	G217	C	2013/07/23	Sulfate, total	mg/L	100
UA	G217	C	2013/10/15	Sulfate, total	mg/L	110
UA	G217	C	2014/02/20	Sulfate, total	mg/L	99.0
UA	G217	C	2014/05/14	Sulfate, total	mg/L	110
UA	G217	C	2014/08/12	Sulfate, total	mg/L	120
UA	G217	C	2014/10/15	Sulfate, total	mg/L	120
UA	G217	C	2015/01/21	Sulfate, total	mg/L	140
UA	G217	C	2015/04/10	Sulfate, total	mg/L	130
UA	G217	C	2015/07/22	Sulfate, total	mg/L	130
UA	G217	C	2015/10/07	Sulfate, total	mg/L	130
UA	G217	C	2020/10/14	Sulfate, total	mg/L	210
UA	G217	C	2021/01/28	Sulfate, total	mg/L	200
UA	G217	C	2021/05/20	Sulfate, total	mg/L	210
UA	G217	C	2021/08/19	Sulfate, total	mg/L	230

UA	G217	C	2021/10/26	Sulfate, total	mg/L	240
UA	G217	C	2022/02/09	Sulfate, total	mg/L	270
UA	G217	C	2022/05/10	Sulfate, total	mg/L	290
UA	G217	C	2022/08/23	Sulfate, total	mg/L	310
UA	G217	C	2022/11/08	Sulfate, total	mg/L	310
UA	G217	C	2023/02/15	Sulfate, total	mg/L	310
UA	G217	C	2023/06/08	Sulfate, total	mg/L	370
UA	G217	C	2023/08/10	Sulfate, total	mg/L	394
UA	G217	C	2023/11/16	Sulfate, total	mg/L	427
UA	G217	C	2022/02/09	Temperature (Celsius)	degrees C	12.7
UA	G217	C	2022/05/10	Temperature (Celsius)	degrees C	18.4
UA	G217	C	2022/08/23	Temperature (Celsius)	degrees C	20.1
UA	G217	C	2022/11/08	Temperature (Celsius)	degrees C	16.1
UA	G217	C	2023/02/15	Temperature (Celsius)	degrees C	15.0
UA	G217	C	2023/06/08	Temperature (Celsius)	degrees C	19.6
UA	G217	C	2023/08/10	Temperature (Celsius)	degrees C	15.6
UA	G217	C	2023/11/16	Temperature (Celsius)	degrees C	16.1
UA	G217	C	2010/11/17	Total Dissolved Solids	mg/L	1,100
UA	G217	C	2011/01/27	Total Dissolved Solids	mg/L	1,000
UA	G217	C	2011/03/09	Total Dissolved Solids	mg/L	1,200
UA	G217	C	2011/05/05	Total Dissolved Solids	mg/L	1,100
UA	G217	C	2011/07/26	Total Dissolved Solids	mg/L	1,000
UA	G217	C	2011/09/20	Total Dissolved Solids	mg/L	930
UA	G217	C	2011/11/11	Total Dissolved Solids	mg/L	890
UA	G217	C	2012/01/26	Total Dissolved Solids	mg/L	810
UA	G217	C	2012/05/23	Total Dissolved Solids	mg/L	830
UA	G217	C	2012/07/24	Total Dissolved Solids	mg/L	800
UA	G217	C	2012/11/15	Total Dissolved Solids	mg/L	780
UA	G217	C	2013/02/04	Total Dissolved Solids	mg/L	700
UA	G217	C	2013/05/21	Total Dissolved Solids	mg/L	660
UA	G217	C	2013/07/23	Total Dissolved Solids	mg/L	660
UA	G217	C	2013/10/15	Total Dissolved Solids	mg/L	650
UA	G217	C	2014/02/20	Total Dissolved Solids	mg/L	680
UA	G217	C	2014/05/14	Total Dissolved Solids	mg/L	580
UA	G217	C	2014/08/12	Total Dissolved Solids	mg/L	620
UA	G217	C	2014/10/15	Total Dissolved Solids	mg/L	640
UA	G217	C	2015/01/21	Total Dissolved Solids	mg/L	670
UA	G217	C	2015/04/10	Total Dissolved Solids	mg/L	700
UA	G217	C	2015/07/22	Total Dissolved Solids	mg/L	750
UA	G217	C	2015/10/07	Total Dissolved Solids	mg/L	660
UA	G217	C	2020/10/14	Total Dissolved Solids	mg/L	680
UA	G217	C	2021/01/28	Total Dissolved Solids	mg/L	710
UA	G217	C	2021/05/20	Total Dissolved Solids	mg/L	730
UA	G217	C	2021/08/19	Total Dissolved Solids	mg/L	850
UA	G217	C	2021/10/26	Total Dissolved Solids	mg/L	740
UA	G217	C	2022/02/09	Total Dissolved Solids	mg/L	720
UA	G217	C	2022/05/10	Total Dissolved Solids	mg/L	870
UA	G217	C	2022/08/23	Total Dissolved Solids	mg/L	1,100
UA	G217	C	2022/11/08	Total Dissolved Solids	mg/L	940
UA	G217	C	2023/02/15	Total Dissolved Solids	mg/L	1,100

UA	G217	C	2023/06/08	Total Dissolved Solids	mg/L	1,100
UA	G217	C	2023/08/10	Total Dissolved Solids	mg/L	1,100
UA	G217	C	2023/11/16	Total Dissolved Solids	mg/L	1,100
UA	G218	C	2010/11/16	pH (field)	SU	7.1
UA	G218	C	2011/01/27	pH (field)	SU	7.1
UA	G218	C	2011/03/09	pH (field)	SU	7.2
UA	G218	C	2011/05/05	pH (field)	SU	7.0
UA	G218	C	2011/07/26	pH (field)	SU	6.9
UA	G218	C	2011/09/20	pH (field)	SU	7.1
UA	G218	C	2011/11/11	pH (field)	SU	7.1
UA	G218	C	2012/01/26	pH (field)	SU	7.1
UA	G218	C	2012/05/23	pH (field)	SU	7.1
UA	G218	C	2012/07/24	pH (field)	SU	7.0
UA	G218	C	2012/11/15	pH (field)	SU	7.2
UA	G218	C	2013/02/04	pH (field)	SU	7.3
UA	G218	C	2013/05/21	pH (field)	SU	7.0
UA	G218	C	2013/07/23	pH (field)	SU	7.0
UA	G218	C	2013/10/15	pH (field)	SU	7.1
UA	G218	C	2014/02/20	pH (field)	SU	7.2
UA	G218	C	2014/05/14	pH (field)	SU	6.8
UA	G218	C	2014/08/12	pH (field)	SU	7.3
UA	G218	C	2014/10/15	pH (field)	SU	7.3
UA	G218	C	2015/01/21	pH (field)	SU	7.2
UA	G218	C	2015/04/10	pH (field)	SU	6.8
UA	G218	C	2015/07/22	pH (field)	SU	6.8
UA	G218	C	2015/10/07	pH (field)	SU	7.0
UA	G218	C	2015/11/24	pH (field)	SU	7.1
UA	G218	C	2016/02/19	pH (field)	SU	7.0
UA	G218	C	2016/05/10	pH (field)	SU	7.0
UA	G218	C	2016/07/30	pH (field)	SU	7.0
UA	G218	C	2016/11/23	pH (field)	SU	7.1
UA	G218	C	2017/02/18	pH (field)	SU	7.2
UA	G218	C	2017/05/22	pH (field)	SU	7.1
UA	G218	C	2017/07/17	pH (field)	SU	7.1
UA	G218	C	2017/10/31	pH (field)	SU	6.9
UA	G218	C	2018/01/26	pH (field)	SU	6.9
UA	G218	C	2018/05/15	pH (field)	SU	7.0
UA	G218	C	2018/11/02	pH (field)	SU	6.9
UA	G218	C	2019/01/17	pH (field)	SU	7.0
UA	G218	C	2019/08/14	pH (field)	SU	7.0
UA	G218	C	2020/01/22	pH (field)	SU	7.1
UA	G218	C	2020/08/13	pH (field)	SU	7.1
UA	G218	C	2020/10/14	pH (field)	SU	6.9
UA	G218	C	2021/01/26	pH (field)	SU	7.0
UA	G218	C	2021/05/20	pH (field)	SU	7.1
UA	G218	C	2021/08/19	pH (field)	SU	7.1
UA	G218	C	2021/10/26	pH (field)	SU	7.1
UA	G218	C	2021/11/29	pH (field)	SU	7.0
UA	G218	C	2022/02/09	pH (field)	SU	6.8
UA	G218	C	2022/05/10	pH (field)	SU	6.8

UA	G218	C	2022/08/23	pH (field)	SU	6.9
UA	G218	C	2022/11/08	pH (field)	SU	6.7
UA	G218	C	2023/02/16	pH (field)	SU	7.1
UA	G218	C	2023/06/01	pH (field)	SU	7.2
UA	G218	C	2023/08/10	pH (field)	SU	6.9
UA	G218	C	2023/11/16	pH (field)	SU	6.8
UA	G218	C	2015/11/24	Oxidation Reduction Potential	mV	-22.0
UA	G218	C	2016/02/19	Oxidation Reduction Potential	mV	28.0
UA	G218	C	2016/05/10	Oxidation Reduction Potential	mV	-7.00
UA	G218	C	2016/07/30	Oxidation Reduction Potential	mV	72.0
UA	G218	C	2016/11/23	Oxidation Reduction Potential	mV	76.0
UA	G218	C	2017/02/18	Oxidation Reduction Potential	mV	57.0
UA	G218	C	2017/05/22	Oxidation Reduction Potential	mV	62.0
UA	G218	C	2017/07/17	Oxidation Reduction Potential	mV	59.0
UA	G218	C	2017/10/31	Oxidation Reduction Potential	mV	69.0
UA	G218	C	2018/01/26	Oxidation Reduction Potential	mV	71.0
UA	G218	C	2018/05/15	Oxidation Reduction Potential	mV	81.0
UA	G218	C	2018/11/02	Oxidation Reduction Potential	mV	61.0
UA	G218	C	2019/01/17	Oxidation Reduction Potential	mV	73.0
UA	G218	C	2019/08/14	Oxidation Reduction Potential	mV	69.0
UA	G218	C	2020/01/22	Oxidation Reduction Potential	mV	33.9
UA	G218	C	2020/08/13	Oxidation Reduction Potential	mV	9.60
UA	G218	C	2021/01/26	Oxidation Reduction Potential	mV	10.5
UA	G218	C	2021/08/19	Oxidation Reduction Potential	mV	-49.3
UA	G218	C	2021/11/29	Oxidation Reduction Potential	mV	-21.4
UA	G218	C	2022/02/09	Oxidation Reduction Potential	mV	45.1
UA	G218	C	2022/05/10	Oxidation Reduction Potential	mV	15.4
UA	G218	C	2022/08/23	Oxidation Reduction Potential	mV	-28.0
UA	G218	C	2022/11/08	Oxidation Reduction Potential	mV	-6.90
UA	G218	C	2023/02/16	Oxidation Reduction Potential	mV	2.90
UA	G218	C	2023/06/01	Oxidation Reduction Potential	mV	-27.0
UA	G218	C	2023/08/10	Oxidation Reduction Potential	mV	70.0
UA	G218	C	2023/11/16	Oxidation Reduction Potential	mV	-5.00
UA	G218	C	2015/11/24	Eh	V	0.17
UA	G218	C	2016/02/19	Eh	V	0.22
UA	G218	C	2016/05/10	Eh	V	0.19
UA	G218	C	2016/07/30	Eh	V	0.27
UA	G218	C	2016/11/23	Eh	V	0.27
UA	G218	C	2017/02/18	Eh	V	0.25
UA	G218	C	2017/05/22	Eh	V	0.26
UA	G218	C	2017/07/17	Eh	V	0.25
UA	G218	C	2017/10/31	Eh	V	0.27
UA	G218	C	2018/01/26	Eh	V	0.27
UA	G218	C	2018/05/15	Eh	V	0.28
UA	G218	C	2018/11/02	Eh	V	0.26
UA	G218	C	2019/01/17	Eh	V	0.27
UA	G218	C	2019/08/14	Eh	V	0.26
UA	G218	C	2020/01/22	Eh	V	0.23
UA	G218	C	2020/08/13	Eh	V	0.20
UA	G218	C	2021/01/26	Eh	V	0.21

UA	G218	C	2021/08/19	Eh	V	0.14
UA	G218	C	2021/11/29	Eh	V	0.17
UA	G218	C	2022/02/09	Eh	V	0.24
UA	G218	C	2022/05/10	Eh	V	0.21
UA	G218	C	2022/08/23	Eh	V	0.16
UA	G218	C	2022/11/08	Eh	V	0.19
UA	G218	C	2023/02/16	Eh	V	0.20
UA	G218	C	2023/06/01	Eh	V	0.17
UA	G218	C	2023/08/10	Eh	V	0.27
UA	G218	C	2023/11/16	Eh	V	0.19
UA	G218	C	2010/12/15	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G218	C	2011/01/27	Alkalinity, bicarbonate	mg/L CaCO3	340
UA	G218	C	2011/03/09	Alkalinity, bicarbonate	mg/L CaCO3	400
UA	G218	C	2011/05/05	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G218	C	2011/07/26	Alkalinity, bicarbonate	mg/L CaCO3	1,700
UA	G218	C	2011/09/20	Alkalinity, bicarbonate	mg/L CaCO3	330
UA	G218	C	2012/01/26	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G218	C	2013/02/04	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G218	C	2014/02/20	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G218	C	2014/08/12	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G218	C	2014/10/15	Alkalinity, bicarbonate	mg/L CaCO3	440
UA	G218	C	2015/01/21	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G218	C	2015/04/10	Alkalinity, bicarbonate	mg/L CaCO3	370
UA	G218	C	2017/07/17	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G218	C	2020/01/22	Alkalinity, bicarbonate	mg/L CaCO3	360
UA	G218	C	2020/08/13	Alkalinity, bicarbonate	mg/L CaCO3	320
UA	G218	C	2021/01/26	Alkalinity, bicarbonate	mg/L CaCO3	390
UA	G218	C	2021/08/19	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G218	C	2022/02/09	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G218	C	2022/06/15	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G218	C	2022/08/23	Alkalinity, bicarbonate	mg/L CaCO3	290
UA	G218	C	2023/02/16	Alkalinity, bicarbonate	mg/L CaCO3	310
UA	G218	C	2023/06/01	Alkalinity, bicarbonate	mg/L CaCO3	300
UA	G218	C	2023/08/10	Alkalinity, bicarbonate	mg/L CaCO3	305
UA	G218	C	2023/11/16	Alkalinity, bicarbonate	mg/L CaCO3	298
UA	G218	C	2022/08/23	Alkalinity, carbonate	mg/L CaCO3	10.0
UA	G218	C	2010/11/16	Barium, total	mg/L	0.190
UA	G218	C	2011/01/27	Barium, total	mg/L	0.120
UA	G218	C	2011/03/09	Barium, total	mg/L	0.140
UA	G218	C	2011/05/05	Barium, total	mg/L	0.140
UA	G218	C	2011/07/26	Barium, total	mg/L	0.180
UA	G218	C	2011/09/20	Barium, total	mg/L	0.160
UA	G218	C	2012/01/26	Barium, total	mg/L	0.140
UA	G218	C	2013/02/04	Barium, total	mg/L	0.130
UA	G218	C	2014/02/20	Barium, total	mg/L	0.130
UA	G218	C	2015/04/10	Barium, total	mg/L	0.140
UA	G218	C	2015/07/22	Barium, total	mg/L	0.150
UA	G218	C	2015/10/07	Barium, total	mg/L	0.140
UA	G218	C	2015/11/24	Barium, total	mg/L	0.170
UA	G218	C	2016/02/19	Barium, total	mg/L	0.150

UA	G218	C	2016/05/10	Barium, total	mg/L	0.140
UA	G218	C	2016/07/30	Barium, total	mg/L	0.150
UA	G218	C	2016/11/23	Barium, total	mg/L	0.130
UA	G218	C	2017/02/18	Barium, total	mg/L	0.130
UA	G218	C	2017/05/22	Barium, total	mg/L	0.150
UA	G218	C	2017/07/17	Barium, total	mg/L	0.140
UA	G218	C	2020/10/14	Barium, total	mg/L	0.140
UA	G218	C	2021/01/26	Barium, total	mg/L	0.140
UA	G218	C	2021/05/20	Barium, total	mg/L	0.140
UA	G218	C	2021/08/19	Barium, total	mg/L	0.150
UA	G218	C	2021/10/26	Barium, total	mg/L	0.130
UA	G218	C	2022/02/09	Barium, total	mg/L	0.140
UA	G218	C	2022/05/10	Barium, total	mg/L	0.120
UA	G218	C	2022/08/23	Barium, total	mg/L	0.0970
UA	G218	C	2022/11/08	Barium, total	mg/L	0.0850
UA	G218	C	2023/02/16	Barium, total	mg/L	0.110
UA	G218	C	2023/06/01	Barium, total	mg/L	0.0850
UA	G218	C	2023/08/10	Barium, total	mg/L	0.0747
UA	G218	C	2023/11/16	Barium, total	mg/L	0.0931
UA	G218	C	2010/11/16	Calcium, total	mg/L	120
UA	G218	C	2011/01/27	Calcium, total	mg/L	110
UA	G218	C	2011/03/09	Calcium, total	mg/L	110
UA	G218	C	2011/05/05	Calcium, total	mg/L	110
UA	G218	C	2011/07/26	Calcium, total	mg/L	110
UA	G218	C	2011/09/20	Calcium, total	mg/L	130
UA	G218	C	2011/11/11	Calcium, total	mg/L	110
UA	G218	C	2012/01/26	Calcium, total	mg/L	110
UA	G218	C	2012/05/23	Calcium, total	mg/L	110
UA	G218	C	2012/07/24	Calcium, total	mg/L	110
UA	G218	C	2012/11/15	Calcium, total	mg/L	110
UA	G218	C	2013/02/04	Calcium, total	mg/L	100
UA	G218	C	2013/05/21	Calcium, total	mg/L	110
UA	G218	C	2013/07/23	Calcium, total	mg/L	110
UA	G218	C	2013/10/15	Calcium, total	mg/L	120
UA	G218	C	2014/02/20	Calcium, total	mg/L	110
UA	G218	C	2014/05/14	Calcium, total	mg/L	140
UA	G218	C	2014/08/12	Calcium, total	mg/L	59.0
UA	G218	C	2014/10/15	Calcium, total	mg/L	120
UA	G218	C	2015/01/21	Calcium, total	mg/L	94.0
UA	G218	C	2015/04/10	Calcium, total	mg/L	120
UA	G218	C	2015/11/24	Calcium, total	mg/L	120
UA	G218	C	2016/02/19	Calcium, total	mg/L	120
UA	G218	C	2016/05/10	Calcium, total	mg/L	110
UA	G218	C	2016/07/30	Calcium, total	mg/L	130
UA	G218	C	2016/11/23	Calcium, total	mg/L	92.0
UA	G218	C	2017/02/18	Calcium, total	mg/L	110
UA	G218	C	2017/05/22	Calcium, total	mg/L	100
UA	G218	C	2017/07/17	Calcium, total	mg/L	120
UA	G218	C	2017/10/31	Calcium, total	mg/L	110
UA	G218	C	2018/05/15	Calcium, total	mg/L	110

UA	G218	C	2018/11/02	Calcium, total	mg/L	130
UA	G218	C	2019/01/17	Calcium, total	mg/L	120
UA	G218	C	2019/08/14	Calcium, total	mg/L	130
UA	G218	C	2020/01/22	Calcium, total	mg/L	130
UA	G218	C	2020/08/13	Calcium, total	mg/L	120
UA	G218	C	2021/01/26	Calcium, total	mg/L	120
UA	G218	C	2021/08/19	Calcium, total	mg/L	150
UA	G218	C	2022/02/09	Calcium, total	mg/L	140
UA	G218	C	2022/05/10	Calcium, total	mg/L	150
UA	G218	C	2022/08/23	Calcium, total	mg/L	170
UA	G218	C	2023/02/16	Calcium, total	mg/L	160
UA	G218	C	2023/06/01	Calcium, total	mg/L	170
UA	G218	C	2023/08/10	Calcium, total	mg/L	179
UA	G218	C	2023/11/16	Calcium, total	mg/L	181
UA	G218	C	2010/11/16	Chloride, total	mg/L	95.0
UA	G218	C	2011/01/27	Chloride, total	mg/L	95.0
UA	G218	C	2011/03/09	Chloride, total	mg/L	96.0
UA	G218	C	2011/05/05	Chloride, total	mg/L	95.0
UA	G218	C	2011/07/26	Chloride, total	mg/L	85.0
UA	G218	C	2011/09/20	Chloride, total	mg/L	98.0
UA	G218	C	2011/11/11	Chloride, total	mg/L	92.0
UA	G218	C	2012/01/26	Chloride, total	mg/L	85.0
UA	G218	C	2012/05/23	Chloride, total	mg/L	99.0
UA	G218	C	2012/07/24	Chloride, total	mg/L	84.0
UA	G218	C	2012/11/15	Chloride, total	mg/L	83.0
UA	G218	C	2013/02/04	Chloride, total	mg/L	91.0
UA	G218	C	2013/05/21	Chloride, total	mg/L	83.0
UA	G218	C	2013/07/23	Chloride, total	mg/L	93.0
UA	G218	C	2013/10/15	Chloride, total	mg/L	97.0
UA	G218	C	2014/02/20	Chloride, total	mg/L	88.0
UA	G218	C	2014/05/14	Chloride, total	mg/L	91.0
UA	G218	C	2014/08/12	Chloride, total	mg/L	91.0
UA	G218	C	2014/10/15	Chloride, total	mg/L	92.0
UA	G218	C	2015/01/21	Chloride, total	mg/L	100
UA	G218	C	2015/04/10	Chloride, total	mg/L	93.0
UA	G218	C	2015/07/22	Chloride, total	mg/L	98.0
UA	G218	C	2015/10/07	Chloride, total	mg/L	96.0
UA	G218	C	2015/11/24	Chloride, total	mg/L	99.0
UA	G218	C	2016/02/19	Chloride, total	mg/L	100
UA	G218	C	2016/05/10	Chloride, total	mg/L	97.0
UA	G218	C	2016/07/30	Chloride, total	mg/L	100
UA	G218	C	2016/11/23	Chloride, total	mg/L	97.0
UA	G218	C	2017/02/18	Chloride, total	mg/L	88.0
UA	G218	C	2017/05/22	Chloride, total	mg/L	84.0
UA	G218	C	2017/07/17	Chloride, total	mg/L	81.0
UA	G218	C	2017/10/31	Chloride, total	mg/L	91.0
UA	G218	C	2018/05/15	Chloride, total	mg/L	91.0
UA	G218	C	2018/11/02	Chloride, total	mg/L	84.0
UA	G218	C	2019/01/17	Chloride, total	mg/L	82.0
UA	G218	C	2019/08/14	Chloride, total	mg/L	81.0

UA	G218	C	2020/01/22	Chloride, total	mg/L	83.0
UA	G218	C	2020/08/13	Chloride, total	mg/L	84.0
UA	G218	C	2020/10/14	Chloride, total	mg/L	81.0
UA	G218	C	2021/01/26	Chloride, total	mg/L	81.0
UA	G218	C	2021/05/20	Chloride, total	mg/L	82.0
UA	G218	C	2021/08/19	Chloride, total	mg/L	88.0
UA	G218	C	2021/10/26	Chloride, total	mg/L	79.0
UA	G218	C	2022/02/09	Chloride, total	mg/L	110
UA	G218	C	2022/05/10	Chloride, total	mg/L	96.0
UA	G218	C	2022/08/23	Chloride, total	mg/L	100
UA	G218	C	2022/11/08	Chloride, total	mg/L	110
UA	G218	C	2023/02/16	Chloride, total	mg/L	100
UA	G218	C	2023/06/01	Chloride, total	mg/L	160
UA	G218	C	2023/08/10	Chloride, total	mg/L	116
UA	G218	C	2023/11/16	Chloride, total	mg/L	125
UA	G218	C	2023/06/01	Ferrous Iron, dissolved	mg/L	1.20
UA	G218	C	2010/11/16	Iron, dissolved	mg/L	0.130
UA	G218	C	2011/01/27	Iron, dissolved	mg/L	0.0720
UA	G218	C	2011/03/09	Iron, dissolved	mg/L	0.0760
UA	G218	C	2011/05/05	Iron, dissolved	mg/L	0.110
UA	G218	C	2011/07/26	Iron, dissolved	mg/L	0.0880
UA	G218	C	2011/09/20	Iron, dissolved	mg/L	0.380
UA	G218	C	2011/11/11	Iron, dissolved	mg/L	0.330
UA	G218	C	2012/01/26	Iron, dissolved	mg/L	0.530
UA	G218	C	2012/05/23	Iron, dissolved	mg/L	0.340
UA	G218	C	2012/07/24	Iron, dissolved	mg/L	0.450
UA	G218	C	2012/11/15	Iron, dissolved	mg/L	0.540
UA	G218	C	2013/02/04	Iron, dissolved	mg/L	0.590
UA	G218	C	2013/05/21	Iron, dissolved	mg/L	0.280
UA	G218	C	2013/07/23	Iron, dissolved	mg/L	0.430
UA	G218	C	2013/10/15	Iron, dissolved	mg/L	0.330
UA	G218	C	2014/02/20	Iron, dissolved	mg/L	0.530
UA	G218	C	2014/05/14	Iron, dissolved	mg/L	0.380
UA	G218	C	2014/08/12	Iron, dissolved	mg/L	0.670
UA	G218	C	2014/10/15	Iron, dissolved	mg/L	0.590
UA	G218	C	2015/01/21	Iron, dissolved	mg/L	0.700
UA	G218	C	2015/04/10	Iron, dissolved	mg/L	<0.01
UA	G218	C	2015/07/22	Iron, dissolved	mg/L	0.0410
UA	G218	C	2015/10/07	Iron, dissolved	mg/L	0.280
UA	G218	C	2016/02/19	Iron, dissolved	mg/L	0.600
UA	G218	C	2016/05/11	Iron, dissolved	mg/L	0.0120
UA	G218	C	2016/07/25	Iron, dissolved	mg/L	0.0570
UA	G218	C	2016/11/23	Iron, dissolved	mg/L	0.390
UA	G218	C	2017/02/14	Iron, dissolved	mg/L	0.470
UA	G218	C	2017/05/24	Iron, dissolved	mg/L	<0.01
UA	G218	C	2017/07/25	Iron, dissolved	mg/L	<0.01
UA	G218	C	2017/10/31	Iron, dissolved	mg/L	0.860
UA	G218	C	2018/01/27	Iron, dissolved	mg/L	0.110
UA	G218	C	2018/05/15	Iron, dissolved	mg/L	<0.01
UA	G218	C	2018/08/09	Iron, dissolved	mg/L	0.180

UA	G218	C	2018/11/02	Iron, dissolved	mg/L	0.390
UA	G218	C	2019/01/17	Iron, dissolved	mg/L	0.700
UA	G218	C	2019/05/02	Iron, dissolved	mg/L	0.0640
UA	G218	C	2019/08/14	Iron, dissolved	mg/L	0.310
UA	G218	C	2019/10/22	Iron, dissolved	mg/L	0.690
UA	G218	C	2020/01/22	Iron, dissolved	mg/L	0.270
UA	G218	C	2020/05/04	Iron, dissolved	mg/L	0.470
UA	G218	C	2020/08/13	Iron, dissolved	mg/L	0.380
UA	G218	C	2020/10/14	Iron, dissolved	mg/L	0.650
UA	G218	C	2021/01/26	Iron, dissolved	mg/L	0.510
UA	G218	C	2021/05/20	Iron, dissolved	mg/L	1.10
UA	G218	C	2021/08/19	Iron, dissolved	mg/L	0.840
UA	G218	C	2021/10/26	Iron, dissolved	mg/L	0.770
UA	G218	C	2022/02/09	Iron, dissolved	mg/L	0.610
UA	G218	C	2022/05/10	Iron, dissolved	mg/L	0.660
UA	G218	C	2022/08/23	Iron, dissolved	mg/L	0.810
UA	G218	C	2022/11/08	Iron, dissolved	mg/L	0.740
UA	G218	C	2023/02/16	Iron, dissolved	mg/L	<0.00072
UA	G218	C	2023/06/01	Iron, dissolved	mg/L	1.00
UA	G218	C	2023/08/10	Iron, dissolved	mg/L	0.950
UA	G218	C	2023/11/16	Iron, dissolved	mg/L	0.905
UA	G218	C	2010/11/16	Magnesium, total	mg/L	46.0
UA	G218	C	2011/01/27	Magnesium, total	mg/L	42.0
UA	G218	C	2011/03/09	Magnesium, total	mg/L	46.0
UA	G218	C	2011/05/05	Magnesium, total	mg/L	<100
UA	G218	C	2011/07/26	Magnesium, total	mg/L	49.0
UA	G218	C	2011/09/20	Magnesium, total	mg/L	50.0
UA	G218	C	2012/01/26	Magnesium, total	mg/L	45.0
UA	G218	C	2013/02/04	Magnesium, total	mg/L	44.0
UA	G218	C	2014/02/20	Magnesium, total	mg/L	46.0
UA	G218	C	2015/04/10	Magnesium, total	mg/L	51.0
UA	G218	C	2017/07/17	Magnesium, total	mg/L	57.0
UA	G218	C	2020/01/22	Magnesium, total	mg/L	52.0
UA	G218	C	2020/08/13	Magnesium, total	mg/L	49.0
UA	G218	C	2021/01/26	Magnesium, total	mg/L	50.0
UA	G218	C	2021/08/19	Magnesium, total	mg/L	59.0
UA	G218	C	2022/02/09	Magnesium, total	mg/L	57.0
UA	G218	C	2022/05/10	Magnesium, total	mg/L	62.0
UA	G218	C	2022/08/23	Magnesium, total	mg/L	70.0
UA	G218	C	2023/02/16	Magnesium, total	mg/L	57.0
UA	G218	C	2023/06/01	Magnesium, total	mg/L	65.0
UA	G218	C	2023/08/10	Magnesium, total	mg/L	70.6
UA	G218	C	2023/11/16	Magnesium, total	mg/L	74.3
UA	G218	C	2010/11/16	Manganese, dissolved	mg/L	0.290
UA	G218	C	2011/01/27	Manganese, dissolved	mg/L	0.330
UA	G218	C	2011/03/09	Manganese, dissolved	mg/L	0.230
UA	G218	C	2011/05/05	Manganese, dissolved	mg/L	0.140
UA	G218	C	2011/07/26	Manganese, dissolved	mg/L	0.180
UA	G218	C	2011/09/20	Manganese, dissolved	mg/L	0.320
UA	G218	C	2011/11/11	Manganese, dissolved	mg/L	0.170

UA	G218	C	2012/01/26	Manganese, dissolved	mg/L	0.250
UA	G218	C	2012/05/23	Manganese, dissolved	mg/L	0.230
UA	G218	C	2012/07/24	Manganese, dissolved	mg/L	0.280
UA	G218	C	2012/11/15	Manganese, dissolved	mg/L	0.250
UA	G218	C	2013/02/04	Manganese, dissolved	mg/L	0.250
UA	G218	C	2013/05/21	Manganese, dissolved	mg/L	0.160
UA	G218	C	2013/07/23	Manganese, dissolved	mg/L	0.230
UA	G218	C	2013/10/15	Manganese, dissolved	mg/L	0.310
UA	G218	C	2014/02/20	Manganese, dissolved	mg/L	0.190
UA	G218	C	2014/05/14	Manganese, dissolved	mg/L	0.230
UA	G218	C	2014/08/12	Manganese, dissolved	mg/L	0.260
UA	G218	C	2014/10/15	Manganese, dissolved	mg/L	0.270
UA	G218	C	2015/01/21	Manganese, dissolved	mg/L	0.260
UA	G218	C	2015/04/10	Manganese, dissolved	mg/L	<0.002
UA	G218	C	2015/07/22	Manganese, dissolved	mg/L	0.110
UA	G218	C	2015/10/07	Manganese, dissolved	mg/L	0.320
UA	G218	C	2016/02/19	Manganese, dissolved	mg/L	0.200
UA	G218	C	2016/05/11	Manganese, dissolved	mg/L	0.180
UA	G218	C	2016/07/25	Manganese, dissolved	mg/L	0.0100
UA	G218	C	2016/11/23	Manganese, dissolved	mg/L	0.270
UA	G218	C	2017/02/14	Manganese, dissolved	mg/L	0.130
UA	G218	C	2017/05/24	Manganese, dissolved	mg/L	0.00900
UA	G218	C	2017/07/25	Manganese, dissolved	mg/L	0.00540
UA	G218	C	2017/10/31	Manganese, dissolved	mg/L	0.200
UA	G218	C	2018/01/27	Manganese, dissolved	mg/L	0.0530
UA	G218	C	2018/05/15	Manganese, dissolved	mg/L	0.00530
UA	G218	C	2018/08/09	Manganese, dissolved	mg/L	0.370
UA	G218	C	2018/11/02	Manganese, dissolved	mg/L	0.290
UA	G218	C	2019/01/17	Manganese, dissolved	mg/L	0.150
UA	G218	C	2019/05/02	Manganese, dissolved	mg/L	0.0550
UA	G218	C	2019/08/14	Manganese, dissolved	mg/L	0.190
UA	G218	C	2019/10/22	Manganese, dissolved	mg/L	0.280
UA	G218	C	2020/01/22	Manganese, dissolved	mg/L	0.160
UA	G218	C	2020/05/04	Manganese, dissolved	mg/L	0.240
UA	G218	C	2020/08/13	Manganese, dissolved	mg/L	0.320
UA	G218	C	2020/10/14	Manganese, dissolved	mg/L	0.300
UA	G218	C	2021/01/26	Manganese, dissolved	mg/L	0.290
UA	G218	C	2021/05/20	Manganese, dissolved	mg/L	0.430
UA	G218	C	2021/08/19	Manganese, dissolved	mg/L	0.390
UA	G218	C	2021/10/26	Manganese, dissolved	mg/L	0.380
UA	G218	C	2022/02/09	Manganese, dissolved	mg/L	0.330
UA	G218	C	2022/05/10	Manganese, dissolved	mg/L	0.340
UA	G218	C	2022/08/23	Manganese, dissolved	mg/L	0.420
UA	G218	C	2022/11/08	Manganese, dissolved	mg/L	0.420
UA	G218	C	2023/02/16	Manganese, dissolved	mg/L	<0.00023
UA	G218	C	2023/06/01	Manganese, dissolved	mg/L	0.450
UA	G218	C	2023/08/10	Manganese, dissolved	mg/L	0.429
UA	G218	C	2023/11/16	Manganese, dissolved	mg/L	0.436
UA	G218	C	2023/08/10	Phosphate, dissolved	mg/L	0.0210
UA	G218	C	2010/11/16	Potassium, total	mg/L	3.20

UA	G218	C	2011/01/27	Potassium, total	mg/L	1.00
UA	G218	C	2011/03/09	Potassium, total	mg/L	0.530
UA	G218	C	2011/05/05	Potassium, total	mg/L	0.310
UA	G218	C	2011/07/26	Potassium, total	mg/L	2.50
UA	G218	C	2011/09/20	Potassium, total	mg/L	0.640
UA	G218	C	2012/01/26	Potassium, total	mg/L	0.490
UA	G218	C	2013/02/04	Potassium, total	mg/L	0.500
UA	G218	C	2014/02/20	Potassium, total	mg/L	0.490
UA	G218	C	2015/04/10	Potassium, total	mg/L	0.540
UA	G218	C	2017/07/17	Potassium, total	mg/L	0.530
UA	G218	C	2020/01/22	Potassium, total	mg/L	0.570
UA	G218	C	2020/08/13	Potassium, total	mg/L	0.440
UA	G218	C	2021/01/26	Potassium, total	mg/L	0.900
UA	G218	C	2021/08/19	Potassium, total	mg/L	0.470
UA	G218	C	2022/02/09	Potassium, total	mg/L	0.630
UA	G218	C	2022/05/10	Potassium, total	mg/L	0.690
UA	G218	C	2022/08/23	Potassium, total	mg/L	0.630
UA	G218	C	2023/02/16	Potassium, total	mg/L	0.790
UA	G218	C	2023/06/01	Potassium, total	mg/L	0.690
UA	G218	C	2023/08/10	Potassium, total	mg/L	0.772
UA	G218	C	2023/11/16	Potassium, total	mg/L	0.810
UA	G218	C	2023/06/01	Silicon, dissolved	mg/L	8.50
UA	G218	C	2023/08/10	Silicon, dissolved	mg/L	8.19
UA	G218	C	2010/11/16	Sodium, total	mg/L	52.0
UA	G218	C	2011/01/27	Sodium, total	mg/L	52.0
UA	G218	C	2011/03/09	Sodium, total	mg/L	58.0
UA	G218	C	2011/05/05	Sodium, total	mg/L	<100
UA	G218	C	2011/07/26	Sodium, total	mg/L	55.0
UA	G218	C	2011/09/20	Sodium, total	mg/L	63.0
UA	G218	C	2012/01/26	Sodium, total	mg/L	56.0
UA	G218	C	2013/02/04	Sodium, total	mg/L	55.0
UA	G218	C	2014/02/20	Sodium, total	mg/L	57.0
UA	G218	C	2015/04/10	Sodium, total	mg/L	60.0
UA	G218	C	2017/07/17	Sodium, total	mg/L	67.0
UA	G218	C	2020/01/22	Sodium, total	mg/L	55.0
UA	G218	C	2020/08/13	Sodium, total	mg/L	58.0
UA	G218	C	2021/01/26	Sodium, total	mg/L	58.0
UA	G218	C	2021/08/19	Sodium, total	mg/L	63.0
UA	G218	C	2022/02/09	Sodium, total	mg/L	67.0
UA	G218	C	2022/05/10	Sodium, total	mg/L	65.0
UA	G218	C	2022/08/23	Sodium, total	mg/L	75.0
UA	G218	C	2023/02/16	Sodium, total	mg/L	63.0
UA	G218	C	2023/06/01	Sodium, total	mg/L	73.0
UA	G218	C	2023/08/10	Sodium, total	mg/L	75.3
UA	G218	C	2023/11/16	Sodium, total	mg/L	73.7
UA	G218	C	2010/11/16	Sulfate, total	mg/L	79.0
UA	G218	C	2011/01/27	Sulfate, total	mg/L	87.0
UA	G218	C	2011/03/09	Sulfate, total	mg/L	87.0
UA	G218	C	2011/05/05	Sulfate, total	mg/L	88.0
UA	G218	C	2011/07/26	Sulfate, total	mg/L	85.0

UA	G218	C	2011/09/20	Sulfate, total	mg/L	88.0
UA	G218	C	2011/11/11	Sulfate, total	mg/L	83.0
UA	G218	C	2012/01/26	Sulfate, total	mg/L	81.0
UA	G218	C	2012/05/23	Sulfate, total	mg/L	94.0
UA	G218	C	2012/07/24	Sulfate, total	mg/L	76.0
UA	G218	C	2012/11/15	Sulfate, total	mg/L	76.0
UA	G218	C	2013/02/04	Sulfate, total	mg/L	86.0
UA	G218	C	2013/05/21	Sulfate, total	mg/L	76.0
UA	G218	C	2013/07/23	Sulfate, total	mg/L	82.0
UA	G218	C	2013/10/15	Sulfate, total	mg/L	91.0
UA	G218	C	2014/02/20	Sulfate, total	mg/L	81.0
UA	G218	C	2014/05/14	Sulfate, total	mg/L	93.0
UA	G218	C	2014/08/12	Sulfate, total	mg/L	97.0
UA	G218	C	2014/10/15	Sulfate, total	mg/L	96.0
UA	G218	C	2015/01/21	Sulfate, total	mg/L	110
UA	G218	C	2015/04/10	Sulfate, total	mg/L	99.0
UA	G218	C	2015/07/22	Sulfate, total	mg/L	97.0
UA	G218	C	2015/10/07	Sulfate, total	mg/L	95.0
UA	G218	C	2015/11/24	Sulfate, total	mg/L	94.0
UA	G218	C	2016/02/19	Sulfate, total	mg/L	110
UA	G218	C	2016/05/10	Sulfate, total	mg/L	140
UA	G218	C	2016/07/30	Sulfate, total	mg/L	120
UA	G218	C	2016/11/23	Sulfate, total	mg/L	130
UA	G218	C	2017/02/18	Sulfate, total	mg/L	130
UA	G218	C	2017/05/22	Sulfate, total	mg/L	140
UA	G218	C	2017/07/17	Sulfate, total	mg/L	140
UA	G218	C	2017/10/31	Sulfate, total	mg/L	140
UA	G218	C	2018/05/15	Sulfate, total	mg/L	140
UA	G218	C	2018/11/02	Sulfate, total	mg/L	140
UA	G218	C	2019/01/17	Sulfate, total	mg/L	140
UA	G218	C	2019/08/14	Sulfate, total	mg/L	150
UA	G218	C	2020/01/22	Sulfate, total	mg/L	170
UA	G218	C	2020/08/13	Sulfate, total	mg/L	220
UA	G218	C	2020/10/14	Sulfate, total	mg/L	230
UA	G218	C	2021/01/26	Sulfate, total	mg/L	210
UA	G218	C	2021/05/20	Sulfate, total	mg/L	200
UA	G218	C	2021/08/19	Sulfate, total	mg/L	260
UA	G218	C	2021/10/26	Sulfate, total	mg/L	260
UA	G218	C	2022/02/09	Sulfate, total	mg/L	260
UA	G218	C	2022/05/10	Sulfate, total	mg/L	270
UA	G218	C	2022/08/23	Sulfate, total	mg/L	350
UA	G218	C	2022/11/08	Sulfate, total	mg/L	340
UA	G218	C	2023/02/16	Sulfate, total	mg/L	300
UA	G218	C	2023/06/01	Sulfate, total	mg/L	370
UA	G218	C	2023/08/10	Sulfate, total	mg/L	424
UA	G218	C	2023/11/16	Sulfate, total	mg/L	433
UA	G218	C	2015/11/24	Temperature (Celsius)	degrees C	15.8
UA	G218	C	2016/02/19	Temperature (Celsius)	degrees C	13.6
UA	G218	C	2016/05/10	Temperature (Celsius)	degrees C	19.8
UA	G218	C	2016/07/30	Temperature (Celsius)	degrees C	18.5

UA	G218	C	2016/11/23	Temperature (Celsius)	degrees C	14.6
UA	G218	C	2017/02/18	Temperature (Celsius)	degrees C	14.7
UA	G218	C	2017/05/22	Temperature (Celsius)	degrees C	15.8
UA	G218	C	2017/07/17	Temperature (Celsius)	degrees C	20.0
UA	G218	C	2017/10/31	Temperature (Celsius)	degrees C	13.5
UA	G218	C	2018/01/26	Temperature (Celsius)	degrees C	11.9
UA	G218	C	2018/05/15	Temperature (Celsius)	degrees C	15.4
UA	G218	C	2018/11/02	Temperature (Celsius)	degrees C	14.5
UA	G218	C	2019/01/17	Temperature (Celsius)	degrees C	12.5
UA	G218	C	2019/08/14	Temperature (Celsius)	degrees C	16.9
UA	G218	C	2020/01/22	Temperature (Celsius)	degrees C	13.2
UA	G218	C	2020/08/13	Temperature (Celsius)	degrees C	20.2
UA	G218	C	2021/01/26	Temperature (Celsius)	degrees C	12.2
UA	G218	C	2021/08/19	Temperature (Celsius)	degrees C	19.0
UA	G218	C	2021/11/29	Temperature (Celsius)	degrees C	13.9
UA	G218	C	2022/02/09	Temperature (Celsius)	degrees C	12.5
UA	G218	C	2022/05/10	Temperature (Celsius)	degrees C	20.1
UA	G218	C	2022/08/23	Temperature (Celsius)	degrees C	20.8
UA	G218	C	2022/11/08	Temperature (Celsius)	degrees C	16.4
UA	G218	C	2023/02/16	Temperature (Celsius)	degrees C	10.9
UA	G218	C	2023/06/01	Temperature (Celsius)	degrees C	19.8
UA	G218	C	2023/08/10	Temperature (Celsius)	degrees C	15.2
UA	G218	C	2023/11/16	Temperature (Celsius)	degrees C	15.8
UA	G218	C	2010/11/16	Total Dissolved Solids	mg/L	590
UA	G218	C	2011/01/27	Total Dissolved Solids	mg/L	620
UA	G218	C	2011/03/09	Total Dissolved Solids	mg/L	630
UA	G218	C	2011/05/05	Total Dissolved Solids	mg/L	610
UA	G218	C	2011/07/26	Total Dissolved Solids	mg/L	680
UA	G218	C	2011/09/20	Total Dissolved Solids	mg/L	620
UA	G218	C	2011/11/11	Total Dissolved Solids	mg/L	580
UA	G218	C	2012/01/26	Total Dissolved Solids	mg/L	550
UA	G218	C	2012/05/23	Total Dissolved Solids	mg/L	610
UA	G218	C	2012/07/24	Total Dissolved Solids	mg/L	610
UA	G218	C	2012/11/15	Total Dissolved Solids	mg/L	610
UA	G218	C	2013/02/04	Total Dissolved Solids	mg/L	590
UA	G218	C	2013/05/21	Total Dissolved Solids	mg/L	580
UA	G218	C	2013/07/23	Total Dissolved Solids	mg/L	600
UA	G218	C	2013/10/15	Total Dissolved Solids	mg/L	620
UA	G218	C	2014/02/20	Total Dissolved Solids	mg/L	610
UA	G218	C	2014/05/14	Total Dissolved Solids	mg/L	610
UA	G218	C	2014/08/12	Total Dissolved Solids	mg/L	580
UA	G218	C	2014/10/15	Total Dissolved Solids	mg/L	600
UA	G218	C	2015/01/21	Total Dissolved Solids	mg/L	660
UA	G218	C	2015/04/10	Total Dissolved Solids	mg/L	640
UA	G218	C	2015/07/22	Total Dissolved Solids	mg/L	690
UA	G218	C	2015/10/07	Total Dissolved Solids	mg/L	620
UA	G218	C	2015/11/24	Total Dissolved Solids	mg/L	620
UA	G218	C	2016/02/19	Total Dissolved Solids	mg/L	560
UA	G218	C	2016/05/10	Total Dissolved Solids	mg/L	600
UA	G218	C	2016/07/30	Total Dissolved Solids	mg/L	620

UA	G218	C	2016/11/23	Total Dissolved Solids	mg/L	620
UA	G218	C	2017/02/18	Total Dissolved Solids	mg/L	630
UA	G218	C	2017/05/22	Total Dissolved Solids	mg/L	600
UA	G218	C	2017/07/17	Total Dissolved Solids	mg/L	720
UA	G218	C	2017/10/31	Total Dissolved Solids	mg/L	660
UA	G218	C	2018/05/15	Total Dissolved Solids	mg/L	640
UA	G218	C	2018/11/02	Total Dissolved Solids	mg/L	280
UA	G218	C	2019/01/17	Total Dissolved Solids	mg/L	600
UA	G218	C	2019/08/14	Total Dissolved Solids	mg/L	660
UA	G218	C	2020/01/22	Total Dissolved Solids	mg/L	560
UA	G218	C	2020/08/13	Total Dissolved Solids	mg/L	720
UA	G218	C	2020/10/14	Total Dissolved Solids	mg/L	740
UA	G218	C	2021/01/26	Total Dissolved Solids	mg/L	710
UA	G218	C	2021/05/20	Total Dissolved Solids	mg/L	760
UA	G218	C	2021/08/19	Total Dissolved Solids	mg/L	1,000
UA	G218	C	2021/10/26	Total Dissolved Solids	mg/L	850
UA	G218	C	2021/11/29	Total Dissolved Solids	mg/L	880
UA	G218	C	2022/02/09	Total Dissolved Solids	mg/L	850
UA	G218	C	2022/05/10	Total Dissolved Solids	mg/L	920
UA	G218	C	2022/08/23	Total Dissolved Solids	mg/L	1,100
UA	G218	C	2022/11/08	Total Dissolved Solids	mg/L	940
UA	G218	C	2023/02/16	Total Dissolved Solids	mg/L	920
UA	G218	C	2023/06/01	Total Dissolved Solids	mg/L	1,000
UA	G218	C	2023/08/10	Total Dissolved Solids	mg/L	1,140
UA	G218	C	2023/11/16	Total Dissolved Solids	mg/L	1,140

Notes:

< = results is less than detection limit

B = Background

C = Compliance

HSU = Hydrostratigraphic Unit

DA = Deep Aquifer

S = Source Water

UA = Uppermost Aquifer

mg/L = milligrams per liter

SU = standard units

V = volts

Attachment H

Memorandum – Evaluation of Partition Coefficient Results – Coffeen GMF Recycle Pond

Geosyntec consultants

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Memorandum

Date:	July 5, 2022
To:	David Mitchell, Stu Cravens, Vic Modeer Illinois Power Generating Company
Copies to:	Brian Hennings - Ramboll
From:	Allison Kreinberg, Ryan Fimmen – Geosyntec Consultants, Inc.
Subject:	Evaluation of Partition Coefficient Results – Coffeen GMF Recycle Pond CCR Unit 104, Coffeen Power Plant, Coffeen, Illinois

INTRODUCTION

The Illinois Power Generation Company (IPGC) currently operates the Coffeen Power Plant (CPP) in Coffeen, Illinois. The coal combustion residuals (CCR) Unit referred to as the Gypsum Management Facility (GMP) Recycle Pond (RP) (Vistra identification [ID] number [No.] 104; Illinois Environmental Protection Agency [IEPA] ID No. W1350150004-04; National Inventory of Dams [NID] No. IL50578) is a 17-acre pond that receives blowdown from the air emission scrubber. The pond was in operation starting in 2010 until April 11, 2021, when IPGC ceased receipt of waste to the GMF RP. Geosyntec Consultants (Geosyntec) is assisting IPGC with Part 845 compliance at the Site.

IPGC is currently preparing a Construction Permit application for the GMF RP as required under Section 845.220. As part of the Construction Permit application, groundwater modeling is being completed for known potential exceedances of groundwater protection standards (GWPS) as outlined in the Operating Permit (Burns & McDonnell, 2021). In the Operating Permit (October 2021), Burns & McDonnell identified potential GWPS exceedances for several compounds potentially associated with the GMF RP, including boron, sulfate, and total dissolved solids (TDS). Batch adsorption testing was conducted for boron and sulfate to generate site-specific partition coefficients. This technical memorandum summarizes the results of the batch adsorption testing and calculation of partition coefficients.

BATCH ATTENUATION TESTING

In 2021 Geosyntec conducted a field investigation at the GMF RP which included completion of two (2) soil/rock borings ranging in depth from 18 to 28 feet below ground surface. As part of that investigation, soil and groundwater samples were submitted to SiREM Laboratories (Guelph, ON) for batch solid/liquid partitioning testing. A summary of the soil samples used for the batch testing is provided in **Table 1**.

One groundwater sample (G215) and one soil sample (SB-215) were used for batch attenuation testing at five (5) soil:solution ratios (**Table 1**), each ran in duplicate. For each treatment, 0.1 L of groundwater was brought into contact with varying amounts of soil (0.004 to 0.2 kg, depending on the ratio) and equilibrated over a seven-day period. One set of microcosms was amended (i.e., spiked) with sodium sulfate (Na_2SO_4) and another with boric acid (H_3BO_3) to achieve target concentrations of sulfate and boron, respectively (**Table 2**).

An initial sample of the stock solution for each experimental design was collected on Day 0, and a control sample (i.e., only amended G215 groundwater with no aquifer solids) was collected on Day 7 after tumbling in polypropylene bottleware to evaluate any loss to interactions with the bottleware or ambient conditions. Duplicates were constructed for each microcosm, including the control samples. After seven days of contact time, an aliquot of the free liquid was collected and filtered through a 0.45 micron (µm) filter prior to analysis for dissolved concentrations of sulfate and/or boron. The oxidation/reduction potential (redox) and pH were measured for each batch test at the beginning and end of the contact period and in the control samples.

Data obtained from the tests (**Tables 3** and **4**) were used to construct isotherms for boron and sulfate; 5-point isotherms were constructed by averaging duplicate results for each soil:solution ratio. Mathematical fitting was used to calculate the partition coefficients (K_d), assuming linear adsorption. The linear adsorption equation was used:

$$q_e = K_d \times C_e \qquad \text{Eq. 1}$$

where q_e is the mass of constituent adsorbed to the solid phase at equilibrium, C_e is the remaining aqueous constituent concentration at equilibrium, and K_d is the linear sorption coefficient (reported in liters per kilogram [L/kg]). Some of the data showed a deviation from a linear trend, and so were also fitted using non-linear isotherms. The non-linear Langmuir isotherm was used:

$$q_e = \frac{q_m K_L C_e}{1 + K_L C_e} \qquad \text{Eq. 2}$$

where q_m is the inverse of the slope and K_L is the Langmuir partition coefficient. The adsorption data were linearized according to:

$$\frac{C_e}{q_e} = \frac{1}{(K_L \times q_m)} + \frac{C_e}{q_m} \qquad \text{Eq. 3}$$

A common non-linear Freundlich equation was also used:

$$q_e = K_F (C_e)^{1/n} \qquad \text{Eq. 4}$$

where q_e is the mass of constituent adsorbed to the solid phase at equilibrium, C_e is the remaining aqueous constituent concentration at equilibrium, K_F is the Freundlich partition coefficient, and $1/n$ is a non-linearity constant. The adsorption data were plotted as log-transformed values to perform the non-linear isotherm fitting using the linearized Freundlich equation:

$$log(q_e) = \log(K_F) + (1/n)\log(C_e) \qquad \text{Eq. 5}$$

The calculated linear, Langmuir, and Freundlich partition coefficients (K_d, K_L, and K_F, respectively) and $1/n$ values are shown in **Table 5**.

SUMMARY OF RESULTS

The partition coefficient values for each amendment (denoted as G215-SO_4 when amended with sodium sulfate and G215-B when amended with boric acid) are presented in **Table 5**. Figures which show the linear, Langmuir, and Freundlich isotherms for boron and sulfate are provided in **Appendix A**. Measurements of soil boron concentrations in SB-215 are pending; a surrogate value of 0 mg/kg was used, consistent with soil boron concentrations from other areas at the CPP.

A boron partition coefficient was not determined for any isotherm for the boron amended microcosms. Both the linear and linearized Langmuir isotherms yielded negative partition coefficients, and the linearized Freundlich could not be calculated as the data were not conducive to log transformation. Other studies have reported low partition coefficients for boron ranging from 0.19 to 1.3 L/kg, depending on pH conditions and the amount of sorbent present (EPRI, 2005; Strenge & Peterson, 1989).

A sulfate partition coefficient was not determined for any isotherm for the sulfate amended microcosms. The linear isotherm yielded a partition coefficient of 0.1 L/kg but had a very poor goodness-of-fit, and the Langmuir isotherm yielded a negative coefficient. As in the boron-amended microcosms, the Freundlich isotherm could not be calculated because the data were not conducive to log transformation These results are consistent with the findings of Strenge and Peterson (1989), who found that partition coefficients for sulfate are 0.0 L/kg, regardless of pH conditions and the amount of sorbent present.

REFERENCES

EPRI, 2005. *Chemical constituents in coal combustion product leachate: boron. Final Report 1005258.*

Burns & McDonnell. 2021. Initial Operating Permit Coffeen GMF Recycle Pond. October

Strenge, D. and Peterson, S. 1989. Chemical Data Bases for the Multimedia Environmental Pollutant Assessment System (MEPAS) (No. PNL-7145). Pacific Northwest National Laboratory, Richland, WA (USA).

TABLES

Table 1 - Batch Attenuation Testing Data Summary
Coffeen GMF RP

Geosyntec Consultants

Groundwater Sample ID	Soil Sample ID	Soil: Water Ratio
G215	SB-215 (19-24.5 ft bgs) Sodium Sulfate Amendment	2:1.5
		1:1.3
		1:5.8
		1:11.5
		1:27.2
G215	SB-215 (19-24.5 ft bgs) Boric Acid Amendment	2:1.5
		1:1.3
		1:5.8
		1:11.5
		1:28.1

Notes:

ft bgs = feet below ground surface

Table 2 - Microcosm Amendment and Target Concentrations
Coffeen GMF RP

Groundwater Sample ID	Soil Sample ID	Compound	Amendment	Target Concentration (mg/L)
G215	SB-215 (19-24.5 ft bgs)	Boron	31.93 mL of a 2 g/L H_3BO_3	6
		Sulfate	3.41 g of Na_2SO_4	1500

Notes:
ft bgs - feet below ground surface
mg/L - milligrams per liter
Na_2SO_4 - sodium sulfate
H_3BO_3 - boric acid

Table 3 - Batch Attenuation Testing Results
Coffeen GMF RP - Sodium Sulfate Amendment

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Date	Day	Replicate	Dissolved Sulfate	pH	ORP
						mg/L	SU	mV
G215	--	Groundwater Only Control	25-Jan-22	0	G215-1a (SO_4^{2-})	1,589	6.98	83
					G215-2a (SO_4^{2-})	1,826	6.99	79
					Average Concentration (mg/L)	**1,708**	**6.99**	**81**
			7-Feb-22	7	G215-1 (SO_4^{2-})	1,617	6.8	26
					G215-2 (SO_4^{2-})	1,478	6.81	13
					Average Concentration (mg/L)	**1,548**	**6.81**	**20**
	G215 SB-215 Geologic Material	2:1 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 2:1-1 (SO_4^{2-})	1,321	6.92	57
					SB-215-(19-24.5) :G215 2:1-2 (SO_4^{2-})	1,302	6.94	103
					Average Concentration (mg/L)	**1,311**	**6.93**	**80**
		1:1 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:1-1 (SO_4^{2-})	1,727	6.89	85
					SB-215-(19-24.5) :G215 1:1-2 (SO_4^{2-})	860	6.91	91
					Average Concentration (mg/L)	**1,294**	**6.90**	**88**
		1:5 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:5-1 (SO_4^{2-})	1,326	6.92	29
					SB-215-(19-24.5) :G215 1:5-2 (SO_4^{2-})	1,516	6.87	15
					Average Concentration (mg/L)	**1,421**	**6.90**	**22**
		1:10 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:10-1 (SO_4^{2-})	1,570	6.87	23
					SB-215-(19-24.5) :G215 1:10-2 (SO_4^{2-})	1,551	6.85	30
					Average Concentration (mg/L)	**1,560**	**6.86**	**27**
		1:20 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:20-1 (SO_4^{2-})	1,511	6.83	32
					SB-215-(19-24.5) :G215 1:20-2 (SO_4^{2-})	1,588	6.84	79
					Average Concentration (mg/L)	**1,550**	**6.84**	**56**

Notes:
mg/L - milligrams per liter
mV - millivolts
SU - Standard Units
ORP - oxidation/reduction potential

Table 4 - Batch Attenuation Testing Results
Coffeen GMF RP - Boric Acid Amendment

Groundwater Sample ID	Geologic Material Sample ID	Treatment	Date	Day	Replicate	Dissolved Boron	pH	ORP
						mg/L	SU	mV
G215	--	Groundwater Only Control	25-Jan-22	0	G215-1a (B)	4.6	6.88	90
					G215-2a (B)	4.7	6.85	72
					Average Concentration (mg/L)	**4.7**	**6.87**	**81**
			7-Feb-22	7	G215-1 (B)	5.3	6.9	57
					G215-2 (B)	5.4	7.03	13
					Average Concentration (mg/L)	**5.4**	**6.97**	**35**
	G215 SB-215 Geologic Material	2:1 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 2:1-1 (B)	3.4	6.91	9
					SB-215-(19-24.5) :G215 2:1-2 (B)	3.4	7.05	11
					Average Concentration (mg/L)	**3.4**	**6.98**	**10**
		1:1 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:1-1 (B)	4.3	6.98	15
					SB-215-(19-24.5) :G215 1:1-2 (B)	4.3	7.06	31
					Average Concentration (mg/L)	**4.3**	**7.02**	**23**
		1:5 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:5-1 (B)	5.0	6.96	49
					SB-215-(19-24.5) :G215 1:5-2 (B)	5.2	7.00	19
					Average Concentration (mg/L)	**5.1**	**6.98**	**34**
		1:10 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:10-1 (B)	5.5	6.95	20
					SB-215-(19-24.5) :G215 1:10-2 (B)	5.3	6.95	29
					Average Concentration (mg/L)	**5.4**	**6.95**	**25**
		1:20 Soil:Water Ratio	31-Jan-22	0				
			7-Feb-22	7	SB-215-(19-24.5) :G215 1:20-1 (B)	5.6	6.93	174
					SB-215-(19-24.5) :G215 1:20-2 (B)	5.5	6.84	102
					Average Concentration (mg/L)	**5.5**	**6.89**	**138**

Notes:
mg/L - milligrams per liter
mV - millivolts
SU - Standard Units
ORP - oxidation/reduction potential

Table 5 - Partition Coefficient Results
Coffeen GMF RP

Analyte	Amendment	Isotherm	Variable	Value
Boron	Boric Acid	Linear	R^2	0.518
			K_D (L/kg)	-8.45
		Langmuir	R^2	0.47
			q_m (mg/g)	0.000
			K_L (L/kg)	-1.87E+05
		Freundlich	R^2	--
			1/n	--
			K_F (L/kg)	--
Sulfate	Sodium Sulfate	Linear	R^2	0.0
			K_D (L/kg)	0.10
		Langmuir	R^2	0.66
			q_m (mg/g)	-0.028
			K_L (L/kg)	-8.94E+02
		Freundlich	R^2	--
			1/n	--
			K_F (L/kg)	--

Notes:

The Freundlich isotherm was not calculated for boron or sulfate because the data were not conducive to log transformation

K_D - linear partition coefficient

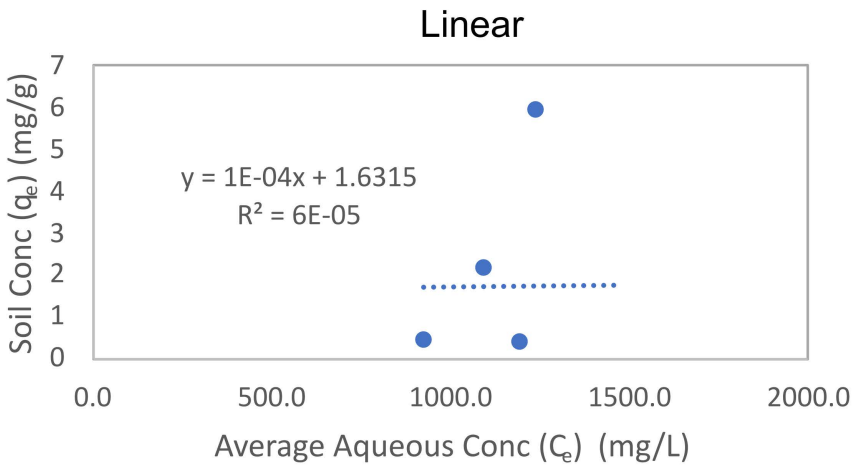
K_L - Langmuir partition coefficient

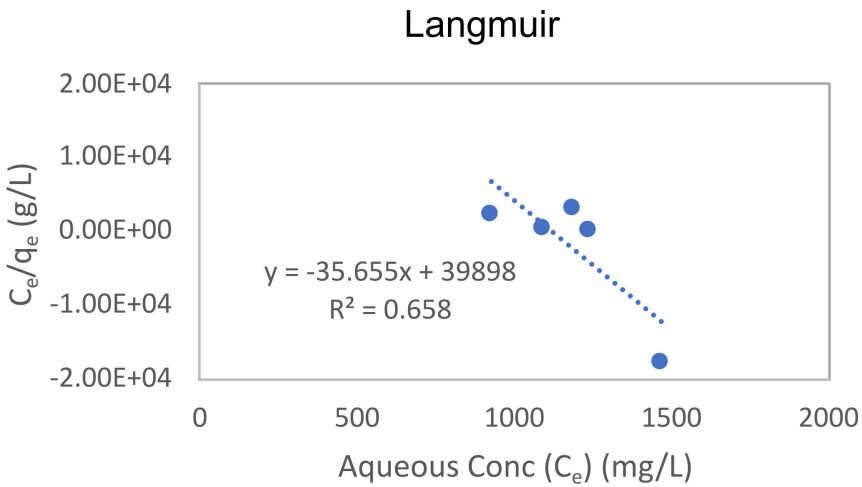
K_F - Freundlich partition coefficient

q_m - inverse of the slope of the linearized Langmuir isotherm

n - non-linearity constant of the Freundlich isotherm

APPENDIX A
BATCH TESTING ISOTHERM PLOTS





Notes:

The Freundlich isotherm was not calculated because the data were not conducive to log transformation.

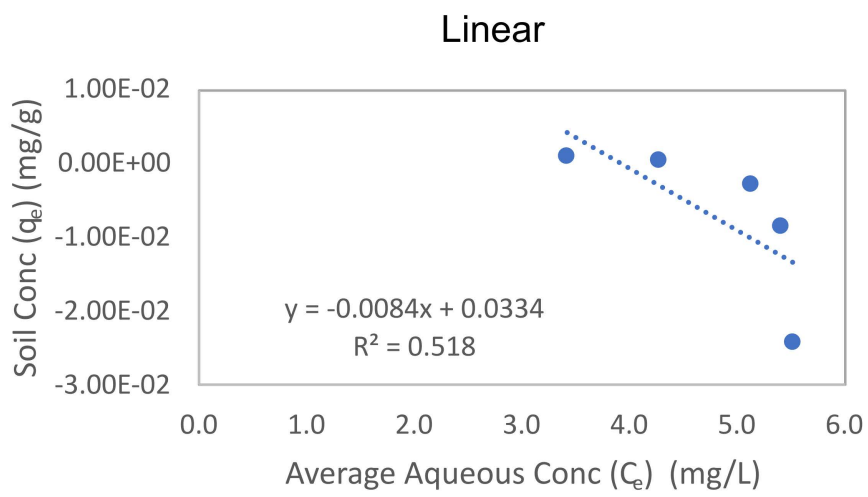
q_e - mass of constituent adsorbed to the solid phase
C_e - remaining aqueous constituent concentration
mg/L - milligrams per liter
mg/g - milligrams per gram
g/L - grams per liter

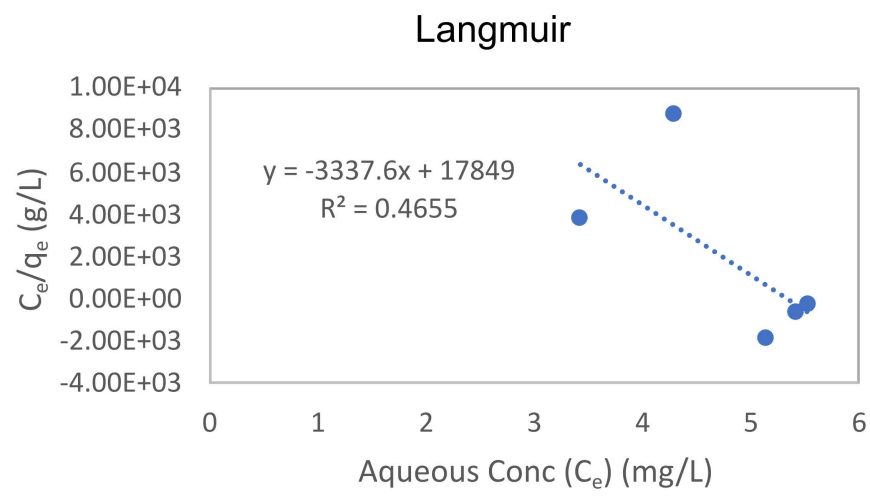
G215-SO_4 Sulfate Partitioning Coefficients
Coffeen Power Plant GMF RP
Coffeen, Illinois

Geosyntec consultants

Columbus, OH | May 2022

Figure 1





Notes:

The Freundlich isotherm was not calculated because the data were not conducive to log transformation.

q_e - mass of constituent adsorbed to the solid phase
C_e - remaining aqueous constituent concentration
mg/L - milligrams per liter
mg/g - milligrams per gram
g/L - grams per liter

G215-B Boron Partitioning Coefficients
Coffeen Power Plant GMF RP
Coffeen, Illinois

Geosyntec consultants

Columbus, OH | May 2022

Figure 2

NATURE & EXTENT REPORT ADDENDUM

Intended for
Illinois Power Generating Company
134 CIPS Lane
Coffeen, IL 62017
Montgomery County

Date
June 10, 2025

Project No.
1940110241-001

NATURE AND EXTENT REPORT ADDENDUM

COFFEEN POWER PLANT, GYPSUM MANAGEMENT FACILITY GYPSUM STACK POND, IEPA ID NO. W1350150004-03

RAMBOLL Bright ideas. Sustainable change.

NATURE AND EXTENT REPORT ADDENDUM COFFEEN POWER PLANT, GYPSUM MANAGEMENT FACILITY GYPSUM STACK POND, IEPA ID NO. W1350150004-03

Project name	**Coffeen Power Plant Gypsum Management Facility Gypsum Stack Pond**
Project no.	**1940110241-001**
Recipient	**Illinois Power Generating Company**
Document type	**Nature and Extent Report**
Revision	**Final**
Date	**June 10, 2025**
Prepared by	**Nathaniel Keller and Alison O'Connor**
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CONTENTS

1.	**Introduction**	**3**
2.	**Additional Investigation Results**	**4**
2.1	Geology	4
2.2	Hydrogeology	4
3.	**Updates to The Occurrence and Distribution of Groundwater Exceedances (Extent)**	**5**
3.1	Extents in the Uppermost Aquifer	5
3.1.1	Sulfate	5
3.1.2	Total Dissolved Solids	5
4.	**Updates To the Geochemical Conceptual Site Model (Nature)**	**7**
5.	**Combined Geochemical and Hydrogeologic Conceptual Site Models**	**9**
6.	**Conclusions**	**10**
7.	**References**	**11**

TABLES (ATTACHED)

Table 3-1 Exceedance Parameter Statistical Results
Table 3-2 Summary of Groundwater Data

FIGURES (ATTACHED)

Figure 1-1 Monitoring Well Location Map
Figure 2-1 Uppermost Aquifer Potentiometric Surface Map, February 2025
Figure 3-1 GWPS Exceedance Map Uppermost Aquifer – Quarters 1-4, 2024

APPENDICES

Appendix A Technical Memorandum – Summary of Site Work Completed in March 2024
Appendix B Field Sampling Forms and Groundwater Laboratory Analytical Reports
Appendix C Coffeen GMF Stack Pond Update to the Geochemical Conceptual Site Model (Nature)

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
CPP	Coffeen Power Plant
CCR	coal combustion residuals
CSM	conceptual site model
DA	deep aquifer
DCU	deep confining unit
GCSM	geochemical conceptual site model
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	groundwater protection standard(s)
HDPE	high-density polyethylene
ID	Identification
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
LCU	lower confining unit
mg/L	milligrams per liter
NAVD88	North American Vertical Datum 1988
NE Report	Nature and Extent Report
SI	surface impoundment
TDS	total dissolved solids
UA	uppermost aquifer
UCU	upper confining unit

1. INTRODUCTION

Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.650(d)(1) requires the owner or operator of a coal combustion residuals (CCR) surface impoundment (SI) to characterize the nature and extent of a release and relevant site conditions that may affect the remedy ultimately selected for a CCR SI if any constituent regulated under 35 I.A.C. § 845 is found to exceed the groundwater protection standard (GWPS). A report documenting the nature and extent of constituents detected above the GWPS that are attributable to the Coffeen Power Plant (CPP) Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) was prepared and submitted to the Illinois Environmental Protection Agency (IEPA) on June 12, 2024 (Nature and Extent Report [NE Report]) [1]. Additional investigation to further characterize the nature and extent as described in the NE Report was conducted beginning in March 2024.

The additional investigation included the following:

- Installation and development of two monitoring wells (G219 and G220) east of well G215 to further define the nature and extent of sulfate (**Figure 1-1**).
- Collection of soil samples from the screened interval of each additional well to characterize soils that interact with groundwater in support of groundwater polishing evaluations.

The documentation regarding the well installation and well maintenance activities performed during the March 2024 field work is included as **Appendix A**. Groundwater elevations[1] were measured and samples were collected following installation of the wells. This NE Report Addendum supplements the existing NE Report with the results from the additional investigation and ongoing groundwater monitoring completed in 2024.

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

2. ADDITIONAL INVESTIGATION RESULTS

2.1 Geology

As previously described [1], five hydrostratigraphic units have been identified at the CPP based on stratigraphic relationships and common hydrogeologic characteristics, and are summarized as follows:

- **Upper Confining Unit (UCU)**: Consists of the Loess Unit and the upper clayey portion of the Hagarstown Member which has generally lower vertical permeability and generally greater than 60 percent fines. This unit was encountered across most of the CPP, with the exception of the eastern edges of the SIs near the Unnamed Tributary where the unit was eroded following deposition, or locations where it has been excavated for construction.
- **Uppermost Aquifer (UA):** This unit consists primarily of sand and sandy silts and clays at the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member. This unit is absent in several locations due to weathering and in others due to excavation during construction of the GMF GSP. The hydraulic characteristics of the Hagarstown Member are variable due to the different material compositions, but generally indicate the unit has a moderate hydraulic conductivity.
- **Lower Confining Unit (LCU):** This unit is composed of the sandy clay till of the Vandalia Member, the silt of the Mulberry Grove Formation, and the compacted clay till of the Smithboro Member. The unit underlies the UA and was encountered in all boring locations on the CPP. Results from laboratory tests completed for vertical hydraulic conductivity indicate the Vandalia Member has a very low vertical hydraulic conductivity.
- **Deep Aquifer (DA)**: This unit consists primarily of sandy silt and sands of the Yarmouth Soil, which are thin (less than 5 feet) and discontinuous across the CPP.
- **Deep Confining Unit (DCU)**: This unit underlies the DA and is composed of the Banner Formation, of which the thick Lierle Clay is the first encountered unit. No boring penetrated the full thickness of this formation.

Monitoring wells installed to further define the nature and extent of sulfate in G215 were advanced and screened within the UA. Materials encountered in the borings included clay with sand, sandy silt, and poorly-graded sand, consistent with the previous descriptions for the UA.

2.2 Hydrogeology

Consistent with previous reporting [1] overall groundwater flow within the UA is divided towards the two lobes of Coffeen Lake. The groundwater divide runs approximately through the center of the CPP, with groundwater east of the divide flowing east to southeast towards the Unnamed Tributary or the eastern lobe of Coffeen Lake and groundwater west of the divide flowing west to southwest towards the western lobe of Coffeen Lake. Groundwater flows east to southeast across the GMF GSP (**Figure 2-1**) toward the Unnamed Tributary. Groundwater elevations measured at G219, installed immediately west of the Unnamed Tributary, are consistent with groundwater flow in this direction. Groundwater elevations measured east of the Unnamed Tributary (including G220) indicate that groundwater flow is from east to west toward the Unnamed Tributary (**Figure 2-1**). Flow toward the Unnamed Tributary from both the west and east indicates that groundwater within the UA migrates to the feature and does not continue to the east.

3. UPDATES TO THE OCCURRENCE AND DISTRIBUTION OF GROUNDWATER EXCEEDANCES (EXTENT)

Groundwater analytical reports for sampling from additional locations are presented in **Appendix B** (field sampling forms for all samples and laboratory reports the existing monitoring network wells are posted quarterly).[2]

3.1 Extents in the Uppermost Aquifer

The NE Report [1] described a sulfate exceedance[3] within the UA at well G215. Exceedances reported in the UA since submittal of the NE Report include the following and are shown on **Figure 3-1** and include:

- Total dissolved solids (TDS) at G215
- Sulfate and TDS at G217

This addendum updates the description of the extent of exceedances based on these additional reported exceedances and data collected from wells G219 and G220.

3.1.1 Sulfate

Concentrations of sulfate at UA monitoring well G215 resulted in reported exceedances of the GWPS (400 milligrams per liter [mg/L]) as discussed in the NE Report [1] (**Table 3-1**). Concentrations of sulfate at G215 have remained consistent since 2023, ranging from 489 to 569 mg/L in 2024. Sulfate concentrations at G217 exhibited an upward trend and an exceedance of the GWPS was first reported in the second quarter of 2024 [2]. Concentrations of sulfate at G217 in 2024 ranged from 428 to 554 mg/L. Sulfate concentrations in well G219 and G220 were below the GWPS, ranging from 48.7 to 160 mg/L (**Table 3-2**).

The extent of sulfate exceedances is defined laterally within the UA by monitoring well G213 to the southwest and by the Unnamed Tributary to the east. The extent does not extend beyond the Unnamed Tributary, as determined by concentrations in G220 and the groundwater flow direction (**Section 2.2**). To the north, the lateral extent of sulfate exceedances is defined by the northern limit of the GMF GSP unit and the observed east/southeast groundwater flow direction (**Figure 2-1**). Downward migration of sulfate in the UA is inhibited by the underlying low permeability Vandalia Till, Mulberry Grove Member, and Smithboro Till [1].

3.1.2 Total Dissolved Solids

TDS results indicate the mass of dissolved material in the groundwater and is a representation of multiple constituents present in the groundwater. Typically, major ions (such as sulfate) represent the primary contributors to TDS. Since 2015, TDS at G215 has ranged from 460 to 1,500 mg/L and at G217 from 660 to 1,390 mg/L (**Table 3-2**). Concentrations of TDS at wells G215 and G217 resulted in exceedances of the GWPS (1,200 mg/L). Exceedances of TDS were

[2] https://www.luminant.com/ccr/illinois/?dir=Illinois%2FCoffeen
[3] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or GWPSs as described in the proposed groundwater monitoring program, which was submitted to the IEPA on October 25, 2021, as part of Illinois Power Generating Company (IPGC)'s operating permit application for the CPP GMF GSP. That operating permit application, including the proposed groundwater monitoring program, remains under review by the IEPA and, therefore, IPGC has not identified any actual exceedances.

first reported at G215 in the first quarter of 2024 [3], and at G217 in the first quarter of 2025 [4] (**Table 3-1**).

The exceedances of TDS are coincident with the exceedances of sulfate and are identically defined. The extent of TDS exceedances is defined laterally within the UA by monitoring well G213 to the southwest and by the Unnamed Tributary to the east. The extent does not extend beyond the Unnamed Tributary, as determined by concentrations in G220 and the groundwater flow direction (**Section 2.2**). To the north, the lateral extent of TDS exceedances is defined by the northern limit of the GMF GSP unit and the observed east/southeast groundwater flow direction (**Figure 2-1**). Downward migration of TDS in the UA is inhibited by the underlying low permeability Vandalia Till, Mulberry Grove Member, and Smithboro Till [1]

4. UPDATES TO THE GEOCHEMICAL CONCEPTUAL SITE MODEL (NATURE)

A geochemical conceptual site model (GCSM) was developed to describe the conditions of the groundwater in the vicinity of the CPP GMF GSP and is summarized here (full analysis presented in Appendix D of the NE Report [1]). The GCSM describes the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. Only the parameters that have exceeded the GWPS in GMF GSP groundwater will be addressed in the corrective action plan are included in the GCSM. As discussed in previous sections, the exceedances observed at the GMF GSP include sulfate and TDS. The effects of additional and ongoing data collection on the GCSM are summarized below and described in detail in **Appendix C**.

Solid phase data collected from borings G119 and G220 were largely consistent with previous results. All laboratory reports for additional solid phase characterization are presented in **Appendix C**. Groundwater geochemical data collected from G119 and G220 were consistent with previous results from compliance wells without exceedances. Results from the aquifer solids and groundwater investigation wells at GMF GSP are similar to those previously collected. Thermodynamic modeling of 2024 redox conditions indicates that geochemical conditions at multiple GSP UA wells fluctuate such that the systems are in disequilibrium between amorphous iron oxides and aqueous iron. Evaluation of total and dissolved iron concentrations in 2024 groundwater samples indicates that notable amounts of iron exist in both the particulate and dissolved phases, providing further support for the UA being in a state of disequilibrium between solid and aqueous iron phases. Attenuation of sulfate to iron phases is hindered by this disequilibrium, as dissolution of iron oxyhydroxides or other solid phases would result in mobilization of sorbed sulfate. Therefore, the additional investigation into the nature of the exceedances at CPP GMF GSP found results consistent with the existing GCSM as summarized below.

CCR porewater is water "collected from the interstitial water between waste particles in surface impoundments as it occurs in the field" [5] and represents the material potentially leached from impoundments. CCR materials are the primary source of constituent loading to CCR porewater (*i.e.*, CCR source water). Over an extended period (*e.g.*, months to years), CCR porewater (*i.e* water contained within the interstitial pore spaces of CCR that can be sampled by low-flow groundwater sampling methods) reaches equilibrium with the CCR materials. Locations to install porewater wells within the GMF GSP could not be accessed safely and therefore source water, from the NE Riser, was collected to characterize the CCR. The NE riser is connected to a process recovery sump which is located at the base of the unit. As water percolates through the CCR, the resulting CCR contact water can be sampled from the base of the unit above the liner. Source water from the NE riser is representative of the mobile phase constituents capable of migrating into underlying materials and potentially downgradient in groundwater. The GMF GSP CCR source water is therefore the primary indicator of constituents *available* to groundwater and is considered as the primary source term for environmental investigation and fate and transport modeling.

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations, which indicates that a portion of the sulfate in the groundwater system may be

attenuated via surface complexation reactions. However, crystalline iron oxides were not identified in mineralogical analysis. In addition, batch attenuation testing with solids from the site could not determine a partitioning coefficient for sulfate. These results indicate a state of disequilibrium between solid and aqueous iron phases that hinder chemical attenuation of sulfate downgradient of the GMF GSP. It is expected that the mechanisms for attenuation or mobilization of sulfate would similarly influence TDS concentrations at wells with TDS exceedances.

5. COMBINED GEOCHEMICAL AND HYDROGEOLOGIC CONCEPTUAL SITE MODELS

The conceptual site model (CSM) describing current conditions at the GMF GSP combining the hydrogeologic and GCSMs for sulfate is as follows. Water contained in the GMF GSP is hydraulically separated from the underlying unlithified glacial deposits by a 60-mil high-density polyethylene (HDPE) liner that was installed during construction of the GMF GSP in 2010. In addition, the UA was removed from beneath the footprint of the GMF GSP during its construction. Sulfate and TDS concentrations in wells immediately east of the UA have increased slowly since approximately 2018. Concentrations of sulfate in G215 and G217 have exceeded the GWPS of 400 mg/L, while concentrations at UA well G218 to the north has continued to increase. Although the GMF GSP is a lined unit, the presence of sulfate exceedances in groundwater just outside of the east-southeast portion of the unit suggests that leakage from the GMF GSP may be causing elevated sulfate concentrations in this area. The CCR and the liner adjacent to this area, and in the entire southern portion of the GMF GSP, will be removed during closure which will provide source control in the future.

Sulfate and TDS exceedances of the GWPS at G215 and G217 are defined laterally within the UA by monitoring well G213 to the southwest and by the Unnamed Tributary to the east. The Unnamed Tributary as a local groundwater receiving body may prevent or reduce groundwater migration east of the Unnamed Tributary. To the north, the lateral extent of sulfate exceedances is defined by the northern limit of the GMF GSP and the east/southeast groundwater flow direction. Downward migration of sulfate in the UA is inhibited by the underlying low permeability Vandalia Till, Mulberry Grove Member, and Smithboro Till [1].

Conditions within UA groundwater are predicted to favor amorphous iron oxide stability at most locations near the GMF GSP, which indicates that a portion of the sulfate concentrations in the groundwater system may be attenuated via surface complexation reactions. However, batch attenuation testing results indicate that chemical attenuation of sulfate downgradient of the GMF GSP could be minimal as a result of a state of disequilibrium between solid and aqueous iron phases. It is expected that the attenuation or mobilization of sulfate would similarly influence TDS concentrations at wells with TDS exceedances.

6. CONCLUSIONS

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

The lateral extents of exceedances are illustrated in **Figures 3-1**. Sulfate was selected for modeling source control presented in the Final Closure Plan as described in the Groundwater Modeling Report [6] and serves as a surrogate for TDS. For modeling purposes, it was assumed that sulfate would not significantly sorb or chemically react with aquifer solids (soil adsorption coefficient was set to 0 mg/L), which is a conservative estimate for predicting contaminant transport times in the model. Additional geochemical modeling was completed to evaluate how sorption to solid phases may affect sulfate (and therefore TDS) mobility and therefore the time to reach the GWPS for these parameters.[4]

[4] Presented in the Groundwater Polishing Report provided as Appendix E to the Corrective Action Alternatives Analysis to which this report is also attached.

7. REFERENCES

[1] Ramboll, "Nature and Extent Report: Coffeen Power Plant, GMF Gypsum Stack Pond," 2024.

[2] Ramboll, "35 I.A.C. § 845.610(b)(3)(D) Groundwater Monitoring Data and Detected Exceedances Quarter 2, 2024: GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois".

[3] Ramboll, "35 I.A.C. § 845.610(b)(3)(D) Groundwater Monitoring Data and Detected Exceedances Quarter 1, 2024: GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois," 2024.

[4] Ramboll, "35 I.A.C. § 845.610(b)(3)(D) Groundwater Monitoring Data and Detected Exceedances Quarter 1, 2025: GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois".

[5] United States Environmental Protection Agency, "Human and Ecological Risk Assessment of Coal Combustion Residuals (2050-AE81)," December 2014.

[6] Ramboll Americas Engineering Solutions, Inc., "Groundwater Modeling Report, GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois," July 28, 2022.

TABLES

Table 3-1. Exeedance Parameter Statistical Results
Nature and Extent Report Addendum
Coffeen GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Well Type	HSU	Event	Parameter	Unit	Date Range	Sample Count	Percent ND	Statistical Calculation	Statistical Result	GWPS	GWPS Source	Exceedance
G215	C	UA	2023 Q2	Sulfate, total	mg/L	11/24/15 - 06/01/23	27	0	CB around linear reg	468	400	MCL/HBL	YES
G215	C	UA	2023 Q3	Sulfate, total	mg/L	11/24/15 - 08/10/23	28	0	CB around linear reg	474	400	MCL/HBL	YES
G215	C	UA	2023 Q4	Sulfate, total	mg/L	11/24/15 - 11/16/23	29	0	CB around linear reg	488	400	MCL/HBL	YES
G215	C	UA	2024 Q1	Sulfate, total	mg/L	11/24/15 - 02/13/24	30	0	CB around linear reg	506	400	MCL/HBL	YES
G215	C	UA	2024 Q2	Sulfate, total	mg/L	11/24/15 - 04/30/24	31	0	CB around linear reg	519	400	MCL/HBL	YES
G215	C	UA	2024 Q3	Sulfate, total	mg/L	11/24/15 - 08/06/24	32	0	CB around linear reg	524	400	MCL/HBL	YES
G215	C	UA	2024 Q4	Sulfate, total	mg/L	11/24/15 - 10/31/24	33	0	CB around linear reg	537	400	MCL/HBL	YES
G215	C	UA	2025 Q1	Sulfate, total	mg/L	11/24/15 - 02/04/25	34	0	CB around linear reg	541	400	MCL/HBL	YES
G215	C	UA	2023 Q2	Total Dissolved Solids	mg/L	11/24/15 - 06/01/23	27	0	CB around linear reg	1,150	1,200	MCL/HBL	NO
G215	C	UA	2023 Q3	Total Dissolved Solids	mg/L	11/24/15 - 08/10/23	28	0	CB around linear reg	1,170	1,200	MCL/HBL	NO
G215	C	UA	2023 Q4	Total Dissolved Solids	mg/L	11/24/15 - 11/16/23	29	0	CB around linear reg	1,190	1,200	MCL/HBL	NO
G215	C	UA	2024 Q1	Total Dissolved Solids	mg/L	11/24/15 - 02/13/24	30	0	CB around linear reg	1,220	1,200	MCL/HBL	YES
G215	C	UA	2024 Q2	Total Dissolved Solids	mg/L	11/24/15 - 04/30/24	31	0	CB around linear reg	1,240	1,200	MCL/HBL	YES
G215	C	UA	2024 Q3	Total Dissolved Solids	mg/L	11/24/15 - 08/06/24	32	0	CB around linear reg	1,260	1,200	MCL/HBL	YES
G215	C	UA	2024 Q4	Total Dissolved Solids	mg/L	11/24/15 - 10/31/24	33	0	CB around linear reg	1,280	1,200	MCL/HBL	YES
G215	C	UA	2025 Q1	Total Dissolved Solids	mg/L	11/24/15 - 02/04/25	34	0	CB around linear reg	1,290	1,200	MCL/HBL	YES
G217	C	UA	2023 Q2	Sulfate, total	mg/L	10/14/20 - 06/08/23	11	0	CB around linear reg	323	400	MCL/HBL	NO
G217	C	UA	2023 Q3	Sulfate, total	mg/L	10/14/20 - 08/10/23	12	0	CB around linear reg	342	400	MCL/HBL	NO
G217	C	UA	2023 Q4	Sulfate, total	mg/L	10/14/20 - 11/16/23	13	0	CB around linear reg	368	400	MCL/HBL	NO
G217	C	UA	2024 Q1	Sulfate, total	mg/L	10/14/20 - 02/13/24	14	0	CB around linear reg	391	400	MCL/HBL	NO
G217	C	UA	2024 Q2	Sulfate, total	mg/L	10/14/20 - 05/02/24	15	0	CB around linear reg	414	400	MCL/HBL	YES
G217	C	UA	2024 Q3	Sulfate, total	mg/L	10/14/20 - 08/06/24	16	0	CB around linear reg	439	400	MCL/HBL	YES
G217	C	UA	2024 Q4	Sulfate, total	mg/L	10/14/20 - 10/31/24	17	0	CB around linear reg	465	400	MCL/HBL	YES
G217	C	UA	2025 Q1	Sulfate, total	mg/L	10/14/20 - 02/04/25	18	0	CB around linear reg	492	400	MCL/HBL	YES
G217	C	UA	2023 Q2	Total Dissolved Solids	mg/L	10/14/20 - 06/08/23	11	0	CB around linear reg	943	1,200	MCL/HBL	NO
G217	C	UA	2023 Q3	Total Dissolved Solids	mg/L	10/14/20 - 08/10/23	12	0	CB around linear reg	987	1,200	MCL/HBL	NO
G217	C	UA	2023 Q4	Total Dissolved Solids	mg/L	10/14/20 - 11/16/23	13	0	CB around linear reg	1,020	1,200	MCL/HBL	NO
G217	C	UA	2024 Q1	Total Dissolved Solids	mg/L	10/14/20 - 02/13/24	14	0	CB around linear reg	982	1,200	MCL/HBL	NO
G217	C	UA	2024 Q2	Total Dissolved Solids	mg/L	10/14/20 - 05/02/24	15	0	CB around linear reg	1,030	1,200	MCL/HBL	NO
G217	C	UA	2024 Q3	Total Dissolved Solids	mg/L	10/14/20 - 08/06/24	16	0	CB around linear reg	1,100	1,200	MCL/HBL	NO
G217	C	UA	2024 Q4	Total Dissolved Solids	mg/L	10/14/20 - 10/31/24	17	0	CB around linear reg	1,160	1,200	MCL/HBL	NO
G217	C	UA	2025 Q1	Total Dissolved Solids	mg/L	10/14/20 - 02/04/25	18	0	CB around linear reg	1,210	1,200	MCL/HBL	YES
G219	NE	UA	2024 Q3	Sulfate, total	mg/L	05/07/24 - 07/31/24	2	0	Most recent sample	74.0	400	MCL/HBL	NO
G219	NE	UA	2024 Q4	Sulfate, total	mg/L	05/07/24 - 10/31/24	3	0	Most recent sample	48.7	400	MCL/HBL	NO
G219	NE	UA	2024 Q3	Total Dissolved Solids	mg/L	05/07/24 - 07/31/24	2	0	Most recent sample	530	1,200	MCL/HBL	NO
G219	NE	UA	2024 Q4	Total Dissolved Solids	mg/L	05/07/24 - 10/31/24	3	0	Most recent sample	536	1,200	MCL/HBL	NO
G220	NE	UA	2024 Q3	Sulfate, total	mg/L	05/07/24 - 08/07/24	2	0	Most recent sample	160	400	MCL/HBL	NO
G220	NE	UA	2024 Q4	Sulfate, total	mg/L	05/07/24 - 10/30/24	3	0	Most recent sample	134	400	MCL/HBL	NO
G220	NE	UA	2024 Q3	Total Dissolved Solids	mg/L	05/07/24 - 08/07/24	2	0	Most recent sample	844	1,200	MCL/HBL	NO
G220	NE	UA	2024 Q4	Total Dissolved Solids	mg/L	05/07/24 - 10/30/24	3	0	Most recent sample	882	1,200	MCL/HBL	NO

Notes:
GWPS = groundwater protection standard
HSU = hydrostratigraphic unit
UA = uppermost aquifer
DA = deep aquifer
mg/L = milligrams per liter
ND = non-detect
Statistical Calculation:
CB around linear reg = Confidence band around linear regression
CI around mean = Confidence interval around the mean
Most recent sample = Result for the most recently collected sample used due to insufficient data.
Well Type:
C = Compliance
NE = Nature and Extent

Table 3-2. Summary of Groundwater Data
Nature and Extent Report Addendum
Coffeen GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Well Type	HSU	Parameter	Unit	Sample Count	Non-Detect Results	Percent Non-Detect Results	First Sample	Last Sample	Minimum	Median	Mean	Maximum
G215	C	UA	Sulfate, total	mg/L	37	0	0	01/21/2015	10/31/2024	100	220	170	569
G215	C	UA	Total Dissolved Solids	mg/L	37	0	0	01/21/2015	10/31/2024	460	800	640	1,500
G217	C	UA	Sulfate, total	mg/L	21	0	0	01/21/2015	10/31/2024	130	290	140	554
G217	C	UA	Total Dissolved Solids	mg/L	21	0	0	01/21/2015	10/31/2024	660	870	670	1,390
G219	NE	UA	Sulfate, total	mg/L	3	0	0	05/07/2024	10/31/2024	48.7	49	49.0	74.0
G219	NE	UA	Total Dissolved Solids	mg/L	3	0	0	05/07/2024	10/31/2024	472	530	472	536
G220	NE	UA	Sulfate, total	mg/L	3	0	0	05/07/2024	10/30/2024	134	150	152	160
G220	NE	UA	Total Dissolved Solids	mg/L	3	0	0	05/07/2024	10/30/2024	824	840	824	882

Notes:
HSU = hydrostratigraphic unit
UA = uppermost aquifer
DA = deep aquifer
mg/L = milligrams per liter
Well Type:
C = Compliance
NE = Nature and Extent

FIGURES

MONITORING WELL
LEACHATE WELL

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

0 325 650 Feet

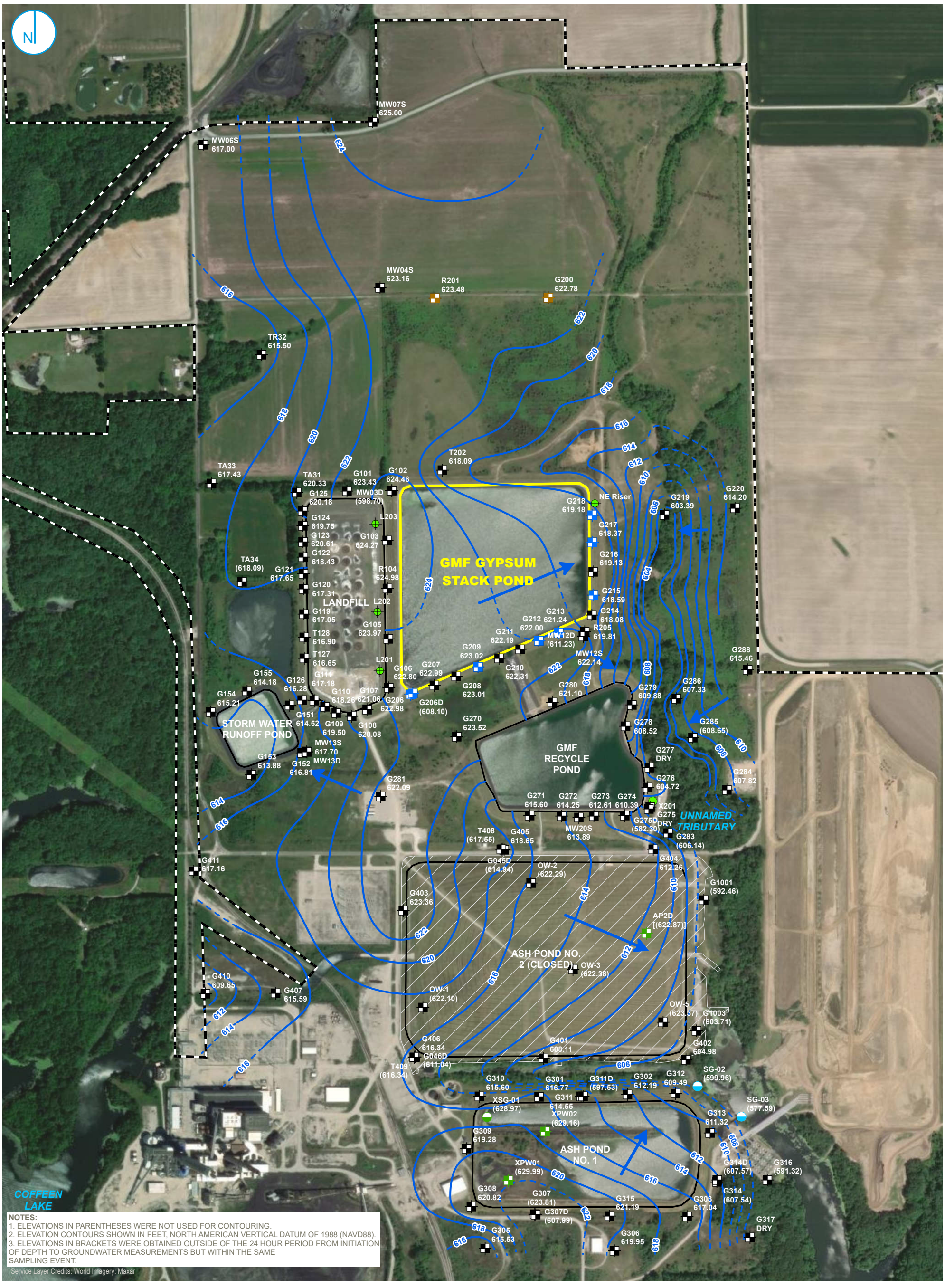
MONITORING WELL LOCATION MAP

FIGURE 1-1

NATURE AND EXTENT ADDENDUM
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24 HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.

Service Layer Credits: World Imagery: Maxar

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- MONITORING WELL
- PORE WATER WELL
- LEACHATE WELL
- CCR SOURCE WATER SAMPLE
- STAFF GAGE, RIVER
- STAFF GAGE, CCR UNIT
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

0 325 650 Feet

POTENTIOMETRIC SURFACE MAP
FEBRUARY 3, 2025

FIGURE 2-1

NATURE AND EXTENT ADDENDUM
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

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TOTAL SULFATE EXCEEDANCE
TOTAL DISSOLVED SOLIDS EXCEEDANCE
COMPLIANCE WELL WITHOUT EXCEEDANCE
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

0 325 650 Feet

GWPS EXCEEDANCE MAP UPPERMOST AQUIFER - QUARTERS 1-4, 2024

NATURE AND EXTENT ADDENDUM
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 3-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

APPENDIX A
TECHNICAL MEMORANDUM SUMMARY OF SITE WORK COMPLETED IN MARCH 2024

ENVIRONMENT
& HEALTH

TECHNICAL MEMORANDUM

To: Ms. Sam Davies, Environmental Manager, Vistra Corp

From: Nikki Pagano and Kristen Theesfeld

Re: Summary of Site Work Completed in March 2024
Coffeen Power Plant
Coffeen, Illinois

April 28, 2025

Ramboll
234 W. Florida Street
Fifth Floor
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USA

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Ref. 1940107274

INTRODUCTION

This Technical Memorandum (Tech Memo) for Coffeen Power Plant (CPP) was prepared by Ramboll America's Engineering Solutions, Inc. (Ramboll) for Illinois Power Generating Company (IPGC). This Tech Memo documents the monitoring network maintenance performed in March 2024 pursuant to the following documents:

- *Proposal for Nature and Extent Investigation and Repairs and Improvements at Select Monitoring Wells, Coffeen Power Plant* (Ramboll, 2024a).
- *Proposal for Nature and Extent Investigation and Repairs and Improvements at Select Monitoring Wells Change Order 1, Coffeen Power Plant* (Ramboll, 2024b).

OBJECTIVES

The objectives of this event were to:

1. Install monitoring wells G219 and G220 to meet requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.650(d)(1),
2. Advance one boring (G285_SB) adjacent to monitoring well G285 to meet requirements of 35 I.A.C. § 845.650(d)(1),
3. Advance two borings (G206D_SB and G275D_SB) adjacent to monitoring wells G206D and G275D to collect samples from within each well's respective screened interval in support of an Alternative Source Demonstration (ASD) required by 35 I.A.C. § 845.650(e),
4. Replace the concrete well pads at selected locations, and
5. Install additional bollards at select well locations across CPP that had less than three bollards present.

In addition, the new packer for the artesian monitoring well G307 was installed, rather than installing the packer during a separate mobilization, and monitoring wells G206, G206D, G275, and G275D were redeveloped.

SITE WORK ACTIVITIES

At the request of Vistra, Ramboll oversaw completion of the on-site work activities on March 18 through March 28, 2024 in accordance with Ramboll's *Proposal for Nature and Extent Investigation and Repairs and Improvements at Select Monitoring Wells, Coffeen Power Plant* (Ramboll, 2024a). Well installations and well repair work was performed by Cascade Drilling with oversight from Ramboll.

The following sections discuss site work methods and documentation of completed work.

NATURE AND EXTENT ACTIVITES

Soil Borings and Monitoring Well Installation

Prior to drilling, the proposed monitoring wells G219 and G220 shown in **Figure 1**, were cleared by Ground Penetrating Radar Systems (GPRS). GPRS utilized a ground penetrating radar antenna to scan a 10-foot radius around each proposed boring and monitoring well location. A Subsurface Clearance Checklist, a Ramboll required safety form, was completed after confirming all locations requiring intrusive work were cleared by GPRS.

A Boart Longyear Mini Sonic 200 drill rig equipped with a 6-inch core barrel was used to advance soil borings G219, G220, and G285_SB. The locations were advanced to 20, 25, and 25 feet bgs, respectively. Soil lithology was logged continuously using the Unified Soil Classification System (USCS). Boring logs are provided in **Attachment A**. Analytical samples were collected by Ramboll for Nature and Extent characterization and are summarized in **Table A** below.

Table A. Nature and Extent Soil Analytical Samples

Location	Top of Sample Interval (feet bgs)	Bottom of Sample Interval (feet bgs)	Analytical Laboratory	Analyses
G219	9	10.5	Eurofins TestAmerica	CEC LOI SEP XRD
G219	11	20	Eurofins TestAmerica	CEC LOI SEP XRD
G220	19.5	20	Eurofins TestAmerica	CEC LOI SEP XRD
G220	21	25	Eurofins TestAmerica	CEC LOI SEP XRD

Notes:
bgs = below ground surface
CEC = cation exchange capacity
LOI = Loss on Ignition
SEP = 7-step sequential extraction
XRD = bulk mineralogy by Reitveld x-ray diffraction

Soil cuttings were thin spread and borehole G285_SB was abandoned using 3/8” bentonite chips placed to ground surface, then hydrated.

Monitoring wells were constructed at locations G219 and G220 using 2-inch diameter schedule 40 polyvinyl chloride (PVC) casing and installed with a 10-foot PVC screen with a slot diameter of 0.010-inches. Filter sand was placed in the borehole extending to approximately one foot below and one foot above the PVC screen in G219 and one foot above the PVC screen in G220. The wells were sealed with 3/8" bentonite chips to one foot bgs. Protective stick-up casings were installed to approximately three feet above ground surface at each location and set in a concrete pad extending approximately one foot bgs. Monitoring wells G219 and G220 were identified on the outside of the protective casing and on the expansion plug. Monitoring wells G219 and G220 were surveyed by Vistra's contracted surveyor on December 4, 2024. Monitoring well construction logs are provided in **Attachment B**. Monitoring wells were temporarily identified on the exterior of the protective cover and permanent identification markers will be installed at each location when available.

Monitoring well construction activities were completed on March 22, 2024. **Attachment C** includes a photographic log of the monitoring well installations.

Monitoring Well Development

Monitoring wells G219 and G220 were developed by Cascade using a pump and surge technique, following installation of the wells. G219 and G220 were surged and pumped dry a minimum of five times each. Well development details including starting depths to water and volume of water removed are provided in **Attachment D**.

ASD SOIL BORINGS

Prior to drilling, the proposed locations for soil borings adjacent to G206D and G275D shown in **Figure 1** were cleared using the same procedures performed for the nature and extent borings and wells described above.

Borings were advanced adjacent to G206D and G275D to 70 and 60 feet below ground surface (bgs), respectively. Drilling fluids daylighted, came to surface through the ground, rather than through the core barrel. around the G206D pad when drilling reached 13 feet bgs at G206D_SB, and at G275D when drilling reached 15 feet bgs at G275D_SB. In both instances, drilling fluid use was stopped and the soil borings were advanced to final depth using a 4-inch core barrel.

Soil lithology was logged using the same procedures for the nature and extent borings and wells. Boring logs are provided in **Attachment A**. Analytical samples were collected by Geosyntec for ASD support and are summarized in **Table B** on the following page.

Table B. ASD Soil Analytical Samples

Location	Top of Sample Interval (feet bgs)	Bottom of Sample Interval (feet bgs)	Analytical Laboratories	Analyses
G206D	--	--	Brooks Applied Labs	Arsenic Species
G206D_SB	45	47	Eurofins TestAmerica	SEP
G206D_SB	56	57	Eurofins TestAmerica	SEP
G206D_SB	67	69	NA	NA
G275D	--	--	Brooks Applied Labs	Arsenic Species
G275D_SB	46	48	Eurofins TestAmerica	SEP
G275D_SB	50	53	Eurofins TestAmerica	SEP

Notes:

-- = Does not apply. Groundwater sample collected from monitoring well.

bgs = below ground surface

NA = Not Analyzed

SEP = 7-step sequential extraction

Soil cuttings were thin spread and boreholes were abandoned using 3/8" bentonite chips placed to ground surface, then hydrated.

MONITORING WELL IMPROVEMENT AND REPAIR TASKS

Prior to drilling, locations with proposed bollard installations shown in **Figure 1** were cleared using the same procedures used for the nature and extent borings and wells.

The protective cover top and/or concrete surface pad were replaced at seven locations summarized in **Table C** on the following page. A skid-steer was utilized to lift the protective casing vertically and remove it without disturbing the PVC well casing[1]. Existing concrete surface pads that were replaced were observed to have fractures, undercutting, and/or heaving and were removed by hand. The area was then hand excavated to approximately 12-inches bgs and concrete forms were placed for the construction of a new well pad.

A new protective casing was installed, and concrete was mixed and poured into the surface seal forms. Weep holes, a padlock, and the identification tag were reinstalled with the new protective casing. All surface seal debris and replaced bollards were disposed of on-site at the direction of CPP personnel. **Attachment E** includes a photographic log of surface seal and protective cover top replacements.

Additional 3.5-inch diameter, 5-foot-tall concrete filled bollards were installed at seven locations at CPP that had less than three bollards present. Locations were identified in need of repair from the spring 2023

[1] The PVC casing at G306 was broken during repairs, which required the casing to be cut down and a PVC casing extension to be fitted to the original casing. Filter pack that was used to fill the annual space between the protective cover and PVC casing was introduced into the monitoring well. Multiple techniques were tried in an attempt to remove the material, and the material was ultimately successfully removed via air lifting.

investigation performed by Ramboll. **Attachment E** includes a photographic log of the installed bollards. The number of bollards installed at each location is summarized in **Table C** below.

Table C. Monitoring Well Repairs and Improvements Summary (March 2024)

Well Location	# of Bollards Present Prior to March 2024	Number of Bollards Installed	Protective Cover Replaced	Well Pad Replaced	Notes
B1	0	4	No	No	None
G111	2	2	No	No	Well pad buried under gravel
G151	2	2	No	Yes	Two concrete blocks present
G152	2	2	No	Yes	Two concrete blocks present
G154	2	2	No	Yes	Two concrete blocks present
G306	NA	NA	Yes	Yes	Casing cut down and extension added Existing bollards need repainting
G307	NA	NA	Yes	Yes	Mechanical packer installed
MW04S	0	4	No	Yes	None
MW12S	NA	NA	Yes	Yes	Casing cut down and extension added
P10	0	4	No	No	None
Total		**20**			

Notes:
NA = not applicable

MONITORING WELL REDEVELOPMENT

In an abundance of caution, Ramboll redeveloped each of the four wells where daylighting occurred using a pump and surge technique to minimize potential impacts, such as increased turbidity. All four wells went dry during redevelopment and each well was pumped dry two times. Well redevelopment details are provided in **Attachment E**.

MECHANICAL PACKER REPLACEMENT

An existing mechanical packer in monitoring well G307 was noted as broken during previous groundwater sampling events. Due to the break, water levels could not be measured using a depth tape during sampling events, and the packer could not create a complete seal within the well. Ramboll installed a new 2-inch, 7.5-foot-long mechanical packer equipped with a frost plug and provided instruction to Vistra's contracted laboratory on how to remove and reinstall the packer during sampling. Photos of the newly installed packer are provided in **Attachment E**.

REFERENCES

Geosyntec Consultants, Inc. (Geosyntec), 2024. *Alternative Source Demonstration, Coffeen Power Plant GMF Recycle Pond (Unit ID #104), IEPA ID: W1350150004-04, 35 IAC 845.650.* May 7, 2024.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2024a. *Proposal for Nature and Extent Investigation and Repairs and Improvements at Select Monitoring Wells, Coffeen Power Plant*. February 19, 2024.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2024b. *Proposal for Nature and Extent Investigation and Repairs and Improvements at Select Monitoring Wells Change Order 1, Coffeen Power Plant*. April 30, 2024.

FIGURES

Figure 1 Nature and Extent Monitoring Well Locations

ATTACHMENTS

Attachment A Soil Boring Logs
Attachment B Well Construction Forms
Attachment C Soil Boring and Monitoring Well Installation Photographic Log
Attachment D Well Development Forms
Attachment E Monitoring Well Improvement and Repairs Photographic Log

FIGURES

- MARCH 2024 WELL LOCATION
- MARCH 2024 BORING LOCATION
- MONITORING WELL
- PORE WATER WELL
- LEACHATE WELL
- STAFF GAGE, CCR UNIT
- STAFF GAGE, RIVER
- SURFACE WATER SAMPLE

- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

0 275 550 Feet

MARCH 2024 MONITORING WELL AND BORING INSTALLATION LOCATIONS

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

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ATTACHMENTS

ATTACHMENT A
SOIL BORING LOGS

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G206D_SB

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/19/2024	3/19/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
	Feet (NAVD88)	628.91 Feet (NAVD88)	6.0 inches

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

State Plane 875,105.43 N, 2,514,689.68 E E/W

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

Lat 39° 4' 2.6544"

Long -89° 23' 54.5136"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 120			0 - 0.3' **CLAYEY SILT:** ML/CL, dark brown (10YR 3/3), organic material, roots, soft, low plasticity, moist.	ML/CL									
			1	0.3 - 19.5' **FAT CLAY:** to **LEAN CLAY:** CH, yellowish brown (10YR 5/6), silt (5-15%), sand (0-5%), very stiff, high plasticity, moist.										
			2											
			3											
			4											
			5											
			6		CH									
			7											
			8											
			9											
2 CS	120 120		10	10' dark gray (10YR 4/1), strong brown (7.5YR 5/6) mottling (10-20%).										
			11											
			12											

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

Signature

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

Boring Number G206D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				0.3 - 19.5' **FAT CLAY:** to **LEAN CLAY:** CH, yellowish brown (10YR 5/6), silt (5-15%), sand (0-5%), very stiff, high plasticity, moist. *(continued)*										
			13											Water daylighting from annular space of adjacent monitoring wells. Stopped using water for drilling.
			14											
			15											
			16		CH									
			17	17' layer of sandy clay, stiff, medium plasticity.										
			18											
			19											
3 CS	120 120		20	19.5 - 20' **LEAN CLAY WITH SAND:** (CL)s, dark yellowish brown (10YR 4/6), fine to medium sand, silt (5-15%), soft, medium plasticity, moist.	(CL)s									
			21	20 - 70' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), very stiff to hard, fine sand (0-15%), low plasticity, dry to moist.										
			22	22' layer of sandy clay, low plasticity to non-plastic.										
			23											
			24											
			25											
			26		CL/ML									
			27											
			28	28' soft, wet.										
			29											
4 CS	120 120		30											
			31											
			32											

Boring Number G206D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				20 - 70' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), very stiff to hard, fine sand (0-15%), low plasticity, dry to moist. *(continued)*										
			33											
			34											
			35											Water used to advance core barrel to 40 feet below ground surface (ft bgs).
			36											
			37											
			38											
			39											
5 CS	120 120		40											
			41											
			42		CL/ML									
			43											
			44											
			45											
			46											Soil sample collected from 45-47 ft bgs.
			47											
			48											
			49											
6 CS	120 120		50											
			51											
			52											

Boring Number G206D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				20 - 70' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), very stiff to hard, fine sand (0-15%), low plasticity, dry to moist. *(continued)*										
			53											
			54											
			55	55' - 60' dark gray (5Y 4/1) to olive gray (5Y 5/2), orange mottling (10-20%), (moisture).										
			56											Soil sample collected from 55-57 ft bgs.
			57											
			58											
			59											
7 CS	120 120		60											
			61		CL/ML									
			62											
			63											
			64											
			65											
			66											
			67											
			68	68' - 68.3' layer of clay with sand, stiff, non-plastic, moist.										Soil sample collected from 67-69 ft bgs.
			69											
			70	70' End of Boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G219

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/18/2024	3/18/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
G219	Feet (NAVD88)	617.04 Feet (NAVD88)	6.0 inches

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

State Plane 876,384.36 N, 2,516,476.36 E E/W

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

Lat 39° 4' 15.1464"

Long -89° 23' 31.722"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 92		1 2 3 4 5 6 7 8 9 10 11 12	0 - 8' **SILTY CLAY:** CL/ML, dark yellowish brown (10YR 3/4), sand (0-5%), very stiff, plastic, moist.	CL/ML									
				5' - 7' reddish gray (5YR 5/2) lenses (10%), reddish gray (5YR 5/2) orange oxidation (10%).										
				7' - 8' orange oxidation (10%).										
				8 - 9' **SILTY CLAY WITH SAND:** (CL/ML)S, grayish brown (2.5Y 5/2), orange oxidation (10%), fine sand, sbangular to subrounded sand, fine gravel (0-5%), very stiff, medium plasticity, moist.	(CL/ML)S									
				9 - 10.5' **SANDY SILT:** s(ML), light olive brown (2.5Y 5/6), medium plasticity, soft, wet.	s(ML)									
2 CS	120 120			10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist.	(CL/ML)S									Soil sample collected from 9.5-10 feet below ground surface (ft bgs).

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

Signature

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

Boring Number G219

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist. *(continued)*										
			13											
			14											
			15											
			16		(CL/ML)S									Soil sample collected from 11-20 ft bgs.
			17											
			18											
			19											
			20	20' End of Boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G220

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/19/2024	3/19/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
G220	Feet (NAVD88)	628.03 Feet (NAVD88)	6.0 inches

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

State Plane 876,432.62 N, 2,516,980.01 E E/W

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

Lat 39° 4' 15.5784"

Long -89° 23' 25.332"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 96			0 - 0.5' **SILT WITH SAND:** (ML)s, organic material, wet.	(ML)s									
			1	0.5 - 3.5' **FAT CLAY:** CH, dark yellowish brown (10YR 4/4), firm to stiff, high plasticity, moist.										
			2		CH									
			3											
			4	3.5 - 8' **SILTY CLAY:** CL/ML, dark brown (10YR 3/3), firm to soft, low to medium plasticicity, moist.										
			5											
			6		CL/ML									
			7											
			8	8 - 10' **CLAYEY SILT:** ML/CL, very dark grayish brown (10YR 3/2), firm to soft, low plasticity to non-plastic, moist.										
			9		ML/CL									
			10	10 - 13' **LEAN CLAY:** CL, very dark grayish brown (10YR 3/2), orange mottling (20%), low to medium plasticity.										
2 CS	120 120		11		CL									
			12											

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

Signature

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

Boring Number G220

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				10 - 13' **LEAN CLAY:** CL, very dark grayish brown (10YR 3/2), orange mottling (20%), low to medium plasticity. *(continued)*	CL									
			13	13 - 15' **FAT CLAY:** CH, very dark gray (5YR 3/1), sand (0-5%), high plasticity, moist.	CH									
			14											
			15	15 - 17.5' **LEAN CLAY WITH SAND:** (CL)s, brown (10YR 4/3), medium plasticity, moist.	(CL)s									
			16											
			17											
			18	17.5 - 19' **SANDY SILT:** s(ML), light olive brown (2.5Y 5/6), medium plasticity, moist to wet.	s(ML)									Soil sample collected from 18-19.5 feet below ground surface (ft bgs).
			19	19 - 20' **POORLY-GRADED SAND:** SP, dark yellowish brown (10YR 4/4), silt (0-5%).	SP									
3 CS	60 60		20	20 - 25' **SILTY CLAY:** CL/ML, very dark grayish brown (10YR 3/2), sand (0-5%), stiff, low to medium plasticity, moist.	CL/ML									Soil sample collected from 19.5-20 ft bgs.
			21											
			22											
			23											Soil sample collected from 21-25 ft bgs.
			24											
			25	25' End of Boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G275D_SB

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/21/2024	3/21/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
	Feet (NAVD88)	615.58 Feet (NAVD88)	6.0 inches

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

State Plane 874,272.78 N, 2,516,364.19 E E/W

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

Lat 39° 3' 54.2844"

Long -89° 23' 33.3708"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 76		0.5	0 - 0.3' **CLAYEY SILT:** ML/CL, dark brown (10YR 3/3), organic material, grass, roots, soft, moist.	ML/CL									
			1.0	0.3 - 11' **LEAN CLAY:** CL, yellowish brown (10YR 5/6), silt (5-15%), sand (0-5%), very stiff, high plasticity, moist.										
			1.5											
			2.0											
			2.5											
			3.0	3' orange mottling (10%).										
			3.5											
			4.0											
			4.5											
			5.0											
			5.5		CL									
			6.0											
			6.5											
			7.0											
			7.5											
			8.0											
			8.5											
			9.0											
			9.5											
			10.0											
2 CS	120 120		10.5											
			11.0											

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

Signature

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

Boring Number G275D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			11.5	11 - 12' **WELL-GRADED SAND:** SW, dark yellowish brown (10YR 4/6), silt (5-15%), loose, wet.	SW									Loss of drilling water.
			12.0											
			12.5	12 - 13' **SANDY SILT:** s(ML), dark yellowish brown (10YR 4/6), fine sand, hard, medium plasticity.	s(ML)									Water daylighting from well pad of adjacent monitoring wells. Stopped using water for drilling.
			13.0											
			13.5	13 - 20' **SILT WITH SAND:** (ML)s, brown (10YR 4/3), fine sand, silt (0-5%), soft, non-plastic to low plasticity, dry.										
			14.0											
			14.5											
			15.0											
			15.5											
			16.0											
			16.5		(ML)s									
			17.0											
			17.5											
			18.0											
			18.5											
			19.0											
			19.5											
3 CS	120 120		20.0	20 - 22' **WELL-GRADED SAND:** SW, dark yellowish brown (10YR 4/6), silt (5-15%), loose, wet.										
			20.5											
			21.0		SW									
			21.5											
			22.0	22 - 23' **CLAYEY SILT:** to **SILTY CLAY WITH SAND:** ML/CL, brown (10YR 5/3), yellow brown mottling (10%), gravel (0-5%), hard.										
			22.5		ML/CL									
			23.0	23 - 50' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), sand (0-5%), very stiff to hard, low plasticity, dry to moist.										
			23.5											
			24.0											
			24.5											
			25.0											
			25.5											
			26.0		CL/ML									
			26.5											
			27.0											
			27.5											
			28.0											
			28.5											
			29.0											

Boring Number G275D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			29.5	23 - 50' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), sand (0-5%), very stiff to hard, low plasticity, dry to moist. *(continued)*										
4 CS	120 120		30.0											
			30.5											
			31.0											
			31.5											
			32.0											
			32.5											
			33.0											
			33.5											
			34.0											
			34.5											
			35.0											
			35.5											
			36.0											
			36.5											
			37.0											
			37.5											
			38.0											
			38.5		CL/ML									
			39.0											
			39.5											
5 CS	120 120		40.0											6-inch casing set to 40 feet below ground surface (ft bgs). Resumed drilling on 3/20/2024.
			40.5											
			41.0											
			41.5											
			42.0											
			42.5											
			43.0											
			43.5											
			44.0											
			44.5											
			45.0											
			45.5											
			46.0											
			46.5											
			47.0											
			47.5											

Boring Number G275D_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			48.0	23 - 50' **SILTY CLAY:** CL/ML, dark gray (5YR 4/1), sand (0-5%), very stiff to hard, low plasticity, dry to moist. *(continued)*	CL/ML									Soil sample collected from 47-49 ft bgs.
			48.5											
			49.0											
			49.5											
6 CS	120 120		50.0	50 - 53' **POORLY-GRADED SAND:** SP, white (10YR 8/1) to gray (10YR 5/1), white to gray, fine sand, angular to subangular sand, coarse sand (0-5%), loose, moist.	SP									
			50.5											
			51.0											
			51.5											
			52.0											Soil sample collected from 51-53 ft bgs.
			52.5											
			53.0	53 - 60' **SILTY CLAY:** CL/ML, very dark brown (10YR 2/2), wood (0-5%), sand (0-5%), hard, high plasticity, moist.	CL/ML									
			53.5											
			54.0											
			54.5											
			55.0											
			55.5											
			56.0	56' dark gray (10YR 4/1).										
			56.5											
			57.0											
			57.5											
			58.0											
			58.5											
			59.0											
			59.5											
			60.0	60' End of Boring.										

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G285_SB

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/22/2024	3/22/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
	Feet (NAVD88)	611.28 Feet (NAVD88)	6.0 inches

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

State Plane 874,797.93 N, 2,516,686.70 E E/W

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

Lat 39° 3' 59.4482"

Long -89° 23' 29.2263"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 105		1	0 - 13' **LEAN CLAY:** CL, yellowish brown (10YR 5/4), silt (5-30%), sand (5-15%), cohesive, medium to high plasticity, soft, moist.	CL									
			2											
			3	3' brown (10YR 4/3), stiff, fractured.										
			4											
			5	5' yellowish red (5YR 4/6) along fractures.										
			6											
			7											
			8											
			9											
2 CS	120 120		10											
			11											
			12											

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

Signature

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

Boring Number G285_SB

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				0 - 13' **LEAN CLAY:** CL, yellowish brown (10YR 5/4), silt (5-30%), sand (5-15%), cohesive, medium to high plasticity, soft, moist. *(continued)*	CL									
			13	13 - 25' **LEAN CLAY:** CL, dark gray (10YR 4/1), sand (5-15%), silt (5-15%), gravel (0-5%), hard, medium to high plasticity, moist.										
			14											
			15											
			16											
			17											
			18											Soil sample collected from 17-19 feet below ground surface (ft bgs).
			19		CL									
3 CS	60 60		20											
			21											
			22											
			23											Soil sample collected from 22-24 ft bgs.
			24											
			25	25' End of Boring.										

ATTACHMENT B
WELL CONSTRUCTION FORMS

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name Coffeen 2024 Nature & Extent Investigation	Local Grid Location of Well _____ft. ☐ N. ☐ S. _____ft. ☐ E. ☐ W.	Well Name G219
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 39° 4' 15.1" Long. -89° 23' 31.7" or	
Facility ID	St. Plane 876,384 ft. N, 2,516,476 ft. E. S / C / N	Date Well Installed 03/18/2024
Type of Well Well Code 11/mw	Section Location of Waste/Source _____1/4 of _____ 1/4 of Sec. _____, T. _____ N, R. _____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Ethan Orange
Distance from Waste/ Source ft. / State Illinois	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known Gov. Lot Number _____	Cascade Drilling LP

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

B. Well casing, top elevation 620.51 ft. (NAVD88)

C. Land surface elevation 617.0 ft. (NAVD88)

D. Surface seal, bottom 616.0 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☒ Yes ☐

Describe N

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

E. Bentonite seal, top 616.0 ft. (NAVD88) or 1.0 ft.

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

G. Filter pack, top 613.0 ft. (NAVD88) or 4.0 ft.

H. Screen joint, top 612.0 ft. (NAVD88) or 5.0 ft.

I. Well bottom _____ ft. (NAVD88) or _____ ft.

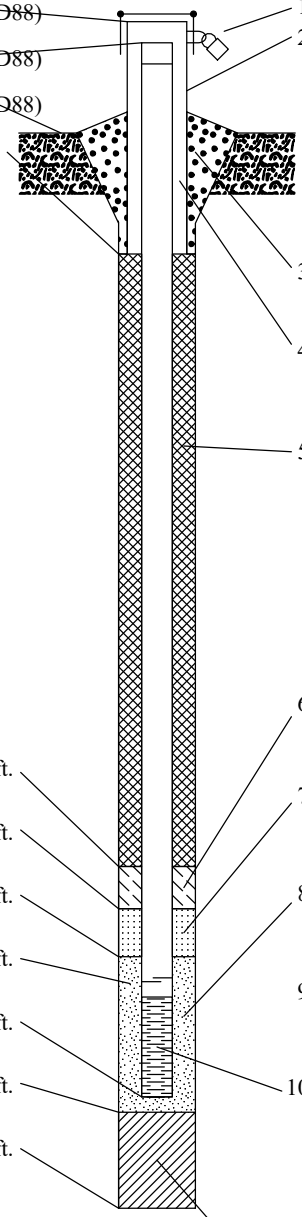
J. Filter pack, bottom 601.0 ft. (NAVD88) or 16.0 ft.

K. Borehole, bottom 597.0 ft. (NAVD88) or 20.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: 5.0 ft.
c. Material: Steel ☒
_____ Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 4 - 3.5"x5' steel bollards
3. Surface seal: Bentonite ☐
Concrete ☒
_____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ☒
Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☒
b. _____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. _____Lbs/gal mud weight . . . Bentonite slurry ☐
d. _____% Bentonite . . . Bentonite-cement grout ☐
e. 0.52 Ft^3 volume added for any of the above
f. How installed: Tremie ☐
Tremie pumped ☐
Gravity ☒
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. PW Gillibrand Co., Inc. 16/30
b. Volume added 2.1 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
_____ Other ☐
10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒
Continuous slot ☐
_____ Other ☐
b. Manufacturer Johnson
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐
3/8" bentonite Other ☒

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

Date Modified: 3/24/2025

Signature

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

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name Coffeen 2024 Nature & Extent Investigation	Local Grid Location of Well _____ft. ☐ N. ☐ S. _____ft. ☐ E. ☐ W.	Well Name G220
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 39° 4' 15.6" Long. -89° 23' 25.3" or	
Facility ID	St. Plane 876,433 ft. N, 2,516,980 ft. E. S / C / N	Date Well Installed 03/19/2024
Type of Well Well Code 11/mw	Section Location of Waste/Source _____1/4 of _____ 1/4 of Sec. _____, T. _____ N, R. _____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Ethan Orange
Distance from Waste/ Source ft. / State Illinois	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known Gov. Lot Number _____	Cascade Drilling LP

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

B. Well casing, top elevation 631.03 ft. (NAVD88)

C. Land surface elevation 628.0 ft. (NAVD88)

D. Surface seal, bottom 627.0 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☒ Yes ☐

Describe N

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

E. Bentonite seal, top 627.0 ft. (NAVD88) or 1.0 ft.

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

G. Filter pack, top 614.0 ft. (NAVD88) or 14.0 ft.

H. Screen joint, top 613.0 ft. (NAVD88) or 15.0 ft.

I. Well bottom _____ ft. (NAVD88) or _____ ft.

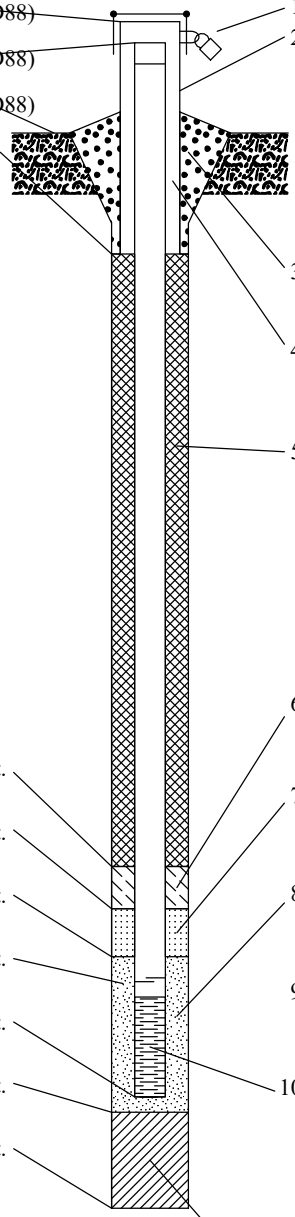
J. Filter pack, bottom 603.0 ft. (NAVD88) or 25.0 ft.

K. Borehole, bottom 603.0 ft. (NAVD88) or 25.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: 5.0 ft.
c. Material: Steel ☒
_____ Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 4 - 3.5"x5' steel bollards
3. Surface seal: Bentonite ☐
Concrete ☒
_____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ☒
Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☒
b. _____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. _____Lbs/gal mud weight . . . Bentonite slurry ☐
d. _____% Bentonite . . . Bentonite-cement grout ☐
e. 2.25 Ft^3 volume added for any of the above
f. How installed: Tremie ☐
Tremie pumped ☐
Gravity ☒
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. PW Gillibrand Co., Inc. 16/30
b. Volume added 1.9 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
_____ Other ☐
10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒
Continuous slot ☐
_____ Other ☐
b. Manufacturer Johnson
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☒
_____ Other ☐

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

Date Modified: 3/24/2025

Signature

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

ATTACHMENT C
SOIL BORING AND MONITORING WELL INSTALLATION PHOTOGRAPHIC LOG

ATTACHMENT C. SOIL BORING AND MONITORING WELL INSTALLATION PHOTOGRAPHIC LOG

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
Illinois Power Generating Company (IPGC)	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
1	3/19/24

DESCRIPTION:

General site conditions during site work.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
2	3/19/24

DESCRIPTION:

Soil samples were collected from lithologies within the screened interval for analytical testing. Monitoring well G219 was screened from approximately 5 to 15 feet below ground surface.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
3	3/19/24

DESCRIPTION:

Soil samples were collected from lithologies within the screened interval for analytical testing. Monitoring well G220 was screened from approximately 15 to 25 feet below ground surface.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
4	3/21/24

DESCRIPTION:

Example of completed Nature & Extent monitoring well. (G219 shown, facing southeast.)

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
5	3/20/24

DESCRIPTION:

Ramboll logged, and Geosyntec sampled, soil from G206D_SB to support an Alternative Source Demonstration (ASD) for the Gypsum Management Facility (GMF) Gypsum Stack Pond. Samples were collected from the Lower Confining Unit (LCU) and Deep Aquifer (DA).

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
6	3/21/24

DESCRIPTION:

Ramboll logged, and Geosyntec sampled, soil from G275D_SB to support an ASD for the GMF Recycle Pond. Samples were collected from the LCU and DA.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
7	3/21/24

DESCRIPTION:

Ramboll logged, and Geosyntec sampled, soil from G285_SB to support an ASD for the GMF Recycle Pond. Samples were collected from the LCU and DA.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
8	4/1/24

DESCRIPTION:

Example of bollard installation completed during site work.

(B1 shown, facing east.)

ATTACHMENT D
WELL DEVELOPMENT FORMS

RAMBOLL

MONITORING WELL DEVELOPMENT

Facility/Project Name	State	Well Name
Vistra - Coffeen	Illinois	G219

Facility License, Permit or Monitoring Number

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:
   - surged with bailer and bailed ☐
   - surged with bailer and pumped ☐
   - surged with block and bailed ☐
   - surged with block and pumped ☒
   - surged with block, bailed, and pumped ☐
   - compressed air ☐
   - bailed only ☐
   - pumped only ☐
   - pumped slowly ☐
   - other _____ ☐

3. Time spent developing well 140 min.

4. Depth of well (from top of well casing) 15.00 ft.

5. Inside diameter of well 2 in.

6. Volume of water in filter pack and well casing 5.96 gal.

7. Volume of water removed from well 29 gal.

8. Volume of water added (if any) 0 gal.

9. Source of water added NA

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

		Before Development		After Development	
11. Depth to Water (from top of well casing)	a.	4.97	ft.	DRY	ft.
Date	b.	03/26/2024		03/26/2024	
Time	c.	09:30	☒ a.m. ☐ p.m.	11:50	☒ a.m. ☐ p.m.
12. Sediment in well bottom		0	inches	0	inches
13. Water clarity		Clear ☐ Turbid ☒ (Describe)		Clear ☒ Turbid ☐ (Describe)	

Tan to Brown Sediment

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	mg/l	mg/l
15. COD	mg/l	mg/l

16. Well developed by: Person's Name and Firm

Jerome Komas
Ramboll Americas Engineering Solutions, Inc.

17. Additional comments on development:

Purged well dry 15 times. Purge rate approximately 1.5 gallons per minute.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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

Signature: Jerome Komas

Print Name: Jerome Komas

Firm: Ramboll Americas Engineering Solutions, Inc.

MONITORING WELL DEVELOPMENT

Facility/Project Name	State	Well Name
Vistra - Coffeen	Illinois	G220

Facility License, Permit or Monitoring Number

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:
   - surged with bailer and bailed ☐
   - surged with bailer and pumped ☐
   - surged with block and bailed ☐
   - surged with block and pumped ☒
   - surged with block, bailed, and pumped ☐
   - compressed air ☐
   - bailed only ☐
   - pumped only ☐
   - pumped slowly ☐
   - other _____ ☐

3. Time spent developing well 60 min.

4. Depth of well (from top of well casing) 27.28 ft.

5. Inside diameter of well 2 in.

6. Volume of water in filter pack and well casing 6.9 gal.

7. Volume of water removed from well 25 gal.

8. Volume of water added (if any) 0 gal.

9. Source of water added NA

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

		Before Development		After Development	
11. Depth to Water (from top of well casing)	a.	12.62	ft.	DRY	ft.
Date	b.	03/26/2024		03/26/2024	
Time	c.	09:20	☒ a.m. ☐ p.m.	10:20	☒ a.m. ☐ p.m.
12. Sediment in well bottom		1	inches	0	inches
13. Water clarity		Clear ☐ Turbid ☒ (Describe)		Clear ☒ Turbid ☐ (Describe)	

Grayish brown Sediment

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	mg/l	mg/l
15. COD	mg/l	mg/l

16. Well developed by: Person's Name and Firm

Kyle Heimstead
Ramboll Americas Engineering Solutions, Inc.

17. Additional comments on development:

Purged well dry 5 times. Purge rate approximately 0.5 gallons per minute.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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

Signature: _____

Print Name: Kyle Heimstead

Firm: Ramboll Americas Engineering Solutions, Inc.

ATTACHMENT E
MONITORING WELL IMPROVEMENT AND REPAIRS PHOTOGRAPHIC LOG

ATTACHMENT E. MONITORING WELL IMPROVEMENT AND REPAIRS PHOTOGRAPHIC LOG

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
Illinois Power Generating Company (IPGC)	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
1	3/22/24

DESCRIPTION:

Four bollards were installed surrounding B1. Bollards were installed to approximately 1 foot below ground surface (bgs), within the topsoil cover only, to minimize the potential for impact to the final protective cover system.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
2	3/27/24

DESCRIPTION:

Two additional bollards were installed surrounding G111. Bollards were installed to approximately2 feet bgs.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
3	3/27/24

DESCRIPTION:

Two additional bollards were installed surrounding G151 to approximately 2 feet bgs. A well pad was also constructed around G151.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
4	3/27/24

DESCRIPTION:

Two additional bollards were installed surrounding G152 to approximately 2 feet bgs. A well pad was also constructed around G152.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
5	3/27/24

DESCRIPTION:

Two additional bollards were installed surrounding G153 to approximately 2 feet bgs. A well pad was also constructed around G153.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
6	3/22/24

DESCRIPTION:

Photo shows condition of G154 pre-repairs. Two additional bollards were installed surrounding G154 to approximately 2 feet bgs. The fractured well pad at G154 was removed and replaced with a newly constructed well pad.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
7	3/27/24

DESCRIPTION:

A well pad and new protop were installed at G306.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
8	3/27/24

DESCRIPTION:

A well pad and new protop were installed at G307. A new packer was additionally installed at G307, which is often under artesian conditions, to prevent the well from freezing during the winter

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
9	3/28/24

DESCRIPTION:

Four bollards were installed to approximately 2 feet bgs surrounding MW04S for protection. A well pad and new protop were also installed at MW04S.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
10	3/27/24

DESCRIPTION:

A well pad and new protop were also installed at MW12S.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
IPGC	Coffeen Power Plant	1940107274

PHOTO NO.	DATE:
11	3/22/24

DESCRIPTION:

Four bollards were installed surrounding P10. Bollards were installed to approximately 1 foot bgs, within the topsoil cover only, to minimize the potential for impact to the final protective cover system.

APPENDIX B
FIELD SAMPLING FORMS AND GROUNDWATER ANALYTICAL LABORATORY REPORTS

June 17, 2024

Eric Bauer
Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
TEL: (414) 837-3607
FAX: (414) 837-3608

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: COF-24Q2 **WorkOrder:** 24041541

Dear Eric Bauer:

TEKLAB, INC received 5 samples for COF_SUP_000 on 5/8/2024 1:48:00 PM for the analysis presented in the following report.

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

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

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

Sincerely,

Elizabeth A. Hurley

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

Report Contents

http://www.teklabinc.com/

Client: Ramboll

Client Project: COF-24Q2

Work Order: 24041541

Report Date: 17-Jun-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Sample Summary	14
Quality Control Results	15
Receiving Check List	194
Chain of Custody	Appended

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

Abbr Definition

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

Definitions

Client: Ramboll

Work Order: 24041541

Client Project: COF-24Q2

Report Date: 17-Jun-24

Qualifiers

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

Case Narrative

http://www.teklabinc.com/

Client: Ramboll

Client Project: COF-24Q2

Work Order: 24041541

Report Date: 17-Jun-24

Cooler Receipt Temp: 1.7 °C

An employee of Teklab, Inc. collected the sample(s).

Depth, only, collection dates/times per field files. Field Blank, and Equipment Blank 1 collection times per field files. Equipment Blanks 2 and 3 were not needed. EAH 5/9/24

Per Eric Bauer's request, only COF_SUP_000 data is included in this report. EAH 6/17/24

Locations

Collinsville

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

Springfield

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

Kansas City

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

Collinsville Air

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

Chicago

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

Accreditations

Client: Ramboll

Client Project: COF-24Q2

Work Order: 24041541

Report Date: 17-Jun-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-003
Client Sample ID: G1003
Matrix: GROUNDWATER
Collection Date: 05/06/2024 13:18

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS									
Depth to water from measuring point	*	0	0		**11.16**	ft	1	05/06/2024 13:18	R347020

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-095
Client Sample ID: Field Blank
Matrix: AQUEOUS
Collection Date: 05/08/2024 11:21

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 17:11	R347249
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 17:11	R347249
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20		**< 20**	mg/L	1	05/10/2024 9:47	R347190
SW-846 9036 (TOTAL)									
Sulfate	NELAP	6	10		**< 10**	mg/L	1	05/10/2024 23:55	R347112
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**< 0.10**	mg/L	1	05/14/2024 14:38	R347245
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**< 4**	mg/L	1	05/10/2024 23:55	R347114
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100		**< 0.100**	mg/L	1	05/10/2024 16:02	222728
Magnesium	NELAP	0.006	0.050		**< 0.050**	mg/L	1	05/10/2024 16:02	222728
Potassium	NELAP	0.040	0.100		**< 0.100**	mg/L	1	05/10/2024 16:02	222728
Sodium	NELAP	0.018	0.050	J	**0.026**	mg/L	1	05/10/2024 16:02	222728
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.8	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Arsenic	NELAP	0.4	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Barium	NELAP	0.7	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Boron	NELAP	9.2	20.0		**< 20.0**	µg/L	5	06/04/2024 18:52	223769
Cadmium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Chromium	NELAP	0.8	1.5	J	**0.8**	µg/L	5	05/14/2024 0:01	222728
Cobalt	NELAP	0.1	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 0:01	222728
Lithium	*	1.4	3.0		**< 3.0**	µg/L	5	05/14/2024 0:01	222728
Molybdenum	NELAP	0.6	1.5		**< 1.5**	µg/L	5	06/04/2024 18:52	223769
Selenium	NELAP	0.6	1.0	J	**0.7**	µg/L	5	05/14/2024 0:01	222728
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	05/14/2024 0:01	222728
Contamination present in the CCB for B. Sample results below the reporting limit are reportable per the TNI Standard.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.06	0.20		**< 0.20**	µg/L	1	05/21/2024 19:00	223077

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-101
Client Sample ID: Equipment Blank 1
Matrix: AQUEOUS
Collection Date: 05/08/2024 11:35

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 17:14	R347249
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 17:14	R347249
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20		**< 20**	mg/L	1	05/10/2024 9:47	R347190
SW-846 9036 (TOTAL)									
Sulfate	NELAP	6	10		**< 10**	mg/L	1	05/11/2024 0:53	R347112
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**< 0.10**	mg/L	1	05/14/2024 15:11	R347245
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**< 4**	mg/L	1	05/11/2024 0:53	R347114
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100		**0.219**	mg/L	1	05/10/2024 16:04	222728
Magnesium	NELAP	0.006	0.050	J	**0.021**	mg/L	1	05/10/2024 16:04	222728
Potassium	NELAP	0.040	0.100		**< 0.100**	mg/L	1	05/10/2024 16:04	222728
Sodium	NELAP	0.018	0.050		**0.056**	mg/L	1	05/10/2024 16:04	222728
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.8	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Arsenic	NELAP	0.4	1.0		**1.2**	µg/L	5	05/14/2024 0:07	222728
Barium	NELAP	0.7	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Boron	NELAP	9.2	20.0		**32.2**	µg/L	5	05/14/2024 0:07	222728
Cadmium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Chromium	NELAP	0.8	1.5	J	**1.1**	µg/L	5	05/14/2024 0:07	222728
Cobalt	NELAP	0.1	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Lithium	*	1.4	3.0		**< 3.0**	µg/L	5	05/14/2024 0:07	222728
Molybdenum	NELAP	0.7	1.5		**4.3**	µg/L	5	05/16/2024 7:47	222728
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 0:07	222728
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	05/14/2024 0:07	222728
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.06	0.20		**< 0.20**	µg/L	1	05/21/2024 20:14	223077

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-104
Client Sample ID: G219
Matrix: GROUNDWATER
Collection Date: 05/07/2024 11:10

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS									
Depth to water from measuring point	*	0	0		**6.45**	ft	1	05/07/2024 11:10	R347020
STANDARD METHODS 2130 B FIELD									
Turbidity	*	1.0	1.0		**26**	NTU	1	05/07/2024 11:10	R347020
STANDARD METHODS 18TH ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300	-300		**-58**	mV	1	05/07/2024 11:10	R347020
STANDARD METHODS 2510 B FIELD									
Spec. Conductance, Field	*	0	0		**867**	µS/cm	1	05/07/2024 11:10	R347020
STANDARD METHODS 2550 B FIELD									
Temperature	*	0	0		**13.9**	°C	1	05/07/2024 11:10	R347020
STANDARD METHODS 4500-O G FIELD									
Oxygen, Dissolved	*	0	0		**0.45**	mg/L	1	05/07/2024 11:10	R347020
SW-846 9040B FIELD									
pH	*	0	1.00		**7.17**		1	05/07/2024 11:10	R347020
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**386**	mg/L	1	05/14/2024 12:40	R347249
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 12:40	R347249
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20		**472**	mg/L	1	05/08/2024 12:06	R347018
SW-846 9036 (TOTAL)									
Sulfate	NELAP	6	10		**49**	mg/L	1	05/11/2024 0:56	R347112
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.46**	mg/L	1	05/14/2024 15:16	R347245
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**35**	mg/L	1	05/11/2024 0:56	R347114
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100		**89.2**	mg/L	1	05/10/2024 17:36	222656
Magnesium	NELAP	0.006	0.050		**43.2**	mg/L	1	05/10/2024 17:36	222656
Potassium	NELAP	0.040	0.100		**0.753**	mg/L	1	05/10/2024 17:36	222656
Sodium	NELAP	0.018	0.050		**64.2**	mg/L	1	05/10/2024 17:36	222656
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.8	1.0		**< 1.0**	µg/L	5	05/16/2024 4:50	222656
Arsenic	NELAP	0.4	1.0		**1.5**	µg/L	5	05/14/2024 3:08	222656
Barium	NELAP	0.7	1.0		**85.5**	µg/L	5	05/14/2024 14:30	222656
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 3:08	222656
Boron	NELAP	9.2	20.0		**< 20.0**	µg/L	5	05/14/2024 14:30	222656
Cadmium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 3:08	222656
Chromium	NELAP	0.7	1.5		**2.4**	µg/L	5	05/14/2024 3:08	222656
Cobalt	NELAP	0.1	1.0		**1.6**	µg/L	5	05/14/2024 3:08	222656
Lead	NELAP	0.6	1.0	J	**0.8**	µg/L	5	05/14/2024 3:08	222656
Lithium	*	1.4	3.0		**8.6**	µg/L	5	05/14/2024 14:30	222656
Molybdenum	NELAP	0.9	1.5		**2.1**	µg/L	5	05/14/2024 3:08	222656
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 3:08	222656
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	05/14/2024 3:08	222656

LCS for Sb recovered outside upper control limits. Sample results are below the reporting limit. Data is reportable per the TNI Standard.

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-104
Client Sample ID: G219
Matrix: GROUNDWATER
Collection Date: 05/07/2024 11:10

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.12	0.20		**< 0.20**	µg/L	1	05/19/2024 14:31	222984

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-105
Client Sample ID: G220
Matrix: GROUNDWATER
Collection Date: 05/07/2024 12:08

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS									
Depth to water from measuring point	*	0	0		**12.10**	ft	1	05/07/2024 12:08	R347020
STANDARD METHODS 2130 B FIELD									
Turbidity	*	1.0	1.0		**25**	NTU	1	05/07/2024 12:08	R347020
STANDARD METHODS 18TH ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300	-300		**21**	mV	1	05/07/2024 12:08	R347020
STANDARD METHODS 2510 B FIELD									
Spec. Conductance, Field	*	0	0		**1270**	µS/cm	1	05/07/2024 12:08	R347020
STANDARD METHODS 2550 B FIELD									
Temperature	*	0	0		**15.4**	°C	1	05/07/2024 12:08	R347020
STANDARD METHODS 4500-O G FIELD									
Oxygen, Dissolved	*	0	0		**0.64**	mg/L	1	05/07/2024 12:08	R347020
SW-846 9040B FIELD									
pH	*	0	1.00		**6.89**		1	05/07/2024 12:08	R347020
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**390**	mg/L	1	05/14/2024 12:47	R347249
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	05/14/2024 12:47	R347249
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20		**824**	mg/L	1	05/08/2024 12:07	R347018
SW-846 9036 (TOTAL)									
Sulfate	NELAP	61	100		**152**	mg/L	10	05/11/2024 1:09	R347112
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.37**	mg/L	1	05/14/2024 15:19	R347245
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**102**	mg/L	10	05/11/2024 1:09	R347114
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100		**129**	mg/L	1	05/10/2024 17:38	222656
Magnesium	NELAP	0.006	0.050		**52.2**	mg/L	1	05/10/2024 17:38	222656
Potassium	NELAP	0.040	0.100		**0.447**	mg/L	1	05/10/2024 17:38	222656
Sodium	NELAP	0.018	0.050		**114**	mg/L	1	05/10/2024 17:38	222656
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.8	1.0		**< 1.0**	µg/L	5	05/16/2024 4:54	222656
Arsenic	NELAP	0.4	1.0	J	**0.5**	µg/L	5	05/14/2024 4:21	222656
Barium	NELAP	0.7	1.0		**182**	µg/L	5	05/14/2024 14:36	222656
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 4:21	222656
Boron	NELAP	9.2	20.0		**< 20.0**	µg/L	5	05/14/2024 14:36	222656
Cadmium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	05/14/2024 4:21	222656
Chromium	NELAP	0.7	1.5	J	**0.7**	µg/L	5	05/14/2024 4:21	222656
Cobalt	NELAP	0.1	1.0		**2.1**	µg/L	5	05/14/2024 4:21	222656
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 4:21	222656
Lithium	*	1.4	3.0		**4.2**	µg/L	5	05/14/2024 14:36	222656
Molybdenum	NELAP	0.6	1.5		**2.2**	µg/L	5	05/16/2024 7:59	222656
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	05/14/2024 4:21	222656
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	05/14/2024 4:21	222656

LCS for Sb recovered outside upper control limits. Sample results are below the reporting limit. Data is reportable per the TNI Standard.

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24041541
Client Project: COF-24Q2
Report Date: 17-Jun-24
Lab ID: 24041541-105
Client Sample ID: G220
Matrix: GROUNDWATER
Collection Date: 05/07/2024 12:08

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.12	0.20	J	**0.13**	µg/L	1	05/19/2024 14:34	222984

Sample Summary

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
24041541-003	G1003	Groundwater	4	05/06/2024 13:18
24041541-095	Field Blank	Aqueous	17	05/08/2024 11:21
24041541-101	Equipment Blank 1	Aqueous	17	05/08/2024 11:35
24041541-104	G219	Groundwater	2	05/07/2024 11:10
24041541-105	G220	Groundwater	2	05/07/2024 12:08

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2510 B FIELD

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	04/29/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-1.15

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	04/30/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-1.8

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.2	90	110	04/30/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	04/30/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-2.16

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/01/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-2.9

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.4	90	110	05/01/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-3

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/01/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-3.10

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2510 B FIELD

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-3.17

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/02/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-4

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/02/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-4.11

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/03/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-4.18

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/03/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-5

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	05/03/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-5.12

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/06/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-5.19

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/06/2024

Batch R347020 **SampType:** LCS Units µS/cm
SampID: LCS-6

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/06/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

STANDARD METHODS 2510 B FIELD

Batch R347020 **SampType:** LCS Units **µS/cm**
SampID: LCS-6.13

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.3	90	110	05/07/2024

Batch R347020 **SampType:** LCS Units **µS/cm**
SampID: LCS-6.20

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/07/2024

Batch R347020 **SampType:** LCS Units **µS/cm**
SampID: LCS-7

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	05/07/2024

Batch R347020 **SampType:** LCS Units **µS/cm**
SampID: LCS-7.14

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	05/08/2024

Batch R347020 **SampType:** LCS Units **µS/cm**
SampID: LCS-7.21

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	05/08/2024

SW-846 9040B FIELD

Batch R347020 **SampType:** LCS Units
SampID: LCS-1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	04/29/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-1.15

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	04/30/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

SW-846 9040B FIELD

Batch R347020 **SampType:** LCS Units
SampID: LCS-1.8

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	04/30/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	04/30/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-2.16

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/01/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-2.9

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	05/01/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-3

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.10**	7.000	0	101.4	98.57	101.4	05/01/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-3.10

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.02**	7.000	0	100.3	98.57	101.4	05/02/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-3.17

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/02/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-4

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.06**	7.000	0	100.9	98.57	101.4	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9040B FIELD

Batch R347020 **SampType:** LCS Units
SampID: LCS-4.11

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/03/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-4.18

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	05/03/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-5

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/03/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-5.12

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	05/06/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-5.19

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/06/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-6

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.07**	7.000	0	101.0	98.57	101.4	05/06/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-6.13

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/07/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-6.20

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

SW-846 9040B FIELD

Batch R347020 **SampType:** LCS Units
SampID: LCS-7

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.05**	7.000	0	100.7	98.57	101.4	05/07/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-7.14

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.02**	7.000	0	100.3	98.57	101.4	05/08/2024

Batch R347020 **SampType:** LCS Units
SampID: LCS-7.21

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.02**	7.000	0	100.3	98.57	101.4	05/08/2024

EPA 1664A

Batch R346878 **SampType:** MBLK Units **mg/L**
SampID: MBLK2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**< 5**	4.400	0	0	-100	100	05/07/2024

Batch R346878 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**38**	40.00	0	94.8	78	114	05/06/2024

Batch R346878 **SampType:** MS Units **mg/L**
SampID: 24042278-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		6		**44**	44.74	5.410	86.7	78	114	05/06/2024

Batch R347205 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**< 5**	4.400	0	0	-100	100	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

EPA 1664A

Batch R347205 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**42**	40.00	0	103.8	78	114	05/13/2024

Batch R347205 **SampType:** MS Units **mg/L**
SampID: 24050711-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		6		**52**	46.47	11.45	87.4	78	114	05/13/2024

Batch R347241 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**< 5**	4.400	0	0	-100	100	05/13/2024

Batch R347241 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**45**	40.00	0	112.8	78	114	05/13/2024

Batch R347241 **SampType:** MS Units **mg/L**
SampID: 24050632-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5	S	**33**	41.98	6.672	63.4	78	114	05/13/2024

Batch R347241 **SampType:** MS Units **mg/L**
SampID: 24051058-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		3		**29**	27.12	3.653	94.8	78	114	05/13/2024

EPA 600 350.1 (TOTAL)

Batch R346656 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346656 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.05**	1.000	0	105.2	90	110	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**
SampID: 24042332-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.03**	2.000	0.1340	94.6	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042332-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.02**	2.000	0.1340	94.2	2.027	0.49	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**
SampID: 24042342-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.07**	2.000	0.1860	94.3	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042342-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.04**	2.000	0.1860	92.8	2.072	1.41	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**
SampID: 24042398-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.99**	2.000	0.1260	93.1	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042398-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.95**	2.000	0.1260	91.2	1.988	1.93	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**
SampID: 24042409-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.98**	2.000	0.1040	93.9	90	110	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042409-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.98**	2.000	0.1040	93.8	1.982	0.15	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**

SampID: 24042412-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.90**	2.000	0.03400	93.2	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042412-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0.03400	94.2	1.898	1.10	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**

SampID: 24042441-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.89**	2.000	0	94.6	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042441-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.90**	2.000	0	94.8	1.891	0.32	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**

SampID: 24042441-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.71**	2.000	0.04000	83.6	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042441-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.73**	2.000	0.04000	84.4	1.712	0.93	05/01/2024

Batch R346656 **SampType:** MS Units **mg/L**

SampID: 24042443-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.07**	2.000	0.1680	95.0	90	110	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042443-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.03**	2.000	0.1680	93.1	2.069	1.90	05/01/2024

Batch R346717 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	05/03/2024

Batch R346717 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.05**	1.000	0	105.4	90	110	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050060-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		1.00		**27.8**	20.00	8.734	95.4	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050060-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		1.00		**27.9**	20.00	8.734	95.7	27.80	0.28	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050069-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.14**	2.000	0.1880	97.6	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050069-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.13**	2.000	0.1880	96.9	2.141	0.70	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050111-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0	96.0	90	110	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050111-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0	93.3	1.920	2.85	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050118-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.15**	2.000	0.2730	93.8	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050118-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.16**	2.000	0.2730	94.4	2.150	0.51	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050212-016AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.29**	2.000	0.3750	95.8	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050212-016AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.31**	2.000	0.3750	96.7	2.290	0.83	05/03/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24050234-004EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.01**	2.000	0.1280	94.2	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050234-004EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.03**	2.000	0.1280	95.0	2.012	0.79	05/03/2024

Batch R346869 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346869 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**0.96**	1.000	0	96.2	90	110	05/06/2024

Batch R346869 **SampType:** MS Units **mg/L**
SampID: 24050079-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		2.00		**38.4**	40.00	2.417	90.0	90	110	05/06/2024

Batch R346869 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050079-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		2.00	S	**37.9**	40.00	2.417	88.7	38.44	1.40	05/06/2024

Batch R346869 **SampType:** MS Units **mg/L**
SampID: 24050337-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.60**	2.000	0.03900	77.8	90	110	05/06/2024

Batch R346869 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050337-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.60**	2.000	0.03900	78.0	1.595	0.31	05/06/2024

Batch R346869 **SampType:** MS Units **mg/L**
SampID: 24050339-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0.06700	90.2	90	110	05/06/2024

Batch R346869 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050339-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.86**	2.000	0.06700	89.8	1.872	0.43	05/06/2024

Batch R346869 **SampType:** MS Units **mg/L**
SampID: 24050352-003HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.78**	2.000	0.05600	86.0	90	110	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R346869 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050352-003HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.79**	2.000	0.05600	86.7	1.775	0.84	05/06/2024

Batch R346965 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	05/08/2024

Batch R346965 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.01**	1.000	0	100.7	90	110	05/08/2024

Batch R346965 **SampType:** MS Units **mg/L**

SampID: 24050628-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	E	**5.43**	2.000	3.465	98.4	90	110	05/08/2024

Batch R346965 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050628-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	E	**5.43**	2.000	3.465	98.4	5.432	0.04	05/08/2024

Batch R347127 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	05/10/2024

Batch R347127 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.01**	1.000	0	100.9	90	110	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050001-011JMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**4.27**	2.000	2.398	93.4	90	110	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050001-011JMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**4.28**	2.000	2.398	93.8	4.267	0.19	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050697-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0	95.8	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050697-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.91**	2.000	0	95.5	1.915	0.26	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050718-004DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.27**	2.000	0.4000	93.4	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050718-004DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.28**	2.000	0.4000	94.1	2.267	0.66	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050795-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.28**	2.000	0.4800	90.0	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050795-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.28**	2.000	0.4800	90.0	2.280	0.00	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050795-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.30**	2.000	0.4930	90.2	90	110	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050795-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.32**	2.000	0.4930	91.1	2.297	0.78	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050811-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.74**	2.000	0.8620	93.7	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050811-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.75**	2.000	0.8620	94.3	2.735	0.44	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050848-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.50		**11.6**	10.00	1.977	95.9	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050848-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.50		**11.5**	10.00	1.977	95.3	11.57	0.53	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050859-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0.02800	94.4	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050859-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.93**	2.000	0.02800	95.2	1.915	0.88	05/10/2024

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050876-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.96**	2.000	0.04700	95.6	90	110	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 350.1 (TOTAL)

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050876-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.97**	2.000	0.04700	96.1	1.959	0.51	05/10/2024

EPA 600 365.4 (TOTAL)

Batch 222716 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240508 TP1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**< 0.100**	0.0660	0	0	-100	100	05/09/2024

Batch 222716 **SampType:** LCS Units **mg/L**

SampID: LCS 240508 TP1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.06**	1.000	0	106.5	85	115	05/09/2024

Batch 222716 **SampType:** MS Units **mg/L**

SampID: 24050604-001HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.46**	1.000	0.4740	99.1	85	115	05/09/2024

Batch 222716 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050604-001HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.48**	1.000	0.4740	100.9	1.465	1.22	05/09/2024

Batch 222716 **SampType:** MS Units **mg/L**

SampID: 24050709-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.500		**11.4**	5.000	6.620	96.3	85	115	05/09/2024

Batch 222716 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050709-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phosphorus, Total (as P)		0.500		**11.5**	5.000	6.620	97.1	11.44	0.35	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

EPA 600 365.4 (TOTAL)

Batch 222716 **SampType: MS** Units **mg/L**
SampID: 24050714-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.500		**6.30**	5.000	1.375	98.5	85	115	05/09/2024

Batch 222716 **SampType: MSD** Units **mg/L** RPD Limit **15**
SampID: 24050714-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phosphorus, Total (as P)		0.500		**6.37**	5.000	1.375	99.9	6.300	1.10	05/09/2024

Batch 222767 **SampType: MBLK** Units **mg/L**
SampID: MBLK 240509 TP1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**< 0.100**	0.0660	0	0	-100	100	05/14/2024

Batch 222767 **SampType: LCS** Units **mg/L**
SampID: LCS 240509 TP1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.09**	1.000	0	108.6	85	115	05/14/2024

Batch 222767 **SampType: MS** Units **mg/L**
SampID: 24050697-008AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.43**	1.000	0.3880	104.1	85	115	05/14/2024

Batch 222767 **SampType: MSD** Units **mg/L** RPD Limit **15**
SampID: 24050697-008AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phosphorus, Total (as P)		0.100		**1.46**	1.000	0.3880	106.7	1.429	1.80	05/14/2024

Batch 222767 **SampType: MS** Units **mg/L**
SampID: 24050745-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phosphorus, Total (as P)		0.100		**2.96**	1.000	1.906	104.9	85	115	05/14/2024

Batch 222767 **SampType: MSD** Units **mg/L** RPD Limit **15**
SampID: 24050745-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phosphorus, Total (as P)		0.100		**3.04**	1.000	1.906	113.5	2.955	2.87	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R346581 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	04/30/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	04/30/2024

Batch R346581 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**952**	1000	0	95.2	90	110	04/30/2024
Total Dissolved Solids		20		**940**	1000	0	94.0	90	110	04/30/2024

Batch R346581 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24042262-006FDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**600**				582.0	3.05	04/30/2024

Batch R346728 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/02/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/02/2024

Batch R346728 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**958**	1000	0	95.8	90	110	05/02/2024
Total Dissolved Solids		20		**952**	1000	0	95.2	90	110	05/02/2024

Batch R346728 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24042406-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50	H	**2160**				2200	1.83	05/02/2024

Batch R346728 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24050057-003ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**565**				515.0	9.26	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R346728 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050143-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**2980**				3120	4.42	05/02/2024

Batch R346753 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/03/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/03/2024

Batch R346753 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**960**	1000	0	96.0	90	110	05/03/2024
Total Dissolved Solids		20		**982**	1000	0	98.2	90	110	05/03/2024

Batch R346753 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24041541-031ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**332**				314.0	5.57	05/03/2024

Batch R346753 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050139-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**400**				406.0	1.49	05/03/2024

Batch R346758 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/04/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/04/2024

Batch R346758 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**928**	1000	0	92.8	90	110	05/04/2024
Total Dissolved Solids		20		**974**	1000	0	97.4	90	110	05/04/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R346758 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24041541-021EDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**494**				474.0	4.13	05/04/2024

Batch R346758 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050228-001BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**1440**				1372	5.11	05/04/2024

Batch R347018 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/08/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/08/2024

Batch R347018 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**960**	1000	0	96.0	90	110	05/08/2024
Total Dissolved Solids		20		**994**	1000	0	99.4	90	110	05/08/2024

Batch R347018 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050482-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**128**				134.0	4.58	05/08/2024

Batch R347018 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050590-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		200		**30100**				30420	1.12	05/08/2024

Batch R347018 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050591-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**1900**				1805	4.86	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R347190 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/10/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/10/2024

Batch R347190 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**946**	1000	0	94.6	90	110	05/10/2024
Total Dissolved Solids		20		**912**	1000	0	91.2	90	110	05/10/2024

Batch R347190 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24041541-075ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**458**				458.0	0.00	05/10/2024

Batch R347190 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24050891-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**455**				470.0	3.24	05/10/2024

Batch R347304 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/14/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/14/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/14/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	05/14/2024

Batch R347304 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**978**	1000	0	97.8	90	110	05/14/2024
Total Dissolved Solids		20		**962**	1000	0	96.2	90	110	05/14/2024
Total Dissolved Solids		20		**922**	1000	0	92.2	90	110	05/14/2024
Total Dissolved Solids		20		**930**	1000	0	93.0	90	110	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R347304 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050819-003BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**380**				385.0	1.31	05/14/2024

Batch R347304 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050906-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**595**				560.0	6.06	05/14/2024

Batch R347304 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050906-014ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**538**				572.0	6.13	05/14/2024

Batch R347304 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050975-002BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**760**				705.0	7.51	05/14/2024

Batch R347304 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24051090-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		100		**680**				670.0	1.48	05/14/2024

STANDARD METHODS 2540 D 1997, 2011

Batch R347107 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids	*	0.5		**< 0.5**	0.3000	0	0	-100	100	05/10/2024
Total Suspended Solids		6		**< 6**	4.000	0	0	-100	100	05/10/2024
Total Suspended Solids		6		**< 6**	4.000	0	0	-100	100	05/10/2024
Total Suspended Solids		6		**< 6**	4.000	0	0	-100	100	05/10/2024
Total Suspended Solids		6		**< 6**	4.000	0	0	-100	100	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 D 1997, 2011

Batch R347107 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids		6		**96**	100.0	0	96.0	85	115	05/10/2024
Total Suspended Solids		6		**108**	100.0	0	108.0	85	115	05/10/2024
Total Suspended Solids		6		**106**	100.0	0	106.0	85	115	05/10/2024
Total Suspended Solids		6		**108**	100.0	0	108.0	85	115	05/10/2024
Total Suspended Solids		6		**107**	100.0	0	107.0	85	115	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24041541-082EDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6		**< 6**				0	0.00	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050602-006ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6	R	**16**				15.00	6.45	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050625-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6	J	**5**				0	0.00	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050717-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6	R	**15**				13.00	14.29	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050735-003ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6		**7**				7.000	0.00	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050763-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6		**< 6**				0	0.00	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 2540 D 1997, 2011

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050774-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6	J	**4**				0	0.00	05/10/2024
Total Suspended Solids	*	1.4	R	**4.0**				4.400	8.28	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050834-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6		**28**				28.00	0.00	05/10/2024

Batch R347107 **SampType:** DUP Units **mg/L** RPD Limit **5**

SampID: 24050872-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids		6		**< 6**				5.000	0.00	05/10/2024

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R346656 **SampType:** MS Units **mg/L**

SampID: 24050007-007KMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.59**	2.000	0.7320	93.0	90	110	05/01/2024

Batch R346656 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050007-007KMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.62**	2.000	0.7320	94.2	2.592	0.88	05/01/2024

Batch R346717 **SampType:** MS Units **mg/L**

SampID: 24041541-020KMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.26**	2.000	0.3980	93.0	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-020KMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.28**	2.000	0.3980	94.2	2.257	1.10	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R346717 **SampType:** MS Units **mg/L**
SampID: 24050138-003IMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.85**	2.000	0	92.6	90	110	05/03/2024

Batch R346717 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050138-003IMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.86**	2.000	0	92.8	1.853	0.16	05/03/2024

Batch R346869 **SampType:** MS Units **mg/L**
SampID: 24050364-005KMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.69**	2.000	0	84.7	90	110	05/06/2024

Batch R346869 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050364-005KMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.73**	2.000	0	86.4	1.694	1.93	05/06/2024

Batch R346965 **SampType:** MS Units **mg/L**
SampID: 24050451-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.43**	2.000	0.6100	91.2	90	110	05/08/2024

Batch R346965 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050451-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.43**	2.000	0.6100	91.0	2.433	0.08	05/08/2024

Batch R347127 **SampType:** MS Units **mg/L**
SampID: 24050887-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.84**	2.000	0	92.1	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050887-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0	93.3	1.842	1.29	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R347127 **SampType:** MS Units **mg/L**

SampID: 24050887-006IMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0	95.8	90	110	05/10/2024

Batch R347127 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050887-006IMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.81**	2.000	0	90.4	1.917	5.91	05/10/2024

STANDARD METHODS 4500-NO2 B (DISSOLVED) 2000, 2011

Batch R346545 **SampType:** MS Units **mg/L**

SampID: 24050007-002FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.46**	0.5000	0	91.4	85	115	05/01/2024

Batch R346545 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050007-002FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.44**	0.5000	0	88.4	0.4570	3.34	05/01/2024

Batch R346614 **SampType:** MS Units **mg/L**

SampID: 24050031-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.43**	0.5000	0	86.4	85	115	05/01/2024

Batch R346614 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050031-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.43**	0.5000	0	85.6	0.4320	0.93	05/01/2024

Batch R346614 **SampType:** MS Units **mg/L**

SampID: 24050053-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.25		**2.26**	2.500	0	90.4	85	115	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (DISSOLVED) 2000, 2011

Batch R346614 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050053-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.25		**2.14**	2.500	0	85.6	2.260	5.45	05/01/2024

Batch R346679 **SampType:** MS Units **mg/L**

SampID: 24050138-004DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.44**	0.5000	0	88.6	85	115	05/02/2024

Batch R346679 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050138-004DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0	94.4	0.4430	6.34	05/02/2024

Batch R346741 **SampType:** MS Units **mg/L**

SampID: 24041541-004FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0	95.6	85	115	05/03/2024

Batch R346741 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-004FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0	94.2	0.4780	1.48	05/03/2024

Batch R346741 **SampType:** MS Units **mg/L**

SampID: 24050364-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.45**	0.5000	0	89.8	85	115	05/03/2024

Batch R346741 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050364-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.44**	0.5000	0	87.2	0.4490	2.94	05/03/2024

Batch R346899 **SampType:** MS Units **mg/L**

SampID: 24041541-089FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0	93.2	85	115	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (DISSOLVED) 2000, 2011

Batch R346899 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-089FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0	96.2	0.4660	3.17	05/07/2024

Batch R346899 **SampType:** MS Units **mg/L**

SampID: 24050583-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.45**	0.5000	0	90.8	85	115	05/07/2024

Batch R346899 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050583-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.44**	0.5000	0	87.8	0.4540	3.36	05/07/2024

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346545 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	04/30/2024
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	04/30/2024

Batch R346545 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.30**	0.3045	0	99.5	90	110	04/30/2024
Nitrogen, Nitrite (as N)		0.05		**0.30**	0.3045	0	99.5	90	110	04/30/2024

Batch R346545 **SampType:** MS Units **mg/L**

SampID: 24042378-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	101.6	85	115	04/30/2024

Batch R346545 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042378-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.4	0.5080	0.78	04/30/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346545 **SampType:** MS Units **mg/L**
SampID: 24042422-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0.05500	91.6	85	115	04/30/2024

Batch R346545 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042422-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.52**	0.5000	0.05500	92.8	0.5130	1.16	04/30/2024

Batch R346614 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/01/2024

Batch R346614 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.30**	0.3045	0	99.5	90	110	05/01/2024

Batch R346614 **SampType:** MS Units **mg/L**
SampID: 24050025-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	S	**0.42**	0.5000	0	84.2	85	115	05/01/2024

Batch R346614 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050025-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	S	**0.42**	0.5000	0	84.0	0.4210	0.24	05/01/2024

Batch R346679 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/02/2024
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346679 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	103.8	90	110	05/02/2024
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	103.8	90	110	05/02/2024

Batch R346679 **SampType:** MS Units **mg/L**
SampID: 24050118-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.48**	0.5000	0.005000	95.8	85	115	05/02/2024

Batch R346679 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050118-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.49**	0.5000	0.005000	97.0	0.4840	1.23	05/02/2024

Batch R346679 **SampType:** MS Units **mg/L**
SampID: 24050133-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.54**	0.5000	0	108.6	85	115	05/02/2024

Batch R346679 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050133-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.53**	0.5000	0	106.8	0.5430	1.67	05/02/2024

Batch R346741 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/03/2024

Batch R346741 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.31**	0.3045	0	102.5	90	110	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346741 **SampType:** MS Units **mg/L**
SampID: 24041541-052AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	E	**0.78**	0.5000	0.3120	94.6	85	115	05/03/2024

Batch R346741 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-052AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	E	**0.79**	0.5000	0.3120	95.6	0.7850	0.63	05/03/2024

Batch R346899 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/07/2024

Batch R346899 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	106.1	90	110	05/07/2024

Batch R346899 **SampType:** MS Units **mg/L**
SampID: 24041541-075AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0.006000	95.0	85	115	05/07/2024

Batch R346899 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-075AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0.006000	94.8	0.4810	0.21	05/07/2024

Batch R346971 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/08/2024

Batch R346971 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	104.8	90	110	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346971 **SampType:** MS Units **mg/L**
SampID: 24050636-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0	93.8	85	115	05/08/2024

Batch R346971 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050636-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0	95.0	0.4690	1.27	05/08/2024

Batch R346971 **SampType:** MS Units **mg/L**
SampID: 24050666-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.46**	0.5000	0	92.0	85	115	05/08/2024

Batch R346971 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050666-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.46**	0.5000	0	92.4	0.4600	0.43	05/08/2024

Batch R346971 **SampType:** MS Units **mg/L**
SampID: 24050679-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	S	**0.42**	0.5000	0	84.0	85	115	05/08/2024

Batch R346971 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050679-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.42**	0.5000	0	85.0	0.4200	1.18	05/08/2024

Batch R346971 **SampType:** MS Units **mg/L**
SampID: 24050788-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.46**	0.5000	0	92.8	85	115	05/08/2024

Batch R346971 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.46**	0.5000	0	93.0	0.4640	0.22	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R346971 **SampType:** MS Units **mg/L**
SampID: 24050788-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0	94.2	85	115	05/08/2024

Batch R346971 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0	96.6	0.4710	2.52	05/08/2024

Batch R347917 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/28/2024
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	05/28/2024

Batch R347917 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.31**	0.3045	0	100.8	90	110	05/28/2024
Nitrogen, Nitrite (as N)		0.05		**0.31**	0.3045	0	100.8	90	110	05/28/2024

Batch R347917 **SampType:** MS Units **mg/L**
SampID: 24052144-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	S	**0.44**	0.5000	0.05600	76.8	85	115	05/28/2024

Batch R347917 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24052144-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	S	**0.44**	0.5000	0.05600	76.8	0.4400	0.00	05/28/2024

Batch R347917 **SampType:** MS Units **mg/L**
SampID: 24052155-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0.03300	88.6	85	115	05/28/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R347917 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24052155-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.48**	0.5000	0.03300	89.4	0.4760	0.84	05/28/2024

STANDARD METHODS 4500-NO3 F (DISSOLVED) 2000, 2011

Batch R346632 **SampType:** MS Units **mg/L**

SampID: 24041541-012FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.306**	0.2500	0.05500	100.4	85	115	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-012FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.296**	0.2500	0.05500	96.4	0.3060	3.32	05/01/2024

Batch R346632 **SampType:** MS Units **mg/L**

SampID: 24050007-008FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.369**	0.2500	0.1210	99.2	85	115	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050007-008FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.373**	0.2500	0.1210	100.8	0.3690	1.08	05/01/2024

Batch R346632 **SampType:** MS Units **mg/L**

SampID: 24050031-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.202**	0.2500	0.01300	75.6	90	110	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050031-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.206**	0.2500	0.01300	77.2	0.2020	1.96	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (DISSOLVED) 2000, 2011

Batch R346632 **SampType:** MS Units **mg/L**
SampID: 24050031-007CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.221**	0.2500	0.01300	83.2	90	110	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050031-007CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.210**	0.2500	0.01300	78.8	0.2210	5.10	05/01/2024

Batch R346691 **SampType:** MS Units **mg/L**
SampID: 24050053-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.232**	0.2500	0	92.8	90	110	05/02/2024

Batch R346691 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050053-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.239**	0.2500	0	95.6	0.2320	2.97	05/02/2024

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24041541-009FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.273**	0.2500	0.04500	91.2	85	115	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-009FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.279**	0.2500	0.04500	93.6	0.2730	2.17	05/03/2024

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24041541-084FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**10.1**	5.000	5.409	94.7	85	115	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-084FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**10.2**	5.000	5.409	96.1	10.15	0.65	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (DISSOLVED) 2000, 2011

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24050364-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.26**	0.5000	0.7700	98.6	85	115	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050364-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.24**	0.5000	0.7700	94.6	1.263	1.60	05/03/2024

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24050364-008FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.28**	0.5000	0.7900	97.8	85	115	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050364-008FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.31**	0.5000	0.7900	103.4	1.279	2.17	05/03/2024

Batch R346903 **SampType:** MS Units **mg/L**
SampID: 24050451-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.235**	0.2500	0	94.0	85	115	05/07/2024

Batch R346903 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050451-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.232**	0.2500	0	92.8	0.2350	1.28	05/07/2024

Batch R346993 **SampType:** MS Units **mg/L**
SampID: 24041541-018FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.76**	0.5000	1.261	100.6	85	115	05/08/2024

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-018FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.77**	0.5000	1.261	102.6	1.764	0.57	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346549 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						04/30/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	04/30/2024

Batch R346549 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.512**	0.5000	0	102.4	90	110	04/30/2024

Batch R346549 **SampType:** MS Units **mg/L**
SampID: 24041541-081AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	E	**2.18**	0.5000	1.683	100.4	85	115	04/30/2024

Batch R346549 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-081AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	E	**2.21**	0.5000	1.683	106.0	2.185	1.27	04/30/2024

Batch R346549 **SampType:** MS Units **mg/L**
SampID: 24042368-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00	S	**13.6**	5.000	9.192	88.6	90	110	04/30/2024

Batch R346549 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042368-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**14.0**	5.000	9.192	95.4	13.62	2.48	04/30/2024

Batch R346549 **SampType:** MS Units **mg/L**
SampID: 24042385-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**29.9**	12.50	18.28	92.7	90	110	04/30/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346549 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042385-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**29.8**	12.50	18.28	92.6	29.86	0.04	04/30/2024

Batch R346549 **SampType:** MS Units **mg/L**

SampID: 24042405-009AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	H	**1.71**	0.5000	1.180	105.6	85	115	04/30/2024

Batch R346549 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042405-009AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	H	**1.66**	0.5000	1.180	97.0	1.708	2.55	04/30/2024

Batch R346632 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/01/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/01/2024

Batch R346632 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.520**	0.5000	0	104.0	90	110	05/01/2024

Batch R346632 **SampType:** MS Units **mg/L**

SampID: 24050025-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**18.0**	5.000	12.77	104.1	90	110	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050025-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**18.1**	5.000	12.77	106.4	17.97	0.63	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346632 **SampType:** MS Units **mg/L**

SampID: 24050045-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	SE	**2.10**	0.5000	1.539	112.2	90	110	05/01/2024

Batch R346632 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050045-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	E	**2.09**	0.5000	1.539	109.8	2.100	0.57	05/01/2024

Batch R346691 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/02/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/02/2024

Batch R346691 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.503**	0.5000	0	100.6	90	110	05/02/2024

Batch R346691 **SampType:** MS Units **mg/L**

SampID: 24050143-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**2.63**	2.500	0	105.3	90	110	05/02/2024

Batch R346691 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050143-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**2.60**	2.500	0	104.0	2.633	1.22	05/02/2024

Batch R346793 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/03/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346793 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.493**	0.5000	0	98.6	90	110	05/03/2024

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24050241-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.237**	0.2500	0	94.8	90	110	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050241-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.236**	0.2500	0	94.4	0.2370	0.42	05/03/2024

Batch R346793 **SampType:** MS Units **mg/L**
SampID: 24050288-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**3.17**	1.250	2.035	90.8	90	110	05/03/2024

Batch R346793 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050288-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**3.21**	1.250	2.035	93.7	3.170	1.13	05/03/2024

Batch R346903 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/07/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/07/2024

Batch R346903 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.507**	0.5000	0	101.4	90	110	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346903 **SampType:** MS Units **mg/L**
SampID: 24041541-074AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.244**	0.2500	0	97.6	85	115	05/07/2024

Batch R346903 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-074AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.245**	0.2500	0	98.0	0.2440	0.41	05/07/2024

Batch R346903 **SampType:** MS Units **mg/L**
SampID: 24050493-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.196**	0.2500	0.04500	60.4	85	115	05/07/2024

Batch R346903 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050493-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.195**	0.2500	0.04500	60.0	0.1960	0.51	05/07/2024

Batch R346993 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/08/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/08/2024

Batch R346993 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.501**	0.5000	0	100.2	90	110	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**
SampID: 24050328-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**10.5**	5.000	5.666	96.0	90	110	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050328-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**10.5**	5.000	5.666	97.2	10.47	0.59	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**

SampID: 24050614-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**9.22**	5.000	4.682	90.8	90	110	05/08/2024

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050614-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**9.31**	5.000	4.682	92.5	9.220	0.95	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**

SampID: 24050633-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.22**	0.5000	0.7600	92.4	90	110	05/08/2024

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050633-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.22**	0.5000	0.7600	92.8	1.222	0.16	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**

SampID: 24050666-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**41.3**	25.00	17.60	94.8	90	110	05/08/2024

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050666-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**41.2**	25.00	17.60	94.4	41.30	0.25	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**

SampID: 24050679-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.266**	0.2500	0.04300	89.2	85	115	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050679-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.264**	0.2500	0.04300	88.4	0.2660	0.75	05/08/2024

Batch R346993 **SampType:** MS Units **mg/L**

SampID: 24050788-012BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.211**	0.2500	0.02000	76.4	85	115	05/08/2024

Batch R346993 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050788-012BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	**0.218**	0.2500	0.02000	79.2	0.2110	3.26	05/08/2024

Batch R347067 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/09/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/09/2024

Batch R347067 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.483**	0.5000	0	96.6	90	110	05/09/2024

Batch R347067 **SampType:** MS Units **mg/L**

SampID: 24041541-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.267**	0.2500	0.03700	92.0	85	115	05/09/2024

Batch R347067 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.273**	0.2500	0.03700	94.4	0.2670	2.22	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R347067 **SampType:** MS Units **mg/L**
SampID: 24050788-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.226**	0.2500	0	90.4	85	115	05/09/2024

Batch R347067 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.228**	0.2500	0	91.2	0.2260	0.88	05/09/2024

Batch R347067 **SampType:** MS Units **mg/L**
SampID: 24050788-015BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.251**	0.2500	0.01500	94.4	85	115	05/09/2024

Batch R347067 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-015BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.254**	0.2500	0.01500	95.6	0.2510	1.19	05/09/2024

Batch R347067 **SampType:** MS Units **mg/L**
SampID: 24050817-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.425**	0.2500	0.1870	95.2	90	110	05/09/2024

Batch R347067 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050817-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.429**	0.2500	0.1870	96.8	0.4250	0.94	05/09/2024

Batch R347925 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						05/28/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	05/28/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R347925 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.509**	0.5000	0	101.8	90	110	05/28/2024

Batch R347925 **SampType:** MS Units **mg/L**
SampID: 24052107-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.05		**0.24**	0.2500	0	94.4	90	110	05/28/2024

Batch R347925 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24052107-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.05		**0.24**	0.2500	0	96.8	0.2360	2.51	05/28/2024

Batch R347925 **SampType:** MS Units **mg/L**
SampID: 24052144-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**31.0**	12.50	18.09	103.3	90	110	05/28/2024

Batch R347925 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24052144-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**30.5**	12.50	18.09	99.0	31.00	1.74	05/28/2024

STANDARD METHODS 5210 B 2001, 2011

Batch 222730 **SampType:** LCS Units **mg/L**
SampID: LCS-BOD-1-050924

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Biochemical Oxygen Demand		100		**198**	198.0	0	100.0	84.6	115.4	05/09/2024

Batch 222730 **SampType:** DUP Units **mg/L** RPD Limit **40**
SampID: 24050756-003ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Biochemical Oxygen Demand		50		**585**				615.0	5.00	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 5210 B 2001, 2011

Batch 222730 **SampType:** DUP Units **mg/L** RPD Limit **40**

SampID: 24050794-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Biochemical Oxygen Demand		10		**46**				47.00	2.15	05/09/2024

STANDARD METHODS 5220 D (TOTAL) 1997

Batch R347025 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		50		**< 50**	17.00	0	0	-100	100	05/09/2024

Batch R347025 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		50		**111**	112.0	0	99.2	90	110	05/09/2024

Batch R347025 **SampType:** MS Units **mg/L**

SampID: 24041541-082KMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		100		**1200**	1000	253.2	94.4	85	115	05/09/2024

Batch R347025 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-082KMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chemical Oxygen Demand		100		**1160**	1000	253.2	90.5	1198	3.34	05/09/2024

Batch R347025 **SampType:** MS Units **mg/L**

SampID: 24050715-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		100		**1830**	1000	808.7	101.9	90	110	05/09/2024

Batch R347025 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050715-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chemical Oxygen Demand		100		**1810**	1000	808.7	100.6	1827	0.72	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

STANDARD METHODS 5220 D (TOTAL) 1997

Batch R347025 **SampType:** MS Units **mg/L**
SampID: 24050740-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		100		**1210**	1000	141.7	106.5	90	110	05/09/2024

Batch R347025 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050740-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chemical Oxygen Demand		100		**1200**	1000	141.7	106.0	1206	0.36	05/09/2024

Batch R347103 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		50		**< 50**	17.00	0	0	-100	100	05/10/2024

Batch R347103 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		50		**115**	112.0	0	103.1	90	110	05/10/2024

Batch R347103 **SampType:** MS Units **mg/L**
SampID: 24050834-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		100		**1020**	1000	0	101.8	90	110	05/10/2024

Batch R347103 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050834-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chemical Oxygen Demand		100		**1020**	1000	0	102.3	1018	0.43	05/10/2024

Batch R347103 **SampType:** MS Units **mg/L**
SampID: 24050900-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chemical Oxygen Demand		100		**1280**	1000	200.7	107.6	90	110	05/10/2024

Batch R347103 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050900-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chemical Oxygen Demand		100		**1220**	1000	200.7	101.9	1276	4.56	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7196A

Batch R346973 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		0.0010		**< 0.0010**	0.0004	0	0	-100	100	05/08/2024

Batch R346973 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		0.0010		**0.0539**	0.0500	0	107.8	90	110	05/08/2024

Batch R346973 **SampType:** MS Units **µg/L**
SampID: 24041541-082FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		5.00		**255**	250.0	3.000	100.8	85	115	05/09/2024

Batch R346973 **SampType:** MS Units **µg/L**
SampID: 24041541-095FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		1.00		**54.8**	50.00	0	109.6	85	115	05/08/2024

Batch R346973 **SampType:** MSD Units **µg/L** RPD Limit **10**
SampID: 24041541-095FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chromium, Hexavalent		1.00		**51.7**	50.00	0	103.4	54.80	5.82	05/08/2024

Batch R346973 **SampType:** MS Units **µg/L**
SampID: 24041541-101FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		1.00		**54.9**	50.00	0.6000	108.6	85	115	05/08/2024

Batch R346973 **SampType:** MS Units **mg/L**
SampID: 24050605-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent	*	0.0010		**0.0548**	0.0500	0.001500	106.6	85	115	05/08/2024

Batch R346973 **SampType:** MS Units **mg/L**
SampID: 24050663-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium, Hexavalent		0.0010		**0.0532**	0.0500	0	106.4	85	115	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222268 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240430 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/01/2024

Batch 222268 **SampType:** LCS Units **mg/L**
SampID: LCS 240430 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	102.8	90	110	05/01/2024

Batch 222333 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240501 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/02/2024

Batch 222333 **SampType:** LCS Units **mg/L**
SampID: LCS 240501 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	103.9	90	110	05/02/2024

Batch 222333 **SampType:** MS Units **mg/L**
SampID: 24050044-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.025**	0.0250	0.002715	87.4	90	110	05/02/2024

Batch 222333 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050044-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	S	**0.024**	0.0250	0.002715	85.4	0.02456	2.06	05/02/2024

Batch 222401 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240502 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/03/2024

Batch 222401 **SampType:** LCS Units **mg/L**
SampID: LCS2 240502 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	99.6	90	110	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222402 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240502 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/03/2024

Batch 222402 **SampType:** LCS Units **mg/L**

SampID: LCS 240502 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	96.8	90	110	05/03/2024

Batch 222402 **SampType:** MS Units **µg/L**

SampID: 24050135-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		5.00	S	**20.0**	25.00	0	80.0	90	110	05/03/2024

Batch 222402 **SampType:** MSD Units **µg/L** RPD Limit **15**

SampID: 24050135-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		5.00	S	**18.6**	25.00	0	74.3	20.00	7.41	05/03/2024

Batch 222402 **SampType:** MS Units **mg/L**

SampID: 24050189-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.025		**0.133**	0.1250	0.009825	98.9	90	110	05/03/2024

Batch 222402 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050189-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.025		**0.135**	0.1250	0.009825	100.4	0.1334	1.41	05/03/2024

Batch 222452 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240503 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/06/2024

Batch 222452 **SampType:** LCS Units **mg/L**

SampID: LCS 240503 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.3	90	110	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222452 **SampType:** MS Units **mg/L**
SampID: 24050175-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.500	S	**2.47**	0.0250	2.491	-98.3	90	110	05/08/2024

Batch 222452 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050175-001EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.500	S	**2.54**	0.0250	2.491	207.7	2.466	3.05	05/08/2024

Batch 222452 **SampType:** MS Units **mg/L**
SampID: 24050260-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.029**	0.0250	0.004480	98.5	90	110	05/06/2024

Batch 222452 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050260-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.028**	0.0250	0.004480	95.0	0.02911	3.03	05/06/2024

Batch 222453 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240503 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/06/2024

Batch 222453 **SampType:** LCS Units **mg/L**
SampID: LCS 240503 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	103.7	90	110	05/06/2024

Batch 222453 **SampType:** MS Units **mg/L**
SampID: 24041541-040EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.012**	0.0250	0	46.7	75	125	05/06/2024

Batch 222453 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-040EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	JS	**0.004**	0.0250	0	17.1	0.01166	0.00	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222564 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240506 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/07/2024

Batch 222564 **SampType:** LCS Units **mg/L**

SampID: LCS 240506 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	100.6	90	110	05/07/2024

Batch 222564 **SampType:** MS Units **mg/L**

SampID: 24041541-009HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	102.6	75	125	05/07/2024

Batch 222564 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-009HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	106.0	0.02564	3.28	05/07/2024

Batch 222628 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240507 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/08/2024

Batch 222628 **SampType:** LCS Units **mg/L**

SampID: LCS 240507 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.028**	0.0250	0	111.1	90	110	05/08/2024

Batch 222628 **SampType:** LCS Units **mg/L**

SampID: LCS2 240507 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.028**	0.0250	0	112.5	90	110	05/09/2024

Batch 222628 **SampType:** MS Units **mg/L**

SampID: 24050451-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.027**	0.0250	0	106.7	75	125	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222628 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050451-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.2	0.02668	5.31	05/08/2024

Batch 222628 **SampType:** MS Units **mg/L**

SampID: 24050451-006DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	100.4	75	125	05/08/2024

Batch 222628 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050451-006DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.028**	0.0250	0	110.0	0.02510	9.14	05/08/2024

Batch 222698 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240508 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/09/2024

Batch 222698 **SampType:** LCS Units **mg/L**

SampID: LCS 240508 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.027**	0.0250	0	108.7	90	110	05/09/2024

Batch 222698 **SampType:** MS Units **mg/L**

SampID: 24050536-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	94.5	90	110	05/09/2024

Batch 222698 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050536-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	S	**0.020**	0.0250	0	81.4	0.02362	14.89	05/09/2024

Batch 222815 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240510 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9012A (TOTAL)

Batch 222815 **SampType:** LCS Units **mg/L**
SampID: LCS 240510 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	99.3	90	110	05/14/2024

Batch 222815 **SampType:** MS Units **mg/L**
SampID: 24050830-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.025		**0.133**	0.1250	0.01432	95.2	90	110	05/14/2024

Batch 222815 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050830-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.025		**0.140**	0.1250	0.01432	100.7	0.1334	4.97	05/14/2024

SW-846 9036 (DISSOLVED)

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24041541-031BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**68**	40.00	31.35	92.8	85	115	05/02/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-031BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**69**	40.00	31.35	95.3	68.46	1.48	05/02/2024

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24042088-010CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**27**	20.00	8.280	95.1	85	115	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042088-010CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**27**	20.00	8.280	95.8	27.30	0.48	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24042186-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**49**	20.00	35.56	66.5	85	115	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042186-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**49**	20.00	35.56	66.8	48.86	0.12	05/01/2024

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24042262-003FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**74**	40.00	34.96	98.4	85	115	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042262-003FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**74**	40.00	34.96	97.0	74.30	0.76	05/01/2024

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24042262-006FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**208**	100.0	115.6	92.0	85	115	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042262-006FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**206**	100.0	115.6	90.8	207.6	0.57	05/01/2024

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24041541-010FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20	SE	**107**	40.00	79.07	70.6	85	115	05/02/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-010FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20	SE	**109**	40.00	79.07	75.8	107.3	1.93	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24041541-090FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**97**	40.00	60.50	92.2	85	115	05/03/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-090FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**98**	40.00	60.50	93.3	97.39	0.42	05/03/2024

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24041541-007FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**207**	100.0	112.8	94.2	85	115	05/07/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-007FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**215**	100.0	112.8	102.4	207.1	3.85	05/07/2024

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24041541-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**175**	100.0	84.53	90.4	85	115	05/06/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**178**	100.0	84.53	93.6	174.9	1.85	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24041541-045BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		200		**898**	400.0	516.5	95.3	85	115	05/06/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-045BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		200		**916**	400.0	516.5	99.9	897.5	2.04	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24042163-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**36**	20.00	17.40	91.8	90	110	05/06/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042163-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**36**	20.00	17.40	95.4	35.76	1.97	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24050031-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**19**	20.00	7.640	57.5	85	115	05/07/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050031-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**20**	20.00	7.640	60.7	19.14	3.29	05/07/2024

Batch R346843 **SampType:** MS Units **mg/L**
SampID: 24050053-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**20**	20.00	9.080	52.1	85	115	05/07/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050053-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**21**	20.00	9.080	59.6	19.50	7.45	05/07/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050138-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**34**	20.00	16.22	90.6	85	115	05/08/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050138-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**35**	20.00	16.22	92.7	34.33	1.24	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050364-004FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**41**	20.00	22.24	93.3	85	115	05/07/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050364-004FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**41**	20.00	22.24	94.1	40.90	0.39	05/07/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050364-010FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**155**	100.0	64.68	90.1	85	115	05/07/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050364-010FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**154**	100.0	64.68	89.2	154.8	0.54	05/07/2024

Batch R347057 **SampType:** MS Units **mg/L**
SampID: 24041541-027BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**206**	100.0	103.7	102.5	85	115	05/09/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-027BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**208**	100.0	103.7	104.7	206.2	1.08	05/09/2024

Batch R347057 **SampType:** MS Units **mg/L**
SampID: 24041541-042BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**93**	40.00	54.70	96.3	85	115	05/09/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-042BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**95**	40.00	54.70	100.8	93.21	1.94	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R347057 **SampType:** MS Units **mg/L**
SampID: 24050451-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**48**	20.00	30.38	86.8	85	115	05/09/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050451-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**48**	20.00	30.38	89.8	47.73	1.29	05/09/2024

Batch R347057 **SampType:** MS Units **mg/L**
SampID: 24050464-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**237**	100.0	140.4	96.8	85	115	05/09/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050464-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**242**	100.0	140.4	101.9	237.2	2.09	05/09/2024

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050493-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	SE	**53**	20.00	40.00	64.5	90	110	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050493-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	SE	**53**	20.00	40.00	65.7	52.90	0.45	05/10/2024

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050583-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**220**	100.0	126.8	93.1	85	115	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050583-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**225**	100.0	126.8	98.4	219.9	2.40	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050001-010CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**241**	100.0	141.6	99.2	85	115	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050001-010CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**246**	100.0	141.6	103.9	240.8	1.91	05/14/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050646-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**49**	20.00	30.07	93.4	90	110	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050646-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**48**	20.00	30.07	91.5	48.75	0.78	05/14/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050819-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**42**	20.00	23.20	94.0	90	110	05/16/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050819-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**43**	20.00	23.20	99.1	41.99	2.42	05/16/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050887-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**178**	100.0	87.25	90.9	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050887-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**187**	100.0	87.25	99.5	178.2	4.73	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050907-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**29**	20.00	13.10	81.6	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050907-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**30**	20.00	13.10	83.3	29.41	1.18	05/17/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050975-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**199**	100.0	104.8	94.2	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050975-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**199**	100.0	104.8	94.6	199.0	0.22	05/17/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050976-003FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	E	**264**	100.0	166.4	98.0	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050976-003FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	E	**260**	100.0	166.4	93.8	264.5	1.64	05/17/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050976-007FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**213**	100.0	118.0	95.1	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050976-007FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**221**	100.0	118.0	102.7	213.1	3.52	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (DISSOLVED)

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050979-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**31**	20.00	14.35	83.3	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050979-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**32**	20.00	14.35	86.2	31.01	1.82	05/17/2024

SW-846 9036 (TOTAL)

Batch R346635 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/01/2024

Batch R346635 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	90.2	90	110	05/01/2024

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24041541-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**66**	40.00	31.81	86.2	85	115	05/02/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**68**	40.00	31.81	89.4	66.31	1.87	05/02/2024

Batch R346635 **SampType:** MS Units **mg/L**
SampID: 24042088-010BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**23**	20.00	0	116.9	85	115	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042088-010BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**23**	20.00	0	116.6	23.38	0.21	05/01/2024

Batch R346635 **SampType:** MS Units **mg/L**

SampID: 24042193-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**41**	20.00	23.14	89.1	85	115	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042193-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**41**	20.00	23.14	91.4	40.96	1.12	05/01/2024

Batch R346635 **SampType:** MS Units **mg/L**

SampID: 24042357-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**50**	20.00	37.08	62.4	85	115	05/02/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042357-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	SE	**50**	20.00	37.08	66.8	49.57	1.74	05/02/2024

Batch R346635 **SampType:** MS Units **mg/L**

SampID: 24042384-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**24**	20.00	6.850	86.4	90	110	05/01/2024

Batch R346635 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042384-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**25**	20.00	6.850	91.8	24.13	4.34	05/01/2024

Batch R346706 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346706 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	96.9	90	110	05/02/2024

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24041541-033AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**278**	200.0	105.3	86.4	85	115	05/03/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-033AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**292**	200.0	105.3	93.2	278.1	4.74	05/03/2024

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24042186-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**20**	20.00	0	101.8	85	115	05/02/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042186-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**21**	20.00	0	106.2	20.35	4.28	05/02/2024

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24042406-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**39**	20.00	18.04	104.0	85	115	05/02/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24042406-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**39**	20.00	18.04	105.2	38.83	0.67	05/02/2024

Batch R346706 **SampType:** MS Units **mg/L**
SampID: 24042406-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		200		**793**	400.0	392.1	100.1	85	115	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042406-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		200		**804**	400.0	392.1	102.9	792.6	1.41	05/02/2024

Batch R346706 **SampType:** MS Units **mg/L**

SampID: 24042406-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**31**	20.00	12.12	95.2	85	115	05/02/2024

Batch R346706 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042406-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**32**	20.00	12.12	98.6	31.17	2.13	05/02/2024

Batch R346843 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/06/2024

Batch R346843 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**20**	20.00	0	98.0	90	110	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**

SampID: 24041541-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**176**	100.0	80.06	95.9	85	115	05/06/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**186**	100.0	80.06	105.6	176.0	5.36	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**

SampID: 24041541-045AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		200		**874**	400.0	477.2	99.2	85	115	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-045AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		200		**895**	400.0	477.2	104.3	874.1	2.32	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**

SampID: 24042163-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**36**	20.00	17.35	92.2	90	110	05/06/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24042163-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**36**	20.00	17.35	94.6	35.79	1.30	05/06/2024

Batch R346843 **SampType:** MS Units **mg/L**

SampID: 24050031-005BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**19**	20.00	7.900	57.1	85	115	05/07/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050031-005BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**20**	20.00	7.900	58.4	19.32	1.39	05/07/2024

Batch R346843 **SampType:** MS Units **mg/L**

SampID: 24050053-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**21**	20.00	9.700	54.8	85	115	05/07/2024

Batch R346843 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050053-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**20**	20.00	9.700	53.0	20.66	1.76	05/07/2024

Batch R346932 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346932 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**20**	20.00	0	98.1	90	110	05/07/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24041541-007EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**212**	100.0	121.6	90.8	85	115	05/07/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-007EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**215**	100.0	121.6	93.6	212.5	1.28	05/07/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050139-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**36**	20.00	18.62	89.0	85	115	05/07/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050139-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**37**	20.00	18.62	91.8	36.42	1.55	05/07/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050140-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**48**	20.00	29.22	93.2	85	115	05/08/2024

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050140-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**48**	20.00	29.22	95.6	47.86	1.00	05/08/2024

Batch R346932 **SampType:** MS Units **mg/L**
SampID: 24050369-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**215**	100.0	121.8	92.7	85	115	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R346932 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050369-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**214**	100.0	121.8	91.8	214.6	0.43	05/07/2024

Batch R347057 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/09/2024

Batch R347057 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**20**	20.00	0	100.8	90	110	05/09/2024

Batch R347057 **SampType:** MS Units **mg/L**

SampID: 24041541-027AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	S	**195**	100.0	110.2	84.5	85	115	05/10/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-027AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**200**	100.0	110.2	90.2	194.7	2.89	05/10/2024

Batch R347057 **SampType:** MS Units **mg/L**

SampID: 24041541-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**92**	40.00	55.55	91.7	85	115	05/10/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**94**	40.00	55.55	97.1	92.23	2.30	05/10/2024

Batch R347057 **SampType:** MS Units **mg/L**

SampID: 24050131-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		200	SEH	**1040**	400.0	712.8	82.6	90	110	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050131-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		200	EH	**1080**	400.0	712.8	91.2	1043	3.24	05/10/2024

Batch R347057 **SampType:** MS Units **mg/L**

SampID: 24050273-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**43**	20.00	24.34	92.7	85	115	05/09/2024

Batch R347057 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24050273-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**43**	20.00	24.34	94.5	42.87	0.86	05/09/2024

Batch R347112 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/10/2024

Batch R347112 **SampType:** MBLK Units **mg/L**

SampID: MBLK-181812

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	*	10		**< 10**	6.140	0	0	-100	100	05/10/2024

Batch R347112 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	94.2	90	110	05/10/2024

Batch R347112 **SampType:** MS Units **mg/L**

SampID: 24041541-100AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**333**	200.0	155.1	89.0	85	115	05/11/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24041541-100AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**336**	200.0	155.1	90.6	333.2	0.95	05/11/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050352-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**158**	100.0	66.70	90.8	90	110	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050352-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**159**	100.0	66.70	92.4	157.5	1.00	05/10/2024

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050482-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**48**	20.00	29.02	94.4	85	115	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050482-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**50**	20.00	29.02	103.6	47.89	3.79	05/10/2024

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050590-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		5000		**16300**	10000	7151	91.6	90	110	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050590-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		5000		**17000**	10000	7151	98.7	16310	4.25	05/10/2024

Batch R347112 **SampType:** MS Units **mg/L**
SampID: 24050891-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	SE	**51**	20.00	40.16	55.6	85	115	05/10/2024

Batch R347112 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050891-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	SE	**51**	20.00	40.16	56.6	51.29	0.39	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347268 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/14/2024

Batch R347268 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	91.4	90	110	05/14/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24041541-092AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		200		**963**	400.0	584.2	94.7	85	115	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24041541-092AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		200		**959**	400.0	584.2	93.7	962.9	0.42	05/14/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050001-011BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**25**	20.00	10.87	71.7	85	115	05/15/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050001-011BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**25**	20.00	10.87	69.2	25.21	1.96	05/15/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050002-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**28**	20.00	12.03	80.2	85	115	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050002-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**28**	20.00	12.03	80.5	28.07	0.21	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050634-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20	S	**56**	40.00	22.50	84.7	85	115	05/15/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050634-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**58**	40.00	22.50	87.9	56.37	2.26	05/15/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050646-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**48**	20.00	30.53	88.0	90	110	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050646-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**48**	20.00	30.53	87.8	48.13	0.06	05/14/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050795-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**161**	100.0	67.26	94.0	90	110	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050795-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**161**	100.0	67.26	93.6	161.2	0.27	05/14/2024

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24050795-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**154**	100.0	62.59	91.0	90	110	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050795-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	S	**150**	100.0	62.59	87.0	153.6	2.67	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347268 **SampType:** MS Units **mg/L**
SampID: 24051090-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**145**	100.0	56.17	88.6	85	115	05/14/2024

Batch R347268 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24051090-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**144**	100.0	56.17	88.2	144.7	0.24	05/14/2024

Batch R347372 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/15/2024

Batch R347372 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	90.3	90	110	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050788-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**32**	20.00	13.98	89.8	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**32**	20.00	13.98	91.4	31.94	1.03	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050788-012BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**329**	200.0	146.5	91.1	85	115	05/16/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050788-012BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**331**	200.0	146.5	92.2	328.7	0.65	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050819-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**43**	20.00	24.35	91.4	90	110	05/16/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050819-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**43**	20.00	24.35	93.4	42.64	0.91	05/16/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050905-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**39**	20.00	19.90	95.5	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050905-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**40**	20.00	19.90	99.3	39.00	1.93	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050906-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**37**	20.00	17.92	93.6	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**38**	20.00	17.92	99.2	36.63	3.06	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050906-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**73**	40.00	35.53	94.1	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**76**	40.00	35.53	100.0	73.17	3.19	05/15/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050906-018AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**86**	40.00	48.86	93.4	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-018AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**89**	40.00	48.86	100.1	86.21	3.06	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050906-021AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**25**	20.00	8.010	83.2	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-021AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**25**	20.00	8.010	86.5	24.64	2.64	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24050906-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**37**	20.00	18.12	93.2	85	115	05/15/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**37**	20.00	18.12	96.6	36.77	1.78	05/15/2024

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24051000-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**45**	20.00	25.83	97.0	85	115	05/16/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24051000-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**46**	20.00	25.83	101.4	45.24	1.88	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9036 (TOTAL)

Batch R347372 **SampType:** MS Units **mg/L**
SampID: 24051000-010BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**35**	20.00	17.50	89.4	85	115	05/16/2024

Batch R347372 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24051000-010BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**36**	20.00	17.50	93.0	35.39	2.01	05/16/2024

Batch R347512 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	05/17/2024

Batch R347512 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	94.1	90	110	05/17/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24050907-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**30**	20.00	13.17	84.2	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050907-001EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**29**	20.00	13.17	81.6	30.01	1.75	05/17/2024

Batch R347512 **SampType:** MS Units **mg/L**
SampID: 24051437-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	SE	**59**	20.00	45.65	68.2	85	115	05/17/2024

Batch R347512 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24051437-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	SE	**59**	20.00	45.65	66.0	59.28	0.71	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9060A

Batch R347237 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**< 1.0**	0.4500	0	0	-100	100	05/13/2024

Batch R347237 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**4.9**	5.000	0	98.6	90	110	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050001-003IMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**8.6**	5.000	3.590	99.6	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050001-003IMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**8.9**	5.000	3.590	106.0	8.570	3.67	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050001-006IMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**9.4**	5.000	4.350	100.2	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050001-006IMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**9.2**	5.000	4.350	97.2	9.360	1.62	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050633-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**5.3**	5.000	0	105.6	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050633-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**5.3**	5.000	0	106.2	5.280	0.57	05/13/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9060A

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050633-006DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.0**	5.000	0.9700	101.4	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050633-006DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**5.8**	5.000	0.9700	96.4	6.040	4.23	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050906-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.4**	5.000	1.510	97.6	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.6**	5.000	1.510	102.0	6.390	3.38	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050906-005DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.2**	5.000	1.380	96.8	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-005DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.3**	5.000	1.380	98.2	6.220	1.12	05/13/2024

Batch R347237 **SampType:** MS Units **mg/L**
SampID: 24050906-020DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.2**	5.000	1.410	96.6	85	115	05/13/2024

Batch R347237 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24050906-020DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0		**6.1**	5.000	1.410	94.2	6.240	1.94	05/13/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9060A

Batch R347237 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24050655-008BDUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)		1.0	J	**0.6**				0.7600	0.00	05/13/2024

SW-846 9066 (TOTAL)

Batch R346796 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	05/03/2024

Batch R346796 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.054**	0.0500	0	107.1	90	110	05/03/2024

Batch R346796 **SampType:** MS Units **mg/L**

SampID: 24050028-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.055**	0.0500	0	109.6	90	110	05/03/2024

Batch R346796 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050028-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.054**	0.0500	0	108.5	0.05478	0.95	05/03/2024

Batch R346796 **SampType:** MS Units **mg/L**

SampID: 24050080-002EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.053**	0.0500	0	106.9	90	110	05/03/2024

Batch R346796 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050080-002EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.054**	0.0500	0	107.2	0.05343	0.35	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R346796 **SampType:** MS Units **mg/L**
SampID: 24050186-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.050**	0.0500	0	99.0	90	110	05/03/2024

Batch R346796 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050186-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.052**	0.0500	0	103.6	0.04951	4.54	05/03/2024

Batch R346796 **SampType:** MS Units **mg/L**
SampID: 24050237-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.071**	0.0500	0.02125	99.1	90	110	05/03/2024

Batch R346796 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050237-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.074**	0.0500	0.02125	105.0	0.07081	4.05	05/03/2024

Batch R347059 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	05/07/2024

Batch R347059 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.051**	0.0500	0	102.5	90	110	05/07/2024

Batch R347059 **SampType:** MS Units **mg/L**
SampID: 24050334-010AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.025		**0.285**	0.2500	0.02831	102.6	90	110	05/07/2024

Batch R347059 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050334-010AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.025		**0.300**	0.2500	0.02831	108.8	0.2848	5.31	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R347189 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	05/13/2024

Batch R347189 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.052**	0.0500	0	103.3	90	110	05/13/2024

Batch R347189 **SampType:** MS Units **mg/L**
SampID: 24050410-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.058**	0.0500	0	115.2	90	110	05/13/2024

Batch R347189 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050410-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.060**	0.0500	0	120.1	0.05760	4.18	05/13/2024

Batch R347189 **SampType:** MS Units **mg/L**
SampID: 24050523-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.056**	0.0500	0.003420	104.2	90	110	05/13/2024

Batch R347189 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050523-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.056**	0.0500	0.003420	104.7	0.05552	0.47	05/13/2024

Batch R347189 **SampType:** MS Units **mg/L**
SampID: 24050604-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.057**	0.0500	0.003680	106.4	90	110	05/13/2024

Batch R347189 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050604-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.064**	0.0500	0.003680	121.3	0.05688	12.31	05/13/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R347258 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	05/14/2024

Batch R347258 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.049**	0.0500	0	98.7	90	110	05/14/2024

Batch R347258 **SampType:** MS Units **mg/L**
SampID: 24050696-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.064**	0.0500	0.01029	107.5	90	110	05/14/2024

Batch R347258 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050696-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.064**	0.0500	0.01029	107.7	0.06402	0.19	05/14/2024

Batch R347258 **SampType:** MS Units **mg/L**
SampID: 24050744-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.100		**1.28**	1.000	0.3356	94.7	90	110	05/14/2024

Batch R347258 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050744-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.100		**1.30**	1.000	0.3356	96.0	1.282	1.02	05/14/2024

Batch R347258 **SampType:** MS Units **mg/L**
SampID: 24050937-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.025		**0.310**	0.2500	0.05270	102.9	90	110	05/14/2024

Batch R347258 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050937-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.025		**0.297**	0.2500	0.05270	97.7	0.3100	4.28	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R347258 **SampType:** MS Units **mg/L**
SampID: 24050943-001HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.010		**0.155**	0.1000	0.04964	105.1	90	110	05/14/2024

Batch R347258 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050943-001HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.010		**0.155**	0.1000	0.04964	105.8	0.1548	0.42	05/14/2024

Batch R347258 **SampType:** MS Units **mg/L**
SampID: 24051058-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.055**	0.0500	0.004460	101.3	90	110	05/14/2024

Batch R347258 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24051058-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.057**	0.0500	0.004460	105.2	0.05509	3.50	05/14/2024

Batch R347452 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	05/16/2024

Batch R347452 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.051**	0.0500	0	101.9	90	110	05/16/2024

Batch R347452 **SampType:** MS Units **µg/L**
SampID: 24041541-042FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**48**	50.00	0	96.8	85	115	05/17/2024

Batch R347452 **SampType:** MSD Units **µg/L** RPD Limit **15**
SampID: 24041541-042FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**49**	50.00	0	97.9	48.42	1.09	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R347452 **SampType:** MS Units µg/L
SampID: 24041541-049FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**50**	50.00	0	100.7	85	115	05/16/2024

Batch R347452 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-049FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	101.1	50.35	0.38	05/16/2024

Batch R347452 **SampType:** MS Units µg/L
SampID: 24050001-012HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**51**	50.00	0	102.3	85	115	05/16/2024

Batch R347452 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24050001-012HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	102.7	51.14	0.41	05/16/2024

Batch R347452 **SampType:** MS Units µg/L
SampID: 24050887-008GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**52**	50.00	0	103.5	85	115	05/16/2024

Batch R347452 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24050887-008GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**52**	50.00	0	103.4	51.77	0.14	05/16/2024

Batch R347452 **SampType:** MS Units µg/L
SampID: 24050975-003FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**50**	50.00	0	100.2	85	115	05/16/2024

Batch R347452 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24050975-003FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	101.6	50.11	1.39	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9066 (TOTAL)

Batch R347452 **SampType:** MS Units µg/L
SampID: 24050976-006KMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**51**	50.00	0	101.9	85	115	05/16/2024

Batch R347452 **SampType:** MSD Units µg/L RPD Limit 15
SampID: 24050976-006KMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**49**	50.00	0	98.4	50.94	3.48	05/16/2024

Batch R347452 **SampType:** MS Units mg/L
SampID: 24051232-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.053**	0.0500	0	105.9	90	110	05/16/2024

Batch R347452 **SampType:** MSD Units mg/L RPD Limit 15
SampID: 24051232-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.051**	0.0500	0	101.1	0.05297	4.70	05/16/2024

SW-846 9214 (DISSOLVED)

Batch R346823 **SampType:** MS Units mg/L
SampID: 24050007-008FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.41**	2.000	0.2910	105.8	75	125	05/07/2024

Batch R346823 **SampType:** MSD Units mg/L RPD Limit 15
SampID: 24050007-008FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.31**	2.000	0.2910	101.0	2.408	4.07	05/07/2024

Batch R346966 **SampType:** MS Units mg/L
SampID: 24041541-015FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.60**	2.000	0.4300	108.4	75	125	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (DISSOLVED)

Batch R346966 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-015FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.57**	2.000	0.4300	107.2	2.597	0.89	05/08/2024

Batch R347102 **SampType:** MS Units **mg/L**

SampID: 24050364-006FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.28**	2.000	0.4910	89.3	75	125	05/10/2024

Batch R347102 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050364-006FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.26**	2.000	0.4910	88.7	2.277	0.57	05/10/2024

Batch R347147 **SampType:** MS Units **mg/L**

SampID: 24041541-034BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.14**	2.000	0.3580	89.2	75	125	05/13/2024

Batch R347147 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-034BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**1.86**	2.000	0.3580	75.2	2.142	13.99	05/13/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-017FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.05**	2.000	0.2040	92.3	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-017FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.25**	2.000	0.2040	102.2	2.050	9.26	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-086BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.17**	2.000	0.3040	93.1	75	125	05/14/2024

Quality Control Results

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Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

SW-846 9214 (DISSOLVED)

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-086BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.33**	2.000	0.3040	101.2	2.166	7.25	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**
SampID: 24041541-097BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.09**	2.000	0.2960	89.9	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-097BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.19**	2.000	0.2960	94.7	2.094	4.48	05/14/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24041541-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.90**	2.000	0.8760	101.0	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.96**	2.000	0.8760	104.0	2.896	2.05	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24050887-004CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.10**	2.000	0.1690	96.8	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050887-004CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.18**	2.000	0.1690	100.4	2.104	3.41	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R346823 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/06/2024

Batch R346823 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**0.95**	1.000	0	95.0	90	110	05/06/2024

Batch R346823 **SampType:** MS Units **mg/L**
SampID: 24041541-033AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.37**	2.000	0.3940	98.9	75	125	05/06/2024

Batch R346823 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-033AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.47**	2.000	0.3940	103.9	2.372	4.13	05/06/2024

Batch R346823 **SampType:** MS Units **mg/L**
SampID: 24041541-061AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.53**	2.000	0.4850	102.2	75	125	05/06/2024

Batch R346823 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-061AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.62**	2.000	0.4850	106.6	2.528	3.42	05/06/2024

Batch R346823 **SampType:** MS Units **mg/L**
SampID: 24041541-081AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.60**	2.000	0.6420	98.0	75	125	05/06/2024

Batch R346823 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-081AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.68**	2.000	0.6420	101.7	2.601	2.81	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R346823 **SampType:** MS Units **mg/L**
SampID: 24042405-009AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10	H	**2.45**	2.000	0.4690	99.0	75	125	05/07/2024

Batch R346823 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24042405-009AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10	H	**2.44**	2.000	0.4690	98.4	2.449	0.45	05/07/2024

Batch R346823 **SampType:** MS Units **mg/L**
SampID: 24050131-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10	H	**2.08**	2.000	0.08400	99.7	75	125	05/07/2024

Batch R346823 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050131-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10	H	**2.18**	2.000	0.08400	104.7	2.078	4.70	05/07/2024

Batch R346966 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/08/2024

Batch R346966 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**1.07**	1.000	0	106.7	90	110	05/08/2024

Batch R347102 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/10/2024

Batch R347102 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**0.99**	1.000	0	99.3	90	110	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347102 **SampType:** MS Units **mg/L**
SampID: 24050273-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**1.90**	2.000	0.2030	85.0	75	125	05/10/2024

Batch R347102 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050273-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**1.93**	2.000	0.2030	86.3	1.903	1.36	05/10/2024

Batch R347102 **SampType:** MS Units **mg/L**
SampID: 24050273-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**1.67**	2.000	0	83.5	75	125	05/10/2024

Batch R347102 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050273-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**1.54**	2.000	0	77.0	1.670	8.03	05/10/2024

Batch R347102 **SampType:** MS Units **mg/L**
SampID: 24050362-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.11**	2.000	0.2380	93.5	75	125	05/10/2024

Batch R347102 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050362-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.15**	2.000	0.2380	95.5	2.108	1.88	05/10/2024

Batch R347102 **SampType:** DUP Units **mg/L** RPD Limit **15**
SampID: 24042193-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10	R	**0.16**				0	200.00	05/10/2024

Batch R347102 **SampType:** DUP Units **mg/L** RPD Limit **15**
SampID: 24042193-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10	J	**0.06**				0	0.00	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347102 **SampType:** DUP Units **mg/L** RPD Limit **15**

SampID: 24042194-006ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10	R	**0.23**				0	200.00	05/10/2024

Batch R347147 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/13/2024

Batch R347147 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**0.93**	1.000	0	93.2	90	110	05/13/2024

Batch R347147 **SampType:** MS Units **mg/L**

SampID: 24041541-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.11**	2.000	0.3630	87.6	75	125	05/13/2024

Batch R347147 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.03**	2.000	0.3630	83.6	2.114	3.86	05/13/2024

Batch R347147 **SampType:** MS Units **mg/L**

SampID: 24041541-050AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.30**	2.000	0.3070	99.6	75	125	05/13/2024

Batch R347147 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-050AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.04**	2.000	0.3070	86.4	2.299	12.18	05/13/2024

Batch R347147 **SampType:** MS Units **mg/L**

SampID: 24050482-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.05**	2.000	0.1210	96.3	75	125	05/13/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347147 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050482-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.14**	2.000	0.1210	101.1	2.046	4.63	05/13/2024

Batch R347147 **SampType:** MS Units **mg/L**

SampID: 24050777-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.62**	2.000	0.4570	108.2	75	125	05/13/2024

Batch R347147 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050777-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.59**	2.000	0.4570	106.7	2.621	1.15	05/13/2024

Batch R347245 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/14/2024

Batch R347245 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**0.94**	1.000	0	94.3	90	110	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-007EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.14**	2.000	0.2960	92.2	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-007EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.31**	2.000	0.2960	100.9	2.140	7.81	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-063AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.09**	2.000	0.3540	86.9	75	125	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-063AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.08**	2.000	0.3540	86.2	2.092	0.72	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-075AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.08**	2.000	0.2980	89.0	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-075AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.15**	2.000	0.2980	92.5	2.079	3.26	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24041541-105AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.19**	2.000	0.3680	91.3	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-105AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.10**	2.000	0.3680	86.6	2.194	4.38	05/14/2024

Batch R347245 **SampType:** MS Units **mg/L**

SampID: 24050590-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		1.00		**87.0**	20.00	66.59	101.9	75	125	05/14/2024

Batch R347245 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050590-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		1.00		**89.0**	20.00	66.59	112.1	86.97	2.32	05/14/2024

Batch R347401 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**< 0.10**	0.0500	0	0	-100	100	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347401 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**0.96**	1.000	0	96.1	90	110	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24050734-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.82**	2.000	0.6570	108.2	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050734-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.79**	2.000	0.6570	106.6	2.821	1.10	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24050906-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.29**	2.000	0.1310	108.1	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050906-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.22**	2.000	0.1310	104.4	2.293	3.28	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24050906-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.09**	2.000	0.1160	98.6	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050906-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.20**	2.000	0.1160	104.0	2.087	5.09	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**
SampID: 24050906-018AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.18**	2.000	0.1550	101.0	75	125	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-018AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.10**	2.000	0.1550	97.3	2.175	3.46	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**

SampID: 24050906-027AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.15**	2.000	0.1480	100.2	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-027AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.20**	2.000	0.1480	102.6	2.151	2.30	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**

SampID: 24050906-035AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.11**	2.000	0.1490	98.0	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-035AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.13**	2.000	0.1490	98.8	2.108	0.85	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**

SampID: 24050906-041AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.16**	2.000	0.2220	96.9	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-041AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.17**	2.000	0.2220	97.4	2.160	0.46	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**

SampID: 24051000-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**3.46**	2.000	1.421	101.9	75	125	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9214 (TOTAL)

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24051000-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**3.63**	2.000	1.421	110.4	3.459	4.80	05/16/2024

Batch R347401 **SampType:** MS Units **mg/L**

SampID: 24051000-017AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.46**	2.000	0.4510	100.2	75	125	05/16/2024

Batch R347401 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24051000-017AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.39**	2.000	0.4510	97.2	2.456	2.56	05/16/2024

SW-846 9251 (DISSOLVED)

Batch R346639 **SampType:** MS Units **mg/L**

SampID: 24041541-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	3.840	99.9	85	115	05/02/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	3.840	101.1	23.82	1.00	05/02/2024

Batch R346639 **SampType:** MS Units **mg/L**

SampID: 24041541-031BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**75**	40.00	35.91	97.6	85	115	05/02/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-031BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**76**	40.00	35.91	101.0	74.96	1.81	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24042262-003FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**78**	40.00	40.01	95.0	85	115	05/01/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24042262-003FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**75**	40.00	40.01	88.2	78.03	3.56	05/01/2024

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24042262-006FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**154**	100.0	62.72	91.6	85	115	05/01/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24042262-006FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**150**	100.0	62.72	87.4	154.3	2.80	05/01/2024

Batch R346714 **SampType:** MS Units **mg/L**
SampID: 24041541-010FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8	S	**70**	40.00	36.49	83.8	85	115	05/02/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-010FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**71**	40.00	36.49	87.2	70.01	1.90	05/02/2024

Batch R346714 **SampType:** MS Units **mg/L**
SampID: 24041541-090FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**69**	40.00	33.46	88.6	85	115	05/03/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-090FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**70**	40.00	33.46	90.4	68.91	1.03	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R346846 **SampType:** MS Units **mg/L**
SampID: 24041541-007FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**59**	20.00	37.73	106.1	85	115	05/06/2024

Batch R346846 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-007FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**59**	20.00	37.73	107.9	58.95	0.61	05/06/2024

Batch R346935 **SampType:** MS Units **mg/L**
SampID: 24050138-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	3.690	99.2	85	115	05/08/2024

Batch R346935 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050138-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	3.690	100.2	23.54	0.76	05/08/2024

Batch R346935 **SampType:** MS Units **mg/L**
SampID: 24050364-004FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**39**	20.00	21.34	90.0	85	115	05/07/2024

Batch R346935 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050364-004FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**41**	20.00	21.34	96.6	39.35	3.30	05/07/2024

Batch R346935 **SampType:** MS Units **mg/L**
SampID: 24050364-010FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**30**	20.00	11.89	92.0	85	115	05/07/2024

Batch R346935 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050364-010FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**30**	20.00	11.89	92.2	30.30	0.10	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24041541-027BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**156**	100.0	58.49	97.5	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-027BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**157**	100.0	58.49	98.4	156.0	0.56	05/09/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24041541-042BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**31**	20.00	12.60	93.7	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-042BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**31**	20.00	12.60	93.0	31.33	0.42	05/09/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24050451-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**30**	20.00	11.11	93.0	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050451-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**30**	20.00	11.11	92.6	29.70	0.24	05/09/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24050464-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**35**	20.00	17.39	89.8	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050464-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**35**	20.00	17.39	89.5	35.36	0.20	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R347114 **SampType:** MS Units **mg/L**
SampID: 24050493-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**25**	20.00	4.770	100.7	85	115	05/10/2024

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050493-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**25**	20.00	4.770	101.0	24.90	0.24	05/10/2024

Batch R347114 **SampType:** MS Units **mg/L**
SampID: 24050583-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**150**	100.0	58.62	91.0	85	115	05/10/2024

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050583-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**154**	100.0	58.62	95.6	149.6	3.02	05/10/2024

Batch R347274 **SampType:** MS Units **mg/L**
SampID: 24050001-010CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**131**	100.0	33.49	97.5	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050001-010CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**130**	100.0	33.49	97.0	131.0	0.35	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**
SampID: 24050646-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**23**	20.00	3.980	97.1	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050646-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**23**	20.00	3.980	96.2	23.40	0.82	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R347380 **SampType:** MS Units **mg/L**
SampID: 24050819-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**26**	20.00	7.850	92.2	85	115	05/16/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050819-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	7.850	93.6	26.29	1.02	05/16/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050887-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**117**	100.0	22.03	94.9	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050887-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**124**	100.0	22.03	102.3	117.0	6.09	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050907-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	8.530	92.4	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050907-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	8.530	91.6	27.00	0.56	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050975-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**172**	100.0	82.01	89.7	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050975-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**171**	100.0	82.01	89.2	171.7	0.29	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (DISSOLVED)

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050976-003FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**207**	100.0	114.3	92.5	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050976-003FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**205**	100.0	114.3	90.9	206.8	0.78	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050976-007FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**161**	100.0	68.04	92.6	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050976-007FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**162**	100.0	68.04	94.3	160.6	1.07	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050979-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.050	95.8	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050979-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.050	96.4	20.22	0.49	05/17/2024

SW-846 9251 (TOTAL)

Batch R346639 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/01/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R346639 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**18**	20.00	0	91.0	90	110	05/01/2024

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24041541-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	4.470	99.8	85	115	05/02/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	4.470	99.9	24.42	0.12	05/02/2024

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24041541-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**75**	40.00	37.23	95.6	85	115	05/02/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**75**	40.00	37.23	95.5	75.47	0.04	05/02/2024

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24042193-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	4.460	95.4	85	115	05/01/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24042193-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	4.460	96.8	23.54	1.22	05/01/2024

Batch R346639 **SampType:** MS Units **mg/L**
SampID: 24042357-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	SE	**90**	20.00	43.14	232.6	85	115	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24042357-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	SE	**90**	20.00	43.14	234.6	89.65	0.46	05/02/2024

Batch R346639 **SampType:** MS Units **mg/L**

SampID: 24042384-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	4.650	96.7	85	115	05/01/2024

Batch R346639 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24042384-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	4.650	98.9	23.98	1.86	05/01/2024

Batch R346714 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/02/2024

Batch R346714 **SampType:** MBLK Units **mg/Kg**

SampID: MBLK-240501

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	*	40		**< 40**	0.5000	0	0	-100	100	05/02/2024

Batch R346714 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	0	103.0	90	110	05/02/2024

Batch R346714 **SampType:** MS Units **mg/L**

SampID: 24041541-033AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**258**	200.0	76.14	91.1	85	115	05/03/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-033AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**260**	200.0	76.14	91.7	258.3	0.48	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R346714 **SampType:** MS Units **mg/L**

SampID: 24041541-045AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**254**	200.0	65.43	94.4	85	115	05/03/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-045AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**248**	200.0	65.43	91.2	254.2	2.50	05/03/2024

Batch R346714 **SampType:** MS Units **mg/L**

SampID: 24042406-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**29**	20.00	9.490	96.8	85	115	05/02/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24042406-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**29**	20.00	9.490	95.9	28.85	0.63	05/02/2024

Batch R346714 **SampType:** MS Units **mg/L**

SampID: 24042406-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**403**	200.0	229.3	86.7	85	115	05/02/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24042406-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**410**	200.0	229.3	90.2	402.6	1.75	05/02/2024

Batch R346714 **SampType:** MS Units **mg/L**

SampID: 24042406-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**35**	20.00	17.65	89.0	85	115	05/02/2024

Batch R346714 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24042406-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**35**	20.00	17.65	88.9	35.46	0.08	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R346846 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/06/2024

Batch R346846 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.8	90	110	05/06/2024

Batch R346846 **SampType:** MS Units **mg/L**
SampID: 24041541-007EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**56**	20.00	37.01	97.0	85	115	05/06/2024

Batch R346846 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-007EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**59**	20.00	37.01	109.3	56.40	4.29	05/06/2024

Batch R346935 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/07/2024

Batch R346935 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	0	104.1	90	110	05/07/2024

Batch R346935 **SampType:** MS Units **mg/L**
SampID: 24050139-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	3.780	100.0	85	115	05/07/2024

Batch R346935 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050139-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	3.780	100.8	23.77	0.71	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R346935 **SampType:** MS Units **mg/L**
SampID: 24050140-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**41**	20.00	22.46	91.8	85	115	05/08/2024

Batch R346935 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050140-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**41**	20.00	22.46	91.8	40.83	0.00	05/08/2024

Batch R347069 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/09/2024

Batch R347069 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	0	103.8	90	110	05/09/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24041541-027AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**147**	100.0	60.91	86.1	85	115	05/10/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-027AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**154**	100.0	60.91	93.2	147.0	4.68	05/10/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24041541-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**31**	20.00	12.36	92.2	85	115	05/10/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24041541-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**31**	20.00	12.36	93.2	30.80	0.65	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24050273-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	1.870	97.8	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050273-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**21**	20.00	1.870	97.8	21.44	0.09	05/09/2024

Batch R347069 **SampType:** MS Units **mg/L**
SampID: 24050352-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	3.790	98.6	85	115	05/09/2024

Batch R347069 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050352-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	3.790	101.4	23.50	2.35	05/09/2024

Batch R347114 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/10/2024

Batch R347114 **SampType:** MBLK Units **mg/L**
SampID: MBLK-181812

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride	*	4		**< 4**	0.5000	0	0	-100	100	05/10/2024

Batch R347114 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.3	90	110	05/10/2024

Batch R347114 **SampType:** MS Units **mg/L**
SampID: 24041541-092AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**26**	20.00	7.070	96.6	85	115	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-092AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**26**	20.00	7.070	96.0	26.38	0.46	05/10/2024

Batch R347114 **SampType:** MS Units **mg/L**

SampID: 24041541-100AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**88**	40.00	51.39	91.6	85	115	05/11/2024

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24041541-100AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**89**	40.00	51.39	93.2	88.02	0.72	05/11/2024

Batch R347114 **SampType:** MS Units **mg/L**

SampID: 24050482-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**26**	20.00	6.630	97.0	85	115	05/10/2024

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050482-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**26**	20.00	6.630	97.4	26.03	0.31	05/10/2024

Batch R347114 **SampType:** MS Units **mg/L**

SampID: 24050590-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		2000		**21100**	10000	11820	92.4	85	115	05/10/2024

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050590-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		2000		**21300**	10000	11820	94.3	21070	0.87	05/10/2024

Batch R347114 **SampType:** MS Units **mg/L**

SampID: 24050891-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**51**	20.00	32.45	92.4	85	115	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347114 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050891-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**51**	20.00	32.45	93.8	50.92	0.55	05/10/2024

Batch R347274 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/14/2024

Batch R347274 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.8	90	110	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050001-011BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**47**	20.00	28.26	92.6	85	115	05/15/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050001-011BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**47**	20.00	28.26	94.5	46.77	0.81	05/15/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050002-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**62**	20.00	43.04	97.0	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050002-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**62**	20.00	43.04	96.4	62.45	0.21	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050634-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**82**	40.00	45.78	89.7	85	115	05/15/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050634-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**83**	40.00	45.78	92.6	81.67	1.40	05/15/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050646-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**23**	20.00	3.840	98.1	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050646-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**23**	20.00	3.840	97.6	23.46	0.38	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050795-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**214**	100.0	120.9	93.2	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050795-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**210**	100.0	120.9	89.3	214.2	1.86	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24050795-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**224**	100.0	131.2	92.5	85	115	05/14/2024

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050795-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**221**	100.0	131.2	89.9	223.7	1.18	05/14/2024

Batch R347274 **SampType:** MS Units **mg/L**

SampID: 24051090-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**52**	20.00	33.73	93.0	85	115	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347274 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24051090-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**52**	20.00	33.73	91.6	52.32	0.52	05/14/2024

Batch R347380 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/15/2024

Batch R347380 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**19**	20.00	0	96.2	90	110	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050633-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**32**	20.00	14.47	86.6	85	115	05/15/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050633-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**32**	20.00	14.47	89.4	31.79	1.78	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050819-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	7.960	93.0	85	115	05/16/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050819-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	7.960	93.3	26.55	0.26	05/16/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050905-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**24**	20.00	5.840	92.5	85	115	05/15/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050905-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**24**	20.00	5.840	93.3	24.33	0.70	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050906-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.320	95.0	85	115	05/15/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.320	95.0	20.32	0.05	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050906-011AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**19**	20.00	0.9100	92.6	85	115	05/15/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-011AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	0.9100	94.8	19.43	2.19	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050906-018AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.040	93.8	85	115	05/15/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-018AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.040	94.6	19.79	0.86	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050906-021AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	2.110	95.8	85	115	05/15/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-021AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**21**	20.00	2.110	96.0	21.27	0.19	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24050906-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.100	94.4	85	115	05/15/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24050906-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.100	96.0	19.97	1.64	05/15/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24051000-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.220	95.3	85	115	05/16/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24051000-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.220	96.2	20.28	0.93	05/16/2024

Batch R347380 **SampType:** MS Units **mg/L**

SampID: 24051000-010BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	1.520	93.6	85	115	05/16/2024

Batch R347380 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24051000-010BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**20**	20.00	1.520	93.3	20.24	0.30	05/16/2024

Batch R347548 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 9251 (TOTAL)

Batch R347548 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	99.0	90	110	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24050907-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	8.360	92.1	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24050907-001EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	8.360	92.4	26.78	0.19	05/17/2024

Batch R347548 **SampType:** MS Units **mg/L**
SampID: 24051437-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**51**	20.00	31.81	93.8	85	115	05/17/2024

Batch R347548 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24051437-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**50**	20.00	31.81	90.8	50.56	1.17	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222322 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/01/2024
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/01/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/03/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/01/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/01/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/03/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/01/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/01/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/01/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/01/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/03/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/03/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/01/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/03/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/01/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/03/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/01/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/01/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	05/01/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/01/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/03/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/03/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/01/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/03/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/01/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/01/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll

Client Project: COF-24Q2

Work Order: 24041541

Report Date: 17-Jun-24

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

Batch **222322** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/01/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/03/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	05/01/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	05/03/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/01/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/03/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/03/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/01/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/01/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/03/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/01/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222322 **SampType:** LCS Units **mg/L**

SampID: LCS-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**1.92**	2.000	0	96.2	85	115	05/01/2024
Aluminum		0.0250		**1.77**	2.000	0	88.6	85	115	05/03/2024
Antimony		0.0500		**0.492**	0.5000	0	98.4	85	115	05/01/2024
Antimony		0.0500		**0.453**	0.5000	0	90.6	85	115	05/03/2024
Arsenic		0.0250		**0.487**	0.5000	0	97.4	85	115	05/01/2024
Arsenic		0.0250		**0.472**	0.5000	0	94.5	85	115	05/03/2024
Barium		0.0025		**1.92**	2.000	0	95.8	85	115	05/01/2024
Barium		0.0025		**1.79**	2.000	0	89.5	85	115	05/03/2024
Beryllium		0.0005		**0.0485**	0.0500	0	97.0	85	115	05/01/2024
Beryllium		0.0005		**0.0448**	0.0500	0	89.6	85	115	05/03/2024
Boron		0.0200		**0.439**	0.5000	0	87.9	85	115	05/03/2024
Boron		0.0200		**0.471**	0.5000	0	94.2	85	115	05/01/2024
Cadmium		0.0020		**0.0498**	0.0500	0	99.6	85	115	05/01/2024
Cadmium		0.0020		**0.0462**	0.0500	0	92.4	85	115	05/03/2024
Calcium		0.100		**2.27**	2.500	0	90.9	85	115	05/01/2024
Calcium		0.100		**2.24**	2.500	0	89.8	85	115	05/03/2024
Chromium		0.0050		**0.182**	0.2000	0	90.9	85	115	05/03/2024
Chromium		0.0050		**0.191**	0.2000	0	95.6	85	115	05/01/2024
Cobalt		0.0050		**0.449**	0.5000	0	89.8	85	115	05/03/2024
Cobalt		0.0050		**0.477**	0.5000	0	95.5	85	115	05/01/2024
Copper		0.0050		**0.225**	0.2500	0	90.2	85	115	05/03/2024
Copper		0.0050		**0.243**	0.2500	0	97.2	85	115	05/01/2024
Iron		0.0400		**1.82**	2.000	0	90.9	85	115	05/03/2024
Iron		0.0400		**1.96**	2.000	0	98.0	85	115	05/01/2024
Lead		0.0150		**0.453**	0.5000	0	90.6	85	115	05/03/2024
Lead		0.0150		**0.476**	0.5000	0	95.1	85	115	05/01/2024
Magnesium		0.0500		**2.20**	2.500	0	88.0	85	115	05/03/2024
Magnesium		0.0500		**2.34**	2.500	0	93.7	85	115	05/01/2024
Manganese		0.0070		**0.488**	0.5000	0	97.6	85	115	05/01/2024
Manganese		0.0070		**0.455**	0.5000	0	91.1	85	115	05/03/2024
Molybdenum		0.0100		**0.443**	0.5000	0	88.6	85	115	05/03/2024
Molybdenum		0.0100		**0.463**	0.5000	0	92.6	85	115	05/01/2024
Nickel		0.0050		**0.456**	0.5000	0	91.2	85	115	05/03/2024
Nickel		0.0050		**0.477**	0.5000	0	95.4	85	115	05/01/2024
Potassium		0.100		**2.35**	2.500	0	93.8	85	115	05/03/2024
Potassium		0.100		**2.68**	2.500	0	107.1	85	115	05/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222322 **SampType:** LCS Units **mg/L**
SampID: LCS-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Selenium		0.0400		**0.459**	0.5000	0	91.8	85	115	05/03/2024
Selenium		0.0400		**0.475**	0.5000	0	94.9	85	115	05/01/2024
Silver		0.0070		**0.0433**	0.0500	0	86.6	85	115	05/03/2024
Silver		0.0070		**0.0499**	0.0500	0	99.8	85	115	05/01/2024
Sodium		0.0500		**2.42**	2.500	0	96.7	85	115	05/01/2024
Sodium		0.0500		**2.32**	2.500	0	92.7	85	115	05/03/2024
Thallium		0.0500		**0.219**	0.2500	0	87.4	85	115	05/03/2024
Thallium		0.0500		**0.222**	0.2500	0	88.7	85	115	05/01/2024
Vanadium		0.0100		**0.480**	0.5000	0	96.0	85	115	05/01/2024
Vanadium		0.0100		**0.446**	0.5000	0	89.3	85	115	05/03/2024
Zinc		0.0100		**0.451**	0.5000	0	90.1	85	115	05/03/2024
Zinc		0.0100		**0.480**	0.5000	0	96.0	85	115	05/01/2024

Batch 222322 **SampType:** MS Units **mg/L**
SampID: 24042058-006GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**101**	2.500	99.94	43.2	75	125	05/02/2024
Magnesium		0.050		**37.5**	2.500	35.31	85.8	75	125	05/03/2024
Potassium		0.100		**3.16**	2.500	0.6153	101.9	75	125	05/02/2024
Sodium		0.050		**45.0**	2.500	43.11	77.6	75	125	05/02/2024

Batch 222322 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24042058-006GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**100**	2.500	99.94	6.4	101.0	0.91	05/02/2024
Magnesium		0.050		**37.7**	2.500	35.31	96.6	37.46	0.71	05/03/2024
Potassium		0.100		**3.11**	2.500	0.6153	99.8	3.164	1.69	05/02/2024
Sodium		0.050	S	**44.8**	2.500	43.11	65.6	45.05	0.67	05/02/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch **222415** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/03/2024
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/03/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/03/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/03/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/03/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/03/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/03/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/03/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/06/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/03/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/03/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/03/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/03/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/03/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/03/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/03/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	05/03/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	05/06/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/03/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/03/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/03/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/03/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/03/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/06/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222415** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/03/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/03/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/03/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	05/03/2024
Sodium		0.0500	S	**0.0654**	0.0180	0	363.3	-100	100	05/03/2024
Sodium		0.050	S	**0.063**	0.0180	0	348.9	-100	100	05/06/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/03/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/03/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/03/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/03/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/03/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222415 **SampType:** LCS Units **mg/L**

SampID: LCS-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**1.95**	2.000	0	97.3	85	115	05/03/2024
Aluminum		0.0250		**1.92**	2.000	0	95.8	85	115	05/03/2024
Antimony		0.0500		**0.475**	0.5000	0	95.0	85	115	05/03/2024
Antimony		0.0500		**0.480**	0.5000	0	96.0	85	115	05/03/2024
Arsenic		0.0250		**0.502**	0.5000	0	100.3	85	115	05/03/2024
Arsenic		0.0250		**0.496**	0.5000	0	99.2	85	115	05/03/2024
Barium		0.0025		**1.91**	2.000	0	95.7	85	115	05/03/2024
Barium		0.0025		**1.93**	2.000	0	96.7	85	115	05/03/2024
Beryllium		0.0005		**0.0486**	0.0500	0	97.2	85	115	05/03/2024
Beryllium		0.0005		**0.0485**	0.0500	0	97.0	85	115	05/03/2024
Boron		0.0200		**0.479**	0.5000	0	95.8	85	115	05/03/2024
Boron		0.0200		**0.477**	0.5000	0	95.4	85	115	05/03/2024
Cadmium		0.0020		**0.0503**	0.0500	0	100.6	85	115	05/03/2024
Cadmium		0.0020		**0.0503**	0.0500	0	100.6	85	115	05/03/2024
Calcium		0.100		**2.45**	2.500	0	97.8	85	115	05/06/2024
Calcium		0.100		**2.32**	2.500	0	92.9	85	115	05/03/2024
Calcium		0.100		**2.30**	2.500	0	92.1	85	115	05/03/2024
Chromium		0.0050		**0.190**	0.2000	0	95.1	85	115	05/03/2024
Chromium		0.0050		**0.189**	0.2000	0	94.6	85	115	05/03/2024
Cobalt		0.0050		**0.479**	0.5000	0	95.8	85	115	05/03/2024
Cobalt		0.0050		**0.478**	0.5000	0	95.6	85	115	05/03/2024
Copper		0.0050		**0.240**	0.2500	0	96.0	85	115	05/03/2024
Copper		0.0050		**0.238**	0.2500	0	95.3	85	115	05/03/2024
Iron		0.0400		**1.91**	2.000	0	95.5	85	115	05/03/2024
Iron		0.0400		**1.92**	2.000	0	95.9	85	115	05/03/2024
Lead		0.0150		**0.479**	0.5000	0	95.8	85	115	05/03/2024
Lead		0.0150		**0.478**	0.5000	0	95.6	85	115	05/03/2024
Magnesium		0.050		**2.28**	2.500	0	91.1	85	115	05/06/2024
Manganese		0.0070		**0.480**	0.5000	0	96.0	85	115	05/03/2024
Manganese		0.0070		**0.479**	0.5000	0	95.8	85	115	05/03/2024
Molybdenum		0.0100		**0.450**	0.5000	0	90.0	85	115	05/03/2024
Molybdenum		0.0100		**0.450**	0.5000	0	90.0	85	115	05/03/2024
Nickel		0.0050		**0.483**	0.5000	0	96.5	85	115	05/03/2024
Nickel		0.0050		**0.482**	0.5000	0	96.5	85	115	05/03/2024
Potassium		0.100		**2.70**	2.500	0	108.1	85	115	05/06/2024
Potassium		0.100		**2.59**	2.500	0	103.5	85	115	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222415 **SampType:** LCS Units **mg/L**

SampID: LCS-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Potassium		0.100		**2.61**	2.500	0	104.6	85	115	05/03/2024
Selenium		0.0400		**0.499**	0.5000	0	99.9	85	115	05/03/2024
Selenium		0.0400		**0.498**	0.5000	0	99.6	85	115	05/03/2024
Silver		0.0070	S	**0.0412**	0.0500	0	82.4	85	115	05/03/2024
Sodium		0.050	B	**2.51**	2.500	0	100.6	85	115	05/06/2024
Sodium		0.0500	B	**2.46**	2.500	0	98.6	85	115	05/03/2024
Thallium		0.0500		**0.234**	0.2500	0	93.6	85	115	05/03/2024
Thallium		0.0500		**0.239**	0.2500	0	95.6	85	115	05/03/2024
Vanadium		0.0100		**0.476**	0.5000	0	95.3	85	115	05/03/2024
Vanadium		0.0100		**0.480**	0.5000	0	95.9	85	115	05/03/2024
Zinc		0.0100		**0.490**	0.5000	0	97.9	85	115	05/03/2024
Zinc		0.0100		**0.491**	0.5000	0	98.2	85	115	05/03/2024

Batch 222415 **SampType:** MS Units **mg/L**

SampID: 24041541-010GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**79.7**	2.500	78.60	42.8	75	125	05/03/2024
Magnesium		0.050	S	**37.0**	2.500	35.54	57.8	75	125	05/06/2024
Potassium		0.100		**2.98**	2.500	0.3980	103.2	75	125	05/03/2024
Sodium		0.050	B	**35.8**	2.500	33.71	82.0	75	125	05/03/2024

Batch 222415 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24041541-010GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**79.8**	2.500	78.60	47.2	79.67	0.14	05/03/2024
Magnesium		0.050	S	**37.1**	2.500	35.54	62.5	36.99	0.32	05/06/2024
Potassium		0.100		**3.00**	2.500	0.3980	104.0	2.978	0.65	05/03/2024
Sodium		0.050	B	**35.9**	2.500	33.71	87.2	35.76	0.36	05/03/2024

Batch 222415 **SampType:** MS Units **mg/L**

SampID: 24042405-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.89**	2.000	0	94.5	75	125	05/03/2024
Manganese		0.0070	S	**17.6**	0.5000	17.34	57.4	75	125	05/03/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222415 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24042405-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		0.0400		**1.92**	2.000	0	95.9	1.890	1.47	05/03/2024
Manganese		0.0070	S	**17.5**	0.5000	17.34	26.2	17.63	0.89	05/03/2024

Batch 222458 **SampType:** MS Units **mg/L**
SampID: 24041541-018GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**80.9**	5.000	80.99	-1.2	75	125	05/14/2024
Magnesium		0.050	S	**39.9**	5.000	37.55	46.4	75	125	05/14/2024
Potassium		0.100		**5.37**	5.000	0.4665	98.2	75	125	05/14/2024
Sodium		0.050	S	**65.9**	5.000	63.97	39.0	75	125	05/14/2024

Batch 222458 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24041541-018GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**80.4**	5.000	80.99	-12.6	80.93	0.71	05/14/2024
Magnesium		0.050	S	**39.3**	5.000	37.55	35.7	39.87	1.34	05/14/2024
Potassium		0.100		**5.12**	5.000	0.4665	93.0	5.374	4.86	05/14/2024
Sodium		0.050	S	**64.3**	5.000	63.97	5.8	65.92	2.55	05/14/2024

Batch 222458 **SampType:** MS Units **mg/L**
SampID: 24050001-008EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Magnesium		0.050	S	**90.0**	2.500	88.46	63.3	75	125	05/14/2024

Batch 222458 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24050001-008EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Magnesium		0.050	S	**89.7**	2.500	88.46	48.9	90.04	0.40	05/14/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222460** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-222460

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/03/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/03/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/03/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/03/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/03/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/03/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/03/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/03/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	05/03/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/03/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/03/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/03/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/03/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/03/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	05/03/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/03/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/03/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/03/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/03/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222460 **SampType:** LCS Units **mg/L**
SampID: LCS-222460

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**1.83**	2.000	0	91.5	85	115	05/03/2024
Antimony		0.0500		**0.461**	0.5000	0	92.2	85	115	05/03/2024
Arsenic		0.0250		**0.481**	0.5000	0	96.2	85	115	05/03/2024
Barium		0.0025		**1.84**	2.000	0	92.1	85	115	05/03/2024
Beryllium		0.0005		**0.0463**	0.0500	0	92.6	85	115	05/03/2024
Boron		0.0200		**0.449**	0.5000	0	89.8	85	115	05/03/2024
Cadmium		0.0020		**0.0471**	0.0500	0	94.2	85	115	05/03/2024
Calcium		0.100		**2.33**	2.500	0	93.0	85	115	05/03/2024
Chromium		0.0050		**0.187**	0.2000	0	93.6	85	115	05/03/2024
Cobalt		0.0050		**0.466**	0.5000	0	93.1	85	115	05/03/2024
Copper		0.0050		**0.234**	0.2500	0	93.5	85	115	05/03/2024
Iron		0.0400		**1.87**	2.000	0	93.6	85	115	05/03/2024
Lead		0.0150		**0.470**	0.5000	0	94.1	85	115	05/03/2024
Magnesium		0.0500		**2.27**	2.500	0	90.7	85	115	05/03/2024
Manganese		0.0070		**0.471**	0.5000	0	94.2	85	115	05/03/2024
Molybdenum		0.0100		**0.457**	0.5000	0	91.3	85	115	05/03/2024
Nickel		0.0050		**0.472**	0.5000	0	94.3	85	115	05/03/2024
Potassium		0.100		**2.39**	2.500	0	95.7	85	115	05/03/2024
Selenium		0.0400		**0.463**	0.5000	0	92.7	85	115	05/03/2024
Silver		0.0070		**0.0444**	0.0500	0	88.8	85	115	05/03/2024
Sodium		0.0500		**2.36**	2.500	0	94.3	85	115	05/03/2024
Thallium		0.0500		**0.235**	0.2500	0	93.8	85	115	05/03/2024
Vanadium		0.0100		**0.461**	0.5000	0	92.2	85	115	05/03/2024
Zinc		0.0100		**0.463**	0.5000	0	92.7	85	115	05/03/2024

Batch 222460 **SampType:** MS Units **mg/L**
SampID: 24041541-004GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**80.1**	2.500	78.05	80.4	75	125	05/03/2024
Magnesium		0.050		**38.3**	2.500	36.14	87.4	75	125	05/03/2024
Potassium		0.100		**2.88**	2.500	0.4658	96.7	75	125	05/03/2024
Sodium		0.050	S	**37.1**	2.500	35.48	66.0	75	125	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222460 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24041541-004GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**78.6**	2.500	78.05	22.8	80.06	1.81	05/03/2024
Magnesium		0.050	S	**37.5**	2.500	36.14	55.0	38.32	2.14	05/03/2024
Potassium		0.100		**2.84**	2.500	0.4658	95.1	2.884	1.43	05/03/2024
Sodium		0.050	S	**36.4**	2.500	35.48	35.6	37.13	2.07	05/03/2024

Batch 222460 **SampType:** MS Units **mg/L**

SampID: 24042405-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.84**	2.000	0	92.0	75	125	05/03/2024
Manganese		0.0070		**4.73**	0.5000	4.300	85.7	75	125	05/03/2024

Batch 222460 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24042405-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		0.0400		**1.85**	2.000	0	92.4	1.841	0.40	05/03/2024
Manganese		0.0070		**4.78**	0.5000	4.300	96.6	4.729	1.15	05/03/2024

Batch 222799 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/13/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/13/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/13/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/13/2024

Batch 222799 **SampType:** LCS Units **mg/L**

SampID: LCS-222799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.39**	2.500	0	95.6	85	115	05/13/2024
Magnesium		0.0500		**2.20**	2.500	0	88.1	85	115	05/13/2024
Potassium		0.100		**2.62**	2.500	0	104.9	85	115	05/13/2024
Sodium		0.0500		**2.45**	2.500	0	98.1	85	115	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222799 **SampType:** MS Units **mg/L**
SampID: 24050464-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**61.5**	2.500	60.91	22.0	75	125	05/13/2024
Magnesium		0.050	S	**25.8**	2.500	24.20	62.5	75	125	05/13/2024
Potassium		0.100		**3.20**	2.500	0.4808	109.0	75	125	05/13/2024
Sodium		0.050	S	**52.7**	2.500	51.33	53.6	75	125	05/13/2024

Batch 222799 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24050464-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**61.6**	2.500	60.91	29.2	61.46	0.29	05/13/2024
Magnesium		0.050	S	**25.8**	2.500	24.20	62.4	25.77	0.01	05/13/2024
Potassium		0.100		**3.17**	2.500	0.4808	107.7	3.205	0.99	05/13/2024
Sodium		0.050	S	**52.4**	2.500	51.33	42.8	52.67	0.51	05/13/2024

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

Batch 222328 **SampType:** MBLK Units **mg/L**
SampID: MBLK-222328

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/02/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/02/2024
Sodium		0.0500	S	**0.0658**	0.0180	0	365.6	-100	100	05/02/2024

Batch 222328 **SampType:** LCS Units **mg/L**
SampID: LCS-222328

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium		0.0020		**0.0502**	0.0500	0	100.4	85	115	05/03/2024
Calcium		0.100		**2.52**	2.500	0	100.7	85	115	05/02/2024
Magnesium		0.0500		**2.49**	2.500	0	99.8	85	115	05/03/2024
Potassium		0.100		**2.63**	2.500	0	105.2	85	115	05/02/2024
Sodium		0.0500	B	**2.57**	2.500	0	102.6	85	115	05/02/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222328 **SampType:** MS Units **mg/L**
SampID: 24041541-069BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**590**	2.500	572.0	735.2	75	125	05/02/2024
Magnesium		0.050	S	**313**	2.500	300.9	490.6	75	125	05/03/2024
Potassium		0.100		**6.50**	2.500	3.700	111.9	75	125	05/02/2024
Sodium		0.050	BS	**135**	2.500	131.4	163.2	75	125	05/02/2024

Batch 222328 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24041541-069BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**551**	2.500	572.0	-824.4	590.4	6.83	05/02/2024
Magnesium		0.050	S	**295**	2.500	300.9	-235.8	313.2	5.97	05/03/2024
Potassium		0.100		**6.25**	2.500	3.700	102.1	6.496	3.85	05/02/2024
Sodium		0.050	BS	**129**	2.500	131.4	-97.6	135.5	4.93	05/02/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222392 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222392

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	05/03/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	05/03/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	05/03/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	05/03/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	05/03/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	05/03/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	05/03/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/03/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	05/03/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	05/03/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	05/03/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	05/03/2024
Lead		0.0150		**< 0.0150**	0.0040	0	0	-100	100	05/03/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/03/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	05/03/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	05/03/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	05/03/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/03/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	05/03/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	05/03/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/03/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	05/03/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	05/03/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	05/03/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222392 **SampType:** LCS Units **mg/L**
SampID: LCS-222392

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**1.92**	2.000	0	96.1	85	115	05/03/2024
Antimony		0.0500		**0.506**	0.5000	0	101.3	85	115	05/03/2024
Arsenic		0.0250		**0.518**	0.5000	0	103.6	85	115	05/03/2024
Barium		0.0025		**1.94**	2.000	0	97.0	85	115	05/03/2024
Beryllium		0.0005		**0.0498**	0.0500	0	99.6	85	115	05/03/2024
Boron		0.0200		**0.478**	0.5000	0	95.7	85	115	05/03/2024
Cadmium		0.0020		**0.0512**	0.0500	0	102.4	85	115	05/03/2024
Calcium		0.100		**2.46**	2.500	0	98.3	85	115	05/03/2024
Chromium		0.0050		**0.198**	0.2000	0	99.2	85	115	05/03/2024
Cobalt		0.0050		**0.497**	0.5000	0	99.4	85	115	05/03/2024
Copper		0.0050		**0.246**	0.2500	0	98.2	85	115	05/03/2024
Iron		0.0400		**2.07**	2.000	0	103.5	85	115	05/03/2024
Lead		0.0150		**0.503**	0.5000	0	100.5	85	115	05/03/2024
Magnesium		0.0500		**2.44**	2.500	0	97.7	85	115	05/03/2024
Manganese		0.0070		**0.501**	0.5000	0	100.2	85	115	05/03/2024
Molybdenum		0.0100		**0.486**	0.5000	0	97.2	85	115	05/03/2024
Nickel		0.0050		**0.505**	0.5000	0	100.9	85	115	05/03/2024
Potassium		0.100		**2.48**	2.500	0	99.1	85	115	05/03/2024
Selenium		0.0400		**0.505**	0.5000	0	101.0	85	115	05/03/2024
Silver		0.0070		**0.0470**	0.0500	0	94.0	85	115	05/03/2024
Sodium		0.0500		**2.47**	2.500	0	98.6	85	115	05/03/2024
Thallium		0.0500		**0.244**	0.2500	0	97.5	85	115	05/03/2024
Vanadium		0.0100		**0.489**	0.5000	0	97.9	85	115	05/03/2024
Zinc		0.0100		**0.496**	0.5000	0	99.2	85	115	05/03/2024

Batch 222392 **SampType:** MS Units **mg/L**
SampID: 24050131-005BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium		0.0020		**0.0529**	0.0500	0.001500	102.8	75	125	05/03/2024
Calcium		0.100		**48.4**	2.500	46.28	84.4	75	125	05/03/2024
Magnesium		0.0500		**6.09**	2.500	3.663	97.1	75	125	05/03/2024
Zinc		0.0100		**0.848**	0.5000	0.3432	101.0	75	125	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222392 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24050131-005BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cadmium		0.0020		**0.0524**	0.0500	0.001500	101.8	0.05290	0.95	05/03/2024
Calcium		0.100		**48.8**	2.500	46.28	100.0	48.39	0.80	05/03/2024
Magnesium		0.0500		**6.10**	2.500	3.663	97.4	6.092	0.09	05/03/2024
Zinc		0.0100		**0.847**	0.5000	0.3432	100.8	0.8482	0.13	05/03/2024

Batch 222392 **SampType:** MS Units **mg/L**

SampID: 24050189-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chromium		0.0050		**0.192**	0.2000	0	96.0	75	125	05/03/2024

Batch 222392 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24050189-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chromium		0.0050		**0.190**	0.2000	0	95.1	0.1920	0.99	05/03/2024

Batch 222414 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222414

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/07/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/07/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/07/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/07/2024

Batch 222414 **SampType:** LCS Units **mg/L**

SampID: LCS-222414

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.64**	2.500	0	105.5	85	115	05/07/2024
Magnesium		0.0500		**2.48**	2.500	0	99.2	85	115	05/07/2024
Potassium		0.100		**2.70**	2.500	0	108.2	85	115	05/07/2024
Sodium		0.0500		**2.69**	2.500	0	107.7	85	115	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222461 **SampType:** MBLK Units **mg/L**
SampID: MBLK-222461

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/06/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/06/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/06/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/06/2024

Batch 222461 **SampType:** LCS Units **mg/L**
SampID: LCS-222461

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.58**	2.500	0	103.2	85	115	05/06/2024
Magnesium		0.0500		**2.60**	2.500	0	104.1	85	115	05/06/2024
Potassium		0.100		**2.61**	2.500	0	104.2	85	115	05/06/2024
Sodium		0.0500		**2.47**	2.500	0	98.7	85	115	05/06/2024

Batch 222461 **SampType:** MS Units **mg/L**
SampID: 24050273-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**71.0**	2.500	69.40	66.0	75	125	05/06/2024
Magnesium		0.050		**18.6**	2.500	16.49	85.2	75	125	05/06/2024
Sodium		0.050		**10.3**	2.500	7.700	105.6	75	125	05/07/2024

Batch 222461 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24050273-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100		**71.5**	2.500	69.40	83.6	71.05	0.62	05/06/2024
Magnesium		0.050		**18.7**	2.500	16.49	87.7	18.62	0.35	05/06/2024
Sodium		0.050		**10.2**	2.500	7.700	100.8	10.34	1.17	05/07/2024

Batch 222639 **SampType:** MBLK Units **mg/L**
SampID: MBLK-222639

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/08/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	05/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/08/2024
Sodium		0.050		**< 0.050**	0.0180	0	0	-100	100	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222639 **SampType:** LCS Units **mg/L**

SampID: LCS-222639

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.66**	2.500	0	106.3	85	115	05/08/2024
Magnesium		0.050		**2.43**	2.500	0	97.2	85	115	05/08/2024
Potassium		0.100		**2.68**	2.500	0	107.0	85	115	05/08/2024
Sodium		0.050		**2.57**	2.500	0	102.8	85	115	05/08/2024

Batch 222639 **SampType:** MS Units **mg/L**

SampID: 24041541-053CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**82.6**	2.500	80.55	80.4	75	125	05/08/2024
Magnesium		0.050	S	**39.2**	2.500	37.46	71.4	75	125	05/08/2024
Potassium		0.100		**3.66**	2.500	0.9379	108.7	75	125	05/08/2024
Sodium		0.050		**57.5**	2.500	55.60	77.2	75	125	05/08/2024

Batch 222639 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24041541-053CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**82.0**	2.500	80.55	59.2	82.56	0.64	05/08/2024
Magnesium		0.050	S	**38.9**	2.500	37.46	56.3	39.25	0.96	05/08/2024
Potassium		0.100		**3.53**	2.500	0.9379	103.8	3.656	3.43	05/08/2024
Sodium		0.050	S	**55.7**	2.500	55.60	5.6	57.53	3.16	05/08/2024

Batch 222656 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222656

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/10/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/10/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/10/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/10/2024

Batch 222656 **SampType:** LCS Units **mg/L**

SampID: LCS-222656

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.66**	2.500	0	106.4	85	115	05/10/2024
Magnesium		0.0500		**2.52**	2.500	0	100.9	85	115	05/10/2024
Potassium		0.100		**2.79**	2.500	0	111.4	85	115	05/10/2024
Sodium		0.0500		**2.68**	2.500	0	107.0	85	115	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222656 **SampType:** MS Units **mg/L**

SampID: 24041541-092BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**226**	2.500	215.5	419.6	75	125	05/10/2024
Magnesium		0.050	S	**26.4**	2.500	22.94	137.0	75	125	05/10/2024
Potassium		1.00	S	**24.3**	2.500	20.84	136.7	75	125	05/16/2024
Sodium		0.050	S	**71.6**	2.500	67.61	160.8	75	125	05/10/2024

Batch 222656 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24041541-092BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**233**	2.500	215.5	711.6	226.0	3.18	05/10/2024
Magnesium		0.050	S	**27.3**	2.500	22.94	173.7	26.37	3.42	05/10/2024
Potassium		1.00	S	**24.5**	2.500	20.84	144.2	24.26	0.78	05/16/2024
Sodium		0.050	S	**73.4**	2.500	67.61	230.8	71.63	2.41	05/10/2024

Batch 222728 **SampType:** MBLK Units **mg/L**

SampID: MBLK-222728

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	05/10/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	05/10/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	05/10/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	05/10/2024

Batch 222728 **SampType:** LCS Units **mg/L**

SampID: LCS-222728

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.63**	2.500	0	105.1	85	115	05/10/2024
Magnesium		0.0500		**2.51**	2.500	0	100.5	85	115	05/10/2024
Potassium		0.100		**2.67**	2.500	0	106.9	85	115	05/10/2024
Sodium		0.0500		**2.58**	2.500	0	103.2	85	115	05/10/2024

Batch 222728 **SampType:** MS Units **mg/L**

SampID: 24041541-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**130**	2.500	129.9	19.2	75	125	05/10/2024
Magnesium		0.050	S	**59.5**	2.500	57.92	64.9	75	125	05/10/2024
Potassium		0.100		**4.55**	2.500	1.810	109.6	75	125	05/10/2024
Sodium		0.050	S	**78.5**	2.500	78.93	-16.0	75	125	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222728 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24041541-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**128**	2.500	129.9	-65.2	130.4	1.63	05/10/2024
Magnesium		0.050	S	**58.7**	2.500	57.92	31.0	59.54	1.43	05/10/2024
Potassium		0.100		**4.51**	2.500	1.810	108.0	4.549	0.86	05/10/2024
Sodium		0.050	S	**76.9**	2.500	78.93	-82.4	78.53	2.14	05/10/2024

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

Batch 222322 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/09/2024
Antimony		1.0	S	**2.0**	0.4500	0	454.7	-100	100	05/03/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/07/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/07/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/03/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/03/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/03/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/03/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/03/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/03/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	05/06/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/03/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/03/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/03/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/03/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/03/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/03/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	05/03/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/03/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/03/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/03/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222322** **SampType:** **LCS** Units **µg/L**
SampID: LCS-222322

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1800**	2000	0	89.8	80	120	05/09/2024
Antimony		1.0	B	**440**	500.0	0	87.9	80	120	05/03/2024
Antimony		1.0		**447**	500.0	0	89.5	80	120	05/07/2024
Arsenic		1.0		**473**	500.0	0	94.7	80	120	05/07/2024
Barium		1.0		**2130**	2000	0	106.6	80	120	05/03/2024
Beryllium		1.0		**46.0**	50.00	0	92.1	80	120	05/03/2024
Boron		25.0		**471**	500.0	0	94.2	80	120	05/03/2024
Cadmium		1.0		**52.2**	50.00	0	104.5	80	120	05/03/2024
Chromium		1.5		**194**	200.0	0	96.8	80	120	05/03/2024
Cobalt		1.0		**454**	500.0	0	90.8	80	120	05/03/2024
Copper		1.0		**223**	250.0	0	89.1	80	120	05/06/2024
Iron		25.0		**1850**	2000	0	92.3	80	120	05/03/2024
Lead		1.0		**461**	500.0	0	92.1	80	120	05/03/2024
Manganese		2.0		**489**	500.0	0	97.9	80	120	05/03/2024
Molybdenum		1.5		**437**	500.0	0	87.5	80	120	05/03/2024
Nickel		1.0		**454**	500.0	0	90.8	80	120	05/03/2024
Selenium		1.0		**481**	500.0	0	96.3	80	120	05/03/2024
Silver		1.0		**45.9**	50.00	0	91.7	80	120	05/03/2024
Thallium		2.0		**229**	250.0	0	91.5	80	120	05/03/2024
Vanadium		5.0		**448**	500.0	0	89.6	80	120	05/03/2024
Zinc		15.0		**443**	500.0	0	88.6	80	120	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch **222322** **SampType:** **MS** Units **µg/L**

SampID: 24041541-022CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**478**	500.0	0	95.5	75	125	05/07/2024
Arsenic		1.0		**487**	500.0	0	97.4	75	125	05/07/2024
Barium		1.0		**2130**	2000	70.24	102.9	75	125	05/03/2024
Beryllium		1.0		**45.8**	50.00	0	91.6	75	125	05/03/2024
Boron		25.0		**474**	500.0	0	94.8	75	125	05/03/2024
Cadmium		1.0		**51.1**	50.00	0	102.3	75	125	05/03/2024
Chromium		1.5		**180**	200.0	0.9334	89.6	75	125	05/03/2024
Cobalt		1.0		**427**	500.0	0	85.4	75	125	05/03/2024
Copper		1.0		**215**	250.0	1.306	85.6	75	125	05/06/2024
Iron		25.0		**1770**	2000	0	88.3	75	125	05/03/2024
Lead		1.0		**460**	500.0	0	92.1	75	125	05/03/2024
Manganese		2.0		**489**	500.0	42.22	89.3	75	125	05/03/2024
Nickel		1.0		**420**	500.0	0.5959	83.9	75	125	05/03/2024
Selenium		1.0		**469**	500.0	0	93.8	75	125	05/03/2024
Silver		1.0		**44.0**	50.00	0	88.0	75	125	05/03/2024
Thallium		2.0		**221**	250.0	0	88.5	75	125	05/03/2024
Vanadium		5.0		**427**	500.0	0	85.4	75	125	05/03/2024
Zinc		15.0		**420**	500.0	0	84.1	75	125	05/03/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222322 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24041541-022CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**463**	500.0	0	92.5	477.5	3.17	05/07/2024
Arsenic		1.0		**461**	500.0	0	92.2	486.9	5.51	05/07/2024
Barium		1.0		**2090**	2000	70.24	100.9	2128	1.84	05/03/2024
Beryllium		1.0		**44.9**	50.00	0	89.7	45.79	2.03	05/03/2024
Boron		25.0		**460**	500.0	0	91.9	473.9	3.08	05/03/2024
Cadmium		1.0		**50.1**	50.00	0	100.2	51.15	2.04	05/03/2024
Chromium		1.5		**174**	200.0	0.9334	86.3	180.0	3.64	05/03/2024
Cobalt		1.0		**416**	500.0	0	83.3	426.8	2.46	05/03/2024
Copper		1.0		**216**	250.0	1.306	85.9	215.3	0.41	05/06/2024
Iron		25.0		**1720**	2000	0	85.9	1767	2.81	05/03/2024
Lead		1.0		**451**	500.0	0	90.2	460.5	2.08	05/03/2024
Manganese		2.0		**477**	500.0	42.22	87.0	488.7	2.38	05/03/2024
Nickel		1.0		**414**	500.0	0.5959	82.7	420.0	1.43	05/03/2024
Selenium		1.0		**449**	500.0	0	89.7	468.9	4.39	05/03/2024
Silver		1.0		**42.9**	50.00	0	85.7	43.98	2.57	05/03/2024
Thallium		2.0		**218**	250.0	0	87.2	221.2	1.49	05/03/2024
Vanadium		5.0		**423**	500.0	0	84.6	427.0	1.00	05/03/2024
Zinc		15.0		**407**	500.0	0	81.4	420.4	3.17	05/03/2024

Batch 222322 **SampType:** MS Units µg/L

SampID: 24042058-006GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	B	**430**	500.0	0	86.0	75	125	05/03/2024
Arsenic		1.0		**470**	500.0	0	94.0	75	125	05/07/2024
Lead		1.0		**451**	500.0	0	90.2	75	125	05/03/2024
Selenium		1.0		**449**	500.0	0	89.8	75	125	05/03/2024
Thallium		2.0		**220**	250.0	0	87.9	75	125	05/03/2024

Batch 222322 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24042058-006GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0	B	**450**	500.0	0	90.0	429.9	4.58	05/03/2024
Arsenic		1.0		**474**	500.0	0	94.7	469.9	0.79	05/07/2024
Lead		1.0		**449**	500.0	0	89.8	451.1	0.52	05/03/2024
Selenium		1.0		**461**	500.0	0	92.1	449.2	2.49	05/03/2024
Thallium		2.0		**221**	250.0	0	88.3	219.8	0.46	05/03/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222415** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/10/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/07/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/07/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/08/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/08/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/07/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/08/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/08/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	05/08/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/08/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/08/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/07/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/08/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	05/07/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/07/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/08/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222415 **SampType:** LCS Units **µg/L**

SampID: LCS-222415

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1880**	2000	0	93.8	80	120	05/09/2024
Antimony		1.0		**513**	500.0	0	102.5	80	120	05/10/2024
Arsenic		1.0		**507**	500.0	0	101.4	80	120	05/07/2024
Barium		1.0		**2290**	2000	0	114.6	80	120	05/07/2024
Beryllium		1.0		**46.9**	50.00	0	93.9	80	120	05/08/2024
Boron		25.0		**485**	500.0	0	96.9	80	120	05/08/2024
Cadmium		1.0		**50.6**	50.00	0	101.2	80	120	05/07/2024
Chromium		1.5		**195**	200.0	0	97.7	80	120	05/08/2024
Cobalt		1.0		**475**	500.0	0	95.0	80	120	05/08/2024
Copper		1.0		**242**	250.0	0	96.8	80	120	05/08/2024
Iron		25.0		**1810**	2000	0	90.3	80	120	05/08/2024
Lead		1.0		**507**	500.0	0	101.5	80	120	05/07/2024
Manganese		2.0		**492**	500.0	0	98.3	80	120	05/08/2024
Molybdenum		1.5		**487**	500.0	0	97.3	80	120	05/07/2024
Nickel		1.0		**469**	500.0	0	93.8	80	120	05/08/2024
Selenium		1.0		**537**	500.0	0	107.5	80	120	05/07/2024
Silver		1.0		**42.4**	50.00	0	84.8	80	120	05/10/2024
Thallium		2.0		**247**	250.0	0	98.7	80	120	05/07/2024
Vanadium		5.0		**456**	500.0	0	91.2	80	120	05/08/2024
Zinc		15.0		**451**	500.0	0	90.3	80	120	05/08/2024

Batch 222415 **SampType:** MS Units **µg/L**

SampID: 24041541-010GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**438**	500.0	0	87.6	75	125	05/10/2024
Arsenic		1.0		**524**	500.0	0	104.8	75	125	05/07/2024
Barium		1.0		**2310**	2000	51.62	113.1	75	125	05/07/2024
Boron		25.0		**490**	500.0	0	98.1	75	125	05/08/2024
Cadmium		1.0		**50.3**	50.00	0	100.6	75	125	05/07/2024
Chromium		1.5		**192**	200.0	0	95.8	75	125	05/08/2024
Cobalt		1.0		**465**	500.0	0	93.0	75	125	05/08/2024
Lead		1.0		**511**	500.0	0	102.3	75	125	05/07/2024
Manganese		2.0		**528**	500.0	38.57	98.0	75	125	05/08/2024
Zinc		15.0		**454**	500.0	0	90.8	75	125	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222415 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24041541-010GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**458**	500.0	0	91.7	437.8	4.59	05/10/2024
Arsenic		1.0		**510**	500.0	0	102.0	523.9	2.74	05/07/2024
Barium		1.0		**2270**	2000	51.62	110.9	2313	1.93	05/07/2024
Boron		25.0		**466**	500.0	0	93.3	490.4	5.02	05/08/2024
Cadmium		1.0		**49.6**	50.00	0	99.2	50.32	1.48	05/07/2024
Chromium		1.5		**183**	200.0	0	91.4	191.5	4.67	05/08/2024
Cobalt		1.0		**440**	500.0	0	88.0	465.1	5.61	05/08/2024
Lead		1.0		**501**	500.0	0	100.2	511.3	2.05	05/07/2024
Manganese		2.0		**497**	500.0	38.57	91.6	528.5	6.23	05/08/2024
Zinc		15.0		**417**	500.0	0	83.4	454.0	8.46	05/08/2024

Batch 222458 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222458

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/14/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/14/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/14/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/14/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/14/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/14/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/14/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/14/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/15/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/14/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	05/14/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/14/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/14/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/14/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/14/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	05/14/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/14/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/14/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222458 **SampType:** LCS Units **µg/L**

SampID: LCS-222458

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2360**	2000	0	117.9	80	120	05/14/2024
Antimony		1.0		**445**	500.0	0	88.9	80	120	05/14/2024
Arsenic		1.0		**473**	500.0	0	94.6	80	120	05/14/2024
Barium		1.0		**2100**	2000	0	105.0	80	120	05/15/2024
Beryllium		1.0		**57.7**	50.00	0	115.4	80	120	05/14/2024
Boron		25.0		**564**	500.0	0	112.9	80	120	05/14/2024
Cadmium		1.0		**59.5**	50.00	0	119.1	80	120	05/14/2024
Chromium		1.5		**204**	200.0	0	102.2	80	120	05/15/2024
Cobalt		1.0		**558**	500.0	0	111.6	80	120	05/15/2024
Copper		1.0		**249**	250.0	0	99.8	80	120	05/15/2024
Iron		25.0		**2330**	2000	0	116.6	80	120	05/14/2024
Lead		1.0		**508**	500.0	0	101.6	80	120	05/15/2024
Manganese		2.0		**597**	500.0	0	119.3	80	120	05/14/2024
Molybdenum		1.5		**545**	500.0	0	109.0	80	120	05/14/2024
Nickel		1.0		**586**	500.0	0	117.3	80	120	05/14/2024
Selenium		1.0		**572**	500.0	0	114.5	80	120	05/14/2024
Silver		1.0		**55.6**	50.00	0	111.1	80	120	05/14/2024
Thallium		2.0		**288**	250.0	0	115.1	80	120	05/14/2024
Vanadium		5.0		**579**	500.0	0	115.8	80	120	05/14/2024
Zinc		15.0		**556**	500.0	0	111.3	80	120	05/14/2024

Batch 222458 **SampType:** MS Units **µg/L**

SampID: 24041541-018GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**882**	1000	0	88.2	75	125	05/16/2024
Arsenic		1.0		**1020**	1000	0	102.3	75	125	05/14/2024
Barium		1.0		**4090**	4000	62.86	100.8	75	125	05/15/2024
Boron		25.0		**1050**	1000	9.949	104.0	75	125	05/14/2024
Cadmium		1.0		**89.9**	100.0	0	89.9	75	125	05/15/2024
Chromium		1.5		**343**	400.0	0.9918	85.4	75	125	05/15/2024
Cobalt		1.0		**909**	1000	0	90.9	75	125	05/15/2024
Lead		1.0		**854**	1000	0	85.4	75	125	05/15/2024
Manganese		2.0		**1130**	1000	68.13	106.5	75	125	05/14/2024
Zinc		15.0		**939**	1000	0	93.9	75	125	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222458 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24041541-018GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**900**	1000	0	90.0	881.6	2.03	05/16/2024
Arsenic		1.0		**909**	1000	0	90.9	1023	11.83	05/14/2024
Barium		1.0		**3960**	4000	62.86	97.4	4094	3.33	05/15/2024
Boron		25.0		**903**	1000	9.949	89.3	1050	15.00	05/14/2024
Cadmium		1.0		**85.0**	100.0	0	85.0	89.87	5.56	05/15/2024
Chromium		1.5		**334**	400.0	0.9918	83.2	342.6	2.65	05/15/2024
Cobalt		1.0		**898**	1000	0	89.8	908.7	1.23	05/15/2024
Lead		1.0		**857**	1000	0	85.7	853.6	0.34	05/15/2024
Manganese		2.0		**992**	1000	68.13	92.4	1133	13.22	05/14/2024
Zinc		15.0		**829**	1000	0	82.9	939.3	12.46	05/14/2024

Batch 222458 **SampType:** MS Units **µg/L**

SampID: 24050001-008EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**477**	500.0	2.968	94.8	75	125	05/15/2024
Lead		1.0		**475**	500.0	0	95.0	75	125	05/15/2024

Batch 222458 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24050001-008EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.0		**490**	500.0	2.968	97.5	476.9	2.75	05/15/2024
Lead		1.0		**484**	500.0	0	96.8	475.0	1.91	05/15/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222460 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222460

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/08/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/07/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/08/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/08/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/07/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/08/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/08/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	05/08/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/08/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/08/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/07/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/08/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	05/07/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/07/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/08/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222460 **SampType:** LCS Units µg/L

SampID: LCS-222460

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1680**	2000	0	83.8	80	120	05/08/2024
Antimony		1.0		**440**	500.0	0	88.0	80	120	05/08/2024
Arsenic		1.0		**473**	500.0	0	94.7	80	120	05/07/2024
Beryllium		1.0		**43.9**	50.00	0	87.9	80	120	05/08/2024
Boron		25.0		**441**	500.0	0	88.3	80	120	05/08/2024
Cadmium		1.0		**47.2**	50.00	0	94.3	80	120	05/07/2024
Chromium		1.5		**184**	200.0	0	91.8	80	120	05/08/2024
Cobalt		1.0		**464**	500.0	0	92.7	80	120	05/08/2024
Copper		1.0		**240**	250.0	0	95.9	80	120	05/08/2024
Iron		25.0		**1730**	2000	0	86.6	80	120	05/08/2024
Lead		1.0		**477**	500.0	0	95.4	80	120	05/07/2024
Manganese		2.0		**455**	500.0	0	91.1	80	120	05/08/2024
Molybdenum		1.5		**479**	500.0	0	95.9	80	120	05/07/2024
Nickel		1.0		**462**	500.0	0	92.4	80	120	05/08/2024
Selenium		1.0		**495**	500.0	0	99.0	80	120	05/07/2024
Silver		1.0		**43.3**	50.00	0	86.7	80	120	05/07/2024
Thallium		2.0		**235**	250.0	0	93.9	80	120	05/07/2024
Vanadium		5.0		**446**	500.0	0	89.2	80	120	05/08/2024
Zinc		15.0		**411**	500.0	0	82.3	80	120	05/08/2024

Batch 222460 **SampType:** MS Units µg/L

SampID: 24041541-004GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**424**	500.0	0	84.8	75	125	05/08/2024
Arsenic		1.0		**478**	500.0	0	95.5	75	125	05/07/2024
Barium		1.0		**2120**	2000	16.75	105.0	75	125	05/07/2024
Boron		25.0		**451**	500.0	0	90.1	75	125	05/08/2024
Cadmium		1.0		**46.0**	50.00	0	92.1	75	125	05/07/2024
Chromium		1.5		**179**	200.0	0.7767	89.2	75	125	05/08/2024
Cobalt		1.0		**436**	500.0	0	87.2	75	125	05/08/2024
Lead		1.0		**482**	500.0	0	96.4	75	125	05/07/2024
Manganese		2.0		**453**	500.0	0	90.6	75	125	05/08/2024
Zinc		15.0		**408**	500.0	0	81.7	75	125	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222460 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24041541-004GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**457**	500.0	0	91.5	423.8	7.63	05/08/2024
Arsenic		1.0		**492**	500.0	0	98.5	477.5	3.06	05/07/2024
Barium		1.0		**2170**	2000	16.75	107.5	2117	2.31	05/07/2024
Boron		25.0		**470**	500.0	0	94.0	450.5	4.19	05/08/2024
Cadmium		1.0		**46.8**	50.00	0	93.7	46.04	1.70	05/07/2024
Chromium		1.5		**181**	200.0	0.7767	90.3	179.2	1.23	05/08/2024
Cobalt		1.0		**444**	500.0	0	88.8	436.2	1.78	05/08/2024
Lead		1.0		**486**	500.0	0	97.2	481.9	0.82	05/07/2024
Manganese		2.0		**458**	500.0	0	91.6	453.0	1.05	05/08/2024
Zinc		15.0		**400**	500.0	0	80.1	408.4	2.02	05/08/2024

Batch 222799 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/14/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/14/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/14/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/14/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/14/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/14/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/14/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/14/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/14/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	05/14/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/14/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/14/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/16/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/14/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	05/14/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/14/2024
Zinc		15.0	S	**16.5**	5.900	0	280.3	-100	100	05/14/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222799 **SampType:** LCS Units **µg/L**
SampID: LCS-222799

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1800**	2000	0	89.8	80	120	05/14/2024
Antimony		1.0		**435**	500.0	0	86.9	80	120	05/14/2024
Arsenic		1.0		**464**	500.0	0	92.9	80	120	05/14/2024
Barium		1.0		**1860**	2000	0	93.2	80	120	05/14/2024
Beryllium		1.0		**42.9**	50.00	0	85.7	80	120	05/14/2024
Boron		25.0		**433**	500.0	0	86.7	80	120	05/14/2024
Cadmium		1.0		**44.9**	50.00	0	89.8	80	120	05/14/2024
Chromium		1.5		**187**	200.0	0	93.5	80	120	05/14/2024
Cobalt		1.0		**448**	500.0	0	89.5	80	120	05/14/2024
Copper		1.0		**227**	250.0	0	90.8	80	120	05/14/2024
Iron		25.0		**1780**	2000	0	88.9	80	120	05/14/2024
Lead		1.0		**466**	500.0	0	93.1	80	120	05/14/2024
Manganese		2.0		**458**	500.0	0	91.6	80	120	05/14/2024
Molybdenum		1.5		**432**	500.0	0	86.3	80	120	05/14/2024
Nickel		1.0		**447**	500.0	0	89.3	80	120	05/14/2024
Selenium		1.0		**504**	500.0	0	100.8	80	120	05/14/2024
Silver		1.0		**43.2**	50.00	0	86.4	80	120	05/14/2024
Thallium		2.0		**228**	250.0	0	91.3	80	120	05/14/2024
Vanadium		5.0		**447**	500.0	0	89.3	80	120	05/14/2024
Zinc		15.0	B	**418**	500.0	0	83.6	80	120	05/14/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222799 **SampType:** MS Units **µg/L**

SampID: 24041541-042DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1820**	2000	0	90.8	75	125	05/14/2024
Antimony		1.0		**499**	500.0	0.5213	99.8	75	125	05/14/2024
Arsenic		1.0		**461**	500.0	0	92.1	75	125	05/14/2024
Barium		1.0		**1860**	2000	33.16	91.4	75	125	05/14/2024
Beryllium		1.0		**46.4**	50.00	0	92.8	75	125	05/14/2024
Boron		25.0		**461**	500.0	0	92.2	75	125	05/14/2024
Cadmium		1.0		**46.7**	50.00	0	93.4	75	125	05/14/2024
Chromium		1.5		**188**	200.0	0.8191	93.5	75	125	05/14/2024
Cobalt		1.0		**451**	500.0	0	90.1	75	125	05/14/2024
Copper		1.0		**227**	250.0	0	90.9	75	125	05/14/2024
Iron		25.0		**1820**	2000	22.62	89.6	75	125	05/14/2024
Lead		1.0		**460**	500.0	0	92.0	75	125	05/14/2024
Manganese		2.0		**494**	500.0	33.81	92.0	75	125	05/14/2024
Molybdenum		1.5		**426**	500.0	0	85.1	75	125	05/17/2024
Nickel		1.0		**453**	500.0	0	90.7	75	125	05/14/2024
Selenium		1.0		**459**	500.0	0.7015	91.6	75	125	05/14/2024
Silver		1.0		**42.9**	50.00	0	85.8	75	125	05/14/2024
Thallium		2.0		**217**	250.0	0	86.8	75	125	05/14/2024
Vanadium		5.0		**453**	500.0	0	90.5	75	125	05/14/2024
Zinc		15.0	B	**433**	500.0	0	86.6	75	125	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222799 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24041541-042DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**1830**	2000	0	91.5	1815	0.83	05/14/2024
Antimony		1.0		**503**	500.0	0.5213	100.5	499.3	0.79	05/14/2024
Arsenic		1.0		**454**	500.0	0	90.7	460.6	1.54	05/14/2024
Barium		1.0		**1880**	2000	33.16	92.5	1860	1.20	05/14/2024
Beryllium		1.0		**45.9**	50.00	0	91.8	46.42	1.07	05/14/2024
Boron		25.0		**463**	500.0	0	92.5	461.0	0.36	05/14/2024
Cadmium		1.0		**46.5**	50.00	0	92.9	46.70	0.49	05/14/2024
Chromium		1.5		**188**	200.0	0.8191	93.6	187.8	0.15	05/14/2024
Cobalt		1.0		**447**	500.0	0	89.4	450.6	0.78	05/14/2024
Copper		1.0		**224**	250.0	0	89.6	227.1	1.35	05/14/2024
Iron		25.0		**1810**	2000	22.62	89.5	1816	0.21	05/14/2024
Lead		1.0		**459**	500.0	0	91.8	460.2	0.28	05/14/2024
Manganese		2.0		**491**	500.0	33.81	91.4	493.8	0.65	05/14/2024
Molybdenum		1.5		**428**	500.0	0	85.7	425.7	0.64	05/17/2024
Nickel		1.0		**445**	500.0	0	89.0	453.3	1.85	05/14/2024
Selenium		1.0		**450**	500.0	0.7015	89.9	458.8	1.88	05/14/2024
Silver		1.0		**43.0**	50.00	0	86.0	42.88	0.25	05/14/2024
Thallium		2.0		**218**	250.0	0	87.2	217.0	0.50	05/14/2024
Vanadium		5.0		**453**	500.0	0	90.7	452.6	0.15	05/14/2024
Zinc		15.0	B	**427**	500.0	0	85.5	432.9	1.28	05/14/2024

Batch 222799 **SampType:** MS Units **µg/L**

SampID: 24050464-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**473**	500.0	0	94.7	75	125	05/16/2024
Arsenic		1.0		**500**	500.0	0	100.1	75	125	05/16/2024
Lead		1.0		**500**	500.0	0	100.0	75	125	05/16/2024
Selenium		1.0		**512**	500.0	0	102.4	75	125	05/16/2024
Thallium		2.0		**239**	250.0	0	95.5	75	125	05/16/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222799 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24050464-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**472**	500.0	0	94.4	473.4	0.27	05/16/2024
Arsenic		1.0		**488**	500.0	0	97.6	500.5	2.55	05/16/2024
Lead		1.0		**476**	500.0	0	95.1	500.2	5.04	05/16/2024
Selenium		1.0		**508**	500.0	0	101.7	512.0	0.72	05/16/2024
Thallium		2.0		**235**	250.0	0	94.2	238.9	1.47	05/16/2024

Batch 223767 **SampType:** MBLK Units µg/L

SampID: MBLK-223767

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	06/04/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	06/04/2024
Copper		1.0		**< 1.0**	0.3000	0	0	-100	100	06/04/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	06/04/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	06/04/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	06/04/2024

Batch 223767 **SampType:** LCS Units µg/L

SampID: LCS-223767

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**412**	500.0	0	82.4	80	120	06/04/2024
Barium		1.0		**1740**	2000	0	86.9	80	120	06/04/2024
Copper		1.0		**218**	250.0	0	87.2	80	120	06/04/2024
Lead		1.0		**425**	500.0	0	85.0	80	120	06/04/2024
Nickel		1.0		**425**	500.0	0	84.9	80	120	06/04/2024
Zinc		15.0		**427**	500.0	0	85.4	80	120	06/04/2024

Batch 223767 **SampType:** MS Units µg/L

SampID: 24041541-034DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nickel		1.0		**423**	500.0	0	84.5	75	125	06/04/2024

Batch 223767 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24041541-034DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nickel		1.0		**391**	500.0	0	78.3	422.5	7.62	06/04/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 223767 **SampType:** MS Units µg/L
SampID: 24041541-086DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Barium		1.0		**2010**	2000	65.55	97.5	75	125	06/04/2024

Batch 223767 **SampType:** MSD Units µg/L RPD Limit **20**
SampID: 24041541-086DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Barium		1.0		**1730**	2000	65.55	83.2	2015	15.25	06/04/2024

Batch 224006 **SampType:** MBLK Units µg/L
SampID: MBLK-224006

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	06/06/2024

Batch 224006 **SampType:** LCS Units µg/L
SampID: LCS-224006

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**447**	500.0	0	89.4	80	120	06/06/2024

Batch 224006 **SampType:** MS Units µg/L
SampID: 24041541-021GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**807**	1000	0	80.7	75	125	06/06/2024

Batch 224006 **SampType:** MSD Units µg/L RPD Limit **20**
SampID: 24041541-021GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0	R	**989**	1000	0	98.9	807.0	20.24	06/06/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222328 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222328

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/07/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/09/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/07/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/07/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/07/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/07/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/07/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/07/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/07/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/07/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/07/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/07/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/07/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/07/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/07/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/07/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/07/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/07/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222328 **SampType:** LCS Units **µg/L**
SampID: LCS-222328

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1950**	2000	0	97.3	80	120	05/07/2024
Antimony		1.0		**545**	500.0	0	108.9	80	120	05/09/2024
Arsenic		1.0		**536**	500.0	0	107.2	80	120	05/07/2024
Barium		1.0		**2340**	2000	0	116.8	80	120	05/07/2024
Beryllium		1.0		**55.1**	50.00	0	110.2	80	120	05/07/2024
Boron		25.0		**556**	500.0	0	111.2	80	120	05/07/2024
Cadmium		1.0		**54.9**	50.00	0	109.8	80	120	05/07/2024
Chromium		1.5		**230**	200.0	0	115.2	80	120	05/07/2024
Cobalt		1.0		**530**	500.0	0	106.0	80	120	05/07/2024
Copper		1.0		**282**	250.0	0	112.9	80	120	05/07/2024
Iron		25.0		**2100**	2000	0	105.2	80	120	05/07/2024
Lead		1.0		**532**	500.0	0	106.5	80	120	05/07/2024
Lithium	*	3.0		**567**	500.0	0	113.4	80	120	05/07/2024
Manganese		2.0		**548**	500.0	0	109.5	80	120	05/07/2024
Molybdenum		1.5		**529**	500.0	0	105.7	80	120	05/07/2024
Nickel		1.0		**558**	500.0	0	111.6	80	120	05/07/2024
Selenium		1.0		**547**	500.0	0	109.3	80	120	05/07/2024
Silver		1.0		**50.7**	50.00	0	101.5	80	120	05/07/2024
Thallium		2.0		**259**	250.0	0	103.5	80	120	05/07/2024
Vanadium		5.0		**544**	500.0	0	108.8	80	120	05/07/2024
Zinc		15.0		**512**	500.0	0	102.5	80	120	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222328 **SampType:** MS Units **µg/L**
SampID: 24041541-069BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**540**	500.0	0	108.0	75	125	05/09/2024
Arsenic		1.0		**543**	500.0	0.6306	108.4	75	125	05/07/2024
Barium		1.0		**2390**	2000	15.20	118.6	75	125	05/07/2024
Beryllium		1.0		**52.2**	50.00	0	104.4	75	125	05/07/2024
Boron		25.0		**665**	500.0	132.8	106.4	75	125	05/07/2024
Cadmium		1.0		**52.8**	50.00	0	105.5	75	125	05/07/2024
Chromium		1.5		**221**	200.0	5.957	107.3	75	125	05/07/2024
Cobalt		1.0		**527**	500.0	2.055	105.1	75	125	05/07/2024
Lead		1.0		**555**	500.0	0	111.0	75	125	05/07/2024
Lithium	*	3.0		**554**	500.0	5.324	109.7	75	125	05/07/2024
Molybdenum		1.5		**494**	500.0	1.568	98.4	75	125	05/07/2024
Selenium		1.0		**532**	500.0	0	106.5	75	125	05/07/2024
Thallium		2.0		**278**	250.0	0	111.1	75	125	05/07/2024

Batch 222328 **SampType:** MSD Units **µg/L** RPD Limit **20**
SampID: 24041541-069BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**535**	500.0	0	106.9	540.0	0.99	05/09/2024
Arsenic		1.0		**553**	500.0	0.6306	110.5	542.6	1.92	05/07/2024
Barium		1.0		**2340**	2000	15.20	116.3	2387	1.91	05/07/2024
Beryllium		1.0		**51.7**	50.00	0	103.3	52.19	1.01	05/07/2024
Boron		25.0		**654**	500.0	132.8	104.3	664.7	1.61	05/07/2024
Cadmium		1.0		**51.3**	50.00	0	102.5	52.77	2.93	05/07/2024
Chromium		1.5		**220**	200.0	5.957	107.1	220.6	0.16	05/07/2024
Cobalt		1.0		**519**	500.0	2.055	103.3	527.4	1.69	05/07/2024
Lead		1.0		**548**	500.0	0	109.5	555.1	1.37	05/07/2024
Lithium	*	3.0		**537**	500.0	5.324	106.4	554.0	3.09	05/07/2024
Molybdenum		1.5		**485**	500.0	1.568	96.7	493.7	1.82	05/07/2024
Selenium		1.0		**542**	500.0	0	108.4	532.3	1.86	05/07/2024
Thallium		2.0		**274**	250.0	0	109.8	277.8	1.21	05/07/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch **222392** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-222392

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/07/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/09/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/07/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/07/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/07/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/07/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/07/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/08/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/07/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/07/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/07/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/07/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/07/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/07/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/07/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/07/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/07/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/07/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/07/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222392 **SampType:** LCS Units **µg/L**
SampID: LCS-222392

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1930**	2000	0	96.6	80	120	05/07/2024
Antimony		1.0		**539**	500.0	0	107.9	80	120	05/09/2024
Arsenic		1.0		**533**	500.0	0	106.7	80	120	05/07/2024
Barium		1.0		**2320**	2000	0	115.8	80	120	05/07/2024
Beryllium		1.0		**53.9**	50.00	0	107.9	80	120	05/07/2024
Boron		25.0		**533**	500.0	0	106.6	80	120	05/07/2024
Cadmium		1.0		**51.0**	50.00	0	102.1	80	120	05/07/2024
Chromium		1.5		**199**	200.0	0	99.3	80	120	05/08/2024
Cobalt		1.0		**529**	500.0	0	105.8	80	120	05/07/2024
Copper		1.0		**276**	250.0	0	110.3	80	120	05/07/2024
Iron		25.0		**2070**	2000	0	103.5	80	120	05/07/2024
Lead		1.0		**528**	500.0	0	105.5	80	120	05/07/2024
Lithium	*	3.0		**534**	500.0	0	106.8	80	120	05/07/2024
Manganese		2.0		**534**	500.0	0	106.8	80	120	05/07/2024
Molybdenum		1.5		**511**	500.0	0	102.2	80	120	05/07/2024
Nickel		1.0		**532**	500.0	0	106.4	80	120	05/07/2024
Selenium		1.0		**543**	500.0	0	108.5	80	120	05/07/2024
Silver		1.0		**48.2**	50.00	0	96.3	80	120	05/07/2024
Thallium		2.0		**257**	250.0	0	102.7	80	120	05/07/2024
Vanadium		5.0		**538**	500.0	0	107.6	80	120	05/07/2024
Zinc		15.0		**503**	500.0	0	100.6	80	120	05/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222414** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-222414

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/10/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/10/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/09/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/13/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/09/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/10/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/09/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/09/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/09/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/09/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/09/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/09/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/09/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/09/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/09/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/09/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222414 **SampType:** LCS Units **µg/L**
SampID: LCS-222414

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1920**	2000	0	96.1	80	120	05/09/2024
Antimony		1.0		**565**	500.0	0	113.0	80	120	05/10/2024
Arsenic		1.0		**529**	500.0	0	105.9	80	120	05/10/2024
Barium		1.0		**2250**	2000	0	112.7	80	120	05/09/2024
Beryllium		1.0		**50.4**	50.00	0	100.9	80	120	05/09/2024
Boron		25.0		**507**	500.0	0	101.4	80	120	05/09/2024
Cadmium		1.0		**51.7**	50.00	0	103.4	80	120	05/13/2024
Cadmium		1.0		**51.7**	50.00	0	103.4	80	120	05/13/2024
Chromium		1.5		**208**	200.0	0	104.0	80	120	05/09/2024
Cobalt		1.0		**530**	500.0	0	106.1	80	120	05/10/2024
Copper		1.0		**254**	250.0	0	101.5	80	120	05/09/2024
Iron		25.0		**1970**	2000	0	98.4	80	120	05/09/2024
Lead		1.0		**502**	500.0	0	100.5	80	120	05/09/2024
Lithium	*	3.0		**518**	500.0	0	103.6	80	120	05/09/2024
Manganese		2.0		**511**	500.0	0	102.3	80	120	05/09/2024
Molybdenum		1.5		**479**	500.0	0	95.8	80	120	05/09/2024
Nickel		1.0		**493**	500.0	0	98.6	80	120	05/09/2024
Selenium		1.0		**536**	500.0	0	107.2	80	120	05/09/2024
Thallium		2.0		**244**	250.0	0	97.7	80	120	05/09/2024
Vanadium		5.0		**496**	500.0	0	99.2	80	120	05/09/2024
Zinc		15.0		**481**	500.0	0	96.3	80	120	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222461 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222461

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/08/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/10/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/10/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/10/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/10/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/09/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/13/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/10/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/09/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/10/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/09/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/10/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/09/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/10/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/08/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/09/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/10/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/09/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/10/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/16/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/10/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/10/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/08/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/10/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/08/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/09/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/10/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/10/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/09/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222461 **SampType:** MBLK Units µg/L

SampID: MBLK-222461

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed

Batch 222461 **SampType:** LCS Units µg/L

SampID: LCS-222461

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**475**	500.0	0	95.0	80	120	05/08/2024
Antimony		1.0		**560**	500.0	0	112.1	80	120	05/10/2024
Arsenic		1.0		**498**	500.0	0	99.6	80	120	05/08/2024
Arsenic		1.0		**510**	500.0	0	101.9	80	120	05/10/2024
Barium		1.0		**2180**	2000	0	108.9	80	120	05/09/2024
Beryllium		1.0		**48.3**	50.00	0	96.6	80	120	05/10/2024
Boron		25.0		**485**	500.0	0	96.9	80	120	05/10/2024
Cadmium		1.0		**54.6**	50.00	0	109.3	80	120	05/13/2024
Chromium		1.5		**205**	200.0	0	102.7	80	120	05/10/2024
Cobalt		1.0		**510**	500.0	0	102.0	80	120	05/10/2024
Copper		1.0		**259**	250.0	0	103.6	80	120	05/10/2024
Iron		25.0		**1970**	2000	0	98.7	80	120	05/10/2024
Lead		1.0		**502**	500.0	0	100.3	80	120	05/08/2024
Lithium	*	3.0		**482**	500.0	0	96.4	80	120	05/10/2024
Manganese		2.0		**515**	500.0	0	102.9	80	120	05/10/2024
Molybdenum		1.5		**417**	500.0	0	83.5	80	120	05/16/2024
Nickel		1.0		**514**	500.0	0	102.8	80	120	05/10/2024
Selenium		1.0		**524**	500.0	0	104.7	80	120	05/10/2024
Selenium		1.0		**490**	500.0	0	98.1	80	120	05/08/2024
Silver		1.0		**45.5**	50.00	0	91.0	80	120	05/10/2024
Thallium		2.0		**239**	250.0	0	95.4	80	120	05/09/2024
Vanadium		5.0		**490**	500.0	0	98.1	80	120	05/10/2024
Zinc		15.0		**469**	500.0	0	93.9	80	120	05/10/2024

Batch 222461 **SampType:** MS Units µg/L

SampID: 24050273-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**475**	500.0	0.5302	94.8	75	125	05/08/2024
Arsenic		1.0		**477**	500.0	1.562	95.1	75	125	05/08/2024
Lead		1.0		**495**	500.0	0	99.0	75	125	05/08/2024
Selenium		1.0		**476**	500.0	0	95.3	75	125	05/08/2024
Thallium		2.0		**221**	250.0	1.555	87.7	75	125	05/08/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222461 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24050273-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**457**	500.0	0.5302	91.3	474.7	3.80	05/08/2024
Arsenic		1.0		**474**	500.0	1.562	94.4	477.3	0.74	05/08/2024
Lead		1.0		**464**	500.0	0	92.9	495.1	6.40	05/08/2024
Selenium		1.0		**476**	500.0	0	95.2	476.4	0.13	05/08/2024
Thallium		2.0		**229**	250.0	1.555	91.0	220.8	3.62	05/08/2024

Batch 222639 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222639

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/13/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/14/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/10/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/13/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/13/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/13/2024
Calcium		125		**< 125**	70.00	0	0	-100	100	05/13/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/13/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/13/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/13/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/13/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/10/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/13/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/13/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/13/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/13/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/13/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/13/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/10/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/13/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222639** **SampType:** **LCS** Units **µg/L**
SampID: LCS-222639

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2150**	2000	0	107.5	80	120	05/13/2024
Antimony		1.0		**589**	500.0	0	117.7	80	120	05/14/2024
Barium		1.0		**2220**	2000	0	110.9	80	120	05/10/2024
Beryllium		1.0		**51.5**	50.00	0	103.0	80	120	05/13/2024
Boron		25.0		**488**	500.0	0	97.6	80	120	05/13/2024
Cadmium		1.0		**53.9**	50.00	0	107.7	80	120	05/13/2024
Calcium		125		**2790**	2500	0	111.6	80	120	05/13/2024
Chromium		1.5		**218**	200.0	0	109.1	80	120	05/13/2024
Cobalt		1.0		**531**	500.0	0	106.3	80	120	05/13/2024
Copper		1.0		**272**	250.0	0	108.9	80	120	05/13/2024
Iron		25.0		**2090**	2000	0	104.7	80	120	05/13/2024
Lead		1.0		**499**	500.0	0	99.7	80	120	05/10/2024
Lithium	*	3.0		**512**	500.0	0	102.4	80	120	05/13/2024
Manganese		2.0		**545**	500.0	0	109.0	80	120	05/13/2024
Molybdenum		1.5		**488**	500.0	0	97.5	80	120	05/13/2024
Nickel		1.0		**522**	500.0	0	104.4	80	120	05/13/2024
Selenium		1.0		**556**	500.0	0	111.2	80	120	05/13/2024
Silver		1.0		**51.3**	50.00	0	102.6	80	120	05/13/2024
Thallium		2.0		**240**	250.0	0	96.0	80	120	05/10/2024
Vanadium		5.0		**521**	500.0	0	104.2	80	120	05/13/2024
Zinc		15.0		**497**	500.0	0	99.4	80	120	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222639 **SampType:** MS Units **µg/L**
SampID: 24041541-053CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**3000**	2000	1001	100.0	75	125	05/13/2024
Antimony		1.0		**595**	500.0	0.5594	118.9	75	125	05/15/2024
Arsenic		1.0		**508**	500.0	0.5853	101.5	75	125	05/13/2024
Barium		1.0		**2220**	2000	49.59	108.7	75	125	05/10/2024
Beryllium		1.0		**51.2**	50.00	0	102.4	75	125	05/13/2024
Boron		25.0		**479**	500.0	0	95.7	75	125	05/13/2024
Cadmium		1.0		**51.3**	50.00	0	102.7	75	125	05/13/2024
Chromium		1.5		**207**	200.0	2.444	102.3	75	125	05/13/2024
Cobalt		1.0		**488**	500.0	0.4841	97.4	75	125	05/13/2024
Copper		1.0		**240**	250.0	1.764	95.2	75	125	05/13/2024
Iron		25.0		**3140**	2000	1179	98.3	75	125	05/13/2024
Lead		1.0		**489**	500.0	0.7038	97.7	75	125	05/10/2024
Lithium	*	3.0		**508**	500.0	4.660	100.6	75	125	05/13/2024
Manganese		2.0		**541**	500.0	34.07	101.4	75	125	05/13/2024
Molybdenum		1.5		**462**	500.0	1.025	92.2	75	125	05/13/2024
Nickel		1.0		**472**	500.0	1.787	94.1	75	125	05/13/2024
Selenium		1.0		**516**	500.0	0	103.2	75	125	05/13/2024
Silver		1.0		**46.1**	50.00	0	92.1	75	125	05/13/2024
Thallium		2.0		**238**	250.0	0	95.4	75	125	05/10/2024
Vanadium		5.0		**500**	500.0	0	99.9	75	125	05/13/2024
Zinc		15.0		**465**	500.0	0	93.0	75	125	05/13/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 222639 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24041541-053CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**3030**	2000	1001	101.6	3000	1.10	05/13/2024
Antimony		1.0		**568**	500.0	0.5594	113.4	594.8	4.67	05/15/2024
Arsenic		1.0		**532**	500.0	0.5853	106.2	507.9	4.60	05/13/2024
Barium		1.0		**2140**	2000	49.59	104.5	2223	3.86	05/10/2024
Beryllium		1.0		**52.0**	50.00	0	104.1	51.22	1.59	05/13/2024
Boron		25.0		**492**	500.0	0	98.3	478.7	2.68	05/13/2024
Cadmium		1.0		**50.9**	50.00	0	101.9	51.34	0.81	05/13/2024
Chromium		1.5		**213**	200.0	2.444	105.0	207.0	2.65	05/13/2024
Cobalt		1.0		**502**	500.0	0.4841	100.3	487.6	2.86	05/13/2024
Copper		1.0		**253**	250.0	1.764	100.3	239.9	5.14	05/13/2024
Iron		25.0		**3200**	2000	1179	101.0	3145	1.74	05/13/2024
Lead		1.0		**484**	500.0	0.7038	96.6	489.2	1.11	05/10/2024
Lithium	*	3.0		**527**	500.0	4.660	104.5	507.7	3.76	05/13/2024
Manganese		2.0		**564**	500.0	34.07	105.9	541.3	4.05	05/13/2024
Molybdenum		1.5		**473**	500.0	1.025	94.5	461.8	2.48	05/13/2024
Nickel		1.0		**489**	500.0	1.787	97.4	472.0	3.48	05/13/2024
Selenium		1.0		**540**	500.0	0	108.0	515.9	4.58	05/13/2024
Silver		1.0		**48.4**	50.00	0	96.9	46.07	4.99	05/13/2024
Thallium		2.0		**236**	250.0	0	94.5	238.5	0.96	05/10/2024
Vanadium		5.0		**509**	500.0	0	101.8	499.7	1.83	05/13/2024
Zinc		15.0		**480**	500.0	0	96.0	464.8	3.24	05/13/2024

Batch 222639 **SampType:** MS Units µg/L

SampID: 24050465-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		25.0		**694**	500.0	157.0	107.5	75	125	05/13/2024
Calcium		125	S	**66100**	2500	57460	344.3	75	125	05/13/2024

Batch 222639 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24050465-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Beryllium		1.0		**54.2**	50.00	0	108.3	53.49	1.24	05/13/2024
Calcium		125	S	**68600**	2500	57460	445.0	66070	3.74	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222656** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-222656

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/14/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/16/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/14/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/14/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/14/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/14/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/14/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/14/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/14/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/14/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/14/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/14/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/14/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/14/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/14/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/14/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/14/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/14/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/14/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/14/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch **222656** **SampType:** **LCS** Units **µg/L**
SampID: LCS-222656

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1970**	2000	0	98.6	80	120	05/14/2024
Antimony		1.0	S	**622**	500.0	0	124.4	80	120	05/16/2024
Arsenic		1.0		**546**	500.0	0	109.2	80	120	05/14/2024
Barium		1.0		**2230**	2000	0	111.5	80	120	05/14/2024
Beryllium		1.0		**51.7**	50.00	0	103.5	80	120	05/14/2024
Boron		25.0		**497**	500.0	0	99.4	80	120	05/14/2024
Cadmium		1.0		**57.7**	50.00	0	115.3	80	120	05/14/2024
Chromium		1.5		**220**	200.0	0	110.0	80	120	05/14/2024
Cobalt		1.0		**573**	500.0	0	114.7	80	120	05/14/2024
Copper		1.0		**279**	250.0	0	111.7	80	120	05/14/2024
Iron		25.0		**2190**	2000	0	109.4	80	120	05/14/2024
Lead		1.0		**562**	500.0	0	112.3	80	120	05/14/2024
Lithium	*	3.0		**561**	500.0	0	112.2	80	120	05/14/2024
Manganese		2.0		**597**	500.0	0	119.4	80	120	05/14/2024
Molybdenum		1.5		**523**	500.0	0	104.7	80	120	05/14/2024
Nickel		1.0		**535**	500.0	0	107.0	80	120	05/14/2024
Selenium		1.0		**552**	500.0	0	110.5	80	120	05/14/2024
Silver		1.0		**53.8**	50.00	0	107.6	80	120	05/14/2024
Thallium		2.0		**267**	250.0	0	106.9	80	120	05/14/2024
Vanadium		5.0		**556**	500.0	0	111.3	80	120	05/14/2024
Zinc		15.0		**551**	500.0	0	110.3	80	120	05/14/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222728 **SampType:** MBLK Units **µg/L**

SampID: MBLK-222728

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	05/13/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	05/13/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	05/13/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	05/13/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	05/13/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	05/13/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	05/13/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	05/13/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	05/13/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	05/13/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	05/13/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	05/13/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	05/13/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	05/13/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	05/13/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	05/13/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	05/13/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	05/13/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	05/13/2024
Tin	*	5.0		**< 5.0**	0.5000	0	0	-100	100	05/16/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	05/13/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222728 **SampType:** LCS Units **µg/L**
SampID: LCS-222728

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1800**	2000	0	90.2	80	120	05/13/2024
Antimony		1.0		**582**	500.0	0	116.4	80	120	05/13/2024
Arsenic		1.0		**497**	500.0	0	99.3	80	120	05/13/2024
Barium		1.0		**2270**	2000	0	113.3	80	120	05/13/2024
Beryllium		1.0		**45.9**	50.00	0	91.8	80	120	05/13/2024
Boron		25.0		**464**	500.0	0	92.8	80	120	05/13/2024
Cadmium		1.0		**53.0**	50.00	0	105.9	80	120	05/13/2024
Chromium		1.5		**202**	200.0	0	100.8	80	120	05/13/2024
Cobalt		1.0		**528**	500.0	0	105.6	80	120	05/13/2024
Copper		1.0		**260**	250.0	0	103.9	80	120	05/13/2024
Iron		25.0		**2020**	2000	0	101.2	80	120	05/13/2024
Lead		1.0		**520**	500.0	0	104.0	80	120	05/13/2024
Lithium	*	3.0		**557**	500.0	0	111.4	80	120	05/13/2024
Manganese		2.0		**541**	500.0	0	108.2	80	120	05/13/2024
Molybdenum		1.5		**481**	500.0	0	96.2	80	120	05/13/2024
Nickel		1.0		**556**	500.0	0	111.2	80	120	05/13/2024
Selenium		1.0		**497**	500.0	0	99.4	80	120	05/13/2024
Silver		1.0		**50.2**	50.00	0	100.5	80	120	05/13/2024
Thallium		2.0		**246**	250.0	0	98.4	80	120	05/13/2024
Tin	*	5.0		**431**	500.0	0	86.3	80	120	05/16/2024
Vanadium		5.0		**517**	500.0	0	103.5	80	120	05/13/2024
Zinc		15.0		**492**	500.0	0	98.4	80	120	05/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 222728 **SampType:** MS Units **µg/L**
SampID: 24041541-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	S	**627**	500.0	0.8515	125.2	75	125	05/14/2024
Arsenic		1.0		**534**	500.0	0.7045	106.7	75	125	05/14/2024
Barium		1.0		**2450**	2000	47.32	120.0	75	125	05/14/2024
Beryllium		1.0		**47.6**	50.00	0	95.1	75	125	05/14/2024
Boron		25.0		**1310**	500.0	823.1	97.0	75	125	05/14/2024
Cadmium		1.0		**56.0**	50.00	0	112.1	75	125	05/14/2024
Chromium		1.5		**211**	200.0	2.382	104.3	75	125	05/14/2024
Cobalt		1.0		**538**	500.0	0.2411	107.5	75	125	05/14/2024
Lead		1.0		**556**	500.0	0	111.2	75	125	05/14/2024
Lithium	*	3.0		**622**	500.0	7.800	122.8	75	125	05/14/2024
Molybdenum		1.5		**422**	500.0	6.923	83.1	75	125	05/16/2024
Selenium		1.0		**530**	500.0	0	105.9	75	125	05/14/2024
Thallium		2.0		**266**	250.0	0	106.4	75	125	05/14/2024

Batch 222728 **SampType:** MSD Units **µg/L** RPD Limit **20**
SampID: 24041541-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**598**	500.0	0.8515	119.5	626.9	4.66	05/14/2024
Arsenic		1.0		**536**	500.0	0.7045	107.0	534.1	0.31	05/14/2024
Barium		1.0		**2360**	2000	47.32	115.6	2447	3.67	05/14/2024
Beryllium		1.0		**48.0**	50.00	0	96.1	47.56	1.00	05/14/2024
Boron		25.0		**1310**	500.0	823.1	97.2	1308	0.09	05/14/2024
Cadmium		1.0		**53.8**	50.00	0	107.6	56.05	4.08	05/14/2024
Chromium		1.5		**208**	200.0	2.382	102.7	211.0	1.58	05/14/2024
Cobalt		1.0		**539**	500.0	0.2411	107.7	537.6	0.24	05/14/2024
Lead		1.0		**547**	500.0	0	109.5	556.1	1.58	05/14/2024
Lithium	*	3.0		**592**	500.0	7.800	116.8	621.6	4.92	05/14/2024
Molybdenum		1.5		**445**	500.0	6.923	87.7	422.3	5.28	05/16/2024
Selenium		1.0		**533**	500.0	0	106.6	529.5	0.66	05/14/2024
Thallium		2.0		**264**	250.0	0	105.7	266.0	0.72	05/14/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

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

Batch 223763 **SampType:** MBLK Units **µg/L**

SampID: MBLK-223763

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	06/06/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	06/06/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	06/06/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	06/06/2024
Copper		1.0		**< 1.0**	0.2980	0	0	-100	100	06/06/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	06/06/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	06/06/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	06/06/2024

Batch 223763 **SampType:** LCS Units **µg/L**

SampID: LCS-223763

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**525**	500.0	0	105.0	80	120	06/06/2024
Boron		25.0		**454**	500.0	0	90.9	80	120	06/06/2024
Chromium		1.5		**191**	200.0	0	95.7	80	120	06/06/2024
Cobalt		1.0		**468**	500.0	0	93.5	80	120	06/06/2024
Copper		1.0		**234**	250.0	0	93.6	80	120	06/06/2024
Iron		25.0		**1910**	2000	0	95.7	80	120	06/06/2024
Lead		1.0		**475**	500.0	0	95.0	80	120	06/06/2024
Nickel		1.0		**461**	500.0	0	92.1	80	120	06/06/2024

Batch 223769 **SampType:** MBLK Units **µg/L**

SampID: MBLK-223769

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	06/04/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	06/04/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	06/04/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	06/05/2024
Cadmium		1.0		**< 1.0**	0.1340	0	0	-100	100	06/04/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	06/04/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	06/04/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	06/05/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	06/04/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	06/04/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	06/04/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

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

Batch 223769 **SampType:** LCS Units µg/L
SampID: LCS-223769

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2010**	2000	0	100.6	80	120	06/04/2024
Arsenic		1.0		**480**	500.0	0	96.0	80	120	06/04/2024
Barium		1.0		**1900**	2000	0	95.1	80	120	06/04/2024
Boron		25.0		**473**	500.0	0	94.6	80	120	06/05/2024
Cadmium		1.0		**47.7**	50.00	0	95.3	80	120	06/04/2024
Cobalt		1.0		**462**	500.0	0	92.4	80	120	06/04/2024
Lead		1.0		**468**	500.0	0	93.6	80	120	06/04/2024
Lithium	*	3.0		**495**	500.0	0	99.0	80	120	06/05/2024
Molybdenum		1.5		**430**	500.0	0	86.0	80	120	06/04/2024
Selenium		1.0		**482**	500.0	0	96.4	80	120	06/04/2024
Thallium		2.0		**201**	250.0	0	80.5	80	120	06/05/2024

SW-846 7470A (DISSOLVED)

Batch 222472 **SampType:** MS Units µg/L
SampID: 24041541-024CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.24**	5.000	0.08220	103.1	75	125	05/06/2024

Batch 222472 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-024CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.24**	5.000	0.08220	103.2	5.239	0.02	05/06/2024

Batch 222472 **SampType:** MS Units µg/L
SampID: 24041541-032DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.37**	5.000	0	107.4	75	125	05/06/2024

Batch 222472 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-032DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.10**	5.000	0	101.9	5.371	5.25	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (DISSOLVED)

Batch 222481 **SampType:** MS Units µg/L
SampID: 24041541-037DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.39**	5.000	0	87.8	75	125	05/06/2024

Batch 222481 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-037DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.28**	5.000	0	85.6	4.389	2.55	05/06/2024

Batch 222504 **SampType:** MS Units µg/L
SampID: 24041541-084HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**3.92**	5.000	0	78.4	75	125	05/21/2024

Batch 222504 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-084HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20	SR	**3.16**	5.000	0	63.3	3.918	21.29	05/21/2024

Batch 222504 **SampType:** MS Units µg/L
SampID: 24050007-005GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.16**	5.000	0.1046	81.2	75	125	05/07/2024

Batch 222504 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24050007-005GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.05**	5.000	0.1046	79.0	4.162	2.68	05/07/2024

Batch 222670 **SampType:** MBLK Units µg/L
SampID: MBLK-222670

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/10/2024

Batch 222670 **SampType:** LCS Units µg/L
SampID: LCS-222670

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.44**	5.000	0	108.8	85	115	05/10/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (DISSOLVED)

Batch 222670 **SampType:** MS Units µg/L
SampID: 24041541-018GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.05**	5.000	0	101.0	75	125	05/14/2024

Batch 222670 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-018GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.15**	5.000	0	103.1	5.050	2.05	05/14/2024

Batch 223077 **SampType:** MS Units µg/L
SampID: 24041541-095IMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.44**	5.000	0	88.8	75	125	05/21/2024

Batch 223077 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-095IMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.47**	5.000	0	89.3	4.440	0.60	05/21/2024

Batch 223077 **SampType:** MS Units µg/L
SampID: 24050001-004EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.66**	5.000	0	93.3	75	125	05/22/2024

Batch 223077 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24050001-004EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.43**	5.000	0	88.7	4.664	5.09	05/22/2024

SW-846 7470A (TOTAL)

Batch 222438 **SampType:** MBLK Units µg/L
SampID: MBLK-222438

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/06/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (TOTAL)

Batch 222438 **SampType:** LCS Units µg/L
SampID: LCS-222438

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.51**	5.000	0	110.3	85	115	05/06/2024

Batch 222438 **SampType:** MS Units µg/L
SampID: 24041541-006GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.27**	5.000	0.3041	79.4	75	125	05/03/2024

Batch 222438 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-006GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.46**	5.000	0.3041	83.1	4.272	4.24	05/03/2024

Batch 222472 **SampType:** MBLK Units µg/L
SampID: MBLK-222472

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/08/2024

Batch 222472 **SampType:** LCS Units µg/L
SampID: LCS-222472

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.50**	5.000	0	110.0	85	115	05/08/2024

Batch 222481 **SampType:** MBLK Units µg/L
SampID: MBLK-222481

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/14/2024

Batch 222481 **SampType:** LCS Units µg/L
SampID: LCS-222481

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20	S	**5.86**	5.000	0	117.2	85	115	05/14/2024

Batch 222482 **SampType:** MBLK Units µg/L
SampID: MBLK-222482

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/08/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (TOTAL)

Batch 222482 **SampType:** LCS Units µg/L
SampID: LCS-222482

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.38**	5.000	0	107.7	85	115	05/08/2024

Batch 222482 **SampType:** MS Units µg/L
SampID: 24041541-048BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.05**	5.000	0.5139	90.8	75	125	05/06/2024

Batch 222482 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-048BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.11**	5.000	0.5139	91.9	5.053	1.07	05/06/2024

Batch 222482 **SampType:** MS Units µg/L
SampID: 24041541-066BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.36**	5.000	0.3407	100.4	75	125	05/14/2024

Batch 222482 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-066BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.70**	5.000	0.3407	107.2	5.358	6.19	05/14/2024

Batch 222504 **SampType:** MBLK Units µg/L
SampID: MBLK-222504

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/08/2024

Batch 222504 **SampType:** LCS Units µg/L
SampID: LCS-222504

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20	S	**6.31**	5.000	0	126.2	85	115	05/08/2024
Mercury		0.20		**4.62**	5.000	0	92.4	85	115	05/15/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (TOTAL)

Batch 222725 **SampType:** MBLK Units µg/L
SampID: MBLK-222725

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/10/2024

Batch 222725 **SampType:** LCS Units µg/L
SampID: LCS-222725

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.73**	5.000	0	94.6	85	115	05/10/2024

Batch 222725 **SampType:** MS Units µg/L
SampID: 24041541-036CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.25**	5.000	0	84.9	75	125	05/17/2024

Batch 222725 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-036CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.28**	5.000	0	85.6	4.246	0.77	05/17/2024

Batch 222921 **SampType:** MBLK Units µg/L
SampID: MBLK-222921

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/18/2024

Batch 222921 **SampType:** LCS Units µg/L
SampID: LCS-222921

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.41**	5.000	0	88.1	85	115	05/18/2024

Batch 222921 **SampType:** MS Units µg/L
SampID: 24041541-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.41**	5.000	0	88.2	75	125	05/18/2024

Batch 222921 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.56**	5.000	0	91.2	4.409	3.38	05/18/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (TOTAL)

Batch 222921 **SampType:** MS Units µg/L
SampID: 24041541-086CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.53**	5.000	0	90.5	75	125	05/18/2024

Batch 222921 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-086CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.49**	5.000	0	89.8	4.525	0.78	05/18/2024

Batch 222984 **SampType:** MBLK Units µg/L
SampID: MBLK-222984

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/19/2024

Batch 222984 **SampType:** LCS Units µg/L
SampID: LCS-222984

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.59**	5.000	0	91.8	85	115	05/19/2024

Batch 223054 **SampType:** MBLK Units µg/L
SampID: MBLK-223054

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/17/2024

Batch 223054 **SampType:** LCS Units µg/L
SampID: LCS-223054

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.26**	5.000	0	105.3	85	115	05/17/2024

Batch 223054 **SampType:** MS Units µg/L
SampID: 24041541-099BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.88**	5.000	0	97.6	75	125	05/17/2024

Batch 223054 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-099BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.77**	5.000	0	95.5	4.880	2.21	05/17/2024

Client: Ramboll **Work Order:** 24041541

Client Project: COF-24Q2 **Report Date:** 17-Jun-24

SW-846 7470A (TOTAL)

Batch 223077 **SampType:** MBLK Units µg/L
SampID: MBLK-223077

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/21/2024

Batch 223077 **SampType:** LCS Units µg/L
SampID: LCS-223077

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.50**	5.000	0	90.1	85	115	05/21/2024

Batch 223153 **SampType:** MBLK Units µg/L
SampID: MBLK-223153

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	05/20/2024

Batch 223153 **SampType:** LCS Units µg/L
SampID: LCS-223153

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.65**	5.000	0	93.0	85	115	05/20/2024

Batch 223153 **SampType:** MS Units µg/L
SampID: 24041541-067BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**3.99**	5.000	0	79.8	75	125	05/20/2024

Batch 223153 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24041541-067BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**3.94**	5.000	0	78.8	3.991	1.34	05/20/2024

Batch 223672 **SampType:** MBLK Units µg/L
SampID: MBLK-223672

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	06/03/2024

Batch 223672 **SampType:** LCS Units µg/L
SampID: LCS-223672

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.96**	5.000	0	99.2	85	115	06/03/2024

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q2

Work Order: 24041541
Report Date: 17-Jun-24

Carrier: Payton Yoch

Received By: NR

Completed by: Nicholas G Reed
On: 29-Apr-24
Nick Reed

Reviewed by: Ellie Hopkins
On: 09-May-24
Ellie Hopkins

Pages to follow: Chain of custody 45 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 1.7
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

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

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

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

pH strip #96651/89660. - pschultz - 4/30/2024 7:51:31 AM

Per Tracy Carroll, some G411 containers may be marked as G410, and some G410 containers may be marked as G411 (bagging error during bottle prep). - ehurley - 4/30/2024 9:29:57 AM

Samples were received on 4/30/24 at 16:30 on ice [19.3C - LTG#5]. - nickreed - 4/30/2024 5:47:16 PM

Added Sodium Hydroxide(95613) to sample G153. Added Nitric Acid(97528) to sample G314, G314D, & G316. Preservation checks for O&G analysis are to be completed by the laboratory technician prior to analysis. -pH strip #89960/96651. - nickreed - 4/30/2024 5:53:34 PM

Samples were received on 5/1/2024 at 16:31 on ice [12.1C - LTG#5]. - pschultz - 5/2/2024 8:39:06 AM

pH strip #96651/89660. - pschultz - 5/2/2024 8:39:45 AM

Additional Sodium Hydroxide (95443) preservative was needed for samples G122 and G272 upon arrival at the laboratory. - pschultz - 5/2/2024 8:39:49 AM

Samples were received on 5/2/24 at 16:15 on ice [16.1C - LTG#5]. Added Nitric Acid(97606) to sample G106 & G275D. Added Sodium Hydroxide(95443) to sample G401. Preservation checks for O&G analysis are to be completed by the laboratory technician prior to analysis. pH strip #96651/89660. - nickreed - 5/2/2024 6:50:49 PM

Samples were received on 5/3/24 at 1148 on ice [16.3C - LTG5]. pH strip #89660/96651. Preservation checks for O&G analysis are to be

completed by the laboratory technician prior to analysis. - amberdilallo - 5/3/2024 12:46:21 PM

Samples were received on 5/6/24 at 1642 on ice [12.9C - LTG5]. Additional Nitric Acid (97606) was needed upon arrival at the laboratory for G285 and G302. pH strip #89660/96651. - amberdilallo - 5/7/2024 8:24:08 AM

Samples were received on 5/7/2024 at 16:02 on ice [16.7C - LTG#7]. - pschultz - 5/7/2024 5:07:35 PM

pH strip #96651/89660. LH - pschultz - 5/7/2024 5:07:38 PM

Additional Nitric Acid (97606) preservative was needed for samples G1001 and G276 upon arrival at the laboratory. LH - pschultz - 5/7/2024 5:07:41 PM

Samples were received on 5/8/24 at 1348 on ice [6.9C - LTG5]. Additional Nitric Acid (97737) was needed upon arrival at the laboratory for L203 and Field Blank. pH strip #89660/96651. Preservation checks for O&G analysis are to be completed by the laboratory technician prior to analysis. - amberdilallo - 5/8/2024 4:27:38 PM

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes: MATRIX — DRINKING WATER (DW), WATER (WT), WASTE WATER (WW), PRODUCT (P), SOIL/SOLID (SL), OIL (OL), WIPE (WP), AIR (AR), OTHER (OT), TISSUE (TS)

Sample IDs MUST BE UNIQUE (A-Z, 0-9 / ,-)

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G308	WT	G				2	1		1							X						X								24041541-065
2	G310	WT	G				2	1		1							X						X								24041541-066
3	G312	WT	G				2	1		1							X						X								24041541-067
4	G313	WT	G				2	1		1							X						X								24041541-068
5	G314	WT	G				2	1		1							X						X								24041541-069
6	G314D	WT	G				2	1		1							X						X								24041541-070
7	G315	WT	G				2	1		1							X						X								24041541-071
8	G316	WT	G				2	1		1							X						X								24041541-072
9	G401	WT	G				4	1		2		1						X						X			X				24041541-073
10	G402	WT	G				4	1		2		1						X						X			X				24041541-074
11	G403	WT	G				4	1		2		1						X						X			X				24041541-075
12	G404	WT	G				4	1		2		1						X						X			X				24041541-076
13	G405	WT	G				4	1		2		1						X						X			X				24041541-077
14	G406	WT	G				4	1		2		1						X						X			X				24041541-078
15	G407	WT	G	4-29-24	1452		4	1		2		1						X						X			X				24041541-079
16	G410	WT	G				4	1		2		1															X				24041541-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 0	[signature]	4/29/24	0500	[signature]	4/29/24	1700	N / Y / Z

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 4-29-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

PM: 96651/89660

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

(A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106		Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G411	WT	G	4-29	1311		4	1		2		1															X						24041541-081
2	L203	WT	G				18	9	4	1	3	1											X										24041541-082
3	NE Riser	WT	G				0												X						X								24041541-083
4	R104	WT	G				15	6	3	2	3	1											X					X					24041541-084
5	R201	WT	G				6	2	1	2		1							X						X			X					24041541-085
6	R205	WT	G				6	2	1	2		1																X					24041541-086
7	SG-02	WT	G				0										X	X					X	X									24041541-087
8	SG-03	WT	G				0										X	X					X	X									24041541-088
9	T127	WT	G				14	6	3	1	3	1										X											24041541-089
10	T128	WT	G				14	6	3	1	3	1										X											24041541-090
11	X201	WT	G				2	1		1										X						X							24041541-091
12	XPW01	WT	G				2	1		1													X										24041541-092
13	XPW02	WT	G				2	1		1													X										24041541-093
14	XSG-01	WT	G				0										X						X										24041541-094
15	Field Blank	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X				24041541-095
16	G102 Duplicate	WT	G				15	6	3	2	3	1										X						X					24041541-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 0	[signature]	4/29/24	1500	[signature]	4/29/24	1700	T ② Z
Blanks: filter upon arrival at the lab for dissolved parameters.							—

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 4-29-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

LT6 #3

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1														X								24041541-001
2	G1001	WT	G				2	1		1								X						X								24041541-002
3	G1003	WT	G				4	1		3								X						X						X		24041541-003
4	G101	WT	G				14	6	3	1	3	1										X										24041541-004
5	G102	WT	G				15	6	3	2	3	1										X						X				24041541-005
6	G103	WT	G				15	6	3	2	3	1										X						X				24041541-006
7	G105	WT	G				15	6	3	2	3	1										X						X				24041541-007
8	G106	WT	G				15	6	3	2	3	1										X						X				24041541-008
9	G107	WT	G				14	6	3	1	3	1										X										24041541-009
10	G108	WT	G				14	6	3	1	3	1										X										24041541-010
11	G109	WT	G				14	6	3	1	3	1										X										24041541-011
12	G110	WT	G	4-30-24	1448		14	6	3	1	3	1										X										24041541-012
13	G111	WT	G	4-30-24	1411		14	6	3	1	3	1										X										24041541-013
14	G119	WT	G				14	6	3	1	3	1										X										24041541-014
15	G120	WT	G				14	6	3	1	3	1										X										24041541-015
16	G121	WT	G				14	6	3	1	3	1										X										24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Daniel Crump	4-30	16:30	Nick Reed	4/30/24	1630	N ⊖ N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 4-30-24

Temp in °C: 14 | Received on Ice (Y/N): | Custody Sealed Cooler (Y/N): | Samples Intact (Y/N):

ØHS 89760/96651

G153: Added NaOH(95613)

G314, G314D, & G316: Added HNO_3(97528)

LTG#5

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				14	6	3	1	3	1										X											24041541-017
2	G123	WT	G				14	6	3	1	3	1										X											24041541-018
3	G124	WT	G				14	6	3	1	3	1										X											24041541-019
4	G125	WT	G				14	6	3	1	3	1										X											24041541-020
5	G126	WT	G				14	6	3	1	3	1										X											24041541-021
6	G151	WT	G	4-30-24	1011		4	2		1		1																	X				24041541-022
7	G152	WT	G	~~4-30-24~~			4	2		1		1																	X				24041541-023
8	G153	WT	G	4-30-24	1238		4	2		1		1																	X				24041541-024
9	G154	WT	G	4-30-24	1201		5	2		2		1															X		X				24041541-025
10	G155	WT	G	4-30-24	1121		4	2		1		1																	X				24041541-026
11	G200	WT	G				6	2	1	2		1							X						X			X					24041541-027
12	G206	WT	G	4-30-24	1028		6	2	1	2		1							X						X			X					24041541-028
13	G206D	WT	G	4-30-24	1058		2	1		1									X						X			X					24041541-029
14	G207	WT	G				6	2	1	2		1																X					24041541-030
15	G208	WT	G	4-30-24	1128		6	2	1	2		1																X					24041541-031
16	G209	WT	G				6	2	1	2		1							X						X			X					24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Daniel Crump	4-30	16:30	Mich Bell	4/30/24	1630	7 Y N
							14

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cup

SIGNATURE of SAMPLER: Justin Cup

DATE Signed (MM/DD/YY): 4-30-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																X				24041541-033
2	G211	WT	G				6	2	1	2		1																X				24041541-034
3	G212	WT	G				6	2	1	2		1							X						X			X				24041541-035
4	G213	WT	G				6	2	1	2		1							X						X			X				24041541-036
5	G214	WT	G	4-30-24	1417		6	2	1	2		1																X				24041541-037
6	G215	WT	G	4-30-24	1319		6	2	1	2		1							X						X			X				24041541-038
7	G216	WT	G	4-30-24	1220		6	2	1	2		1																X				24041541-039
8	G217	WT	G				6	2	1	2		1							X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1							X						X			X				24041541-041
10	G219	WT	G				2	1		1																				X		24041541-104
11	G220	WT	G				2	1		1																				X		24041541-105
12	G270	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-042
13	G271	WT	G				6	2	1	2		1								X						X		X				24041541-043
14	G272	WT	G				6	2	1	2		1								X						X		X				24041541-044
15	G273	WT	G				6	2	1	2		1								X						X		X				24041541-045
16	G274	WT	G				6	2	1	2		1																X				24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Daniel Crump	4-30	16:30	[illegible] Reed	4/30/24	1630	5 Y N
							14

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [illegible] Colp

DATE Signed (MM/DD/YY): 4-30-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1							X						X									24041541-063
2	G307D	WT	G				2	1		1							X						X									24041541-064
3	G308	WT	G				2	1		1							X						X									24041541-065
4	G310	WT	G				2	1		1							X						X									24041541-066
5	G312	WT	G				2	1		1							X						X									24041541-067
6	G313	WT	G				2	1		1							X						X									24041541-068
7	G314	WT	G	4/30/24	1336		2	1		1							X						X									24041541-069
8	G314D	WT	G	4/30/24	1225		2	1		1							X						X									24041541-070
9	G315	WT	G				2	1		1							X						X									24041541-071
10	G316	WT	G	4/30/24	1122		2	1		1							X						X									24041541-072
11	G401	WT	G				4	1		2		1						X						X			X					24041541-073
12	G402	WT	G				4	1		2		1						X						X			X					24041541-074
13	G403	WT	G				4	1		2		1						X						X			X					24041541-075
14	G404	WT	G				4	1		2		1						X						X			X					24041541-076
15	G405	WT	G				4	1		2		1						X						X			X					24041541-077
16	G406	WT	G				4	1		2		1						X						X			X					24041541-078

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	4-30	16:30	Nick Reed	4/30/24	1620	19	Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Gil

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 4-30-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X			X					24041541-079
2	G410	WT	G	4/30/24	1006		4	1		2		1															X					24041541-080
3	G411	WT	G				4	1		2		1															X					24041541-081
4	L203	WT	G				18	9	4	1	3	1											X									24041541-082
5	NE Riser	WT	G				0												X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1											X					X				24041541-084
7	R201	WT	G				6	2	1	2		1							X						X			X				24041541-085
8	R205	WT	G				6	2	1	2		1																X				24041541-086
9	SG-02	WT	G				0										X	X					X	X								24041541-087
10	SG-03	WT	G				0										X	X					X	X								24041541-088
11	T127	WT	G				14	6	3	1	3	1										X										24041541-089
12	T128	WT	G				14	6	3	1	3	1										X										24041541-090
13	X201	WT	G				2	1		1										X						X						24041541-091
14	XPW01	WT	G				2	1		1													X									24041541-092
15	XPW02	WT	G				2	1		1													X									24041541-093
16	XSG-01	WT	G				0										X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Samuel Crump	4-30	16:30	[illegible]	4/30/24	1630	7 ⓪ z
							Temp in °C / Received on Ice (Y/N) / Custody Sealed Cooler (Y/N) / Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 4-30-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1														X								24041541-001
2	G1001	WT	G				2	1		1								X						X								24041541-002
3	G1003	WT	G				4	1		3								X						X						X		24041541-003
4	G101	WT	G				14	6	3	1	3	1										X										24041541-004
5	G102	WT	G				15	6	3	2	3	1										X						X				24041541-005
6	G103	WT	G				15	6	3	2	3	1										X						X				24041541-006
7	G105	WT	G				15	6	3	2	3	1										X						X				24041541-007
8	G106	WT	G				15	6	3	2	3	1										X						X				24041541-008
9	G107	WT	G				14	6	3	1	3	1										X										24041541-009
10	G108	WT	G	5-1-24	1036		14	6	3	1	3	1										X										24041541-010
11	G109	WT	G	5-1-24	0953		14	6	3	1	3	1										X										24041541-011
12	G110	WT	G				14	6	3	1	3	1										X										24041541-012
13	G111	WT	G				14	6	3	1	3	1										X										24041541-013
14	G119	WT	G	5-1-24	1222		14	6	3	1	3	1										X										24041541-014
15	G120	WT	G	5-1-24	1254		14	6	3	1	3	1										X										24041541-015
16	G121	WT	G	5-1-24	1321		14	6	3	1	3	1										X										24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5-1	1631	[illegible]	5/1/24	1133	12.1	Y	N	
							0605			

Added NaOH(95443) to G122 + G272
pH ✓ 9665/189660 BS 5/2
ØHS

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-1-24

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G	5-1-24	1359		14	6	3	1	3	1										X											24041541-017
2	G123	WT	G				14	6	3	1	3	1										X											24041541-018
3	G124	WT	G	5-1-24	1451		14	6	3	1	3	1										X											24041541-019
4	G125	WT	G				14	6	3	1	3	1										X											24041541-020
5	G126	WT	G				14	6	3	1	3	1										X											24041541-021
6	G151	WT	G				4	2		1		1																	X				24041541-022
7	G152	WT	G				4	2		1		1																	X				24041541-023
8	G153	WT	G				4	2		1		1																	X				24041541-024
9	G154	WT	G				5	2		2		1																X		X			24041541-025
10	G155	WT	G				4	2		1		1																		X			24041541-026
11	G200	WT	G				6	2	1	2		1							X						X			X					24041541-027
12	G206	WT	G				6	2	1	2		1							X						X			X					24041541-028
13	G206D	WT	G				2	1		1									X						X			X					24041541-029
14	G207	WT	G				6	2	1	2		1																X					24041541-030
15	G208	WT	G				6	2	1	2		1																X					24041541-031
16	G209	WT	G	5-1-24	1155		6	2	1	2		1							X						X			X					24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q2 Rev 1	[illegible] Camp	5-1	1631	[illegible]	5/1/24	1631

SAMPLE CONDITIONS: Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G	5-1-24	1128		6	2	1	2		1																X				24041541-033
2	G211	WT	G	5-1-24	1040		6	2	1	2		1																X				24041541-034
3	G212	WT	G	5-1-24	0952		6	2	1	2		1							X						X			X				24041541-035
4	G213	WT	G				6	2	1	2		1							X						X			X				24041541-036
5	G214	WT	G				6	2	1	2		1																X				24041541-037
6	G215	WT	G				6	2	1	2		1							X						X			X				24041541-038
7	G216	WT	G				6	2	1	2		1																X				24041541-039
8	G217	WT	G				6	2	1	2		1							X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1							X						X			X				24041541-041
10	G219	WT	G				2	1		1																				X		24041541-104
11	G220	WT	G				2	1		1																				X		24041541-105
12	G270	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-042
13	G271	WT	G	5-1-24	1337		6	2	1	2		1								X						X		X				24041541-043
14	G272	WT	G	5-1-24	1310		6	2	1	2		1								X						X		X				24041541-044
15	G273	WT	G	5-1-24	1231		6	2	1	2		1								X						X		X				24041541-045
16	G274	WT	G	5-1-24	1421		6	2	1	2		1																X				24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Camp	5-1	1631	Omar Quezada	5/1/24	1631				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Camp

SIGNATURE of SAMPLER: Justin Camp

DATE Signed (MM/DD/YY): 5-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
	Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X		X				24041541-047
2	G275D	WT	G				2	1		1										X						X						24041541-048
3	G276	WT	G				6	2	1	2		1								X						X		X				24041541-049
4	G277	WT	G				6	2	1	2		1								X						X		X				24041541-050
5	G278	WT	G				6	2	1	2		1																X				24041541-051
6	G279	WT	G				6	2	1	2		1								X						X	X	X				24041541-052
7	G280	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-053
8	G281	WT	G				4	1		2		1					X	X					X	X			X					24041541-054
9	G283	WT	G				2	1		1										X						X						24041541-055
10	G284	WT	G				2	1		1										X						X						24041541-056
11	G285	WT	G				2	1		1										X						X						24041541-057
12	G301	WT	G				2	1		1							X						X									24041541-058
13	G302	WT	G				2	1		1							X						X									24041541-059
14	G303	WT	G	5/1/24	1049		2	1		1							X						X									24041541-060
15	G305	WT	G	5/1/24	1441		2	1		1							X						X									24041541-061
16	G306	WT	G	5/1/24	1347		2	1		1							X						X									24041541-062

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5-1	1631	[illegible]	5/1/24	1631		Y	Z	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-1-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N) COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1						X						X									24041541-063
2	G307D	WT	G				2	1		1						X						X									24041541-064
3	G308	WT	G				2	1		1						X						X									24041541-065
4	G310	WT	G				2	1		1						X						X									24041541-066
5	G312	WT	G				2	1		1						X						X									24041541-067
6	G313	WT	G	5/1/24	1213		2	1		1						X						X									24041541-068
7	G314	WT	G				2	1		1						X						X									24041541-069
8	G314D	WT	G				2	1		1						X						X									24041541-070
9	G315	WT	G				2	1		1						X						X									24041541-071
10	G316	WT	G				2	1		1						X						X									24041541-072
11	G401	WT	G				4	1		2		1					X						X			X					24041541-073
12	G402	WT	G				4	1		2		1					X						X			X					24041541-074
13	G403	WT	G				4	1		2		1					X						X			X					24041541-075
14	G404	WT	G				4	1		2		1					X						X			X					24041541-076
15	G405	WT	G				4	1		2		1					X						X			X					24041541-077
16	G406	WT	G				4	1		2		1					X						X			X					24041541-078

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5-1	1631	[illegible]	5/1/24	1631		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-1-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

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Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1					X						X			X					24041541-079
2	G410	WT	G				4	1		2		1														X					24041541-080
3	G411	WT	G				4	1		2		1														X					24041541-081
4	L203	WT	G				18	9	4	1	3	1										X									24041541-082
5	NE Riser	WT	G				0											X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1										X					X				24041541-084
7	R201	WT	G				6	2	1	2		1						X						X			X				24041541-085
8	R205	WT	G				6	2	1	2		1															X				24041541-086
9	SG-02	WT	G				0									X	X					X	X								24041541-087
10	SG-03	WT	G				0									X	X					X	X								24041541-088
11	T127	WT	G				14	6	3	1	3	1									X										24041541-089
12	T128	WT	G	5-1-24	1131		14	6	3	1	3	1									X										24041541-090
13	X201	WT	G				2	1		1									X						X						24041541-091
14	XPW01	WT	G				2	1		1												X									24041541-092
15	XPW02	WT	G				2	1		1												X									24041541-093
16	XSG-01	WT	G				0									X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Crump S-1		1631	[illegible]	5/1/24	1631				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-1-24

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes: MATRIX — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1														X							24041541-001
2	G1001	WT	G				2	1		1								X						X							24041541-002
3	G1003	WT	G				4	1		3								X						X							24041541-003
4	G101	WT	G	5-2-24	1022		14	6	3	1	3	1										X									24041541-004
5	G102	WT	G	5-2-24	1103		15	6	3	2	3	1										X						X			24041541-005
6	G103	WT	G	5-2-24	1226		15	6	3	2	3	1										X						X			24041541-006
7	G105	WT	G	5-2-24	1330		15	6	3	2	3	1										X						X			24041541-007
8	G106	WT	G	5-2-24	1415		15	6	3	2	3	1										X						X			24041541-008
9	G107	WT	G				14	6	3	1	3	1										X									24041541-009
10	G108	WT	G				14	6	3	1	3	1										X									24041541-010
11	G109	WT	G				14	6	3	1	3	1										X									24041541-011
12	G110	WT	G				14	6	3	1	3	1										X									24041541-012
13	G111	WT	G				14	6	3	1	3	1										X									24041541-013
14	G119	WT	G				14	6	3	1	3	1										X									24041541-014
15	G120	WT	G				14	6	3	1	3	1										X									24041541-015
16	G121	WT	G				14	6	3	1	3	1										X									24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Daniel Crump	5-2	[redacted]	[illegible]	5/2/24	1615	16.19	(Y)	N	
G1003: include Appendix III/IV, major ions and field parameters if well volume is sufficient for sample collection							5			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: [redacted] Cole

SIGNATURE of SAMPLER: [redacted] DATE Signed (MM/DD/YY): 5-2-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

Added HNO_3 to G106 & G275D. Added NaOH to G401. 96651/89660 M 5/2

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes: MATRIX — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				14	6	3	1	3	1									X									24041541-017
2	G123	WT	G				14	6	3	1	3	1									X									24041541-018
3	G124	WT	G				14	6	3	1	3	1									X									24041541-019
4	G125	WT	G	5-2-24	0941		14	6	3	1	3	1									X									24041541-020
5	G126	WT	G				14	6	3	1	3	1									X									24041541-021
6	G151	WT	G				4	2		1		1																X		24041541-022
7	G152	WT	G				4	2		1		1																X		24041541-023
8	G153	WT	G				4	2		1		1																X		24041541-024
9	G154	WT	G				5	2		2		1														X		X		24041541-025
10	G155	WT	G				4	2		1		1																X		24041541-026
11	G200	WT	G				6	2	1	2		1						X						X			X			24041541-027
12	G206	WT	G				6	2	1	2		1						X						X			X			24041541-028
13	G206D	WT	G				2	1		1								X						X			X			24041541-029
14	G207	WT	G				6	2	1	2		1															X			24041541-030
15	G208	WT	G				6	2	1	2		1															X			24041541-031
16	G209	WT	G				6	2	1	2		1						X						X			X			24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS		
COF-24Q2 Rev 0	Daniel Crump	5-2	1615	[illegible]	5/2/24	1615		Y	N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cop

SIGNATURE of SAMPLER: [illegible] DATE Signed (MM/DD/YY): 5-2-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes: MATRIX — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106		Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																X					24041541-033
2	G211	WT	G				6	2	1	2		1																X					24041541-034
3	G212	WT	G				6	2	1	2		1							X						X			X					24041541-035
4	G213	WT	G				6	2	1	2		1							X						X			X					24041541-036
5	G214	WT	G				6	2	1	2		1																X					24041541-037
6	G215	WT	G				6	2	1	2		1							X						X			X					24041541-038
7	G216	WT	G				6	2	1	2		1																X					24041541-039
8	G217	WT	G	5-2-24	1239		6	2	1	2		1							X						X			X					24041541-040
9	G218	WT	G	5-2-24	1147		6	2	1	2		1							X						X			X					24041541-041
10	G270	WT	G				6	2	1	2		1						X		X				X		X	X	X					24041541-042
11	G271	WT	G				6	2	1	2		1								X						X		X					24041541-043
12	G272	WT	G				6	2	1	2		1								X						X		X					24041541-044
13	G273	WT	G				6	2	1	2		1								X						X		X					24041541-045
14	G274	WT	G				6	2	1	2		1																X					24041541-046
15	G275	WT	G	5-2-24	1033		6	2	1	2		1								X						X		X					24041541-047
16	G275D	WT	G	5-2-24	0958		2	1		1										X						X							24041541-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Daniel Crump	5-2	16:15		5/2/24	1615		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: John Cole

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5-2-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Preservatives: Unpreserved, H_2SO_4, HNO_3, HCl, NaOH, $Na_2S_2O_3$, Methanol, Other

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G276	WT	G				6	2	1	2		1								X						X		X			24041541-049
2	G277	WT	G				6	2	1	2		1								X						X		X			24041541-050
3	G278	WT	G				6	2	1	2		1																X			24041541-051
4	G279	WT	G				6	2	1	2		1								X						X	X	X			24041541-052
5	G280	WT	G				6	2	1	2		1						X		X				X		X	X	X			24041541-053
6	G281	WT	G				4	1		2		1					X	X					X	X			X				24041541-054
7	G283	WT	G				2	1		1										X						X					24041541-055
8	G284	WT	G				2	1		1										X						X					24041541-056
9	G285	WT	G				2	1		1										X						X					24041541-057
10	G301	WT	G				2	1		1							X						X								24041541-058
11	G302	WT	G				2	1		1							X						X								24041541-059
12	G303	WT	G				2	1		1							X						X								24041541-060
13	G305	WT	G				2	1		1							X						X								24041541-061
14	G306	WT	G				2	1		1							X						X								24041541-062
15	G307	WT	G	5/2/24	1432		2	1		1							X						X								24041541-063
16	G307D	WT	G	5/2/24	1435		2	1		1							X						X								24041541-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Daniel Crump	5-2	1615	[illegible]	5/2/24	1615		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [illegible] DATE Signed (MM/DD/YY): 5-2-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes: MATRIX — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106		Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G308	WT	G	5/2/24	1135		2	1		1							X						X									24041541-065
2	G310	WT	G	~~5/2/24~~			2	1		1							X						X									24041541-066
3	G312	WT	G				2	1		1							X						X									24041541-067
4	G313	WT	G				2	1		1							X						X									24041541-068
5	G314	WT	G				2	1		1							X						X									24041541-069
6	G314D	WT	G				2	1		1							X						X									24041541-070
7	G315	WT	G	5/2/24	1031		2	1		1							X						X									24041541-071
8	G316	WT	G				2	1		1							X						X									24041541-072
9	G401	WT	G	5-2-24	1406		4	1		2		1						X						X			X					24041541-073
10	G402	WT	G				4	1		2		1						X						X			X					24041541-074
11	G403	WT	G				4	1		2		1						X						X			X					24041541-075
12	G404	WT	G				4	1		2		1						X						X			X					24041541-076
13	G405	WT	G				4	1		2		1						X						X			X					24041541-077
14	G406	WT	G				4	1		2		1						X						X			X					24041541-078
15	G407	WT	G				4	1		2		1						X						X			X					24041541-079
16	G410	WT	G				4	1		2		1															X					24041541-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Daniel Crump	5-2	1615	[illegible]	5/2/24	1615		Y	Z	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-2-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes: MATRIX — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; TISSUE OT; OTHER TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106		Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G411	WT	G				4	1		2		1															X						24041541-081
2	L203	WT	G				18	9	4	1	3	1											X										24041541-082
3	NE Riser	WT	G				0												X						X								24041541-083
4	R104	WT	G	5-2-24	1300		15	6	3	2	3	1											X					X					24041541-084
5	R201	WT	G				6	2	1	2		1							X						X			X					24041541-085
6	R205	WT	G				6	2	1	2		1																X					24041541-086
7	SG-02	WT	G				0										X	X					X	X									24041541-087
8	SG-03	WT	G				0										X	X					X	X									24041541-088
9	T127	WT	G				14	6	3	1	3	1										X											24041541-089
10	T128	WT	G				14	6	3	1	3	1										X											24041541-090
11	X201	WT	G				2	1		1										X						X							24041541-091
12	XPW01	WT	G				2	1		1													X										24041541-092
13	XPW02	WT	G				2	1		1													X										24041541-093
14	XSG-01	WT	G				0										X						X										24041541-094
15	Field Blank	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X				24041541-095
16	G102 Duplicate	WT	G	5-2-24	1103		15	6	3	2	3	1										X						X					24041541-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Daniel Crump	5-2	1615	Paul [illegible]	5/2/24	1615		Y	N	
Blanks: filter upon arrival at the lab for dissolved parameters.							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cap

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-2-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	0

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OT; TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-105		Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G200 Duplicate	WT	G				6	2	1	2		1							X						X			X					24041541-097
2	~~G273 Duplicate~~ G217	WT	G	5-2-24	1239		6	2	1	2		1								X						X		X					24041541-098
3	G301 Duplicate	WT	G				2	1		1							X						X										24041541-099
4	R201 Duplicate	WT	G				6	2	1	2		1								X					X			X					24041541-100
5	Equipment Blank 1	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X				24041541-101
6	Equipment Blank 2	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X				24041541-102
7	Equipment Blank 3	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X				24041541-103
8																																	
9																																	
10																																	
11																																	
12																																	
13																																	
14																																	
15																																	
16																																	

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 0	Samiel Crump	5-2	1615	[illegible]	5/2/24	1615		Y	N	
Blanks: filter upon arrival at the lab for dissolved parameters.							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Gilp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-2-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1													X									24041541-001
2	G1001	WT	G				2	1		1								X					X									24041541-002
3	G1003	WT	G				4	1		3								X					X						X			24041541-003
4	G101	WT	G				14	6	3	1	3	1									X											24041541-004
5	G102	WT	G				15	6	3	2	3	1									X						X					24041541-005
6	G103	WT	G				15	6	3	2	3	1									X						X					24041541-006
7	G105	WT	G				15	6	3	2	3	1									X						X					24041541-007
8	G106	WT	G				15	6	3	2	3	1									X						X					24041541-008
9	G107	WT	G	5-3-24	0920		14	6	3	1	3	1									X											24041541-009
10	G108	WT	G				14	6	3	1	3	1									X											24041541-010
11	G109	WT	G				14	6	3	1	3	1									X											24041541-011
12	G110	WT	G				14	6	3	1	3	1									X											24041541-012
13	G111	WT	G				14	6	3	1	3	1									X											24041541-013
14	G119	WT	G				14	6	3	1	3	1									X											24041541-014
15	G120	WT	G				14	6	3	1	3	1									X											24041541-015
16	G121	WT	G				14	6	3	1	3	1									X											24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	[signature]	5-3	1148	[signature]	5/3/24	1148	5.1	Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-3-24

96651/89660 QMS 5/3

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N) COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				14	6	3	1	3	1									X										24041541-017
2	G123	WT	G				14	6	3	1	3	1									X										24041541-018
3	G124	WT	G				14	6	3	1	3	1									X										24041541-019
4	G125	WT	G				14	6	3	1	3	1									X										24041541-020
5	G126	WT	G	5-3-24	0953		14	6	3	1	3	1									X										24041541-021
6	G151	WT	G				4	2		1		1																X			24041541-022
7	G152	WT	G				4	2		1		1																X			24041541-023
8	G153	WT	G				4	2		1		1																X			24041541-024
9	G154	WT	G				5	2		2		1														X		X			24041541-025
10	G155	WT	G				4	2		1		1																X			24041541-026
11	G200	WT	G				6	2	1	2		1						X						X			X				24041541-027
12	G206	WT	G				6	2	1	2		1						X						X			X				24041541-028
13	G206D	WT	G				2	1		1								X						X			X				24041541-029
14	G207	WT	G				6	2	1	2		1															X				24041541-030
15	G208	WT	G				6	2	1	2		1															X				24041541-031
16	G209	WT	G				6	2	1	2		1						X						X			X				24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	[signature]	5-3	1148	[signature]	5/3/24	1148				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-3-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1															X				24041541-033
2	G211	WT	G				6	2	1	2		1															X				24041541-034
3	G212	WT	G				6	2	1	2		1						X						X			X				24041541-035
4	G213	WT	G				6	2	1	2		1						X						X			X				24041541-036
5	G214	WT	G				6	2	1	2		1															X				24041541-037
6	G215	WT	G				6	2	1	2		1						X						X			X				24041541-038
7	G216	WT	G				6	2	1	2		1															X				24041541-039
8	G217	WT	G				6	2	1	2		1						X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1						X						X			X				24041541-041
10	G219	WT	G				2	1		1																			X		24041541-104
11	G220	WT	G				2	1		1																			X		24041541-105
12	G270	WT	G				6	2	1	2		1					X		X				X		X	X	X					24041541-042
13	G271	WT	G				6	2	1	2		1							X						X		X					24041541-043
14	G272	WT	G				6	2	1	2		1							X						X		X					24041541-044
15	G273	WT	G				6	2	1	2		1							X						X		X					24041541-045
16	G274	WT	G				6	2	1	2		1															X					24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	[signature]	5/3	1148	[signature]	5/3/24	1148	

SAMPLE CONDITIONS	Y	Z	
Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WI
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X		X				24041541-047
2	G275D	WT	G				2	1		1										X						X						24041541-048
3	G276	WT	G				6	2	1	2		1								X						X		X				24041541-049
4	G277	WT	G				6	2	1	2		1								X						X		X				24041541-050
5	G278	WT	G				6	2	1	2		1																X				24041541-051
6	G279	WT	G	5-3-24	9:40		6	2	1	2		1								X						X	X	X				24041541-052
7	G280	WT	G	~~5-3-24~~	~~9:40~~		6	2	1	2		1						X		X				X		X	X	X				24041541-053
8	G281	WT	G	5-3-24	1027		4	1		2		1					X	X					X	X			X					24041541-054
9	G283	WT	G				2	1		1										X						X						24041541-055
10	G284	WT	G				2	1		1										X						X						24041541-056
11	G285	WT	G				2	1		1										X						X						24041541-057
12	G301	WT	G				2	1		1							X						X									24041541-058
13	G302	WT	G				2	1		1							X						X									24041541-059
14	G303	WT	G				2	1		1							X						X									24041541-060
15	G305	WT	G				2	1		1							X						X									24041541-061
16	G306	WT	G				2	1		1							X						X									24041541-062

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	[signature]	5-3	1148	[signature]	5/3/24	1148				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-3-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES	GROUND WATER	DRINKING WATER
UST	RCRA	OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1						X						X									24041541-063
2	G307D	WT	G				2	1		1						X						X									24041541-064
3	G308	WT	G				2	1		1						X						X									24041541-065
4	G310	WT	G	5/3/24	955		2	1		1						X						X									24041541-066
5	G312	WT	G				2	1		1						X						X									24041541-067
6	G313	WT	G				2	1		1						X						X									24041541-068
7	G314	WT	G				2	1		1						X						X									24041541-069
8	G314D	WT	G				2	1		1						X						X									24041541-070
9	G315	WT	G				2	1		1						X						X									24041541-071
10	G316	WT	G				2	1		1						X						X									24041541-072
11	G401	WT	G				4	1		2		1					X						X			X					24041541-073
12	G402	WT	G				4	1		2		1					X						X			X					24041541-074
13	G403	WT	G				4	1		2		1					X						X			X					24041541-075
14	G404	WT	G				4	1		2		1					X						X			X					24041541-076
15	G405	WT	G				4	1		2		1					X						X			X					24041541-077
16	G406	WT	G				4	1		2		1					X						X			X					24041541-078

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	[signature]	5/3	1148	[signature]	5/3/24	1148				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
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Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	Section D Required Client Information: SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X			X					24041541-079
2	G410	WT	G				4	1		2		1															X					24041541-080
3	G411	WT	G				4	1		2		1															X					24041541-081
4	L203	WT	G				18	9	4	1	3	1											X									24041541-082
5	NE Riser	WT	G				0												X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1											X					X				24041541-084
7	R201	WT	G				6	2	1	2		1							X						X			X				24041541-085
8	R205	WT	G				6	2	1	2		1																X				24041541-086
9	SG-02	WT	G				0										X	X					X	X								24041541-087
10	SG-03	WT	G				0										X	X					X	X								24041541-088
11	T127	WT	G				14	6	3	1	3	1										X										24041541-089
12	T128	WT	G				14	6	3	1	3	1										X										24041541-090
13	X201	WT	G				2	1		1										X						X						24041541-091
14	XPW01	WT	G				2	1		1													X									24041541-092
15	XPW02	WT	G				2	1		1													X									24041541-093
16	XSG-01	WT	G				0										X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	[signature]	5/3	1148	[signature]	5/3/24	1148		Y	N	

SAMPLER NAME AND SIGNATURE		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:					
SIGNATURE of SAMPLER:	DATE Signed (MM/DD/YY):				

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-095
2	G102 Duplicate	WT	G				15	6	3	2	3	1									X						X				24041541-096
3	G200 Duplicate	WT	G				6	2	1	2		1						X						X			X				24041541-097
4	G273 Duplicate	WT	G				6	2	1	2		1							X						X		X				24041541-098
5	G301 Duplicate	WT	G				2	1		1						X						X									24041541-099
6	R201 Duplicate	WT	G				6	2	1	2		1							X					X			X				24041541-100
7	Equipment Blank 1	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-101
8	Equipment Blank 2	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-102
9	Equipment Blank 3	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-103
10																															
11																															
12																															
13																															
14																															
15																															
16																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	[signature]	5/3	1148	[signature]	5/3/24	1148				
Blanks: filter upon arrival at the lab for dissolved parameters.										

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1													X									24041541-001
2	G1001	WT	G	5-6-24	dry		2	1		1								X					X									24041541-002
3	G1003	WT	G				4	1		3								X					X						X			24041541-003
4	G101	WT	G				14	6	3	1	3	1									X											24041541-004
5	G102	WT	G				15	6	3	2	3	1									X						X					24041541-005
6	G103	WT	G				15	6	3	2	3	1									X						X					24041541-006
7	G105	WT	G				15	6	3	2	3	1									X						X					24041541-007
8	G106	WT	G				15	6	3	2	3	1									X						X					24041541-008
9	G107	WT	G				14	6	3	1	3	1									X											24041541-009
10	G108	WT	G				14	6	3	1	3	1									X											24041541-010
11	G109	WT	G				14	6	3	1	3	1									X											24041541-011
12	G110	WT	G				14	6	3	1	3	1									X											24041541-012
13	G111	WT	G				14	6	3	1	3	1									X											24041541-013
14	G119	WT	G				14	6	3	1	3	1									X											24041541-014
15	G120	WT	G				14	6	3	1	3	1									X											24041541-015
16	G121	WT	G				14	6	3	1	3	1									X											24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5/6		Nick Reed	5/6/24	1642	12.9	(-)	N	
		5/6	1642				100			

	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillihan

SIGNATURE of SAMPLER: Brett Gillihan DATE Signed (MM/DD/YY): 5-6-24

pH/ 8260/ 9056.

Added HNO_3 (92606) to G285 + G302

PS 5/7

Per Brett Gillihan, G1003 is dry not G1001. JM 5/8/24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
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Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				14	6	3	1	3	1									X										24041541-017
2	G123	WT	G				14	6	3	1	3	1									X										24041541-018
3	G124	WT	G				14	6	3	1	3	1									X										24041541-019
4	G125	WT	G				14	6	3	1	3	1									X										24041541-020
5	G126	WT	G				14	6	3	1	3	1									X										24041541-021
6	G151	WT	G				4	2		1		1																X			24041541-022
7	G152	WT	G				4	2		1		1																X			24041541-023
8	G153	WT	G				4	2		1		1																X			24041541-024
9	G154	WT	G				5	2		2		1														X		X			24041541-025
10	G155	WT	G				4	2		1		1																X			24041541-026
11	G200	WT	G				6	2	1	2		1						X						X			X				24041541-027
12	G206	WT	G				6	2	1	2		1						X						X			X				24041541-028
13	G206D	WT	G				2	1		1								X						X			X				24041541-029
14	G207	WT	G				6	2	1	2		1															X				24041541-030
15	G208	WT	G				6	2	1	2		1															X				24041541-031
16	G209	WT	G				6	2	1	2		1						X						X			X				24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5/6	1642	[illegible]	5/6/24	1642		Y	Z	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

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Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																X				24041541-033
2	G211	WT	G				6	2	1	2		1																X				24041541-034
3	G212	WT	G				6	2	1	2		1							X						X			X				24041541-035
4	G213	WT	G	5-6-24	1429		6	2	1	2		1							X						X			X				24041541-036
5	G214	WT	G				6	2	1	2		1																X				24041541-037
6	G215	WT	G				6	2	1	2		1							X						X			X				24041541-038
7	G216	WT	G				6	2	1	2		1																X				24041541-039
8	G217	WT	G				6	2	1	2		1							X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1							X						X			X				24041541-041
10	G219	WT	G				2	1		1																				X		24041541-104
11	G220	WT	G				2	1		1																				X		24041541-105
12	G270	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-042
13	G271	WT	G				6	2	1	2		1								X						X		X				24041541-043
14	G272	WT	G				6	2	1	2		1								X						X		X				24041541-044
15	G273	WT	G				6	2	1	2		1								X						X		X				24041541-045
16	G274	WT	G				6	2	1	2		1																X				24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Crump	5/6	1642	Trish Reed	5/6/24	1642				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillihan

SIGNATURE of SAMPLER: Brett Gillihan

DATE Signed (MM/DD/YY): 5-6-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1							X						X		X				24041541-047
2	G275D	WT	G				2	1		1									X						X						24041541-048
3	G276	WT	G				6	2	1	2		1							X						X		X				24041541-049
4	G277	WT	G				6	2	1	2		1							X						X		X				24041541-050
5	G278	WT	G				6	2	1	2		1															X				24041541-051
6	G279	WT	G				6	2	1	2		1							X						X	X	X				24041541-052
7	G280	WT	G	5-6-24	1407		6	2	1	2		1					X		X				X		X	X	X				24041541-053
8	G281	WT	G				4	1		2		1				X	X					X	X			X					24041541-054
9	G283	WT	G	5-6-24	1100		2	1		1									X						X						24041541-055
10	G284	WT	G	5-6-24	1136		2	1		1									X						X						24041541-056
11	G285	WT	G	5-6-24	1222		2	1		1									X						X						24041541-057
12	G301	WT	G	5/6/24	1078		2	1		1						X						X									24041541-058
13	G302	WT	G	5/6/24	1154		2	1		1						X						X									24041541-059
14	G303	WT	G				2	1		1						X						X									24041541-060
15	G305	WT	G				2	1		1						X						X									24041541-061
16	G306	WT	G				2	1		1						X						X									24041541-062

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q2 Rev 1	Daniel Crump	5-6	1642	[illegible]	5/6/24	1642

SAMPLE CONDITIONS: Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-6-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1						X						X									24041541-063
2	G307D	WT	G				2	1		1						X						X									24041541-064
3	G308	WT	G				2	1		1						X						X									24041541-065
4	G310	WT	G				2	1		1						X						X									24041541-066
5	G312	WT	G	5/6/24	1329		2	1		1						X						X									24041541-067
6	G313	WT	G				2	1		1						X						X									24041541-068
7	G314	WT	G				2	1		1						X						X									24041541-069
8	G314D	WT	G				2	1		1						X						X									24041541-070
9	G315	WT	G				2	1		1						X						X									24041541-071
10	G316	WT	G				2	1		1						X						X									24041541-072
11	G401	WT	G				4	1		2		1					X						X			X					24041541-073
12	G402	WT	G	5-6-24	1200		4	1		2		1					X						X			X					24041541-074
13	G403	WT	G	5-6-24	1028		4	1		2		1					X						X			X					24041541-075
14	G404	WT	G	5-6-24	1244		4	1		2		1					X						X			X					24041541-076
15	G405	WT	G	5-6-24	1313		4	1		2		1					X						X			X					24041541-077
16	G406	WT	G	5-6-24	1105		4	1		2		1					X						X			X					24041541-078

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Camp	5-6	1642	[illegible]	5/6/24	1642		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Camp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-6-24

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N) COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1					X						X			X					24041541-079
2	G410	WT	G				4	1		2		1														X					24041541-080
3	G411	WT	G				4	1		2		1														X					24041541-081
4	L203	WT	G				18	9	4	1	3	1										X									24041541-082
5	NE Riser	WT	G				0											X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1										X					X				24041541-084
7	R201	WT	G				6	2	1	2		1						X						X			X				24041541-085
8	R205	WT	G				6	2	1	2		1															X				24041541-086
9	SG-02	WT	G				0									X	X					X	X								24041541-087
10	SG-03	WT	G				0									X	X					X	X								24041541-088
11	T127	WT	G	5/6/24	1506		14	6	3	1	3	1									X										24041541-089
12	T128	WT	G				14	6	3	1	3	1									X										24041541-090
13	X201	WT	G				2	1		1									X						X						24041541-091
14	XPW01	WT	G				2	1		1												X									24041541-092
15	XPW02	WT	G				2	1		1												X									24041541-093
16	XSG-01	WT	G				0									X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Crump	5/6	1642	Trish Reed	5/6/24	1642				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillihan

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-6-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N) COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-095
2	G102 Duplicate	WT	G				15	6	3	2	3	1									X						X				24041541-096
3	G200 Duplicate	WT	G				6	2	1	2		1						X						X			X				24041541-097
4	G273 Duplicate	WT	G				6	2	1	2		1							X						X		X				24041541-098
5	G301 Duplicate	WT	G	5/6/24	10 28		2	1		1						X						X									24041541-099
6	R201 Duplicate	WT	G				6	2	1	2		1							X					X			X				24041541-100
7	Equipment Blank 1	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-101
8	Equipment Blank 2	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-102
9	Equipment Blank 3	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-103
10																															
11																															
12																															
13																															
14																															
15																															
16																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q2 Rev 1	Daniel Crump	5/6	1642	[illegible] Reed	5/6/24	1642

Blanks: filter upon arrival at the lab for dissolved parameters.

SAMPLE CONDITIONS

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Y	N	

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Bret Gillihan

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5-6-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
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Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1														X								24041541-001
2	G1001	WT	G	5/7/24	1016		2	1		1								X						X								24041541-002
3	G1003	WT	G				4	1		3								X						X						X		24041541-003
4	G101	WT	G				14	6	3	1	3	1										X										24041541-004
5	G102	WT	G				15	6	3	2	3	1										X						X				24041541-005
6	G103	WT	G				15	6	3	2	3	1										X						X				24041541-006
7	G105	WT	G				15	6	3	2	3	1										X						X				24041541-007
8	G106	WT	G				15	6	3	2	3	1										X						X				24041541-008
9	G107	WT	G				14	6	3	1	3	1										X										24041541-009
10	G108	WT	G				14	6	3	1	3	1										X										24041541-010
11	G109	WT	G				14	6	3	1	3	1										X										24041541-011
12	G110	WT	G				14	6	3	1	3	1										X										24041541-012
13	G111	WT	G				14	6	3	1	3	1										X										24041541-013
14	G119	WT	G				14	6	3	1	3	1										X										24041541-014
15	G120	WT	G				14	6	3	1	3	1										X										24041541-015
16	G121	WT	G				14	6	3	1	3	1										X										24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Daniel Cline	5/7	1602	[signature]	5/7/24	1602	7 ⊙ N
							4.7°C

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Claiborne

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/7/24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

PH/96651/89660

LH 5/7

Added HNO_3 (97660) to G1001 & G276

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				14	6	3	1	3	1										X											24041541-017
2	G123	WT	G	5-7-24	1001		14	6	3	1	3	1										X											24041541-018
3	G124	WT	G				14	6	3	1	3	1										X											24041541-019
4	G125	WT	G				14	6	3	1	3	1										X											24041541-020
5	G126	WT	G				14	6	3	1	3	1										X											24041541-021
6	G151	WT	G				4	2		1		1																	X				24041541-022
7	G152	WT	G	5-7-24	1028		4	2		1		1																	X				24041541-023
8	G153	WT	G				4	2		1		1																	X				24041541-024
9	G154	WT	G				5	2		2		1															X		X				24041541-025
10	G155	WT	G				4	2		1		1																	X				24041541-026
11	G200	WT	G	5-7-24	1253		6	2	1	2		1							X						X			X					24041541-027
12	G206	WT	G				6	2	1	2		1							X						X			X					24041541-028
13	G206D	WT	G				2	1		1									X						X			X					24041541-029
14	G207	WT	G	5-7-24	1146		6	2	1	2		1																X					24041541-030
15	G208	WT	G				6	2	1	2		1																X					24041541-031
16	G209	WT	G				6	2	1	2		1							X						X			X					24041541-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Crump	5-7	1602	[illegible]	5/7/24	1602				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-7-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
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Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

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Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																X				24041541-033
2	G211	WT	G				6	2	1	2		1																X				24041541-034
3	G212	WT	G				6	2	1	2		1							X						X			X				24041541-035
4	G213	WT	G				6	2	1	2		1							X						X			X				24041541-036
5	G214	WT	G				6	2	1	2		1																X				24041541-037
6	G215	WT	G				6	2	1	2		1							X						X			X				24041541-038
7	G216	WT	G				6	2	1	2		1																X				24041541-039
8	G217	WT	G				6	2	1	2		1							X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1							X						X			X				24041541-041
10	G219	WT	G	5-7-24	1110		2	1		1																				X		24041541-104
11	G220	WT	G	5-7-24	1208		2	1		1																				X		24041541-105
12	G270	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-042
13	G271	WT	G				6	2	1	2		1								X						X		X				24041541-043
14	G272	WT	G				6	2	1	2		1								X						X		X				24041541-044
15	G273	WT	G				6	2	1	2		1								X						X		X				24041541-045
16	G274	WT	G				6	2	1	2		1																X				24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Camp	5-7	1602	[illegible]	5/7/24	1602				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Camp

SIGNATURE of SAMPLER: [illegible] DATE Signed (MM/DD/YY): 5-7-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / .-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X		X				24041541-047
2	G275D	WT	G				2	1		1										X						X						24041541-048
3	G276	WT	G	5/7/24	1145		6	2	1	2		1								X						X		X				24041541-049
4	G277	WT	G	5-7-24	0940		6	2	1	2		1								X						X		X				24041541-050
5	G278	WT	G	5/7/24	1331		6	2	1	2		1																X				24041541-051
6	G279	WT	G				6	2	1	2		1								X						X	X	X				24041541-052
7	G280	WT	G				6	2	1	2		1						X		X				X		X	X	X				24041541-053
8	G281	WT	G				4	1		2		1					X	X					X	X			X					24041541-054
9	G283	WT	G				2	1		1										X						X						24041541-055
10	G284	WT	G				2	1		1										X						X						24041541-056
11	G285	WT	G				2	1		1										X						X						24041541-057
12	G301	WT	G				2	1		1							X						X									24041541-058
13	G302	WT	G				2	1		1							X						X									24041541-059
14	G303	WT	G				2	1		1							X						X									24041541-060
15	G305	WT	G				2	1		1							X						X									24041541-061
16	G306	WT	G				2	1		1							X						X									24041541-062

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5-7	1602	Paul [illegible]	5/7/24	1602		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-7-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1						X						X									24041541-063
2	G307D	WT	G				2	1		1						X						X									24041541-064
3	G308	WT	G				2	1		1						X						X									24041541-065
4	G310	WT	G				2	1		1						X						X									24041541-066
5	G312	WT	G				2	1		1						X						X									24041541-067
6	G313	WT	G				2	1		1						X						X									24041541-068
7	G314	WT	G				2	1		1						X						X									24041541-069
8	G314D	WT	G				2	1		1						X						X									24041541-070
9	G315	WT	G				2	1		1						X						X									24041541-071
10	G316	WT	G				2	1		1						X						X									24041541-072
11	G401	WT	G				4	1		2		1					X						X			X					24041541-073
12	G402	WT	G				4	1		2		1					X						X			X					24041541-074
13	G403	WT	G				4	1		2		1					X						X			X					24041541-075
14	G404	WT	G				4	1		2		1					X						X			X					24041541-076
15	G405	WT	G				4	1		2		1					X						X			X					24041541-077
16	G406	WT	G				4	1		2		1					X						X			X					24041541-078

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Daniel Comp	5/7	1602	Paul [illegible]	5/7/24	1602				

SAMPLER NAME AND SIGNATURE		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:					
SIGNATURE of SAMPLER:	DATE Signed (MM/DD/YY):				

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
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Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1					X						X			X					24041541-079
2	G410	WT	G				4	1		2		1														X					24041541-080
3	G411	WT	G				4	1		2		1														X					24041541-081
4	L203	WT	G				18	9	4	1	3	1										X									24041541-082
5	NE Riser	WT	G				0											X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1										X					X				24041541-084
7	R201	WT	G	5-7-24	1243		6	2	1	2		1						X						X			X				24041541-085
8	R205	WT	G	5-7-24	1320		6	2	1	2		1															X				24041541-086
9	SG-02	WT	G				0									X	X					X	X								24041541-087
10	SG-03	WT	G				0									X	X					X	X								24041541-088
11	T127	WT	G				14	6	3	1	3	1									X										24041541-089
12	T128	WT	G				14	6	3	1	3	1									X										24041541-090
13	X201	WT	G	5-7-24	1325		2	1		1									X						X						24041541-091
14	XPW01	WT	G	5-7-24	1355		2	1		1												X									24041541-092
15	XPW02	WT	G				2	1		1												X									24041541-093
16	XSG-01	WT	G				0									X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Daniel Crump	5-7	1602	Paul [illegible]	5/7/24	1602		Y	N	
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-7-24

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24041541

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Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
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WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

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1	Field Blank	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-095
2	G102 Duplicate	WT	G				15	6	3	2	3	1									X						X				24041541-096
3	G200 Duplicate	WT	G	5-7-24	1253		6	2	1	2		1						X						X			X				24041541-097
4	G273 Duplicate	WT	G				6	2	1	2		1							X						X		X				24041541-098
5	G301 Duplicate	WT	G				2	1		1						X						X									24041541-099
6	R201 Duplicate	WT	G	5-7-24	1245		6	2	1	2		1							X					X			X				24041541-100
7	Equipment Blank 1	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-101
8	Equipment Blank 2	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-102
9	Equipment Blank 3	WT	G				21	10	5	2	3	1				X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-103
10																															
11																															
12																															
13																															
14																															
15																															
16																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q2 Rev 1	Samuel Comp	5-7	1602	Paul [illegible]	5/7/24	1602

Blanks: filter upon arrival at the lab for dissolved parameters.

SAMPLE CONDITIONS: Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5-7-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G	5-8-24	952		2	1		1														X								24041541-001
2	G1001	WT	G				2	1		1								X						X								24041541-002
3	G1003	WT	G				4	1		3								X						X						X		24041541-003
4	G101	WT	G				14	6	3	1	3	1										X										24041541-004
5	G102	WT	G				15	6	3	2	3	1										X						X				24041541-005
6	G103	WT	G				15	6	3	2	3	1										X						X				24041541-006
7	G105	WT	G				15	6	3	2	3	1										X						X				24041541-007
8	G106	WT	G				15	6	3	2	3	1										X						X				24041541-008
9	G107	WT	G				14	6	3	1	3	1										X										24041541-009
10	G108	WT	G				14	6	3	1	3	1										X										24041541-010
11	G109	WT	G				14	6	3	1	3	1										X										24041541-011
12	G110	WT	G				14	6	3	1	3	1										X										24041541-012
13	G111	WT	G				14	6	3	1	3	1										X										24041541-013
14	G119	WT	G				14	6	3	1	3	1										X										24041541-014
15	G120	WT	G				14	6	3	1	3	1										X										24041541-015
16	G121	WT	G				14	6	3	1	3	1										X										24041541-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q2 Rev 1	Brett Gillihan	5-8-24	1348	Brian Voelker	5/8/24	1348	0 ⊖ N
							0 LIGHT

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillihan

SIGNATURE of SAMPLER: Brett Gillihan

DATE Signed (MM/DD/YY): 5-8-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

QHS Added HNO_3 (97737) to sample L285 + FB. Added H_2SO_4 (97586) to 96651/89660 sample FB.

24041541

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																X				24041541-033
2	G211	WT	G				6	2	1	2		1																X				24041541-034
3	G212	WT	G				6	2	1	2		1							X						X			X				24041541-035
4	G213	WT	G				6	2	1	2		1							X						X			X				24041541-036
5	G214	WT	G				6	2	1	2		1																X				24041541-037
6	G215	WT	G				6	2	1	2		1							X						X			X				24041541-038
7	G216	WT	G				6	2	1	2		1																X				24041541-039
8	G217	WT	G				6	2	1	2		1							X						X			X				24041541-040
9	G218	WT	G				6	2	1	2		1							X						X			X				24041541-041
10	G219	WT	G				2	1		1																				X		24041541-104
11	G220	WT	G				2	1		1																				X		24041541-105
12	G270	WT	G	5-8-24	940		6	2	1	2		1						X		X				X		X	X	X				24041541-042
13	G271	WT	G				6	2	1	2		1								X						X		X				24041541-043
14	G272	WT	G				6	2	1	2		1								X						X		X				24041541-044
15	G273	WT	G				6	2	1	2		1								X						X		X				24041541-045
16	G274	WT	G				6	2	1	2		1																X				24041541-046

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	[signature]	5-8-24	1345	[signature]	5/8/24	1345				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Bret Gillihan

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-8-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X			X					24041541-079
2	G410	WT	G				4	1		2		1															X					24041541-080
3	G411	WT	G				4	1		2		1															X					24041541-081
4	L203	WT	G	5-8-24	1111		18	9	4	1	3	1											X									24041541-082
5	NE Riser	WT	G				0												X						X							24041541-083
6	R104	WT	G				15	6	3	2	3	1											X					X				24041541-084
7	R201	WT	G				6	2	1	2		1							X						X			X				24041541-085
8	R205	WT	G				6	2	1	2		1																X				24041541-086
9	SG-02	WT	G				0										X	X					X	X								24041541-087
10	SG-03	WT	G				0										X	X					X	X								24041541-088
11	T127	WT	G				14	6	3	1	3	1										X										24041541-089
12	T128	WT	G				14	6	3	1	3	1										X										24041541-090
13	X201	WT	G				2	1		1										X						X						24041541-091
14	XPW01	WT	G				2	1		1													X									24041541-092
15	XPW02	WT	G	5-8-24	1049		2	1		1													X									24041541-093
16	XSG-01	WT	G				0										X						X									24041541-094

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q2 Rev 1	Brett Gillicker	5-8-24	1348	Mich Reel	5/8/24	1348				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillicker

SIGNATURE of SAMPLER: Brett Gillicker — DATE Signed (MM/DD/YY): 5-8-24

CHAIN-OF-CUSTODY / Analytical Request Document

24041541

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies-samantha.davies@vistracorp.com
	John Romang - John.Romang@vistracorp.com Scott Bell- Michael.Bell@vistracorp.com
Purchase Order No.:	
Project Name:	
Project Number:	2285

Section C Invoice Information:

Attention:	Jason Stuckey
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	COF-SUP-000	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G	5/8/24	1130		21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-095
2	G102 Duplicate	WT	G				15	6	3	2	3	1										X						X				24041541-096
3	G200 Duplicate	WT	G				6	2	1	2		1							X						X			X				24041541-097
4	G273 Duplicate	WT	G				6	2	1	2		1								X						X		X				24041541-098
5	G301 Duplicate	WT	G				2	1		1							X						X									24041541-099
6	R201 Duplicate	WT	G				6	2	1	2		1								X					X			X				24041541-100
7	Equipment Blank 1	WT	G	5-8-24	1124		21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-101
8	Equipment Blank 2	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-102
9	Equipment Blank 3	WT	G				21	10	5	2	3	1					X	X	X	X	X	X	X	X	X	X	X	X	X	X		24041541-103
10																																
11																																
12																																
13																																
14																																
15																																
16																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q2 Rev 1	Brett Gillinan	5-8-24	1313-15	Nick Reed	5/8/24	1348		Y	N	

Blanks: filter upon arrival at the lab for dissolved parameters.

Field Blank date/time per Brett Gillinan. Nm 5/8/24

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillinan

SIGNATURE of SAMPLER: Brett Gillinan

DATE Signed (MM/DD/YY): 5-8-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

September 13, 2024

Eric Bauer
Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
TEL: (414) 837-3607
FAX: (414) 837-3608

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: COF-24Q3 **WorkOrder:** 24071451

Dear Eric Bauer:

TEKLAB, INC received 3 samples for COF_NE_103 on 8/7/2024 5:27:00 PM for the analysis presented in the following report.

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

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

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

Sincerely,

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

Report Contents

http://www.teklabinc.com/

Client: Ramboll

Client Project: COF-24Q3

Work Order: 24071451

Report Date: 13-Sep-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Sample Summary	12
Quality Control Results	13
Receiving Check List	169
Chain of Custody	Appended

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

Qualifiers

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

Case Narrative

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

Cooler Receipt Temp: 5.9 °C

An employee of Teklab, Inc. collected the sample(s).

Equipment Blank 1 was not needed. EAH 8/12/24

Per Eric Bauer's request, only COF_NE_103 data is included in this report. EAH 9/13/24

Locations

Collinsville

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

Springfield

Address	3920 Pintail Dr Springfield, IL 62711-9415
Phone	(217) 698-1004
Fax	(217) 698-1005
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Accreditations

Client: Ramboll

Client Project: COF-24Q3

Work Order: 24071451

Report Date: 13-Sep-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2025	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2025	Collinsville
Oklahoma	ODEQ	9978	NELAP	12/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24071451
Client Project: COF-24Q3
Report Date: 13-Sep-24
Lab ID: 24071451-042
Client Sample ID: G219
Matrix: GROUNDWATER
Collection Date: 07/31/2024 11:16

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS									
Depth to water from measuring point	*	0	0		**7.55**	ft	1	07/31/2024 11:16	R351564
STANDARD METHODS 2130 B FIELD									
Turbidity	*	1.0	1.0		**6.2**	NTU	1	07/31/2024 11:16	R351564
STANDARD METHODS 18TH ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300	-300		**-17**	mV	1	07/31/2024 11:16	R351564
STANDARD METHODS 2510 B FIELD									
Spec. Conductance, Field	*	0	0		**866**	µS/cm	1	07/31/2024 11:16	R351564
STANDARD METHODS 2550 B FIELD									
Temperature	*	0	0		**18.9**	°C	1	07/31/2024 11:16	R351564
STANDARD METHODS 4500-O G FIELD									
Oxygen, Dissolved	*	0	0		**5.29**	mg/L	1	07/31/2024 11:16	R351564
SW-846 9040B FIELD									
pH	*	0	1.00		**7.09**		1	07/31/2024 11:16	R351564
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**400**	mg/L	1	08/01/2024 14:06	R351100
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	08/01/2024 14:06	R351100
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20		**530**	mg/L	1	08/05/2024 9:17	R351309
SW-846 9036 (TOTAL)									
Sulfate	NELAP	12	20		**74**	mg/L	2	08/12/2024 15:35	R351588
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY									
Fluoride	*	0.03	0.50		**0.54**	mg/L	10	08/13/2024 16:21	R351606
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**34**	mg/L	1	08/12/2024 15:08	R351636
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100	S	**93.7**	mg/L	1	08/05/2024 17:40	226542
Magnesium	NELAP	0.006	0.050	S	**45.0**	mg/L	1	08/05/2024 17:40	226542
Potassium	NELAP	0.040	0.100		**0.387**	mg/L	1	08/05/2024 17:40	226542
Sodium	NELAP	0.018	0.050	S	**69.7**	mg/L	1	08/05/2024 17:40	226542
Matrix spike control limits are not applicable due to high sample/spike ratio.									
SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)									
Iron	NELAP	11.5	25.0		**337**	µg/L	5	08/02/2024 17:28	226540
Manganese	NELAP	0.8	2.0		**187**	µg/L	5	08/02/2024 17:28	226540
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.4	1.0		**< 1.0**	µg/L	5	08/08/2024 15:07	226542
Arsenic	NELAP	0.4	1.0	J	**0.8**	µg/L	5	08/05/2024 11:16	226542
Barium	NELAP	0.7	1.0		**66.4**	µg/L	5	08/05/2024 11:16	226542
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	08/05/2024 11:16	226542
Boron	NELAP	9.2	20	J	**12**	µg/L	5	08/05/2024 11:16	226542
Cadmium	*	0.2	1.0		**< 1.0**	µg/L	5	08/05/2024 11:16	226542
Chromium	NELAP	0.7	1.5		**< 1.5**	µg/L	5	08/05/2024 11:16	226542
Cobalt	NELAP	0.1	1.0	J	**0.7**	µg/L	5	08/05/2024 11:16	226542
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/05/2024 11:16	226542
Lithium	*	1.4	3.0		**8.0**	µg/L	5	08/05/2024 11:16	226542

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24071451
Client Project: COF-24Q3
Report Date: 13-Sep-24
Lab ID: 24071451-042
Client Sample ID: G219
Matrix: GROUNDWATER
Collection Date: 07/31/2024 11:16

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Molybdenum	NELAP	0.6	1.5	J	**1.1**	µg/L	5	08/05/2024 11:16	226542
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/05/2024 11:16	226542
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	08/05/2024 11:16	226542
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.06	0.20		**< 0.20**	µg/L	1	08/05/2024 9:19	226541

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24071451
Client Project: COF-24Q3
Report Date: 13-Sep-24
Lab ID: 24071451-043
Client Sample ID: G220
Matrix: GROUNDWATER
Collection Date: 08/07/2024 13:03

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS									
Depth to water from measuring point	*	0	0		**14.18**	ft	1	08/07/2024 13:03	R351564
STANDARD METHODS 2130 B FIELD									
Turbidity	*	1.0	1.0		**120**	NTU	1	08/07/2024 13:03	R351564
STANDARD METHODS 18TH ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300	-300		**27**	mV	1	08/07/2024 13:03	R351564
STANDARD METHODS 2510 B FIELD									
Spec. Conductance, Field	*	0	0		**963**	µS/cm	1	08/07/2024 13:03	R351564
STANDARD METHODS 2550 B FIELD									
Temperature	*	0	0		**16.2**	°C	1	08/07/2024 13:03	R351564
STANDARD METHODS 4500-O G FIELD									
Oxygen, Dissolved	*	0	0		**0.95**	mg/L	1	08/07/2024 13:03	R351564
SW-846 9040B FIELD									
pH	*	0	1.00		**6.76**		1	08/07/2024 13:03	R351564
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**415**	mg/L	1	08/09/2024 11:02	R351503
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	08/09/2024 11:02	R351503
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20	H	**844**	mg/L	1	08/15/2024 12:36	R351887
Sample analysis did not meet hold time requirements.									
SW-846 9036 (TOTAL)									
Sulfate	NELAP	31	50		**160**	mg/L	5	08/15/2024 10:23	R351845
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY									
Fluoride	*	0.03	0.50	J	**0.35**	mg/L	10	08/08/2024 20:36	R351419
SW-846 9251 (TOTAL)									
Chloride	NELAP	2	20		**119**	mg/L	5	08/14/2024 1:27	R351708
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.100		**118**	mg/L	1	08/12/2024 12:52	226877
Magnesium	NELAP	0.006	0.050		**49.2**	mg/L	1	08/12/2024 12:52	226877
Potassium	NELAP	0.040	0.100		**0.417**	mg/L	1	08/12/2024 12:52	226877
Sodium	NELAP	0.018	0.050		**111**	mg/L	1	08/12/2024 12:52	226877
SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)									
Iron	NELAP	12	25	J	**12**	µg/L	5	08/09/2024 21:56	226875
Manganese	NELAP	0.8	2.0		**293**	µg/L	5	08/09/2024 21:56	226875
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.4	1.0		**< 1.0**	µg/L	5	08/12/2024 18:14	226877
Arsenic	NELAP	0.4	1.0	J	**0.6**	µg/L	5	08/12/2024 18:14	226877
Barium	NELAP	0.7	1.0		**170**	µg/L	5	08/12/2024 18:14	226877
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	08/12/2024 18:14	226877
Boron	NELAP	9.2	20.0		**< 20.0**	µg/L	5	08/30/2024 16:39	227725
Cadmium	*	0.2	1.0		**< 1.0**	µg/L	5	08/12/2024 18:14	226877
Chromium	NELAP	0.7	1.5		**< 1.5**	µg/L	5	08/12/2024 18:14	226877
Cobalt	NELAP	0.1	1.0		**1.6**	µg/L	5	08/14/2024 13:50	226877
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/29/2024 22:53	227725
Lithium	*	1.4	3.0	J	**2.9**	µg/L	5	08/12/2024 18:14	226877

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24071451
Client Project: COF-24Q3
Report Date: 13-Sep-24
Lab ID: 24071451-043
Client Sample ID: G220
Matrix: GROUNDWATER
Collection Date: 08/07/2024 13:03

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Molybdenum	NELAP	0.6	1.5	J	**0.6**	µg/L	5	08/14/2024 13:50	226877
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/12/2024 18:14	226877
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	08/12/2024 18:14	226877

CCV recovered outside the upper control limits for B. Sample results are below the reporting limit. Data is reportable per the TNI standard.
CCV recovered outside the upper control limits for Pb. Sample results are below the reporting limit. Data is reportable per the TNI standard.

SW-846 7470A (TOTAL)									
Mercury	NELAP	0.06	0.20		**< 0.20**	µg/L	1	08/13/2024 14:05	226884

Laboratory Results

http://www.teklabinc.com/

Client: Ramboll
Work Order: 24071451
Client Project: COF-24Q3
Report Date: 13-Sep-24
Lab ID: 24071451-097
Client Sample ID: Field Blank
Matrix: AQUEOUS
Collection Date: 08/07/2024 14:49

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 2320 B (TOTAL) 1997, 2011									
Alkalinity, Bicarbonate (as CaCO3)	NELAP	0	0		**1**	mg/L	1	08/08/2024 13:51	R351443
STANDARD METHODS 2320 B 1997, 2011									
Alkalinity, Carbonate (as CaCO3)	NELAP	0	0		**0**	mg/L	1	08/08/2024 13:51	R351443
STANDARD METHODS 2540 C (TOTAL) 1997, 2011									
Total Dissolved Solids	NELAP	16	20	H	**< 20**	mg/L	1	08/15/2024 17:20	R351887
Sample analysis did not meet hold time requirements.									
SW-846 9036 (TOTAL)									
Sulfate	NELAP	6	10		**< 10**	mg/L	1	08/12/2024 18:17	R351588
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY									
Fluoride	*	0.03	0.50		**ND**	mg/L	10	08/08/2024 15:56	R351419
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**< 4**	mg/L	1	08/12/2024 18:18	R351636
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)									
Calcium	NELAP	0.035	0.10	J	**0.041**	mg/L	1	08/12/2024 16:10	226881
Magnesium	NELAP	0.006	0.050	J	**0.046**	mg/L	1	08/12/2024 16:10	226881
Potassium	NELAP	0.040	0.100		**< 0.100**	mg/L	1	08/12/2024 16:10	226881
Sodium	NELAP	0.018	0.050	J	**0.048**	mg/L	1	08/12/2024 16:10	226881
SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)									
Iron	NELAP	11.5	25.0		**< 25.0**	µg/L	5	08/09/2024 22:07	226875
Manganese	NELAP	0.8	2.0		**< 2.0**	µg/L	5	08/09/2024 22:07	226875
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.4	1.0	B	**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Arsenic	NELAP	0.4	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Barium	NELAP	0.7	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Beryllium	NELAP	0.2	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Boron	NELAP	9.2	20.0		**< 20.0**	µg/L	5	09/04/2024 15:07	227726
Cadmium	*	0.2	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Chromium	NELAP	0.7	1.5		**< 1.5**	µg/L	5	08/12/2024 17:01	226881
Cobalt	NELAP	0.1	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Lead	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Lithium	*	1.4	3.0		**< 3.0**	µg/L	5	08/12/2024 17:01	226881
Molybdenum	NELAP	0.6	1.5		**< 1.5**	µg/L	5	08/12/2024 17:01	226881
Selenium	NELAP	0.6	1.0		**< 1.0**	µg/L	5	08/12/2024 17:01	226881
Thallium	NELAP	1.0	2.0		**< 2.0**	µg/L	5	08/12/2024 17:01	226881
Contamination present in the MBLK. Sample results below the reporting limit are reportable per the TNI Standard.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.06	0.20		**< 0.20**	µg/L	1	08/13/2024 14:27	226884

Sample Summary

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
24071451-042	G219	Groundwater	3	07/31/2024 11:16
24071451-043	G220	Groundwater	3	08/07/2024 13:03
24071451-097	Field Blank	Aqueous	9	08/07/2024 14:49

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2510 B FIELD

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-1-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.4	90	110	07/30/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-1-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	07/30/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-1-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	07/31/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-2-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	07/31/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-2-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	07/31/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-2-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	08/01/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-3-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.3	90	110	08/01/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-3-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2510 B FIELD

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-3-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	08/05/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-4-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.5	90	110	08/05/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-4-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	08/02/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-4-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1400**	1412	0	99.2	90	110	08/06/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-5-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.1	90	110	08/05/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-5-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.8	90	110	08/05/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-5-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	99.9	90	110	08/07/2024

Batch R351564 **SampType:** LCS Units **µS/cm**
SampID: LCS-6-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1420**	1412	0	100.4	90	110	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2510 B FIELD

Batch R351564 **SampType:** LCS Units **µS/cm**

SampID: LCS-6-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Spec. Conductance, Field	*	0		**1410**	1412	0	100.0	90	110	08/06/2024

SW-846 9040B FIELD

Batch R351564 **SampType:** LCS Units

SampID: LCS-1-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	07/30/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-1-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**6.99**	7.000	0	99.9	98.57	101.4	07/30/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-1-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.03**	7.000	0	100.4	98.57	101.4	07/31/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-2-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	07/31/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-2-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**6.98**	7.000	0	99.7	98.57	101.4	07/31/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-2-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.06**	7.000	0	100.9	98.57	101.4	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9040B FIELD

Batch R351564 **SampType:** LCS Units

SampID: LCS-3-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	08/01/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-3-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	08/01/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-3-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.05**	7.000	0	100.7	98.57	101.4	08/05/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-4-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	08/05/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-4-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**6.99**	7.000	0	99.9	98.57	101.4	08/02/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-4-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.03**	7.000	0	100.4	98.57	101.4	08/06/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-5-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	08/05/2024

Batch R351564 **SampType:** LCS Units

SampID: LCS-5-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**6.99**	7.000	0	99.9	98.57	101.4	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9040B FIELD

Batch R351564 **SampType:** LCS Units
SampID: LCS-5-TC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**6.99**	7.000	0	99.9	98.57	101.4	08/07/2024

Batch R351564 **SampType:** LCS Units
SampID: LCS-6-BG

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.00**	7.000	0	100.0	98.57	101.4	08/06/2024

Batch R351564 **SampType:** LCS Units
SampID: LCS-6-JC

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
pH	*	1.00		**7.01**	7.000	0	100.1	98.57	101.4	08/06/2024

EPA 1664A

Batch R351520 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**< 5**	4.400	0	0	-100	100	08/09/2024

Batch R351520 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**31**	40.00	0	78.2	78	114	08/09/2024

Batch R351520 **SampType:** MS Units **mg/L**
SampID: 24080864-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**35**	43.72	0	81.0	78	114	08/09/2024

Batch R351613 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**< 5**	4.400	0	0	-100	100	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

EPA 1664A

Batch R351613 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		5		**35**	40.00	0	87.0	78	114	08/12/2024

Batch R351613 **SampType:** MS Units **mg/L**
SampID: 24071451-013GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		6		**43**	47.29	0	90.0	78	114	08/12/2024

Batch R351613 **SampType:** MSD Units **mg/L** RPD Limit **18**
SampID: 24071451-013GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hexane Extractable Material		6		**39**	46.59	0	82.8	42.56	9.88	08/12/2024

Batch R351613 **SampType:** MS Units **mg/L**
SampID: 24071451-103BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material		6		**43**	47.29	0	90.0	78	114	08/12/2024

Batch R351613 **SampType:** MSD Units **mg/L** RPD Limit **18**
SampID: 24071451-103BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hexane Extractable Material		6		**39**	46.59	0	82.8	42.56	9.88	08/12/2024

EPA 1664A, (TOTAL) PETROLEUM HYDROCARBONS

Batch R351520 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		5		**< 5**	4.400	0	0	-100	100	08/13/2024

Batch R351520 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		5		**15**	20.00	0	74.0	64	132	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

EPA 1664A, (TOTAL) PETROLEUM HYDROCARBONS

Batch R351613 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		5		**< 5**	4.400	0	0	-100	100	08/14/2024

Batch R351613 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		5		**17**	20.00	0	85.5	64	132	08/14/2024

Batch R351613 **SampType:** MS Units **mg/L**
SampID: 24071451-013GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		6		**17**	23.65	0	72.0	64	132	08/14/2024

Batch R351613 **SampType:** MSD Units **mg/L** RPD Limit **34**
SampID: 24071451-013GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hexane Extractable Material (SGT)		6		**15**	23.30	0	66.5	17.03	9.43	08/14/2024

Batch R351613 **SampType:** MS Units **mg/L**
SampID: 24071451-103BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hexane Extractable Material (SGT)		6		**17**	23.65	0	72.0	64	132	08/14/2024

Batch R351613 **SampType:** MSD Units **mg/L** RPD Limit **34**
SampID: 24071451-103BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hexane Extractable Material (SGT)		6		**15**	23.30	0	66.5	17.03	9.43	08/14/2024

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R351152 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/01/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R351152 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**978**	1000	0	97.8	90	110	08/01/2024
Total Dissolved Solids		20		**968**	1000	0	96.8	90	110	08/01/2024

Batch R351309 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/05/2024

Batch R351309 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**978**	1000	0	97.8	90	110	08/05/2024

Batch R351309 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-078ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**958**				1012	5.48	08/05/2024

Batch R351366 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/06/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/06/2024

Batch R351366 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**960**	1000	0	96.0	90	110	08/06/2024
Total Dissolved Solids		20		**928**	1000	0	92.8	90	110	08/06/2024

Batch R351366 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-065ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**914**				918.0	0.44	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R351366 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24080156-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		50		**5430**				5660	4.15	08/06/2024

Batch R351366 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24080157-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**2800**				2982	6.15	08/06/2024

Batch R351427 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/07/2024

Batch R351427 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**944**	1000	0	94.4	90	110	08/07/2024

Batch R351427 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24080319-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		200		**3460**				3520	1.72	08/07/2024

Batch R351496 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/08/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/08/2024

Batch R351496 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**932**	1000	0	93.2	90	110	08/08/2024
Total Dissolved Solids		20		**942**	1000	0	94.2	90	110	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R351496 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24071451-012ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**554**				580.0	4.59	08/08/2024

Batch R351496 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24080687-005ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**874**				862.0	1.38	08/08/2024

Batch R351578 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/09/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/09/2024

Batch R351578 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**942**	1000	0	94.2	90	110	08/09/2024
Total Dissolved Solids		20		**982**	1000	0	98.2	90	110	08/09/2024

Batch R351578 **SampType:** DUP Units **mg/L** RPD Limit **10**

SampID: 24080600-005ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**482**				472.0	2.10	08/09/2024

Batch R351887 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/15/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/15/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R351887 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**994**	1000	0	99.4	90	110	08/15/2024
Total Dissolved Solids		20		**1000**	1000	0	100.0	90	110	08/15/2024
Total Dissolved Solids		20		**1010**	1000	0	100.8	90	110	08/15/2024

Batch R351887 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-043ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20	H	**820**				844.0	2.88	08/15/2024

Batch R351887 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-059ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20	H	**1850**				1826	1.31	08/15/2024

Batch R351887 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24080002-007ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**474**				492.0	3.73	08/15/2024

Batch R351887 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24080862-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		200	H	**24200**				24660	1.97	08/15/2024

Batch R351887 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24080863-001ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20	H	**1160**				1136	2.09	08/15/2024

Batch R352109 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/20/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 2540 C (TOTAL) 1997, 2011

Batch R352109 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**998**	1000	0	99.8	90	110	08/20/2024

Batch R352109 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24080169-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**524**				518.0	1.15	08/20/2024

Batch R352173 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/21/2024
Total Dissolved Solids		20		**< 20**	16.00	0	0	-100	100	08/21/2024

Batch R352173 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids		20		**984**	1000	0	98.4	90	110	08/21/2024
Total Dissolved Solids		20		**986**	1000	0	98.6	90	110	08/21/2024

Batch R352173 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-100ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20	H	**1440**				1394	3.11	08/21/2024

Batch R352173 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24071451-102ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20	H	**706**				706.0	0.00	08/21/2024

Batch R352173 **SampType:** DUP Units **mg/L** RPD Limit **10**
SampID: 24081724-002ADUP

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Dissolved Solids		20		**430**				422.0	1.88	08/21/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R351331 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	08/07/2024

Batch R351331 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.02**	1.000	0	101.8	90	110	08/07/2024

Batch R351331 **SampType:** MS Units **mg/L**
SampID: 24071451-004EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.84**	2.000	0	91.8	90	110	08/07/2024

Batch R351331 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-004EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.81**	2.000	0	90.6	1.836	1.37	08/07/2024

Batch R351331 **SampType:** MS Units **mg/L**
SampID: 24071451-006GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.86**	2.000	0	92.8	90	110	08/07/2024

Batch R351331 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-006GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.85**	2.000	0	92.7	1.855	0.05	08/07/2024

Batch R351331 **SampType:** MS Units **mg/L**
SampID: 24080270-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.84**	2.000	0.9630	93.8	90	110	08/07/2024

Batch R351331 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080270-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.81**	2.000	0.9630	92.6	2.840	0.92	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R351331 **SampType:** MS Units **mg/L**
SampID: 24080304-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.99**	2.000	0.07800	95.5	90	110	08/07/2024

Batch R351331 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080304-001EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.94**	2.000	0.07800	93.2	1.988	2.29	08/07/2024

Batch R351331 **SampType:** MS Units **mg/L**
SampID: 24080359-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.43**	2.000	0.6300	90.0	90	110	08/07/2024

Batch R351331 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080359-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.45**	2.000	0.6300	90.8	2.430	0.66	08/07/2024

Batch R351499 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**< 0.10**	0.0270	0	0	-100	100	08/09/2024

Batch R351499 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.02**	1.000	0	101.5	90	110	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24071451-007GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.20	S	**7.10**	4.000	3.575	88.2	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-007GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.20	S	**7.13**	4.000	3.575	89.0	7.101	0.45	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080524-007BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0	93.6	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080524-007BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.88**	2.000	0	93.8	1.871	0.32	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080552-002EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10	S	**1.84**	2.000	0.05500	89.2	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080552-002EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.86**	2.000	0.05500	90.3	1.839	1.19	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080553-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.98**	2.000	0.1020	94.0	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080553-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.94**	2.000	0.1020	92.2	1.981	1.83	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080588-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.95**	2.000	0.04500	95.2	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080588-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.92**	2.000	0.04500	93.6	1.948	1.55	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NH3 G (DISSOLVED) 1997, 2011

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080686-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.35**	2.000	0.4800	93.4	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080686-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**2.34**	2.000	0.4800	93.0	2.349	0.38	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080708-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0.05800	90.6	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080708-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.87**	2.000	0.05800	90.7	1.869	0.11	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080743-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**3.55**	2.000	1.679	93.6	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080743-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**3.56**	2.000	1.679	94.2	3.552	0.34	08/09/2024

Batch R351499 **SampType:** MS Units **mg/L**
SampID: 24080780-002CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.91**	2.000	0.03500	93.8	90	110	08/09/2024

Batch R351499 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080780-002CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Ammonia (as N)		0.10		**1.90**	2.000	0.03500	93.2	1.910	0.63	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (DISSOLVED) 2000, 2011

Batch R351109 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/01/2024

Batch R351109 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.33**	0.3045	0	109.4	90	110	08/01/2024

Batch R351109 **SampType:** MS Units **mg/L**
SampID: 24072335-008BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.57**	0.5000	0.02300	108.8	85	115	08/01/2024

Batch R351109 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072335-008BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.57**	0.5000	0.02300	110.2	0.5670	1.23	08/01/2024

Batch R351317 **SampType:** MS Units **mg/L**
SampID: 24071451-008BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	101.4	85	115	08/06/2024

Batch R351317 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-008BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.50**	0.5000	0	100.0	0.5070	1.39	08/06/2024

Batch R351317 **SampType:** MS Units **mg/L**
SampID: 24071451-010BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.8	85	115	08/06/2024

Batch R351317 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-010BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.0	0.5140	0.78	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (DISSOLVED) 2000, 2011

Batch R351317 **SampType:** MS Units **mg/L**
SampID: 24071451-021BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.0	85	115	08/06/2024

Batch R351317 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-021BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	101.6	0.5100	0.39	08/06/2024

Batch R351426 **SampType:** MS Units **mg/L**
SampID: 24071451-018BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.50**	0.5000	0.01000	99.0	85	115	08/08/2024

Batch R351426 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-018BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.50**	0.5000	0.01000	98.2	0.5050	0.80	08/08/2024

Batch R351426 **SampType:** MS Units **mg/L**
SampID: 24080600-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.49**	0.5000	0.006000	96.4	85	115	08/08/2024

Batch R351426 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080600-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.49**	0.5000	0.006000	96.8	0.4880	0.41	08/08/2024

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R351109 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R351109 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	105.7	90	110	08/01/2024

Batch R351109 **SampType:** MS Units **mg/L**
SampID: 24071451-055AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.54**	0.5000	0	107.2	85	115	08/01/2024

Batch R351109 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-055AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.53**	0.5000	0	106.2	0.5360	0.94	08/01/2024

Batch R351109 **SampType:** MS Units **mg/L**
SampID: 24072332-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.53**	0.5000	0	105.6	85	115	08/01/2024

Batch R351109 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072332-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	H	**0.52**	0.5000	0	103.6	0.5280	1.91	08/01/2024

Batch R351109 **SampType:** MS Units **mg/L**
SampID: 24072496-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.53**	0.5000	0	106.4	85	115	08/01/2024

Batch R351109 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072496-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.54**	0.5000	0	107.2	0.5320	0.75	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R351187 **SampType:** MBLK Units **mg/L**
SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/02/2024
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/02/2024

Batch R351187 **SampType:** LCS Units **mg/L**
SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	104.1	90	110	08/02/2024
Nitrogen, Nitrite (as N)		0.05		**0.32**	0.3045	0	104.1	90	110	08/02/2024

Batch R351187 **SampType:** MS Units **mg/L**
SampID: 24071451-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.52**	0.5000	0	104.4	85	115	08/02/2024

Batch R351187 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.53**	0.5000	0	105.6	0.5220	1.14	08/02/2024

Batch R351187 **SampType:** MS Units **mg/L**
SampID: 24071451-080AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.53**	0.5000	0	106.2	85	115	08/02/2024

Batch R351187 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-080AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.52**	0.5000	0	103.4	0.5310	2.67	08/02/2024

Batch R351187 **SampType:** MS Units **mg/L**
SampID: 24080033-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.52**	0.5000	0	104.2	85	115	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R351187 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080033-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.52**	0.5000	0	103.6	0.5210	0.58	08/02/2024

Batch R351317 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/06/2024
Nitrogen, Nitrite (as N)		0.05		**< 0.05**	0.0250	0	0	-100	100	08/06/2024

Batch R351317 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.33**	0.3045	0	109.0	90	110	08/06/2024
Nitrogen, Nitrite (as N)		0.05		**0.33**	0.3045	0	108.7	90	110	08/06/2024

Batch R351317 **SampType:** MS Units **mg/L**

SampID: 24080386-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.8	85	115	08/06/2024

Batch R351317 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080386-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.51**	0.5000	0	102.4	0.5140	0.39	08/06/2024

Batch R351426 **SampType:** MBLK Units **mg/L**

SampID: MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05	J	**0.01**	0.0250	0	24.0	-100	100	08/08/2024
Nitrogen, Nitrite (as N)		0.05	J	**0.01**	0.0250	0	24.0	-100	100	08/08/2024

Batch R351426 **SampType:** LCS Units **mg/L**

SampID: LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.31**	0.3045	0	101.5	90	110	08/08/2024
Nitrogen, Nitrite (as N)		0.05		**0.30**	0.3045	0	100.2	90	110	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO2 B (TOTAL) 2000, 2011

Batch R351426 **SampType:** MS Units **mg/L**

SampID: 24080632-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.50**	0.5000	0.006000	98.2	85	115	08/08/2024

Batch R351426 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080632-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrite (as N)		0.05		**0.47**	0.5000	0.006000	92.6	0.4970	5.80	08/08/2024

STANDARD METHODS 4500-NO3 F (DISSOLVED) 2000, 2011

Batch R351318 **SampType:** MS Units **mg/L**

SampID: 24071451-014BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.716**	0.2500	0.4720	97.6	85	115	08/06/2024

Batch R351318 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-014BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.718**	0.2500	0.4720	98.4	0.7160	0.28	08/06/2024

Batch R351318 **SampType:** MS Units **mg/L**

SampID: 24071451-093BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.71**	0.5000	1.207	101.0	85	115	08/06/2024

Batch R351318 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-093BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.70**	0.5000	1.207	98.2	1.712	0.82	08/06/2024

Batch R351318 **SampType:** MS Units **mg/L**

SampID: 24080359-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.252**	0.2500	0.009000	97.2	85	115	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (DISSOLVED) 2000, 2011

Batch R351318 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080359-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.250**	0.2500	0.009000	96.4	0.2520	0.80	08/06/2024

Batch R351420 **SampType:** MS Units **mg/L**

SampID: 24071451-098BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	E	**2.34**	0.5000	1.826	102.8	85	115	08/07/2024

Batch R351420 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-098BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100	E	**2.32**	0.5000	1.826	98.8	2.340	0.86	08/07/2024

Batch R351420 **SampType:** MS Units **mg/L**

SampID: 24080512-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.239**	0.2500	0	95.6	85	115	08/07/2024

Batch R351420 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080512-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.241**	0.2500	0	96.4	0.2390	0.83	08/07/2024

Batch R351457 **SampType:** MS Units **mg/L**

SampID: 24080689-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.237**	0.2500	0	94.8	85	115	08/08/2024

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080689-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.231**	0.2500	0	92.4	0.2370	2.56	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351061 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	07/31/2024

Batch R351061 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.494**	0.5000	0	98.8	90	110	07/31/2024

Batch R351061 **SampType:** MS Units **mg/L**
SampID: 24071451-054AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**15.8**	5.000	10.07	114.9	85	115	07/31/2024

Batch R351061 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-054AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**15.4**	5.000	10.07	106.5	15.82	2.70	07/31/2024

Batch R351061 **SampType:** MS Units **mg/L**
SampID: 24072405-003CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.279**	0.2500	0.04400	94.0	85	115	07/31/2024

Batch R351061 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072405-003CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.274**	0.2500	0.04400	92.0	0.2790	1.81	07/31/2024

Batch R351061 **SampType:** MS Units **mg/L**
SampID: 24072460-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**82.5**	25.00	58.00	97.9	90	110	07/31/2024

Batch R351061 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072460-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**81.3**	25.00	58.00	93.3	82.47	1.39	07/31/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351061 **SampType:** MS Units **mg/L**
SampID: 24072461-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.11**	0.5000	0.6330	96.2	90	110	07/31/2024

Batch R351061 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072461-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.13**	0.5000	0.6330	98.8	1.114	1.16	07/31/2024

Batch R351061 **SampType:** MS Units **mg/L**
SampID: 24072496-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**32.9**	12.50	19.46	107.4	90	110	07/31/2024

Batch R351061 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072496-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**31.9**	12.50	19.46	99.6	32.88	3.00	07/31/2024

Batch R351125 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/01/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/01/2024

Batch R351125 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.515**	0.5000	0	103.0	90	110	08/01/2024

Batch R351125 **SampType:** MS Units **mg/L**
SampID: 24072558-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**2.47**	1.250	1.339	90.7	90	110	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351125 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072558-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**2.52**	1.250	1.339	94.9	2.473	2.08	08/01/2024

Batch R351125 **SampType:** MS Units **mg/Kg-dry**

SampID: 24072568-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		3.88		**19.4**	19.39	0	100.0	85	115	08/01/2024

Batch R351125 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **10**

SampID: 24072568-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		3.88		**19.5**	19.39	0	100.8	19.39	0.80	08/01/2024

Batch R351217 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/02/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/02/2024

Batch R351217 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.523**	0.5000	0	104.6	90	110	08/02/2024

Batch R351217 **SampType:** MS Units **mg/L**

SampID: 24071451-077AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.248**	0.2500	0.03000	87.2	85	115	08/02/2024

Batch R351217 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-077AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.247**	0.2500	0.03000	86.8	0.2480	0.40	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351217 **SampType:** MS Units **mg/L**
SampID: 24080017-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.09**	0.5000	0.6210	93.4	90	110	08/02/2024

Batch R351217 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080017-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.10**	0.5000	0.6210	95.6	1.088	1.01	08/02/2024

Batch R351217 **SampType:** MS Units **mg/L**
SampID: 24080065-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**62.3**	25.00	37.50	99.2	90	110	08/02/2024

Batch R351217 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080065-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		5.00		**62.3**	25.00	37.50	99.3	62.30	0.05	08/02/2024

Batch R351217 **SampType:** MS Units **mg/L**
SampID: 24080156-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**2.52**	2.500	0.09900	96.9	90	110	08/02/2024

Batch R351217 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080156-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**2.52**	2.500	0.09900	96.9	2.522	0.04	08/02/2024

Batch R351217 **SampType:** MS Units **mg/L**
SampID: 24080161-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**12.9**	5.000	7.917	98.8	90	110	08/02/2024

Batch R351217 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080161-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**12.8**	5.000	7.917	98.3	12.86	0.22	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351271 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/05/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/05/2024

Batch R351271 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.479**	0.5000	0	95.8	90	110	08/05/2024

Batch R351271 **SampType:** MS Units **mg/Kg-dry**
SampID: 24080115-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.18		**9.70**	5.917	3.905	98.0	85	115	08/05/2024

Batch R351271 **SampType:** MSD Units **mg/Kg-dry** RPD Limit **10**
SampID: 24080115-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.18		**9.63**	5.917	3.905	96.8	9.704	0.73	08/05/2024

Batch R351271 **SampType:** MS Units **mg/L**
SampID: 24080167-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**15.1**	5.000	10.26	97.7	90	110	08/05/2024

Batch R351271 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080167-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**15.1**	5.000	10.26	97.1	15.14	0.20	08/05/2024

Batch R351271 **SampType:** MS Units **mg/L**
SampID: 24080215-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**9.84**	5.000	4.924	98.3	90	110	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351271 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080215-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**9.76**	5.000	4.924	96.6	9.841	0.88	08/05/2024

Batch R351271 **SampType:** MS Units **mg/L**

SampID: 24080277-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**33.7**	12.50	21.56	97.4	90	110	08/05/2024

Batch R351271 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080277-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**34.6**	12.50	21.56	104.0	33.74	2.42	08/05/2024

Batch R351318 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/06/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/06/2024

Batch R351318 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.470**	0.5000	0	94.0	90	110	08/06/2024

Batch R351318 **SampType:** MS Units **mg/L**

SampID: 24080388-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	H	**0.242**	0.2500	0	96.8	90	110	08/06/2024

Batch R351318 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080388-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	H	**0.236**	0.2500	0	94.4	0.2420	2.51	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351420 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/07/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/07/2024

Batch R351420 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.484**	0.5000	0	96.8	90	110	08/07/2024

Batch R351420 **SampType:** MS Units **mg/L**
SampID: 24080571-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**29.7**	12.50	17.39	98.7	90	110	08/07/2024

Batch R351420 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080571-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		2.50		**30.3**	12.50	17.39	103.1	29.72	1.83	08/07/2024

Batch R351420 **SampType:** MS Units **mg/L**
SampID: 24080582-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**4.89**	2.500	2.426	98.5	90	110	08/07/2024

Batch R351420 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080582-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**4.75**	2.500	2.426	93.1	4.889	2.82	08/07/2024

Batch R351457 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate (as N)		0.050		**< 0.050**						08/08/2024
Nitrogen, Nitrate-Nitrite (as N)		0.050		**< 0.050**	0.0090	0	0	-100	100	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351457 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.481**	0.5000	0	96.2	90	110	08/08/2024

Batch R351457 **SampType:** MS Units **mg/L**
SampID: 24080397-006AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**6.49**	2.500	4.005	99.5	90	110	08/08/2024

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080397-006AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.500		**6.45**	2.500	4.005	98.0	6.493	0.60	08/08/2024

Batch R351457 **SampType:** MS Units **mg/L**
SampID: 24080483-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**18.4**	5.000	13.51	98.4	90	110	08/08/2024

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080483-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1.00		**18.3**	5.000	13.51	96.2	18.43	0.60	08/08/2024

Batch R351457 **SampType:** MS Units **mg/L**
SampID: 24080588-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**3.04**	1.250	1.782	100.8	90	110	08/08/2024

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080588-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.250		**3.09**	1.250	1.782	104.7	3.042	1.60	08/08/2024

Batch R351457 **SampType:** MS Units **mg/L**
SampID: 24080597-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.263**	0.2500	0.01900	97.6	90	110	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

STANDARD METHODS 4500-NO3 F (TOTAL) 2000, 2011

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080597-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		**0.262**	0.2500	0.01900	97.2	0.2630	0.38	08/08/2024

Batch R351457 **SampType:** MS Units **mg/L**

SampID: 24080678-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.76**	0.5000	1.268	98.4	90	110	08/08/2024

Batch R351457 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080678-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.100		**1.74**	0.5000	1.268	95.4	1.760	0.86	08/08/2024

SW-846 9012A (TOTAL)

Batch 226480 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240731 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/01/2024

Batch 226480 **SampType:** LCS Units **mg/L**

SampID: LCS 240731 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.022**	0.0250	0	89.7	85	115	08/01/2024

Batch 226480 **SampType:** MS Units **mg/L**

SampID: 24071451-030EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.5	75	125	08/01/2024

Batch 226480 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-030EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	97.2	0.02538	4.37	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226619 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240802 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/05/2024

Batch 226619 **SampType:** LCS Units **mg/L**

SampID: LCS 240802 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	95.6	85	115	08/05/2024

Batch 226619 **SampType:** MS Units **mg/L**

SampID: 24080007-001HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.023**	0.0250	0	91.1	75	125	08/05/2024

Batch 226619 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080007-001HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.023**	0.0250	0	92.3	0.02277	1.33	08/05/2024

Batch 226619 **SampType:** MS Units **mg/L**

SampID: 24080009-001HMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.020**	0.0250	0	78.7	75	125	08/05/2024

Batch 226619 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080009-001HMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.020**	0.0250	0	78.2	0.01968	0.66	08/05/2024

Batch 226680 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240805 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/06/2024

Batch 226680 **SampType:** LCS Units **mg/L**

SampID: LCS 240805 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.5	90	110	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226680 **SampType:** MS Units **mg/L**
SampID: 24080111-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	104.5	90	110	08/06/2024

Batch 226680 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080111-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	97.4	0.02612	7.04	08/06/2024

Batch 226681 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240805 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/06/2024

Batch 226681 **SampType:** LCS Units **mg/L**
SampID: LCS 240805 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	103.4	90	110	08/06/2024

Batch 226681 **SampType:** MS Units **mg/L**
SampID: 24071451-049EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.027**	0.0250	0	107.3	75	125	08/06/2024

Batch 226681 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-049EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	105.6	0.02682	1.63	08/06/2024

Batch 226681 **SampType:** MS Units **mg/L**
SampID: 24080305-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.3	90	110	08/06/2024

Batch 226681 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080305-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	103.1	0.02532	1.78	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226764 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240806 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/07/2024

Batch 226764 **SampType:** LCS Units **mg/L**

SampID: LCS 240806 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	104.9	90	110	08/07/2024

Batch 226764 **SampType:** MS Units **mg/L**

SampID: 24072505-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.028**	0.0250	0.003470	98.5	90	110	08/07/2024

Batch 226764 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24072505-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.028**	0.0250	0.003470	97.3	0.02808	1.00	08/07/2024

Batch 226764 **SampType:** MS Units **mg/L**

SampID: 24072536-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.019**	0.0250	0.001915	67.6	90	110	08/07/2024

Batch 226764 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24072536-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	S	**0.021**	0.0250	0.001915	76.0	0.01882	10.57	08/07/2024

Batch 226765 **SampType:** MBLK Units **mg/L**

SampID: MBLK 240806 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/07/2024

Batch 226765 **SampType:** LCS Units **mg/L**

SampID: LCS 240806 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0	103.6	90	110	08/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226765 **SampType:** MS Units **mg/L**
SampID: 24080185-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.024**	0.0250	0.005185	75.0	90	110	08/07/2024

Batch 226765 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080185-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	R	**0.029**	0.0250	0.005185	95.5	0.02392	19.42	08/07/2024

Batch 226765 **SampType:** MS Units **mg/L**
SampID: 24080279-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.025	S	**0.073**	0.1250	0	58.6	90	110	08/07/2024

Batch 226765 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080279-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.025	S	**0.074**	0.1250	0	59.5	0.07328	1.46	08/07/2024

Batch 226818 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240807 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/08/2024

Batch 226818 **SampType:** LCS Units **mg/L**
SampID: LCS 240807 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	98.1	90	110	08/08/2024

Batch 226818 **SampType:** MS Units **mg/L**
SampID: 24071451-007EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.017**	0.0250	0	69.5	75	125	08/08/2024

Batch 226818 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-007EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	S	**0.017**	0.0250	0	67.4	0.01738	3.16	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226820 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240807 TCN3

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/08/2024

Batch 226820 **SampType:** LCS Units **mg/L**
SampID: LCS 240807 TCN3

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	98.9	85	115	08/08/2024

Batch 226820 **SampType:** MS Units **mg/L**
SampID: 24080359-002DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.024**	0.0250	0	98.0	75	125	08/08/2024

Batch 226820 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080359-002DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.0	0.02450	3.02	08/08/2024

Batch 226820 **SampType:** MS Units **mg/L**
SampID: 24080359-007DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	100.9	75	125	08/08/2024

Batch 226820 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080359-007DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	98.7	0.02522	2.16	08/08/2024

Batch 226879 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240808 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/09/2024

Batch 226879 **SampType:** LCS Units **mg/L**
SampID: LCS 240808 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	98.3	85	115	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 226879 **SampType:** MS Units **mg/L**
SampID: 24080513-002EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	99.6	75	125	08/09/2024

Batch 226879 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080513-002EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	98.5	0.02491	1.15	08/09/2024

Batch 226879 **SampType:** MS Units **mg/L**
SampID: 24080513-010EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.026**	0.0250	0.001550	96.8	75	125	08/09/2024

Batch 226879 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080513-010EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005		**0.027**	0.0250	0.001550	101.5	0.02576	4.46	08/09/2024

Batch 226930 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240809 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/12/2024

Batch 226930 **SampType:** LCS Units **mg/L**
SampID: LCS 240809 TCN2

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.023**	0.0250	0	91.2	90	110	08/12/2024

Batch 227393 **SampType:** MBLK Units **mg/L**
SampID: MBLK 240820 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**< 0.005**	0.0015	0	0	-100	100	08/22/2024

Batch 227393 **SampType:** LCS Units **mg/L**
SampID: LCS 240820 TCN1

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005		**0.025**	0.0250	0	101.4	90	110	08/22/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9012A (TOTAL)

Batch 227393 **SampType:** MS Units **mg/L**
SampID: 24081349-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.025		**0.122**	0.1250	0	97.5	90	110	08/22/2024

Batch 227393 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24081349-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.025		**0.123**	0.1250	0	98.5	0.1218	1.02	08/22/2024

Batch 227393 **SampType:** MS Units **mg/L**
SampID: 24081364-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cyanide		0.005	S	**0.030**	0.0250	0.008085	88.0	90	110	08/22/2024

Batch 227393 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24081364-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cyanide		0.005	S	**0.028**	0.0250	0.008085	81.4	0.03008	5.66	08/22/2024

SW-846 9036 (DISSOLVED)

Batch R351209 **SampType:** MS Units **mg/L**
SampID: 24071451-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20	E	**109**	40.00	74.09	88.1	85	115	08/02/2024

Batch R351209 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20	E	**113**	40.00	74.09	96.7	109.3	3.08	08/02/2024

Batch R351209 **SampType:** MS Units **mg/L**
SampID: 24071451-031BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	E	**54**	20.00	36.52	89.9	85	115	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (DISSOLVED)

Batch R351209 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-031BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	E	**55**	20.00	36.52	92.6	54.50	0.99	08/02/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24071451-034BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**171**	100.0	79.20	91.9	85	115	08/06/2024

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-034BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**174**	100.0	79.20	94.8	171.1	1.65	08/06/2024

Batch R351398 **SampType:** MS Units **mg/L**

SampID: 24071451-014BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**90**	40.00	50.64	99.3	85	115	08/07/2024

Batch R351398 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-014BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**90**	40.00	50.64	98.2	90.35	0.48	08/07/2024

Batch R351398 **SampType:** MS Units **mg/L**

SampID: 24080359-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**209**	100.0	114.5	94.0	85	115	08/07/2024

Batch R351398 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080359-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**215**	100.0	114.5	100.5	208.5	3.04	08/07/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24071451-018BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**316**	200.0	133.2	91.4	85	115	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (DISSOLVED)

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-018BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**314**	200.0	133.2	90.5	316.0	0.57	08/09/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24071451-044BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**97**	40.00	55.40	103.6	85	115	08/09/2024

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-044BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**99**	40.00	55.40	108.9	96.84	2.18	08/09/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24071451-098BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**90**	40.00	49.59	100.8	85	115	08/09/2024

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-098BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**93**	40.00	49.59	108.6	89.89	3.43	08/09/2024

Batch R351845 **SampType:** MS Units **mg/L**

SampID: 24080823-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**473**	200.0	298.6	87.3	85	115	08/15/2024

Batch R351845 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080823-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**486**	200.0	298.6	93.9	473.3	2.75	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351209 **SampType:** MBLK Units **mg/L**
SampID: MBLK/ICB

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/02/2024

Batch R351209 **SampType:** MBLK Units **mg/L**
SampID: MBLK-226428

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	*	10	J	**9**	9.400	0	100.0	-100	100	08/02/2024

Batch R351209 **SampType:** LCS Units **mg/L**
SampID: LCS/ICV

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	95.6	90	110	08/02/2024

Batch R351209 **SampType:** MS Units **mg/L**
SampID: 24072398-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**23**	20.00	9.380	70.0	90	110	08/02/2024

Batch R351209 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24072398-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**24**	20.00	9.380	70.8	23.39	0.68	08/02/2024

Batch R351305 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/06/2024

Batch R351305 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	92.2	90	110	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**
SampID: 24072470-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**186**	100.0	88.42	97.9	85	115	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072470-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**183**	100.0	88.42	94.3	186.3	1.95	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24072589-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**432**	200.0	233.8	98.9	85	115	08/06/2024

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072589-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**442**	200.0	233.8	104.1	431.6	2.40	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24072590-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**410**	200.0	218.9	95.3	85	115	08/06/2024

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072590-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**413**	200.0	218.9	97.2	409.6	0.89	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24072591-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**203**	100.0	103.7	98.8	85	115	08/06/2024

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072591-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**203**	100.0	103.7	99.4	202.5	0.25	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24072592-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	E	**262**	100.0	156.2	105.6	85	115	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24072592-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	E	**271**	100.0	156.2	114.8	261.8	3.46	08/06/2024

Batch R351305 **SampType:** MS Units **mg/L**

SampID: 24080304-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100	E	**505**	200.0	307.2	98.9	90	110	08/06/2024

Batch R351305 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080304-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100	E	**512**	200.0	307.2	102.6	505.1	1.43	08/06/2024

Batch R351398 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/07/2024

Batch R351398 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	95.2	90	110	08/07/2024

Batch R351398 **SampType:** MS Units **mg/L**

SampID: 24071451-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**250**	100.0	146.4	103.3	85	115	08/07/2024

Batch R351398 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	E	**253**	100.0	146.4	106.9	249.6	1.44	08/07/2024

Batch R351398 **SampType:** MS Units **mg/L**

SampID: 24080156-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		1000		**3590**	2000	1771	90.8	90	110	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351398 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080156-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		1000		**3650**	2000	1771	93.7	3587	1.64	08/07/2024

Batch R351398 **SampType:** MS Units **mg/L**

SampID: 24080228-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	E	**271**	100.0	170.6	100.2	90	110	08/07/2024

Batch R351398 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080228-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	E	**272**	100.0	170.6	101.3	270.8	0.41	08/07/2024

Batch R351547 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/09/2024

Batch R351547 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	90.3	90	110	08/09/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24080678-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	E	**57**	20.00	38.22	91.9	90	110	08/09/2024

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080678-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	E	**59**	20.00	38.22	101.7	56.60	3.39	08/09/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24080680-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	E	**52**	20.00	33.15	95.8	90	110	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080680-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	E	**53**	20.00	33.15	99.2	52.31	1.29	08/09/2024

Batch R351547 **SampType:** MS Units **mg/L**

SampID: 24080862-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		5000		**20800**	10000	11000	98.3	90	110	08/09/2024

Batch R351547 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080862-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		5000		**21300**	10000	11000	103.3	20830	2.34	08/09/2024

Batch R351588 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/12/2024

Batch R351588 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	94.4	90	110	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24071451-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**72**	40.00	35.11	91.0	85	115	08/12/2024

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20		**71**	40.00	35.11	88.9	71.53	1.21	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24071451-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20	E	**112**	40.00	74.18	94.1	85	115	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20	E	**115**	40.00	74.18	102.3	111.8	2.89	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24071451-044AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20		**100**	40.00	64.57	88.6	85	115	08/12/2024

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-044AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20	E	**104**	40.00	64.57	97.8	99.99	3.65	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24071451-058AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		20	E	**109**	40.00	70.30	96.8	85	115	08/12/2024

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24071451-058AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		20	E	**108**	40.00	70.30	94.4	109.0	0.88	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24081024-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**228**	100.0	124.6	103.3	90	110	08/12/2024

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24081024-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**227**	100.0	124.6	102.9	227.9	0.20	08/12/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24081026-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100	E	**519**	200.0	337.3	90.8	90	110	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24081026-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100	E	**529**	200.0	337.3	95.8	518.9	1.91	08/13/2024

Batch R351588 **SampType:** MS Units **mg/L**

SampID: 24081027-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100	E	**532**	200.0	332.5	99.7	90	110	08/13/2024

Batch R351588 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24081027-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100	E	**521**	200.0	332.5	94.4	531.9	2.05	08/13/2024

Batch R351696 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/13/2024

Batch R351696 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**18**	20.00	0	92.4	90	110	08/13/2024

Batch R351696 **SampType:** MS Units **mg/L**

SampID: 24080553-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10	S	**20**	20.00	7.020	65.7	85	115	08/13/2024

Batch R351696 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080553-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10	S	**22**	20.00	7.020	73.5	20.15	7.50	08/13/2024

Batch R351696 **SampType:** MS Units **mg/L**

SampID: 24080553-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**44**	20.00	23.54	100.4	85	115	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351696 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080553-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**44**	20.00	23.54	104.2	43.63	1.73	08/13/2024

Batch R351696 **SampType:** MS Units **mg/L**

SampID: 24080553-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**31**	20.00	12.99	89.2	85	115	08/13/2024

Batch R351696 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080553-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		10		**30**	20.00	12.99	86.9	30.82	1.47	08/13/2024

Batch R351696 **SampType:** MS Units **mg/L**

SampID: 24080717-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	SH	**149**	100.0	65.75	82.8	90	110	08/13/2024

Batch R351696 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080717-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	SH	**150**	100.0	65.75	84.2	148.6	0.89	08/13/2024

Batch R351696 **SampType:** MS Units **mg/L**

SampID: 24080717-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**363**	200.0	158.3	102.3	90	110	08/13/2024

Batch R351696 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080717-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**362**	200.0	158.3	102.0	362.8	0.12	08/13/2024

Batch R351845 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**< 10**	6.140	0	0	-100	100	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351845 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		10		**19**	20.00	0	93.8	90	110	08/15/2024

Batch R351845 **SampType:** MS Units **mg/L**
SampID: 24071451-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**169**	100.0	75.41	93.1	85	115	08/15/2024

Batch R351845 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**176**	100.0	75.41	100.4	168.5	4.24	08/15/2024

Batch R351845 **SampType:** MS Units **mg/L**
SampID: 24071451-077AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50		**186**	100.0	87.05	98.8	85	115	08/15/2024

Batch R351845 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24071451-077AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50		**187**	100.0	87.05	100.4	185.8	0.87	08/15/2024

Batch R351845 **SampType:** MS Units **mg/L**
SampID: 24080820-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		50	E	**258**	100.0	165.4	92.8	85	115	08/15/2024

Batch R351845 **SampType:** MSD Units **mg/L** RPD Limit **10**
SampID: 24080820-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		50	E	**258**	100.0	165.4	92.2	258.2	0.26	08/15/2024

Batch R351845 **SampType:** MS Units **mg/L**
SampID: 24080823-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate		100		**487**	200.0	284.1	101.5	85	115	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9036 (TOTAL)

Batch R351845 **SampType:** MSD Units **mg/L** RPD Limit **10**

SampID: 24080823-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate		100		**470**	200.0	284.1	93.1	487.1	3.50	08/15/2024

SW846 9056A DISSOLVED ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351389 **SampType:** MS Units **mg/L**

SampID: 24071451-004BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.2670	100.0	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-004BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.2670	99.6	10.27	0.42	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**

SampID: 24071451-010BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.2570	99.6	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-010BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.2570	99.8	10.22	0.18	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**

SampID: 24071451-011BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.2720	99.8	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-011BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.2720	99.5	10.25	0.31	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW846 9056A DISSOLVED ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351419 **SampType:** MS Units **mg/L**
SampID: 24071451-018BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3040	98.6	80	120	08/08/2024

Batch R351419 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-018BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3040	99.4	10.16	0.80	08/08/2024

Batch R351606 **SampType:** MS Units **mg/L**
SampID: 24071451-022BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.5**	10.00	0.5660	99.0	80	120	08/13/2024

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-022BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.5**	10.00	0.5660	99.1	10.46	0.12	08/13/2024

Batch R351606 **SampType:** MS Units **mg/L**
SampID: 24071451-024BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.4**	10.00	0.4570	99.3	80	120	08/13/2024

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-024BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.4**	10.00	0.4570	99.7	10.38	0.38	08/13/2024

Batch R351606 **SampType:** MS Units **mg/L**
SampID: 24071451-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.8**	10.00	0.9060	99.3	80	120	08/13/2024

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.8**	10.00	0.9060	99.3	10.84	0.02	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW846 9056A DISSOLVED ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351606 **SampType:** MS Units **mg/L**
SampID: 24071451-026BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.7**	10.00	0.7180	100.2	80	120	08/13/2024

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-026BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.7**	10.00	0.7180	99.3	10.74	0.87	08/13/2024

SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351389 **SampType:** MBLK Units **mg/L**
SampID: MBLK/ICB

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**ND**						08/07/2024

Batch R351389 **SampType:** LCS Units **mg/L**
SampID: LCS/ICV/QCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**1.01**	1.000	0	101.4	90	110	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**
SampID: 24071451-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3060	99.3	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.3060	99.7	10.23	0.47	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**
SampID: 24071451-012AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.3330	100.1	80	120	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-012AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.3330	99.5	10.34	0.53	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**

SampID: 24080156-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.10	S	**0.88**	2.000	0.02840	42.6	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080156-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.10	S	**0.84**	2.000	0.02840	40.8	0.8814	4.26	08/07/2024

Batch R351389 **SampType:** MS Units **mg/L**

SampID: 24080305-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10		**2.18**	2.000	0.1666	100.7	80	120	08/07/2024

Batch R351389 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080305-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.10		**2.19**	2.000	0.1666	101.0	2.181	0.23	08/07/2024

Batch R351419 **SampType:** MBLK Units **mg/L**

SampID: MBLK/ICB

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**ND**						08/08/2024

Batch R351419 **SampType:** LCS Units **mg/L**

SampID: LCS/ICV/QCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**0.99**	1.000	0	98.6	90	110	08/08/2024

Batch R351419 **SampType:** MS Units **mg/L**

SampID: 24071451-044AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3140	99.0	80	120	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351419 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-044AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3140	99.0	10.21	0.07	08/08/2024

Batch R351419 **SampType:** MS Units **mg/L**

SampID: 24080678-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.50		**10.2**	10.00	0.3010	98.9	80	120	08/08/2024

Batch R351419 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080678-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.50		**10.3**	10.00	0.3010	99.5	10.19	0.64	08/08/2024

Batch R351419 **SampType:** MS Units **mg/L**

SampID: 24080715-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.50		**10.7**	10.00	0.8410	98.4	80	120	08/08/2024

Batch R351419 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080715-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride		0.50		**10.7**	10.00	0.8410	98.9	10.68	0.49	08/08/2024

Batch R351606 **SampType:** MBLK Units **mg/L**

SampID: MBLK/ICB

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**ND**						08/13/2024

Batch R351606 **SampType:** LCS Units **mg/L**

SampID: LCS/ICV/QCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.05		**0.99**	1.000	0	98.9	90	110	08/13/2024

Batch R351606 **SampType:** MS Units **mg/L**

SampID: 24071451-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.9**	10.00	0.8930	99.6	80	120	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.9**	10.00	0.8930	99.7	10.85	0.05	08/13/2024

Batch R351606 **SampType:** MS Units **mg/L**

SampID: 24071451-028AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride	*	0.50		**10.2**	10.00	0.3960	98.4	80	120	08/13/2024

Batch R351606 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-028AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Fluoride	*	0.50		**10.3**	10.00	0.3960	99.2	10.24	0.74	08/13/2024

SW-846 9066 (TOTAL)

Batch R351148 **SampType:** MBLK Units **mg/L**

SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	08/02/2024

Batch R351148 **SampType:** LCS Units **mg/L**

SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.049**	0.0500	0	98.2	90	110	08/02/2024

Batch R351148 **SampType:** MS Units **µg/L**

SampID: 24071451-030FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**49**	50.00	0	98.5	85	115	08/02/2024

Batch R351148 **SampType:** MSD Units **µg/L** RPD Limit **15**

SampID: 24071451-030FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	101.0	49.26	2.51	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351148 **SampType:** MS Units **mg/L**
SampID: 24080025-002EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.025		**0.256**	0.2500	0	102.6	90	110	08/02/2024

Batch R351148 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080025-002EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.025		**0.262**	0.2500	0	104.6	0.2565	1.99	08/02/2024

Batch R351148 **SampType:** MS Units **mg/L**
SampID: 24080094-001EMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.055**	0.0500	0.003860	101.9	90	110	08/02/2024

Batch R351148 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080094-001EMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.053**	0.0500	0.003860	98.3	0.05481	3.34	08/02/2024

Batch R351322 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	08/06/2024

Batch R351322 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.050**	0.0500	0	99.6	90	110	08/06/2024

Batch R351322 **SampType:** MS Units **mg/L**
SampID: 24080065-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.050		**0.551**	0.5000	0.05054	100.1	90	110	08/06/2024

Batch R351322 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080065-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.050		**0.556**	0.5000	0.05054	101.2	0.5511	0.94	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351322 **SampType:** MS Units **mg/L**
SampID: 24080184-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.078**	0.0500	0.01632	123.3	90	110	08/06/2024

Batch R351322 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080184-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.080**	0.0500	0.01632	127.4	0.07799	2.59	08/06/2024

Batch R351322 **SampType:** MS Units **mg/L**
SampID: 24080282-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.065**	0.0500	0.003720	123.2	90	110	08/06/2024

Batch R351322 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080282-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.064**	0.0500	0.003720	121.3	0.06532	1.50	08/06/2024

Batch R351322 **SampType:** MS Units **mg/L**
SampID: 24080305-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.061**	0.0500	0.002900	116.2	90	110	08/06/2024

Batch R351322 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080305-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.059**	0.0500	0.002900	112.5	0.06100	3.10	08/06/2024

Batch R351359 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	08/07/2024

Batch R351359 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.051**	0.0500	0	102.6	90	110	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351359 **SampType:** MS Units **mg/L**
SampID: 24080408-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.081**	0.0500	0.01071	140.0	90	110	08/07/2024

Batch R351359 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080408-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.078**	0.0500	0.01071	134.3	0.08073	3.61	08/07/2024

Batch R351359 **SampType:** MS Units **mg/L**
SampID: 24080416-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.071**	0.0500	0.007080	127.3	90	110	08/07/2024

Batch R351359 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080416-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.070**	0.0500	0.007080	126.8	0.07073	0.34	08/07/2024

Batch R351516 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	08/09/2024

Batch R351516 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.050**	0.0500	0	100.9	90	110	08/09/2024

Batch R351516 **SampType:** MS Units **µg/L**
SampID: 24071451-005FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**52**	50.00	0	104.3	85	115	08/09/2024

Batch R351516 **SampType:** MSD Units **µg/L** RPD Limit **15**
SampID: 24071451-005FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	101.9	52.16	2.39	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351516 **SampType:** MS Units µg/L
SampID: 24071451-027FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**50**	50.00	0	100.7	85	115	08/09/2024

Batch R351516 **SampType:** MSD Units µg/L RPD Limit 15
SampID: 24071451-027FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	102.1	50.35	1.34	08/09/2024

Batch R351516 **SampType:** MS Units µg/L
SampID: 24071451-037FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**54**	50.00	0	107.5	85	115	08/09/2024

Batch R351516 **SampType:** MSD Units µg/L RPD Limit 15
SampID: 24071451-037FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**54**	50.00	0	107.6	53.73	0.09	08/09/2024

Batch R351516 **SampType:** MS Units µg/L
SampID: 24071451-089FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**59**	50.00	8.190	102.6	85	115	08/09/2024

Batch R351516 **SampType:** MSD Units µg/L RPD Limit 15
SampID: 24071451-089FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**61**	50.00	8.190	105.8	59.49	2.62	08/09/2024

Batch R351516 **SampType:** MS Units mg/L
SampID: 24080573-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.063**	0.0500	0.003890	119.2	90	110	08/09/2024

Batch R351516 **SampType:** MSD Units mg/L RPD Limit 15
SampID: 24080573-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.066**	0.0500	0.003890	124.0	0.06349	3.73	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351516 **SampType:** MS Units **mg/L**
SampID: 24080791-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005	S	**0.064**	0.0500	0.003960	119.2	90	110	08/09/2024

Batch R351516 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080791-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005	S	**0.061**	0.0500	0.003960	114.6	0.06356	3.72	08/09/2024

Batch R351660 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**< 0.005**	0.0028	0	0	-100	100	08/13/2024

Batch R351660 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.047**	0.0500	0	93.3	90	110	08/13/2024

Batch R351660 **SampType:** MS Units **µg/L**
SampID: 24071451-044FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**51**	50.00	0	102.7	85	115	08/13/2024

Batch R351660 **SampType:** MSD Units **µg/L** RPD Limit **15**
SampID: 24071451-044FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**52**	50.00	0	104.3	51.34	1.55	08/13/2024

Batch R351660 **SampType:** MS Units **µg/L**
SampID: 24080600-002BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**50**	50.00	0	100.8	85	115	08/13/2024

Batch R351660 **SampType:** MSD Units **µg/L** RPD Limit **15**
SampID: 24080600-002BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**51**	50.00	0	101.4	50.38	0.59	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9066 (TOTAL)

Batch R351660 **SampType:** MS Units µg/L
SampID: 24080810-001FMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		5		**53**	50.00	0	105.8	85	115	08/13/2024

Batch R351660 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24080810-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		5		**54**	50.00	0	107.0	52.89	1.18	08/13/2024

Batch R351660 **SampType:** MS Units mg/L
SampID: 24081005-001GMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Phenols		0.005		**0.054**	0.0500	0	107.4	90	110	08/13/2024

Batch R351660 **SampType:** MSD Units mg/L RPD Limit **15**
SampID: 24081005-001GMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Phenols		0.005		**0.054**	0.0500	0	108.7	0.05368	1.26	08/13/2024

SW-846 9251 (DISSOLVED)

Batch R351226 **SampType:** MS Units mg/L
SampID: 24071451-025BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**23**	20.00	3.650	98.0	85	115	08/02/2024

Batch R351226 **SampType:** MSD Units mg/L RPD Limit **15**
SampID: 24071451-025BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**23**	20.00	3.650	98.1	23.24	0.13	08/02/2024

Batch R351226 **SampType:** MS Units mg/L
SampID: 24071451-031BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**57**	20.00	36.98	98.6	85	115	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (DISSOLVED)

Batch R351226 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-031BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**57**	20.00	36.98	98.6	56.69	0.04	08/02/2024

Batch R351226 **SampType:** MS Units **mg/L**

SampID: 24071451-034BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**66**	20.00	43.63	111.5	85	115	08/02/2024

Batch R351226 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-034BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**65**	20.00	43.63	109.0	65.93	0.78	08/02/2024

Batch R351406 **SampType:** MS Units **mg/L**

SampID: 24071451-014BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**71**	40.00	35.24	89.3	85	115	08/07/2024

Batch R351406 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-014BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**70**	40.00	35.24	87.0	70.95	1.26	08/07/2024

Batch R351406 **SampType:** MS Units **mg/L**

SampID: 24080359-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**136**	100.0	42.97	93.3	85	115	08/07/2024

Batch R351406 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080359-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**138**	100.0	42.97	94.7	136.3	1.03	08/07/2024

Batch R351555 **SampType:** MS Units **mg/L**

SampID: 24071451-018BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**151**	100.0	58.68	92.3	85	115	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (DISSOLVED)

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-018BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**153**	100.0	58.68	94.4	151.0	1.39	08/09/2024

Batch R351555 **SampType:** MS Units **mg/L**

SampID: 24071451-044BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**30**	20.00	12.60	88.8	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-044BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**31**	20.00	12.60	89.6	30.36	0.53	08/09/2024

Batch R351555 **SampType:** MS Units **mg/L**

SampID: 24071451-098BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	8.010	92.5	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24071451-098BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	8.010	92.6	26.51	0.04	08/09/2024

Batch R351860 **SampType:** MS Units **mg/L**

SampID: 24080823-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		200		**1520**	1000	606.4	91.8	85	115	08/15/2024

Batch R351860 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080823-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		200		**1520**	1000	606.4	91.8	1524	0.03	08/15/2024

Batch R351860 **SampType:** MS Units **mg/L**

SampID: 24080857-005CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**66**	20.00	47.08	95.2	85	115	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (DISSOLVED)

Batch R351860 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24080857-005CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**66**	20.00	47.08	95.4	66.11	0.09	08/15/2024

SW-846 9251 (TOTAL)

Batch R351226 **SampType:** MBLK Units **mg/L**

SampID: MBLK/ICB

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/02/2024

Batch R351226 **SampType:** LCS Units **mg/L**

SampID: LCS/ICV

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	101.0	90	110	08/02/2024

Batch R351226 **SampType:** MS Units **mg/L**

SampID: 24072311-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**21**	20.00	1.160	99.7	85	115	08/03/2024

Batch R351226 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24072311-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**21**	20.00	1.160	100.0	21.10	0.28	08/03/2024

Batch R351226 **SampType:** MS Units **mg/L**

SampID: 24072398-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**25**	20.00	5.650	97.8	85	115	08/02/2024

Batch R351226 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24072398-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**25**	20.00	5.650	98.0	25.22	0.08	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351307 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/06/2024

Batch R351307 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**19**	20.00	0	95.7	90	110	08/06/2024

Batch R351406 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/07/2024

Batch R351406 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	97.5	90	110	08/07/2024

Batch R351406 **SampType:** MS Units **mg/L**
SampID: 24071451-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**28**	20.00	9.330	94.5	85	115	08/07/2024

Batch R351406 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**28**	20.00	9.330	93.9	28.23	0.43	08/07/2024

Batch R351406 **SampType:** MS Units **mg/L**
SampID: 24080156-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		200		**2300**	1000	1338	95.9	85	115	08/07/2024

Batch R351406 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080156-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		200		**2240**	1000	1338	89.9	2297	2.63	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351406 **SampType:** MS Units **mg/L**
SampID: 24080228-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**222**	100.0	133.5	88.2	85	115	08/07/2024

Batch R351406 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080228-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**222**	100.0	133.5	88.9	221.6	0.33	08/07/2024

Batch R351555 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/09/2024

Batch R351555 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**19**	20.00	0	96.0	90	110	08/09/2024

Batch R351555 **SampType:** MS Units **mg/L**
SampID: 24080456-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**364**	200.0	190.2	86.9	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080456-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**362**	200.0	190.2	86.1	364.0	0.44	08/09/2024

Batch R351555 **SampType:** MS Units **mg/L**
SampID: 24080678-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8	E	**109**	40.00	72.92	90.3	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080678-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8	E	**112**	40.00	72.92	98.3	109.0	2.88	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351555 **SampType:** MS Units **mg/L**
SampID: 24080680-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**244**	100.0	149.4	94.6	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080680-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**235**	100.0	149.4	85.2	244.0	3.95	08/09/2024

Batch R351555 **SampType:** MS Units **mg/L**
SampID: 24080862-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		2000		**18200**	10000	9312	89.1	85	115	08/09/2024

Batch R351555 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080862-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		2000		**18300**	10000	9312	89.8	18220	0.40	08/09/2024

Batch R351636 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/12/2024

Batch R351636 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.4	90	110	08/12/2024

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-025AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**23**	20.00	3.730	96.8	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-025AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**23**	20.00	3.730	97.0	23.10	0.09	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-031AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**55**	20.00	36.86	93.0	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-031AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**56**	20.00	36.86	95.4	55.46	0.88	08/12/2024

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-042AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**52**	20.00	34.27	90.9	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-042AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**53**	20.00	34.27	92.6	52.44	0.67	08/12/2024

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-044AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**33**	20.00	14.15	94.4	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-044AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**33**	20.00	14.15	94.9	33.02	0.33	08/12/2024

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-058AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**39**	20.00	20.78	91.4	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-058AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**39**	20.00	20.78	89.6	39.05	0.93	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24071451-077AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**26**	20.00	6.260	97.2	85	115	08/12/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24071451-077AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**26**	20.00	6.260	98.0	25.69	0.70	08/12/2024

Batch R351636 **SampType:** MS Units **mg/L**
SampID: 24081027-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	8.220	96.0	85	115	08/13/2024

Batch R351636 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24081027-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**28**	20.00	8.220	96.7	27.41	0.55	08/13/2024

Batch R351708 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/13/2024

Batch R351708 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	100.5	90	110	08/13/2024

Batch R351708 **SampType:** MS Units **mg/L**
SampID: 24080552-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**63**	20.00	42.42	101.7	85	115	08/13/2024

Batch R351708 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080552-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**62**	20.00	42.42	99.4	62.76	0.74	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351708 **SampType:** MS Units **mg/L**
SampID: 24080553-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**33**	20.00	14.12	93.4	85	115	08/13/2024

Batch R351708 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080553-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**33**	20.00	14.12	94.6	32.81	0.67	08/13/2024

Batch R351708 **SampType:** MS Units **mg/L**
SampID: 24080553-003AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		8		**84**	40.00	47.68	89.9	85	115	08/13/2024

Batch R351708 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080553-003AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		8		**84**	40.00	47.68	89.6	83.63	0.14	08/13/2024

Batch R351708 **SampType:** MS Units **mg/L**
SampID: 24080553-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**26**	20.00	6.760	94.4	85	115	08/13/2024

Batch R351708 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080553-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**26**	20.00	6.760	94.4	25.65	0.04	08/13/2024

Batch R351708 **SampType:** MS Units **mg/L**
SampID: 24080717-005AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**277**	200.0	89.29	94.0	85	115	08/13/2024

Batch R351708 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080717-005AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**279**	200.0	89.29	94.8	277.2	0.60	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R351860 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/15/2024

Batch R351860 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.3	90	110	08/15/2024

Batch R351860 **SampType:** MS Units **mg/L**
SampID: 24080717-002AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	H	**34**	20.00	15.42	90.8	85	115	08/15/2024

Batch R351860 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080717-002AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	H	**34**	20.00	15.42	91.1	33.58	0.18	08/15/2024

Batch R351860 **SampType:** MS Units **mg/L**
SampID: 24080855-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		80		**872**	400.0	507.2	91.1	85	115	08/15/2024

Batch R351860 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080855-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		80		**858**	400.0	507.2	87.8	871.7	1.54	08/15/2024

Batch R352062 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**< 4**	0.5000	0	0	-100	100	08/20/2024

Batch R352062 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**20**	20.00	0	98.6	90	110	08/20/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R352062 **SampType:** MS Units **mg/L**
SampID: 24080242-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**47**	20.00	28.68	91.0	85	115	08/20/2024

Batch R352062 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080242-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**46**	20.00	28.68	89.0	46.87	0.84	08/20/2024

Batch R352062 **SampType:** MS Units **mg/L**
SampID: 24080242-007AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4	E	**55**	20.00	37.19	87.8	85	115	08/20/2024

Batch R352062 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080242-007AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4	E	**55**	20.00	37.19	87.0	54.74	0.26	08/20/2024

Batch R352062 **SampType:** MS Units **mg/L**
SampID: 24080243-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		20		**204**	100.0	108.5	95.2	85	115	08/20/2024

Batch R352062 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080243-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		20		**200**	100.0	108.5	91.7	203.7	1.71	08/20/2024

Batch R352062 **SampType:** MS Units **mg/L**
SampID: 24080243-004AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		40		**358**	200.0	175.5	91.5	85	115	08/20/2024

Batch R352062 **SampType:** MSD Units **mg/L** RPD Limit **15**
SampID: 24080243-004AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		40		**359**	200.0	175.5	91.8	358.5	0.20	08/20/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 9251 (TOTAL)

Batch R352062 **SampType:** MS Units **mg/L**

SampID: 24081588-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Chloride		4		**27**	20.00	8.000	97.2	85	115	08/20/2024

Batch R352062 **SampType:** MSD Units **mg/L** RPD Limit **15**

SampID: 24081588-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Chloride		4		**27**	20.00	8.000	97.2	27.44	0.04	08/20/2024

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

Batch 226703 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226703

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	08/06/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/06/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	08/06/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/06/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/06/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/06/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	08/06/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/06/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/06/2024

Batch 226703 **SampType:** LCS Units **mg/L**

SampID: LCS-226703

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**0.457**	0.5000	0	91.4	85	115	08/06/2024
Calcium		0.100		**2.43**	2.500	0	97.2	85	115	08/06/2024
Cobalt		0.0050		**0.481**	0.5000	0	96.2	85	115	08/06/2024
Iron		0.0400		**1.90**	2.000	0	94.8	85	115	08/06/2024
Magnesium		0.0500		**2.22**	2.500	0	88.9	85	115	08/06/2024
Manganese		0.0070		**0.473**	0.5000	0	94.5	85	115	08/06/2024
Molybdenum		0.0100		**0.465**	0.5000	0	92.9	85	115	08/06/2024
Potassium		0.100		**2.61**	2.500	0	104.3	85	115	08/06/2024
Sodium		0.0500		**2.43**	2.500	0	97.2	85	115	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226703 **SampType: MS** Units **mg/L**
SampID: 24080305-001DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		0.0400		**1.90**	2.000	0	95.2	75	125	08/06/2024

Batch 226703 **SampType: MSD** Units **mg/L** RPD Limit **20**
SampID: 24080305-001DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		0.0400		**1.87**	2.000	0	93.6	1.903	1.67	08/06/2024

Batch 226703 **SampType: MS** Units **mg/L**
SampID: 24080359-008CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Magnesium		0.050	S	**42.3**	2.500	40.57	69.7	75	125	08/06/2024

Batch 226703 **SampType: MSD** Units **mg/L** RPD Limit **20**
SampID: 24080359-008CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Magnesium		0.050	S	**41.8**	2.500	40.57	51.0	42.31	1.11	08/06/2024

Batch 226766 **SampType: MBLK** Units **mg/L**
SampID: MBLK-226766

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/07/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/07/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/07/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/09/2024

Batch 226766 **SampType: LCS** Units **mg/L**
SampID: LCS-226766

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.48**	2.500	0	99.1	85	115	08/07/2024
Iron		0.0400		**1.90**	2.000	0	95.0	85	115	08/07/2024
Magnesium		0.0500		**2.39**	2.500	0	95.4	85	115	08/08/2024
Potassium		0.100		**2.55**	2.500	0	101.9	85	115	08/07/2024
Sodium		0.0500		**2.46**	2.500	0	98.6	85	115	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226766 **SampType: MS** Units **mg/L**

SampID: 24071451-014CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**78.8**	2.500	76.51	91.2	75	125	08/07/2024
Magnesium		0.050	S	**38.6**	2.500	35.44	128.0	75	125	08/08/2024
Potassium		0.100		**3.18**	2.500	0.5508	105.2	75	125	08/07/2024
Sodium		0.050	S	**41.3**	2.500	39.53	72.0	75	125	08/07/2024

Batch 226766 **SampType: MSD** Units **mg/L** RPD Limit **20**

SampID: 24071451-014CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**75.5**	2.500	76.51	-40.4	78.79	4.26	08/07/2024
Magnesium		0.050	S	**36.9**	2.500	35.44	57.0	38.64	4.71	08/08/2024
Potassium		0.100		**3.08**	2.500	0.5508	101.0	3.182	3.41	08/07/2024
Sodium		0.050	S	**39.8**	2.500	39.53	11.6	41.33	3.72	08/07/2024

Batch 226779 **SampType: MBLK** Units **mg/L**

SampID: MBLK-226779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/07/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/07/2024
Sodium		0.050		**< 0.050**	0.0180	0	0	-100	100	08/07/2024

Batch 226779 **SampType: LCS** Units **mg/L**

SampID: LCS-226779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.45**	2.500	0	97.8	85	115	08/07/2024
Magnesium		0.050		**2.32**	2.500	0	92.7	85	115	08/08/2024
Potassium		0.100		**2.57**	2.500	0	102.6	85	115	08/07/2024
Sodium		0.050		**2.47**	2.500	0	98.9	85	115	08/07/2024

Batch 226779 **SampType: MS** Units **mg/L**

SampID: 24071451-013CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**91.6**	2.500	91.09	18.4	75	125	08/07/2024
Magnesium		0.050	S	**44.6**	2.500	43.14	57.1	75	125	08/08/2024
Potassium		0.100		**2.89**	2.500	0.2479	105.5	75	125	08/07/2024
Sodium		0.050	S	**59.2**	2.500	58.17	39.6	75	125	08/07/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226779 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-013CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**92.1**	2.500	91.09	42.0	91.55	0.64	08/07/2024
Magnesium		0.050	S	**44.9**	2.500	43.14	70.9	44.56	0.77	08/08/2024
Potassium		0.100		**2.89**	2.500	0.2479	105.6	2.886	0.02	08/07/2024
Sodium		0.050	S	**59.1**	2.500	58.17	38.8	59.16	0.03	08/07/2024

Batch 226875 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226875

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/12/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/08/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/08/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	08/12/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/12/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/08/2024
Sodium		0.050		**< 0.050**	0.0180	0	0	-100	100	08/12/2024

Batch 226875 **SampType:** LCS Units **mg/L**

SampID: LCS-226875

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.30**	2.500	0	92.1	85	115	08/08/2024
Calcium		0.100		**2.32**	2.500	0	92.7	85	115	08/08/2024
Calcium		0.100		**2.41**	2.500	0	96.3	85	115	08/12/2024
Magnesium		0.0500	S	**2.12**	2.500	0	84.7	85	115	08/08/2024
Magnesium		0.0500	S	**2.11**	2.500	0	84.3	85	115	08/08/2024
Magnesium		0.050		**2.20**	2.500	0	88.2	85	115	08/12/2024
Potassium		0.100		**2.46**	2.500	0	98.4	85	115	08/08/2024
Potassium		0.100		**2.47**	2.500	0	99.0	85	115	08/08/2024
Potassium		0.100		**2.50**	2.500	0	100.1	85	115	08/12/2024
Sodium		0.0500		**2.38**	2.500	0	95.0	85	115	08/08/2024
Sodium		0.0500		**2.37**	2.500	0	94.9	85	115	08/08/2024
Sodium		0.050		**2.42**	2.500	0	96.6	85	115	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226875 **SampType:** MS Units **mg/L**

SampID: 24080600-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Magnesium		0.050	S	**50.9**	2.500	49.53	54.7	75	125	08/12/2024

Batch 226875 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24080600-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Magnesium		0.050	S	**51.1**	2.500	49.53	60.8	50.90	0.30	08/12/2024

Batch 226875 **SampType:** MS Units **mg/L**

SampID: 24080689-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Magnesium		0.050	S	**36.9**	2.500	35.11	69.9	75	125	08/12/2024

Batch 226875 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24080689-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Magnesium		0.050	S	**36.6**	2.500	35.11	60.3	36.86	0.65	08/12/2024

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

Batch 226445 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226445

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/02/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/01/2024
Iron		0.0400	S	**0.0687**	0.0200	0	343.5	-100	100	08/02/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/01/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/02/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/02/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/02/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/01/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/02/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226445 **SampType:** LCS Units **mg/L**

SampID: LCS-226445

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.51**	2.500	0	100.6	85	115	08/01/2024
Magnesium		0.0500		**2.34**	2.500	0	93.6	85	115	08/01/2024
Potassium		0.100		**2.63**	2.500	0	105.3	85	115	08/01/2024
Sodium		0.0500		**2.50**	2.500	0	99.8	85	115	08/01/2024

Batch 226459 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226459

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/05/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/06/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/01/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/06/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/05/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/06/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/05/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/01/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/01/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/05/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/06/2024

Batch 226459 **SampType:** LCS Units **mg/L**

SampID: LCS-226459

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.68**	2.500	0	107.4	85	115	08/05/2024
Calcium		0.100		**2.51**	2.500	0	100.5	85	115	08/06/2024
Calcium		0.100		**2.60**	2.500	0	104.1	85	115	08/01/2024
Magnesium		0.0500		**2.47**	2.500	0	98.6	85	115	08/05/2024
Magnesium		0.0500		**2.49**	2.500	0	99.4	85	115	08/06/2024
Potassium		0.100		**2.70**	2.500	0	107.9	85	115	08/01/2024
Potassium		0.100		**2.72**	2.500	0	108.7	85	115	08/05/2024
Potassium		0.100		**2.63**	2.500	0	105.1	85	115	08/06/2024
Sodium		0.0500		**2.68**	2.500	0	107.2	85	115	08/01/2024
Sodium		0.0500		**2.62**	2.500	0	104.8	85	115	08/06/2024
Sodium		0.0500		**2.74**	2.500	0	109.8	85	115	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226542** **SampType:** **MBLK** Units **mg/L**

SampID: MBLK-226542

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	08/05/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	08/05/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	08/05/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	08/05/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	08/05/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	08/05/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	08/05/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/05/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/08/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	08/05/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	08/05/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	08/05/2024
Iron		0.0400	S	**0.0428**	0.0200	0	214.0	-100	100	08/05/2024
Lead		0.0150		**< 0.0150**	0.0040	0	0	-100	100	08/05/2024
Lithium	*	0.0500		**< 0.0500**	0.0019	0	0	-100	100	08/05/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/05/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/08/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/05/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	08/05/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	08/05/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/05/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	08/05/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	08/05/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/05/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/08/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	08/05/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	08/05/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	08/05/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch 226542 **SampType:** LCS Units **mg/L**

SampID: LCS-226542

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**2.16**	2.000	0	108.0	85	115	08/05/2024
Antimony		0.0500		**0.553**	0.5000	0	110.6	85	115	08/05/2024
Arsenic		0.0250		**0.545**	0.5000	0	109.1	85	115	08/05/2024
Barium		0.0025		**2.15**	2.000	0	107.5	85	115	08/05/2024
Beryllium		0.0005		**0.0558**	0.0500	0	111.6	85	115	08/05/2024
Boron		0.0200		**0.527**	0.5000	0	105.5	85	115	08/05/2024
Cadmium		0.0020		**0.0545**	0.0500	0	109.0	85	115	08/05/2024
Calcium		0.100		**2.70**	2.500	0	107.9	85	115	08/05/2024
Calcium		0.100		**2.46**	2.500	0	98.2	85	115	08/08/2024
Chromium		0.0050		**0.219**	0.2000	0	109.3	85	115	08/05/2024
Cobalt		0.0050		**0.570**	0.5000	0	114.0	85	115	08/05/2024
Copper		0.0050		**0.282**	0.2500	0	112.6	85	115	08/05/2024
Iron		0.0400	B	**2.23**	2.000	0	111.5	85	115	08/05/2024
Lead		0.0150		**0.546**	0.5000	0	109.2	85	115	08/05/2024
Lithium	*	0.0500		**0.528**	0.5000	0	105.6	85	115	08/05/2024
Magnesium		0.0500		**2.32**	2.500	0	93.0	85	115	08/08/2024
Magnesium		0.0500		**2.54**	2.500	0	101.5	85	115	08/05/2024
Manganese		0.0070		**0.546**	0.5000	0	109.2	85	115	08/05/2024
Molybdenum		0.0100		**0.531**	0.5000	0	106.2	85	115	08/05/2024
Nickel		0.0050		**0.561**	0.5000	0	112.2	85	115	08/05/2024
Potassium		0.100		**2.68**	2.500	0	107.1	85	115	08/05/2024
Potassium		0.100		**2.67**	2.500	0	106.8	85	115	08/08/2024
Selenium		0.0400		**0.550**	0.5000	0	110.1	85	115	08/05/2024
Silver		0.0070		**0.0517**	0.0500	0	103.4	85	115	08/05/2024
Sodium		0.0500		**2.67**	2.500	0	107.0	85	115	08/05/2024
Sodium		0.0500		**2.61**	2.500	0	104.3	85	115	08/08/2024
Thallium		0.0500		**0.275**	0.2500	0	109.9	85	115	08/05/2024
Vanadium		0.0100		**0.551**	0.5000	0	110.3	85	115	08/05/2024
Zinc		0.0100		**0.548**	0.5000	0	109.5	85	115	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226542 **SampType:** MS Units **mg/L**
SampID: 24071451-042BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**92.7**	2.500	93.69	-39.6	75	125	08/05/2024
Magnesium		0.050	S	**45.8**	2.500	45.04	28.3	75	125	08/05/2024
Potassium		0.100		**3.19**	2.500	0.3873	112.0	75	125	08/05/2024
Sodium		0.050	S	**70.0**	2.500	69.73	9.2	75	125	08/05/2024

Batch 226542 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24071451-042BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**91.4**	2.500	93.69	-89.6	92.70	1.36	08/05/2024
Magnesium		0.050	S	**45.2**	2.500	45.04	8.0	45.75	1.12	08/05/2024
Potassium		0.100		**3.15**	2.500	0.3873	110.6	3.187	1.08	08/05/2024
Sodium		0.050	S	**68.7**	2.500	69.73	-41.2	69.96	1.82	08/05/2024

Batch 226542 **SampType:** MS Units **mg/L**
SampID: 24072498-001BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**1.07**	0.5000	0.5054	113.4	75	125	08/05/2024

Batch 226542 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24072498-001BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		0.0200		**1.06**	0.5000	0.5054	110.1	1.073	1.55	08/05/2024

Batch 226550 **SampType:** MBLK Units **mg/L**
SampID: MBLK-226550

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	08/06/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/06/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	08/06/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	08/06/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/06/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/06/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/06/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	08/06/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/06/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226550 **SampType:** LCS Units **mg/L**

SampID: LCS-226550

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**0.496**	0.5000	0	99.2	85	115	08/06/2024
Calcium		0.100		**2.54**	2.500	0	101.8	85	115	08/06/2024
Cobalt		0.0050		**0.526**	0.5000	0	105.2	85	115	08/06/2024
Copper		0.0050		**0.267**	0.2500	0	106.9	85	115	08/06/2024
Iron		0.0400		**2.12**	2.000	0	106.0	85	115	08/06/2024
Magnesium		0.0500		**2.42**	2.500	0	96.9	85	115	08/06/2024
Manganese		0.0070		**0.508**	0.5000	0	101.6	85	115	08/06/2024
Molybdenum		0.0100		**0.497**	0.5000	0	99.5	85	115	08/06/2024
Potassium		0.100		**2.73**	2.500	0	109.4	85	115	08/06/2024
Sodium		0.0500		**2.57**	2.500	0	102.8	85	115	08/06/2024

Batch 226550 **SampType:** MS Units **mg/L**

SampID: 24072589-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**9.04**	0.5000	8.543	99.5	75	125	08/06/2024
Iron		0.0400		**2.25**	2.000	0.1538	105.0	75	125	08/06/2024
Manganese		0.0070		**0.572**	0.5000	0.04810	104.9	75	125	08/06/2024
Molybdenum		0.0100		**0.953**	0.5000	0.4290	104.7	75	125	08/06/2024

Batch 226550 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24072589-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		0.0200	S	**8.86**	0.5000	8.543	62.6	9.041	2.06	08/06/2024
Iron		0.0400		**2.23**	2.000	0.1538	103.9	2.254	0.93	08/06/2024
Manganese		0.0070		**0.565**	0.5000	0.04810	103.4	0.5725	1.28	08/06/2024
Molybdenum		0.0100		**0.935**	0.5000	0.4290	101.1	0.9527	1.91	08/06/2024

Batch 226550 **SampType:** MS Units **mg/L**

SampID: 24072590-003BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**7.25**	0.5000	6.746	101.5	75	125	08/06/2024
Iron		0.0400		**3.83**	2.000	1.727	105.2	75	125	08/07/2024
Manganese		0.0070		**0.812**	0.5000	0.2867	105.2	75	125	08/06/2024
Molybdenum		0.0100		**1.03**	0.5000	0.5044	104.7	75	125	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226550 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24072590-003BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		0.0200		**7.15**	0.5000	6.746	81.7	7.253	1.37	08/06/2024
Iron		0.0400		**3.71**	2.000	1.727	99.2	3.830	3.18	08/07/2024
Manganese		0.0070		**0.796**	0.5000	0.2867	102.0	0.8125	1.99	08/06/2024
Molybdenum		0.0100		**1.01**	0.5000	0.5044	100.1	1.028	2.25	08/06/2024

Batch 226569 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226569

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	08/05/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	08/05/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	08/05/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	08/05/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	08/05/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	08/05/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	08/05/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/05/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	08/05/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	08/05/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	08/05/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/05/2024
Lead		0.0150		**< 0.0150**	0.0014	0	0	-100	100	08/05/2024
Lithium		0.0500		**< 0.0500**	0.0019	0	0	-100	100	08/05/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/05/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/05/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	08/05/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	08/05/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/05/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	08/05/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	08/05/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/05/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	08/05/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	08/05/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226569 **SampType:** LCS Units **mg/L**

SampID: LCS-226569

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**2.21**	2.000	0	110.5	85	115	08/05/2024
Antimony		0.0500		**0.564**	0.5000	0	112.7	85	115	08/05/2024
Arsenic		0.0250		**0.557**	0.5000	0	111.3	85	115	08/05/2024
Barium		0.0025		**2.21**	2.000	0	110.5	85	115	08/05/2024
Beryllium		0.0005		**0.0572**	0.0500	0	114.4	85	115	08/05/2024
Boron		0.0200		**0.539**	0.5000	0	107.8	85	115	08/05/2024
Cadmium		0.0020		**0.0565**	0.0500	0	113.0	85	115	08/05/2024
Calcium		0.100		**2.76**	2.500	0	110.5	85	115	08/05/2024
Chromium		0.0050		**0.225**	0.2000	0	112.4	85	115	08/05/2024
Cobalt		0.0050		**0.535**	0.5000	0	107.1	85	115	08/06/2024
Copper		0.0050		**0.274**	0.2500	0	109.4	85	115	08/06/2024
Iron		0.0400		**2.27**	2.000	0	113.5	85	115	08/05/2024
Lead		0.0150		**0.563**	0.5000	0	112.7	85	115	08/05/2024
Lithium		0.0500		**0.544**	0.5000	0	108.7	85	115	08/05/2024
Magnesium		0.0500		**2.60**	2.500	0	104.1	85	115	08/05/2024
Manganese		0.0070		**0.560**	0.5000	0	112.0	85	115	08/05/2024
Molybdenum		0.0100		**0.545**	0.5000	0	109.1	85	115	08/05/2024
Nickel		0.0050		**0.574**	0.5000	0	114.9	85	115	08/05/2024
Potassium		0.100		**2.76**	2.500	0	110.3	85	115	08/05/2024
Selenium		0.0400		**0.565**	0.5000	0	112.9	85	115	08/05/2024
Silver		0.0070		**0.0531**	0.0500	0	106.2	85	115	08/05/2024
Sodium		0.0500		**2.75**	2.500	0	110.2	85	115	08/05/2024
Thallium		0.0500		**0.279**	0.2500	0	111.6	85	115	08/05/2024
Vanadium		0.0100		**0.566**	0.5000	0	113.2	85	115	08/05/2024
Zinc		0.0100		**0.563**	0.5000	0	112.6	85	115	08/05/2024

Batch 226569 **SampType:** MS Units **mg/L**

SampID: 24071451-035CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**61.9**	2.500	56.00	234.8	75	125	08/05/2024
Magnesium		0.050	S	**31.2**	2.500	26.92	169.2	75	125	08/05/2024
Potassium		0.100		**3.38**	2.500	0.5302	114.1	75	125	08/05/2024
Sodium		0.050	S	**68.5**	2.500	63.24	209.2	75	125	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226569 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-035CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**60.3**	2.500	56.00	172.4	61.87	2.55	08/05/2024
Magnesium		0.050	S	**30.2**	2.500	26.92	132.2	31.15	3.02	08/05/2024
Potassium		0.100		**3.29**	2.500	0.5302	110.4	3.384	2.79	08/05/2024
Sodium		0.050	S	**66.6**	2.500	63.24	136.0	68.47	2.71	08/05/2024

Batch 226569 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24080007-001FMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		0.0250		**0.569**	0.5000	0	113.7	0.5489	3.53	08/05/2024
Barium		0.0025		**2.35**	2.000	0.1302	111.0	2.240	4.79	08/05/2024
Beryllium		0.0005		**0.0580**	0.0500	0	116.0	0.05550	4.41	08/05/2024
Boron		0.0200		**0.754**	0.5000	0.1984	111.1	0.7218	4.32	08/05/2024
Cadmium		0.0020		**0.0555**	0.0500	0	111.0	0.05300	4.61	08/05/2024
Chromium		0.0050		**0.229**	0.2000	0	114.5	0.2192	4.37	08/05/2024
Cobalt		0.0050		**0.581**	0.5000	0	116.2	0.5586	3.93	08/05/2024
Copper		0.0050		**0.293**	0.2500	0	117.2	0.2814	4.00	08/05/2024
Iron		0.0400		**5.30**	2.000	2.880	121.0	5.080	4.24	08/05/2024
Lead		0.0150		**0.557**	0.5000	0	111.3	0.5358	3.83	08/05/2024
Manganese		0.0070		**0.790**	0.5000	0.2194	114.0	0.7552	4.44	08/05/2024
Nickel		0.0050		**0.574**	0.5000	0	114.8	0.5532	3.71	08/05/2024
Selenium		0.0400		**0.560**	0.5000	0	112.1	0.5461	2.58	08/05/2024
Silver		0.0070		**0.0541**	0.0500	0	108.2	0.05150	4.92	08/05/2024
Vanadium		0.0100		**0.581**	0.5000	0.002000	115.7	0.5566	4.22	08/05/2024
Zinc		0.0100		**1.32**	0.5000	0.7423	116.0	1.274	3.72	08/05/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch 226612 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226612

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**< 0.0250**	0.0127	0	0	-100	100	08/05/2024
Antimony		0.0500		**< 0.0500**	0.0068	0	0	-100	100	08/05/2024
Arsenic		0.0250		**< 0.0250**	0.0087	0	0	-100	100	08/05/2024
Barium		0.0025		**< 0.0025**	0.0007	0	0	-100	100	08/05/2024
Beryllium		0.0005		**< 0.0005**	0.0002	0	0	-100	100	08/05/2024
Boron		0.0200		**< 0.0200**	0.0090	0	0	-100	100	08/05/2024
Cadmium		0.0020		**< 0.0020**	0.0005	0	0	-100	100	08/05/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/05/2024
Chromium		0.0050		**< 0.0050**	0.0028	0	0	-100	100	08/05/2024
Cobalt		0.0050		**< 0.0050**	0.0020	0	0	-100	100	08/05/2024
Copper		0.0050		**< 0.0050**	0.0013	0	0	-100	100	08/05/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/05/2024
Lead		0.0150		**< 0.0150**	0.0040	0	0	-100	100	08/05/2024
Lithium	*	0.0500		**< 0.0500**	0.0019	0	0	-100	100	08/05/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/05/2024
Manganese		0.0070		**< 0.0070**	0.0025	0	0	-100	100	08/05/2024
Molybdenum		0.0100		**< 0.0100**	0.0037	0	0	-100	100	08/05/2024
Nickel		0.0050		**< 0.0050**	0.0016	0	0	-100	100	08/05/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/05/2024
Selenium		0.0400		**< 0.0400**	0.0170	0	0	-100	100	08/05/2024
Silver		0.0070		**< 0.0070**	0.0027	0	0	-100	100	08/05/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/05/2024
Thallium		0.0500		**< 0.0500**	0.0111	0	0	-100	100	08/05/2024
Vanadium		0.0100		**< 0.0100**	0.0009	0	0	-100	100	08/05/2024
Zinc		0.0100		**< 0.0100**	0.0050	0	0	-100	100	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226612 **SampType:** LCS Units **mg/L**

SampID: LCS-226612

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		0.0250		**2.19**	2.000	0	109.5	85	115	08/05/2024
Antimony		0.0500		**0.557**	0.5000	0	111.4	85	115	08/05/2024
Arsenic		0.0250		**0.548**	0.5000	0	109.6	85	115	08/05/2024
Barium		0.0025		**2.17**	2.000	0	108.5	85	115	08/05/2024
Beryllium		0.0005		**0.0557**	0.0500	0	111.4	85	115	08/05/2024
Boron		0.0200		**0.530**	0.5000	0	106.0	85	115	08/05/2024
Cadmium		0.0020		**0.0546**	0.0500	0	109.2	85	115	08/05/2024
Calcium		0.100		**2.73**	2.500	0	109.2	85	115	08/05/2024
Chromium		0.0050		**0.221**	0.2000	0	110.6	85	115	08/05/2024
Cobalt		0.0050		**0.568**	0.5000	0	113.7	85	115	08/05/2024
Copper		0.0050		**0.286**	0.2500	0	114.2	85	115	08/05/2024
Iron		0.0400		**2.24**	2.000	0	112.0	85	115	08/05/2024
Lead		0.0150		**0.549**	0.5000	0	109.7	85	115	08/05/2024
Lithium	*	0.0500		**0.541**	0.5000	0	108.2	85	115	08/05/2024
Magnesium		0.0500		**2.54**	2.500	0	101.7	85	115	08/05/2024
Manganese		0.0070		**0.548**	0.5000	0	109.6	85	115	08/05/2024
Molybdenum		0.0100		**0.535**	0.5000	0	107.0	85	115	08/05/2024
Nickel		0.0050		**0.562**	0.5000	0	112.4	85	115	08/05/2024
Potassium		0.100		**2.74**	2.500	0	109.7	85	115	08/05/2024
Selenium		0.0400		**0.545**	0.5000	0	109.0	85	115	08/05/2024
Silver		0.0070		**0.0527**	0.0500	0	105.4	85	115	08/05/2024
Sodium		0.0500		**2.77**	2.500	0	111.0	85	115	08/05/2024
Thallium		0.0500		**0.274**	0.2500	0	109.7	85	115	08/05/2024
Vanadium		0.0100		**0.556**	0.5000	0	111.3	85	115	08/05/2024
Zinc		0.0100		**0.550**	0.5000	0	110.0	85	115	08/05/2024

Batch 226612 **SampType:** MS Units **mg/L**

SampID: 24071451-077BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**92.3**	2.500	91.17	45.6	75	125	08/05/2024
Magnesium		0.050	S	**43.7**	2.500	41.86	72.6	75	125	08/05/2024
Potassium		0.100		**3.39**	2.500	0.5999	111.7	75	125	08/05/2024
Sodium		0.050		**31.0**	2.500	29.13	76.8	75	125	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226612 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-077BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**91.7**	2.500	91.17	20.0	92.31	0.70	08/05/2024
Magnesium		0.050	S	**43.3**	2.500	41.86	59.1	43.68	0.78	08/05/2024
Potassium		0.100		**3.41**	2.500	0.5999	112.2	3.393	0.36	08/05/2024
Sodium		0.050		**31.1**	2.500	29.13	79.2	31.05	0.19	08/05/2024

Batch 226612 **SampType:** MS Units **mg/L**

SampID: 24072589-005BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		0.0200		**9.56**	0.5000	9.108	89.9	75	125	08/05/2024
Iron		0.0400		**2.44**	2.000	0.1977	112.1	75	125	08/05/2024
Manganese		0.0070		**0.661**	0.5000	0.1054	111.2	75	125	08/05/2024
Molybdenum		0.0100		**1.24**	0.5000	0.7060	105.8	75	125	08/05/2024

Batch 226612 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24072589-005BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		0.0200		**9.73**	0.5000	9.108	123.8	9.558	1.76	08/05/2024
Iron		0.0400		**2.45**	2.000	0.1977	112.6	2.440	0.41	08/05/2024
Manganese		0.0070		**0.661**	0.5000	0.1054	111.1	0.6612	0.08	08/05/2024
Molybdenum		0.0100		**1.25**	0.5000	0.7060	108.7	1.235	1.17	08/05/2024

Batch 226738 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226738

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/07/2024
Iron		0.0400		**< 0.0400**	0.0200	0	0	-100	100	08/07/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/07/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/07/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch 226738 **SampType:** LCS Units **mg/L**
SampID: LCS-226738

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.63**	2.500	0	105.4	85	115	08/07/2024
Iron		0.0400		**2.08**	2.000	0	104.0	85	115	08/07/2024
Magnesium		0.0500		**2.57**	2.500	0	102.7	85	115	08/08/2024
Potassium		0.100		**2.71**	2.500	0	108.5	85	115	08/07/2024
Sodium		0.0500		**2.65**	2.500	0	105.9	85	115	08/07/2024

Batch 226738 **SampType:** MS Units **mg/L**
SampID: 24071451-012CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**101**	2.500	99.68	44.4	75	125	08/07/2024
Magnesium		0.050	S	**47.1**	2.500	45.36	68.9	75	125	08/08/2024
Potassium		0.100		**3.08**	2.500	0.3384	109.7	75	125	08/07/2024
Sodium		0.050	S	**53.8**	2.500	52.63	47.6	75	125	08/07/2024

Batch 226738 **SampType:** MSD Units **mg/L** RPD Limit **20**
SampID: 24071451-012CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**101**	2.500	99.68	51.6	100.8	0.18	08/07/2024
Magnesium		0.050		**47.8**	2.500	45.36	98.2	47.08	1.54	08/08/2024
Potassium		0.100		**3.05**	2.500	0.3384	108.3	3.082	1.13	08/07/2024
Sodium		0.050	S	**53.7**	2.500	52.63	42.0	53.82	0.26	08/07/2024

Batch 226774 **SampType:** MBLK Units **mg/L**
SampID: MBLK-226774

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/08/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/08/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/08/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226774 **SampType:** LCS Units **mg/L**

SampID: LCS-226774

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.59**	2.500	0	103.5	85	115	08/08/2024
Magnesium		0.0500		**2.52**	2.500	0	100.7	85	115	08/08/2024
Potassium		0.100		**2.79**	2.500	0	111.5	85	115	08/08/2024
Sodium		0.0500		**2.64**	2.500	0	105.6	85	115	08/08/2024

Batch 226774 **SampType:** MS Units **mg/L**

SampID: 24071451-101BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**113**	2.500	111.2	89.2	75	125	08/08/2024
Magnesium		0.050		**44.0**	2.500	41.62	95.0	75	125	08/08/2024
Potassium		0.100		**4.73**	2.500	1.875	114.1	75	125	08/08/2024
Sodium		0.050		**110**	2.500	107.8	91.2	75	125	08/08/2024

Batch 226774 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-101BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**112**	2.500	111.2	41.2	113.4	1.06	08/08/2024
Magnesium		0.050	S	**43.5**	2.500	41.62	74.6	43.99	1.16	08/08/2024
Potassium		0.100		**4.70**	2.500	1.875	113.1	4.727	0.51	08/08/2024
Sodium		0.050	S	**109**	2.500	107.8	42.4	110.1	1.11	08/08/2024

Batch 226782 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226782

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/15/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	08/15/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/15/2024
Sodium		0.050		**< 0.050**	0.0180	0	0	-100	100	08/15/2024

Batch 226782 **SampType:** LCS Units **mg/L**

SampID: LCS-226782

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.58**	2.500	0	103.3	85	115	08/15/2024
Magnesium		0.050		**2.24**	2.500	0	89.8	85	115	08/15/2024
Potassium		0.100		**2.69**	2.500	0	107.6	85	115	08/15/2024
Sodium		0.050		**2.65**	2.500	0	105.8	85	115	08/15/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226782 **SampType:** MS Units **mg/L**

SampID: 24071451-038CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**164**	2.500	162.2	94.0	75	125	08/15/2024
Magnesium		0.050	S	**88.6**	2.500	87.04	62.0	75	125	08/15/2024
Potassium		0.100		**7.56**	2.500	4.840	108.8	75	125	08/15/2024
Sodium		0.050		**98.6**	2.500	95.55	122.8	75	125	08/15/2024

Batch 226782 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-038CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**163**	2.500	162.2	18.0	164.5	1.16	08/15/2024
Magnesium		0.050	S	**88.2**	2.500	87.04	44.7	88.59	0.49	08/15/2024
Potassium		0.100		**7.52**	2.500	4.840	107.1	7.561	0.57	08/15/2024
Sodium		0.050		**97.7**	2.500	95.55	84.8	98.62	0.97	08/15/2024

Batch 226782 **SampType:** MS Units **mg/L**

SampID: 24071451-099CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**86.3**	2.500	85.34	38.0	75	125	08/15/2024
Magnesium		0.050		**40.8**	2.500	38.75	81.5	75	125	08/15/2024
Potassium		0.100		**3.38**	2.500	0.5807	111.9	75	125	08/15/2024
Sodium		0.050		**61.1**	2.500	58.99	86.0	75	125	08/15/2024

Batch 226782 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-099CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**86.2**	2.500	85.34	34.8	86.29	0.09	08/15/2024
Magnesium		0.050		**40.9**	2.500	38.75	87.1	40.79	0.34	08/15/2024
Potassium		0.100		**3.37**	2.500	0.5807	111.4	3.377	0.35	08/15/2024
Sodium		0.050		**61.3**	2.500	58.99	91.2	61.14	0.21	08/15/2024

Batch 226877 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226877

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/12/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/12/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/12/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226877 **SampType:** LCS Units **mg/L**

SampID: LCS-226877

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.56**	2.500	0	102.4	85	115	08/12/2024
Magnesium		0.0500		**2.41**	2.500	0	96.3	85	115	08/12/2024
Potassium		0.100		**2.73**	2.500	0	109.3	85	115	08/12/2024
Sodium		0.0500		**2.59**	2.500	0	103.7	85	115	08/12/2024

Batch 226877 **SampType:** MS Units **mg/L**

SampID: 24080553-006BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**34.2**	2.500	30.96	128.8	75	125	08/12/2024
Magnesium		0.0500		**12.5**	2.500	9.889	106.4	75	125	08/12/2024
Potassium		0.100		**3.96**	2.500	1.210	109.8	75	125	08/12/2024
Sodium		0.0500	S	**75.5**	2.500	71.73	149.2	75	125	08/12/2024

Batch 226877 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24080553-006BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100		**33.1**	2.500	30.96	86.8	34.18	3.12	08/12/2024
Magnesium		0.0500		**12.2**	2.500	9.889	92.1	12.55	2.89	08/12/2024
Potassium		0.100		**3.87**	2.500	1.210	106.5	3.955	2.12	08/12/2024
Sodium		0.0500	S	**73.0**	2.500	71.73	52.8	75.46	3.25	08/12/2024

Batch 226881 **SampType:** MBLK Units **mg/L**

SampID: MBLK-226881

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/13/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/13/2024
Calcium		0.100		**< 0.100**	0.0350	0	0	-100	100	08/12/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/12/2024
Magnesium		0.0500		**< 0.0500**	0.0055	0	0	-100	100	08/13/2024
Magnesium		0.050		**< 0.050**	0.0055	0	0	-100	100	08/13/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/12/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/13/2024
Potassium		0.100		**< 0.100**	0.0400	0	0	-100	100	08/13/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/12/2024
Sodium		0.050		**< 0.050**	0.0180	0	0	-100	100	08/13/2024
Sodium		0.0500		**< 0.0500**	0.0180	0	0	-100	100	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226881 **SampType:** LCS Units **mg/L**

SampID: LCS-226881

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100		**2.66**	2.500	0	106.3	85	115	08/13/2024
Calcium		0.100		**2.66**	2.500	0	106.3	85	115	08/13/2024
Calcium		0.100		**2.66**	2.500	0	106.5	85	115	08/12/2024
Magnesium		0.0500		**2.41**	2.500	0	96.4	85	115	08/12/2024
Magnesium		0.0500		**2.40**	2.500	0	96.2	85	115	08/13/2024
Magnesium		0.050		**2.40**	2.500	0	96.2	85	115	08/13/2024
Potassium		0.100		**2.70**	2.500	0	108.1	85	115	08/12/2024
Potassium		0.100		**2.77**	2.500	0	110.6	85	115	08/13/2024
Potassium		0.100		**2.77**	2.500	0	110.6	85	115	08/13/2024
Sodium		0.0500		**2.69**	2.500	0	107.6	85	115	08/12/2024
Sodium		0.050		**2.75**	2.500	0	110.0	85	115	08/13/2024
Sodium		0.0500		**2.75**	2.500	0	110.0	85	115	08/13/2024

Batch 226881 **SampType:** MS Units **mg/L**

SampID: 24071451-087BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Calcium		0.100	S	**428**	2.500	491.8	-2566	75	125	08/12/2024
Magnesium		0.050	S	**933**	2.500	925.8	290.6	75	125	08/12/2024
Potassium		10.0	S	**127**	2.500	121.8	190.8	75	125	08/13/2024
Sodium		0.050	S	**440**	2.500	434.8	213.6	75	125	08/12/2024

Batch 226881 **SampType:** MSD Units **mg/L** RPD Limit **20**

SampID: 24071451-087BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Calcium		0.100	S	**354**	2.500	491.8	-5510	427.7	18.83	08/12/2024
Magnesium		0.050	S	**932**	2.500	925.8	235.3	933.0	0.15	08/12/2024
Potassium		10.0	S	**126**	2.500	121.8	149.6	126.6	0.82	08/13/2024
Sodium		0.050	S	**439**	2.500	434.8	160.4	440.2	0.30	08/12/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226493** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226493

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/02/2024
Aluminum		25.0	S	**31.8**	12.50	0	254.4	-100	100	08/01/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/01/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/01/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/01/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/01/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/01/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/01/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/01/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/01/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/01/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/01/2024
Lead		1.0	S	**4.4**	0.6000	0	726.0	-100	100	08/01/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/01/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/05/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/05/2024
Nickel		1.0	S	**5.3**	0.4300	0	1227	-100	100	08/01/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/01/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/01/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/01/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/01/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/05/2024
Zinc		15.0	S	**112**	5.900	0	1902	-100	100	08/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226493** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226493

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0	B	**1910**	2000	0	95.6	80	120	08/01/2024
Aluminum		25.0		**2000**	2000	0	100.1	80	120	08/02/2024
Antimony		1.0		**418**	500.0	0	83.6	80	120	08/01/2024
Arsenic		1.0		**458**	500.0	0	91.6	80	120	08/01/2024
Barium		1.0		**1870**	2000	0	93.4	80	120	08/01/2024
Beryllium		1.0		**46.5**	50.00	0	93.0	80	120	08/01/2024
Boron		25.0		**465**	500.0	0	93.0	80	120	08/01/2024
Cadmium	*	1.0		**45.6**	50.00	0	91.1	80	120	08/01/2024
Chromium		1.5		**185**	200.0	0	92.3	80	120	08/01/2024
Cobalt		1.0		**468**	500.0	0	93.5	80	120	08/01/2024
Copper	*	1.0		**234**	250.0	0	93.5	80	120	08/01/2024
Iron		25.0		**2060**	2000	0	102.8	80	120	08/01/2024
Lead		1.0	B	**445**	500.0	0	89.1	80	120	08/01/2024
Manganese		2.0		**475**	500.0	0	95.1	80	120	08/01/2024
Molybdenum		1.5		**438**	500.0	0	87.6	80	120	08/05/2024
Nickel		1.0	B	**466**	500.0	0	93.2	80	120	08/01/2024
Selenium		1.0		**483**	500.0	0	96.6	80	120	08/01/2024
Silver		1.0		**43.3**	50.00	0	86.6	80	120	08/01/2024
Thallium		2.0		**230**	250.0	0	91.9	80	120	08/01/2024
Vanadium		5.0		**442**	500.0	0	88.3	80	120	08/01/2024
Zinc		15.0	B	**468**	500.0	0	93.6	80	120	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226493** **SampType:** **MS** Units **µg/L**

SampID: 24071451-031DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1970**	2000	18.83	97.8	75	125	08/02/2024
Antimony		1.0		**416**	500.0	0	83.2	75	125	08/01/2024
Arsenic		1.0		**452**	500.0	0	90.3	75	125	08/01/2024
Barium		1.0		**1890**	2000	91.09	90.1	75	125	08/01/2024
Beryllium		1.0		**45.5**	50.00	0	90.9	75	125	08/01/2024
Boron		25.0		**477**	500.0	0	95.4	75	125	08/01/2024
Cadmium	*	1.0		**45.1**	50.00	0	90.2	75	125	08/01/2024
Chromium		1.5		**174**	200.0	1.840	86.2	75	125	08/01/2024
Cobalt		1.0		**438**	500.0	0	87.5	75	125	08/01/2024
Copper	*	1.0		**221**	250.0	1.412	87.9	75	125	08/01/2024
Iron		25.0		**1910**	2000	15.17	94.9	75	125	08/01/2024
Lead		1.0	B	**474**	500.0	0	94.9	75	125	08/01/2024
Manganese		2.0		**459**	500.0	2.263	91.4	75	125	08/01/2024
Molybdenum		1.5		**474**	500.0	0.9216	94.6	75	125	08/05/2024
Nickel		1.0	B	**434**	500.0	0	86.8	75	125	08/01/2024
Selenium		1.0		**470**	500.0	2.333	93.5	75	125	08/01/2024
Silver		1.0		**42.4**	50.00	0	84.9	75	125	08/01/2024
Thallium		2.0		**227**	250.0	0	90.8	75	125	08/01/2024
Vanadium		5.0		**439**	500.0	0	87.8	75	125	08/01/2024
Zinc		15.0	B	**449**	500.0	0	89.9	75	125	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226493** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-031DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**1920**	2000	18.83	94.8	1975	3.04	08/02/2024
Antimony		1.0		**425**	500.0	0	85.0	416.0	2.19	08/01/2024
Arsenic		1.0		**455**	500.0	0	91.0	451.6	0.76	08/01/2024
Barium		1.0		**1870**	2000	91.09	89.1	1894	1.15	08/01/2024
Beryllium		1.0		**45.7**	50.00	0	91.5	45.46	0.63	08/01/2024
Boron		25.0		**474**	500.0	0	94.9	477.0	0.52	08/01/2024
Cadmium	*	1.0		**44.6**	50.00	0	89.2	45.11	1.16	08/01/2024
Chromium		1.5		**179**	200.0	1.840	88.5	174.3	2.58	08/01/2024
Cobalt		1.0		**436**	500.0	0	87.2	437.6	0.33	08/01/2024
Copper	*	1.0		**224**	250.0	1.412	88.9	221.2	1.11	08/01/2024
Iron		25.0		**1920**	2000	15.17	95.5	1913	0.60	08/01/2024
Lead		1.0	B	**441**	500.0	0	88.2	474.5	7.36	08/01/2024
Manganese		2.0		**456**	500.0	2.263	90.8	459.0	0.61	08/01/2024
Molybdenum		1.5		**433**	500.0	0.9216	86.3	474.1	9.17	08/05/2024
Nickel		1.0	B	**433**	500.0	0	86.6	434.1	0.23	08/01/2024
Selenium		1.0		**470**	500.0	2.333	93.6	469.7	0.11	08/01/2024
Silver		1.0		**43.2**	50.00	0	86.3	42.45	1.70	08/01/2024
Thallium		2.0		**224**	250.0	0	89.6	227.0	1.38	08/01/2024
Vanadium		5.0		**437**	500.0	0	87.4	439.2	0.52	08/01/2024
Zinc		15.0	B	**452**	500.0	0	90.4	449.3	0.64	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226540** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226540

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/06/2024
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/05/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/02/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/02/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/02/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/02/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/02/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/02/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/02/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/02/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/02/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/02/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/02/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/05/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/02/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/02/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/02/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/02/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/02/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226540** **SampType:** **LCS** Units **µg/L**

SampID: LCS-226540

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1910**	2000	0	95.7	80	120	08/06/2024
Aluminum		25.0		**2060**	2000	0	102.9	80	120	08/05/2024
Antimony		1.0		**482**	500.0	0	96.4	80	120	08/08/2024
Arsenic		1.0		**478**	500.0	0	95.7	80	120	08/02/2024
Barium		1.0		**1960**	2000	0	98.2	80	120	08/02/2024
Beryllium		1.0		**46.2**	50.00	0	92.4	80	120	08/02/2024
Boron		25.0		**472**	500.0	0	94.5	80	120	08/02/2024
Cadmium	*	1.0		**47.7**	50.00	0	95.4	80	120	08/02/2024
Chromium		1.5		**194**	200.0	0	97.2	80	120	08/02/2024
Cobalt		1.0		**470**	500.0	0	93.9	80	120	08/02/2024
Copper	*	1.0		**244**	250.0	0	97.8	80	120	08/02/2024
Iron		25.0		**2020**	2000	0	101.2	80	120	08/02/2024
Lead		1.0		**496**	500.0	0	99.2	80	120	08/05/2024
Manganese		2.0		**481**	500.0	0	96.1	80	120	08/02/2024
Molybdenum		1.5		**438**	500.0	0	87.6	80	120	08/05/2024
Nickel		1.0		**471**	500.0	0	94.3	80	120	08/02/2024
Selenium		1.0		**496**	500.0	0	99.3	80	120	08/02/2024
Silver		1.0		**47.9**	50.00	0	95.8	80	120	08/02/2024
Thallium		2.0		**216**	250.0	0	86.6	80	120	08/05/2024
Vanadium		5.0		**468**	500.0	0	93.5	80	120	08/02/2024
Zinc		15.0		**483**	500.0	0	96.6	80	120	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226540** **SampType:** **MS** Units **µg/L**

SampID: 24071451-041DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1880**	2000	30.23	92.2	75	125	08/06/2024
Antimony		1.0		**539**	500.0	0.6924	107.7	75	125	08/08/2024
Arsenic		1.0		**496**	500.0	2.282	98.7	75	125	08/02/2024
Barium		1.0		**2020**	2000	67.72	97.5	75	125	08/02/2024
Beryllium		1.0		**47.5**	50.00	0	95.1	75	125	08/02/2024
Boron		25.0		**526**	500.0	31.14	98.9	75	125	08/08/2024
Cadmium	*	1.0		**48.5**	50.00	0	97.0	75	125	08/02/2024
Chromium		1.5		**193**	200.0	0	96.7	75	125	08/02/2024
Cobalt		1.0		**466**	500.0	0.5462	93.0	75	125	08/02/2024
Copper	*	1.0		**239**	250.0	1.294	95.2	75	125	08/05/2024
Iron		25.0		**3140**	2000	1386	87.8	75	125	08/02/2024
Lead		1.0		**546**	500.0	0	109.1	75	125	08/05/2024
Manganese		2.0		**1460**	500.0	983.9	95.9	75	125	08/02/2024
Molybdenum		1.5		**443**	500.0	0	88.7	75	125	08/05/2024
Nickel		1.0		**466**	500.0	0	93.2	75	125	08/02/2024
Selenium		1.0		**462**	500.0	0	92.3	75	125	08/02/2024
Silver		1.0		**48.1**	50.00	0	96.2	75	125	08/02/2024
Thallium		2.0		**227**	250.0	0	90.9	75	125	08/05/2024
Vanadium		5.0		**486**	500.0	0	97.3	75	125	08/02/2024
Zinc		15.0		**476**	500.0	0	95.2	75	125	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226540 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24071451-041DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**1910**	2000	30.23	93.9	1875	1.72	08/06/2024
Antimony		1.0		**541**	500.0	0.6924	108.0	539.0	0.35	08/08/2024
Arsenic		1.0		**503**	500.0	2.282	100.1	495.6	1.45	08/02/2024
Barium		1.0		**2100**	2000	67.72	101.6	2017	3.96	08/02/2024
Beryllium		1.0		**47.4**	50.00	0	94.7	47.53	0.38	08/02/2024
Boron		25.0		**518**	500.0	31.14	97.4	525.5	1.43	08/08/2024
Cadmium	*	1.0		**49.2**	50.00	0	98.3	48.52	1.31	08/02/2024
Chromium		1.5		**199**	200.0	0	99.3	193.3	2.67	08/02/2024
Cobalt		1.0		**473**	500.0	0.5462	94.5	465.5	1.59	08/02/2024
Copper	*	1.0		**241**	250.0	1.294	95.8	239.4	0.59	08/05/2024
Iron		25.0		**3280**	2000	1386	95.0	3142	4.45	08/02/2024
Lead		1.0		**543**	500.0	0	108.7	545.6	0.39	08/05/2024
Manganese		2.0		**1450**	500.0	983.9	92.7	1463	1.10	08/02/2024
Molybdenum		1.5		**441**	500.0	0	88.3	443.4	0.43	08/05/2024
Nickel		1.0		**467**	500.0	0	93.4	466.2	0.17	08/02/2024
Selenium		1.0		**472**	500.0	0	94.3	461.6	2.17	08/02/2024
Silver		1.0		**46.6**	50.00	0	93.2	48.11	3.15	08/02/2024
Thallium		2.0		**231**	250.0	0	92.4	227.3	1.62	08/05/2024
Vanadium		5.0		**483**	500.0	0	96.6	486.3	0.68	08/02/2024
Zinc		15.0		**481**	500.0	0	96.2	476.0	1.07	08/02/2024

Batch 226540 **SampType:** MS Units µg/L

SampID: 24071451-079CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1800**	2000	16.18	89.3	75	125	08/06/2024
Arsenic		1.0		**555**	500.0	0.4362	111.0	75	125	08/02/2024
Boron		25.0	S	**10100**	500.0	10050	3.2	75	125	08/09/2024
Copper	*	1.0		**266**	250.0	0.9637	106.0	75	125	08/02/2024
Iron		25.0		**2260**	2000	102.7	107.6	75	125	08/02/2024
Lead		1.0		**524**	500.0	0	104.8	75	125	08/05/2024
Manganese		2.0		**1420**	500.0	956.2	93.6	75	125	08/05/2024
Nickel		1.0		**519**	500.0	1.153	103.6	75	125	08/02/2024
Silver		1.0		**52.5**	50.00	0	105.0	75	125	08/02/2024
Vanadium		5.0		**540**	500.0	0	108.0	75	125	08/02/2024
Zinc		15.0		**537**	500.0	0	107.5	75	125	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226540 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24071451-079CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**1860**	2000	16.18	92.1	1802	3.03	08/06/2024
Arsenic		1.0		**577**	500.0	0.4362	115.3	555.2	3.84	08/02/2024
Boron		25.0	S	**10300**	500.0	9643	132.3	10060	2.37	08/09/2024
Copper	*	1.0		**275**	250.0	0.9637	109.5	266.1	3.20	08/02/2024
Iron		25.0		**2530**	2000	102.7	121.5	2255	11.56	08/02/2024
Lead		1.0		**498**	500.0	0	99.5	524.2	5.18	08/05/2024
Manganese		2.0		**1420**	500.0	956.2	92.6	1424	0.35	08/05/2024
Nickel		1.0		**543**	500.0	1.153	108.4	519.1	4.57	08/02/2024
Silver		1.0		**52.8**	50.00	0	105.5	52.49	0.49	08/02/2024
Vanadium		5.0		**562**	500.0	0	112.5	539.9	4.10	08/02/2024
Zinc		15.0		**549**	500.0	0	109.8	537.3	2.16	08/02/2024

Batch 226588 **SampType:** MBLK Units µg/L

SampID: MBLK-226588

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/05/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/02/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/02/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/02/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/02/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/02/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/02/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/02/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/02/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/02/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/02/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/02/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/02/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/02/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/02/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/02/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/02/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/02/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226588 **SampType:** LCS Units µg/L

SampID: LCS-226588

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**466**	500.0	0	93.2	80	120	08/08/2024
Arsenic		1.0		**458**	500.0	0	91.6	80	120	08/02/2024
Barium		1.0		**1900**	2000	0	95.1	80	120	08/02/2024
Boron		25.0		**439**	500.0	0	87.8	80	120	08/02/2024
Cadmium	*	1.0		**46.1**	50.00	0	92.2	80	120	08/02/2024
Chromium		1.5		**173**	200.0	0	86.4	80	120	08/02/2024
Cobalt		1.0		**454**	500.0	0	90.7	80	120	08/02/2024
Copper	*	1.0		**231**	250.0	0	92.4	80	120	08/02/2024
Iron		25.0		**1830**	2000	0	91.5	80	120	08/02/2024
Lead		1.0		**463**	500.0	0	92.6	80	120	08/02/2024
Manganese		2.0		**462**	500.0	0	92.5	80	120	08/02/2024
Molybdenum		1.5		**446**	500.0	0	89.2	80	120	08/02/2024
Nickel		1.0		**453**	500.0	0	90.6	80	120	08/02/2024
Selenium		1.0		**471**	500.0	0	94.3	80	120	08/02/2024
Silver		1.0		**47.0**	50.00	0	94.0	80	120	08/02/2024
Thallium		2.0		**228**	250.0	0	91.2	80	120	08/02/2024
Vanadium		5.0		**459**	500.0	0	91.7	80	120	08/02/2024
Zinc		15.0		**465**	500.0	0	93.0	80	120	08/02/2024

Batch 226588 **SampType:** MS Units µg/L

SampID: 24071451-080CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**485**	500.0	0	97.1	75	125	08/02/2024
Boron		25.0		**1890**	500.0	1397	98.5	75	125	08/08/2024
Copper	*	1.0		**230**	250.0	1.245	91.4	75	125	08/02/2024
Iron		25.0		**1910**	2000	0	95.4	75	125	08/02/2024
Lead		1.0		**477**	500.0	0	95.5	75	125	08/02/2024
Manganese		2.0		**4870**	500.0	4306	113.2	75	125	08/02/2024
Nickel		1.0		**454**	500.0	4.319	90.0	75	125	08/02/2024
Silver		1.0		**44.0**	50.00	0	88.1	75	125	08/02/2024
Vanadium		5.0		**475**	500.0	0	95.1	75	125	08/02/2024
Zinc		15.0		**476**	500.0	0	95.1	75	125	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226588 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24071451-080CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.0		**489**	500.0	0	97.8	485.5	0.73	08/02/2024
Boron		25.0		**1860**	500.0	1397	91.6	1890	1.86	08/08/2024
Copper	*	1.0		**229**	250.0	1.245	91.3	229.6	0.08	08/02/2024
Iron		25.0		**1910**	2000	0	95.4	1909	0.04	08/02/2024
Lead		1.0		**484**	500.0	0	96.8	477.3	1.45	08/02/2024
Manganese		2.0		**4850**	500.0	4306	109.0	4872	0.44	08/02/2024
Nickel		1.0		**454**	500.0	4.319	90.0	454.1	0.01	08/02/2024
Silver		1.0		**44.0**	50.00	0	88.1	44.03	0.04	08/02/2024
Vanadium		5.0		**472**	500.0	0	94.3	475.4	0.77	08/02/2024
Zinc		15.0		**473**	500.0	0	94.6	475.6	0.58	08/02/2024

Batch 226703 **SampType:** MBLK Units **µg/L**

SampID: MBLK-226703

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/06/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/06/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/06/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/06/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/08/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/06/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/06/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/06/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/06/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/06/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226703 **SampType:** LCS Units **µg/L**

SampID: LCS-226703

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1730**	2000	0	86.7	80	120	08/06/2024
Arsenic		1.0		**473**	500.0	0	94.5	80	120	08/06/2024
Boron		25.0		**454**	500.0	0	90.9	80	120	08/06/2024
Cadmium	*	1.0		**43.4**	50.00	0	86.7	80	120	08/06/2024
Copper	*	1.0		**249**	250.0	0	99.6	80	120	08/08/2024
Iron		25.0		**1740**	2000	0	86.8	80	120	08/06/2024
Lead		1.0		**441**	500.0	0	88.1	80	120	08/06/2024
Manganese		2.0		**445**	500.0	0	89.0	80	120	08/06/2024
Nickel		1.0		**425**	500.0	0	84.9	80	120	08/06/2024
Silver		1.0		**43.5**	50.00	0	87.1	80	120	08/06/2024
Vanadium		5.0		**429**	500.0	0	85.8	80	120	08/06/2024

Batch 226703 **SampType:** MS Units **µg/L**

SampID: 24080359-008CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**476**	500.0	0	95.2	75	125	08/06/2024
Cadmium	*	1.0		**41.2**	50.00	0	82.4	75	125	08/06/2024
Lead		1.0		**438**	500.0	0	87.7	75	125	08/06/2024

Batch 226703 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24080359-008CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.0		**457**	500.0	0	91.3	475.9	4.15	08/06/2024
Cadmium	*	1.0		**41.1**	50.00	0	82.2	41.18	0.14	08/06/2024
Lead		1.0		**432**	500.0	0	86.5	438.5	1.43	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226766** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226766

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/12/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/13/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/13/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/12/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/13/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/12/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/13/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/13/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/12/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/13/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/12/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/13/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/12/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/13/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/13/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/12/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/12/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/13/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226766 **SampType:** LCS Units µg/L

SampID: LCS-226766

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**428**	500.0	0	85.6	80	120	08/12/2024
Arsenic		1.0		**466**	500.0	0	93.2	80	120	08/13/2024
Barium		1.0		**1960**	2000	0	97.9	80	120	08/12/2024
Barium		1.0		**1950**	2000	0	97.6	80	120	08/13/2024
Boron		25.0		**442**	500.0	0	88.4	80	120	08/13/2024
Cadmium	*	1.0		**46.0**	50.00	0	92.1	80	120	08/12/2024
Chromium		1.5		**182**	200.0	0	91.2	80	120	08/13/2024
Cobalt		1.0		**461**	500.0	0	92.2	80	120	08/13/2024
Copper	*	1.0		**224**	250.0	0	89.5	80	120	08/12/2024
Iron		25.0		**1850**	2000	0	92.7	80	120	08/13/2024
Lead		1.0		**465**	500.0	0	93.0	80	120	08/12/2024
Manganese		2.0		**464**	500.0	0	92.8	80	120	08/13/2024
Molybdenum		1.5		**429**	500.0	0	85.9	80	120	08/12/2024
Nickel		1.0		**455**	500.0	0	91.0	80	120	08/13/2024
Selenium		1.0		**471**	500.0	0	94.3	80	120	08/13/2024
Silver		1.0		**46.4**	50.00	0	92.8	80	120	08/12/2024
Thallium		2.0		**231**	250.0	0	92.5	80	120	08/12/2024
Vanadium		5.0		**455**	500.0	0	91.0	80	120	08/13/2024
Zinc		15.0		**440**	500.0	0	87.9	80	120	08/13/2024

Batch 226766 **SampType:** MS Units µg/L

SampID: 24071451-014CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**509**	500.0	0	101.8	75	125	08/13/2024
Arsenic		1.0		**488**	500.0	0	97.6	75	125	08/13/2024
Barium		1.0		**2020**	2000	56.20	98.3	75	125	08/13/2024
Boron		25.0		**491**	500.0	0	98.3	75	125	08/13/2024
Cadmium	*	1.0		**46.3**	50.00	0	92.6	75	125	08/13/2024
Chromium		1.5		**187**	200.0	0.8925	92.9	75	125	08/13/2024
Cobalt		1.0		**442**	500.0	0	88.4	75	125	08/13/2024
Lead		1.0		**472**	500.0	0	94.5	75	125	08/13/2024
Manganese		2.0		**485**	500.0	9.130	95.2	75	125	08/13/2024
Zinc		15.0		**456**	500.0	0	91.3	75	125	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226766** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-014CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**510**	500.0	0	101.9	509.2	0.06	08/13/2024
Arsenic		1.0		**481**	500.0	0	96.2	488.1	1.50	08/13/2024
Barium		1.0		**2060**	2000	56.20	100.1	2021	1.76	08/13/2024
Boron		25.0		**493**	500.0	0	98.6	491.4	0.36	08/13/2024
Cadmium	*	1.0		**47.3**	50.00	0	94.6	46.30	2.17	08/13/2024
Chromium		1.5		**187**	200.0	0.8925	92.9	186.7	0.03	08/13/2024
Cobalt		1.0		**448**	500.0	0	89.6	441.9	1.34	08/13/2024
Lead		1.0		**480**	500.0	0	96.1	472.5	1.64	08/13/2024
Manganese		2.0		**490**	500.0	9.130	96.2	485.0	1.07	08/13/2024
Zinc		15.0		**457**	500.0	0	91.4	456.3	0.11	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226779** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/09/2024
Antimony		1.0	S	**2.2**	0.4500	0	498.3	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/09/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/08/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/08/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/08/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/08/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/08/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/08/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/08/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/08/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/09/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/08/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/08/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/08/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/08/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/08/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/08/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/09/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226779 **SampType:** LCS Units **µg/L**

SampID: LCS-226779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2060**	2000	0	103.1	80	120	08/09/2024
Antimony		1.0	B	**420**	500.0	0	84.0	80	120	08/08/2024
Antimony		1.0		**438**	500.0	0	87.7	80	120	08/09/2024
Arsenic		1.0		**476**	500.0	0	95.1	80	120	08/08/2024
Arsenic		1.0		**479**	500.0	0	95.7	80	120	08/09/2024
Barium		1.0		**1910**	2000	0	95.6	80	120	08/08/2024
Beryllium		1.0		**44.7**	50.00	0	89.3	80	120	08/08/2024
Boron		25.0		**492**	500.0	0	98.4	80	120	08/09/2024
Cadmium	*	1.0		**45.1**	50.00	0	90.3	80	120	08/08/2024
Chromium		1.5		**188**	200.0	0	93.9	80	120	08/08/2024
Cobalt		1.0		**467**	500.0	0	93.3	80	120	08/08/2024
Copper	*	1.0		**233**	250.0	0	93.0	80	120	08/08/2024
Iron		25.0		**1950**	2000	0	97.5	80	120	08/09/2024
Lead		1.0		**463**	500.0	0	92.6	80	120	08/08/2024
Manganese		2.0		**475**	500.0	0	95.0	80	120	08/08/2024
Molybdenum		1.5		**426**	500.0	0	85.2	80	120	08/09/2024
Nickel		1.0		**465**	500.0	0	93.0	80	120	08/08/2024
Selenium		1.0		**477**	500.0	0	95.3	80	120	08/08/2024
Silver		1.0		**43.8**	50.00	0	87.6	80	120	08/08/2024
Thallium		2.0		**248**	250.0	0	99.0	80	120	08/08/2024
Vanadium		5.0		**470**	500.0	0	94.1	80	120	08/09/2024
Zinc		15.0		**465**	500.0	0	92.9	80	120	08/08/2024

Batch 226779 **SampType:** MS Units **µg/L**

SampID: 24071451-013CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	B	**501**	500.0	0	100.2	75	125	08/08/2024
Arsenic		1.0		**500**	500.0	0	100.0	75	125	08/08/2024
Barium		1.0		**2060**	2000	89.93	98.3	75	125	08/08/2024
Boron		25.0		**489**	500.0	0	97.8	75	125	08/09/2024
Cadmium	*	1.0		**46.9**	50.00	0	93.9	75	125	08/08/2024
Chromium		1.5		**196**	200.0	0	98.0	75	125	08/08/2024
Cobalt		1.0		**471**	500.0	0	94.2	75	125	08/08/2024
Lead		1.0		**477**	500.0	0	95.4	75	125	08/08/2024
Manganese		2.0		**506**	500.0	24.33	96.3	75	125	08/08/2024
Zinc		15.0		**478**	500.0	0	95.7	75	125	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226779 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24071451-013CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0	B	**499**	500.0	0	99.8	500.8	0.35	08/08/2024
Arsenic		1.0		**493**	500.0	0	98.6	499.8	1.34	08/08/2024
Barium		1.0		**2020**	2000	89.93	96.3	2055	1.91	08/08/2024
Boron		25.0		**482**	500.0	0	96.4	489.2	1.44	08/09/2024
Cadmium	*	1.0		**47.3**	50.00	0	94.7	46.94	0.85	08/08/2024
Chromium		1.5		**195**	200.0	0	97.3	196.0	0.66	08/08/2024
Cobalt		1.0		**481**	500.0	0	96.1	471.0	2.05	08/08/2024
Lead		1.0		**461**	500.0	0	92.1	477.0	3.48	08/08/2024
Manganese		2.0		**509**	500.0	24.33	96.9	505.7	0.66	08/08/2024
Zinc		15.0		**476**	500.0	0	95.2	478.4	0.51	08/08/2024

Batch 226779 **SampType:** MS Units **µg/L**

SampID: 24071451-040DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1980**	2000	0	99.2	75	125	08/09/2024
Antimony		1.0	B	**486**	500.0	0	97.3	75	125	08/09/2024
Arsenic		1.0		**480**	500.0	0	95.9	75	125	08/09/2024
Barium		1.0		**1980**	2000	72.80	95.2	75	125	08/09/2024
Beryllium		1.0		**46.5**	50.00	0	93.1	75	125	08/09/2024
Boron		25.0		**501**	500.0	35.50	93.0	75	125	08/09/2024
Cadmium	*	1.0		**44.8**	50.00	0	89.5	75	125	08/09/2024
Chromium		1.5		**181**	200.0	0	90.7	75	125	08/09/2024
Cobalt		1.0		**462**	500.0	0.3012	92.3	75	125	08/09/2024
Copper	*	1.0		**220**	250.0	1.137	87.5	75	125	08/09/2024
Iron		25.0		**2500**	2000	637.8	93.3	75	125	08/09/2024
Lead		1.0		**456**	500.0	0	91.1	75	125	08/09/2024
Manganese		2.0		**937**	500.0	496.4	88.1	75	125	08/09/2024
Molybdenum		1.5		**429**	500.0	0	85.9	75	125	08/09/2024
Nickel		1.0		**438**	500.0	0	87.6	75	125	08/09/2024
Selenium		1.0		**468**	500.0	0	93.5	75	125	08/09/2024
Silver		1.0		**43.6**	50.00	0	87.3	75	125	08/09/2024
Thallium		2.0		**236**	250.0	0	94.2	75	125	08/09/2024
Vanadium		5.0		**472**	500.0	0	94.4	75	125	08/09/2024
Zinc		15.0		**455**	500.0	0	91.0	75	125	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226779** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-040DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**2020**	2000	0	100.8	1984	1.63	08/09/2024
Antimony		1.0	B	**507**	500.0	0	101.3	486.4	4.09	08/09/2024
Arsenic		1.0		**496**	500.0	0	99.2	479.7	3.38	08/09/2024
Barium		1.0		**2040**	2000	72.80	98.4	1976	3.21	08/09/2024
Beryllium		1.0		**47.0**	50.00	0	94.1	46.53	1.07	08/09/2024
Boron		25.0		**514**	500.0	35.50	95.8	500.5	2.73	08/09/2024
Cadmium	*	1.0		**45.8**	50.00	0	91.6	44.77	2.33	08/09/2024
Chromium		1.5		**194**	200.0	0	97.2	181.5	6.90	08/09/2024
Cobalt		1.0		**493**	500.0	0.3012	98.6	461.7	6.62	08/09/2024
Copper	*	1.0		**225**	250.0	1.137	89.5	220.0	2.16	08/09/2024
Iron		25.0		**2600**	2000	637.8	97.9	2504	3.60	08/09/2024
Lead		1.0		**466**	500.0	0	93.3	455.6	2.35	08/09/2024
Manganese		2.0		**958**	500.0	496.4	92.4	937.0	2.25	08/09/2024
Molybdenum		1.5		**458**	500.0	0	91.6	429.4	6.42	08/09/2024
Nickel		1.0		**455**	500.0	0	91.1	438.2	3.85	08/09/2024
Selenium		1.0		**483**	500.0	0	96.7	467.5	3.32	08/09/2024
Silver		1.0		**42.9**	50.00	0	85.7	43.64	1.77	08/09/2024
Thallium		2.0		**250**	250.0	0	100.1	235.6	6.00	08/09/2024
Vanadium		5.0		**487**	500.0	0	97.3	472.1	3.04	08/09/2024
Zinc		15.0		**461**	500.0	0	92.1	454.8	1.26	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226875** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226875

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/12/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/09/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/09/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/09/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/09/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/09/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/09/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/09/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/09/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/09/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Silver		1.0		**< 1.0**	0.1000	0	0	-100	100	08/09/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/09/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/09/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/09/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch 226875 **SampType:** LCS Units **µg/L**
SampID: LCS-226875

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1970**	2000	0	98.7	80	120	08/09/2024
Antimony		1.0		**454**	500.0	0	90.7	80	120	08/12/2024
Arsenic		1.0		**486**	500.0	0	97.2	80	120	08/09/2024
Barium		1.0		**1970**	2000	0	98.3	80	120	08/09/2024
Beryllium		1.0		**44.6**	50.00	0	89.2	80	120	08/09/2024
Boron		25.0		**456**	500.0	0	91.2	80	120	08/09/2024
Cadmium	*	1.0		**46.7**	50.00	0	93.4	80	120	08/09/2024
Chromium		1.5		**190**	200.0	0	94.9	80	120	08/09/2024
Cobalt		1.0		**472**	500.0	0	94.3	80	120	08/09/2024
Copper	*	1.0		**238**	250.0	0	95.3	80	120	08/09/2024
Iron		25.0		**1960**	2000	0	97.9	80	120	08/09/2024
Lead		1.0		**440**	500.0	0	87.9	80	120	08/09/2024
Manganese		2.0		**479**	500.0	0	95.8	80	120	08/09/2024
Molybdenum		1.5		**434**	500.0	0	86.9	80	120	08/09/2024
Nickel		1.0		**465**	500.0	0	93.0	80	120	08/09/2024
Selenium		1.0		**470**	500.0	0	94.0	80	120	08/09/2024
Silver		1.0		**47.4**	50.00	0	94.7	80	120	08/09/2024
Thallium		2.0		**239**	250.0	0	95.5	80	120	08/09/2024
Vanadium		5.0		**465**	500.0	0	93.1	80	120	08/09/2024
Zinc		15.0		**471**	500.0	0	94.2	80	120	08/09/2024

Batch 226875 **SampType:** MS Units **µg/L**
SampID: 24080689-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**482**	500.0	2.970	95.7	75	125	08/09/2024
Cadmium	*	1.0		**44.9**	50.00	0	89.9	75	125	08/09/2024
Lead		1.0		**433**	500.0	0	86.7	75	125	08/09/2024

Batch 226875 **SampType:** MSD Units **µg/L** RPD Limit **20**
SampID: 24080689-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.0		**481**	500.0	2.970	95.7	481.7	0.04	08/09/2024
Cadmium	*	1.0		**45.7**	50.00	0	91.3	44.93	1.63	08/09/2024
Lead		1.0		**451**	500.0	0	90.2	433.3	3.99	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 227733 **SampType:** MBLK Units µg/L

SampID: MBLK-227733

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/29/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/29/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/29/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/29/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/29/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/29/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/29/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/29/2024

Batch 227733 **SampType:** LCS Units µg/L

SampID: LCS-227733

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1950**	2000	0	97.5	80	120	08/29/2024
Antimony		1.0		**419**	500.0	0	83.9	80	120	08/29/2024
Arsenic		1.0		**483**	500.0	0	96.7	80	120	08/29/2024
Barium		1.0		**1860**	2000	0	93.1	80	120	08/29/2024
Copper	*	1.0		**230**	250.0	0	92.2	80	120	08/29/2024
Iron		25.0		**1950**	2000	0	97.6	80	120	08/30/2024
Lead		1.0		**436**	500.0	0	87.2	80	120	08/29/2024
Thallium		2.0		**222**	250.0	0	88.7	80	120	08/30/2024
Zinc		15.0		**464**	500.0	0	92.7	80	120	08/29/2024

Batch 227815 **SampType:** MBLK Units µg/L

SampID: MBLK-227815

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/30/2024
Copper	*	1.0		**< 1.0**	0.3000	0	0	-100	100	08/30/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	09/03/2024

Batch 227815 **SampType:** LCS Units µg/L

SampID: LCS-227815

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**473**	500.0	0	94.7	80	120	08/30/2024
Copper	*	1.0		**214**	250.0	0	85.6	80	120	08/30/2024
Zinc		15.0		**441**	500.0	0	88.2	80	120	09/03/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 228021 **SampType:** MBLK Units µg/L

SampID: MBLK-228021

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	09/06/2024

Batch 228021 **SampType:** LCS Units µg/L

SampID: LCS-228021

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1870**	2000	0	93.4	80	120	09/06/2024

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

Batch 226445 **SampType:** MBLK Units µg/L

SampID: MBLK-226445

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/02/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/02/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/01/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/01/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/01/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/01/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/01/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/01/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/01/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/01/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/01/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/01/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/01/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/05/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/01/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/01/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/01/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/01/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/01/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226445** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226445

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2070**	2000	0	103.4	80	120	08/02/2024
Antimony		1.0		**465**	500.0	0	93.0	80	120	08/02/2024
Arsenic		1.0		**477**	500.0	0	95.4	80	120	08/01/2024
Barium		1.0		**1920**	2000	0	96.1	80	120	08/01/2024
Beryllium		1.0		**47.3**	50.00	0	94.6	80	120	08/01/2024
Boron		25.0		**487**	500.0	0	97.3	80	120	08/01/2024
Cadmium	*	1.0		**47.8**	50.00	0	95.6	80	120	08/01/2024
Chromium		1.5		**184**	200.0	0	92.0	80	120	08/01/2024
Cobalt		1.0		**471**	500.0	0	94.2	80	120	08/01/2024
Copper	*	1.0		**235**	250.0	0	93.9	80	120	08/01/2024
Lead		1.0		**485**	500.0	0	97.0	80	120	08/01/2024
Lithium	*	3.0		**494**	500.0	0	98.8	80	120	08/01/2024
Manganese		2.0		**474**	500.0	0	94.9	80	120	08/01/2024
Molybdenum		1.5		**453**	500.0	0	90.6	80	120	08/05/2024
Nickel		1.0		**468**	500.0	0	93.6	80	120	08/01/2024
Selenium		1.0		**500**	500.0	0	100.0	80	120	08/01/2024
Silver		1.0		**45.9**	50.00	0	91.7	80	120	08/01/2024
Thallium		2.0		**256**	250.0	0	102.4	80	120	08/02/2024
Vanadium		5.0		**445**	500.0	0	89.0	80	120	08/01/2024
Zinc		15.0		**470**	500.0	0	93.9	80	120	08/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226445** **SampType:** **MS** Units **µg/L**
SampID: 24071451-030CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2050**	2000	58.32	99.5	75	125	08/02/2024
Antimony		1.0		**544**	500.0	0.6683	108.6	75	125	08/02/2024
Arsenic		1.0		**471**	500.0	0.6794	94.1	75	125	08/01/2024
Barium		1.0		**2010**	2000	115.6	94.8	75	125	08/01/2024
Beryllium		1.0		**49.5**	50.00	0	99.0	75	125	08/01/2024
Boron		25.0		**509**	500.0	0	101.8	75	125	08/01/2024
Cadmium	*	1.0		**48.3**	50.00	0	96.6	75	125	08/01/2024
Chromium		1.5		**186**	200.0	0	92.8	75	125	08/01/2024
Cobalt		1.0		**462**	500.0	0.1962	92.3	75	125	08/01/2024
Copper	*	1.0		**232**	250.0	2.536	91.7	75	125	08/01/2024
Lead		1.0		**496**	500.0	0	99.1	75	125	08/01/2024
Manganese		2.0		**645**	500.0	208.9	87.3	75	125	08/01/2024
Molybdenum		1.5		**463**	500.0	1.353	92.4	75	125	08/05/2024
Nickel		1.0		**455**	500.0	0.6884	90.9	75	125	08/01/2024
Selenium		1.0		**491**	500.0	0	98.3	75	125	08/01/2024
Silver		1.0		**44.3**	50.00	0	88.5	75	125	08/01/2024
Thallium		2.0		**248**	250.0	1.631	98.7	75	125	08/02/2024
Vanadium		5.0		**456**	500.0	0	91.2	75	125	08/01/2024
Zinc		15.0		**468**	500.0	7.030	92.3	75	125	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226445** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-030CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**2090**	2000	58.32	101.5	2049	1.84	08/02/2024
Antimony		1.0		**574**	500.0	0.6683	114.7	543.7	5.45	08/02/2024
Arsenic		1.0		**495**	500.0	0.6794	98.8	471.4	4.87	08/01/2024
Barium		1.0		**2030**	2000	115.6	95.9	2011	1.15	08/01/2024
Beryllium		1.0		**51.7**	50.00	0	103.5	49.49	4.42	08/01/2024
Boron		25.0		**502**	500.0	0	100.4	509.1	1.39	08/01/2024
Cadmium	*	1.0		**48.6**	50.00	0	97.2	48.29	0.67	08/01/2024
Chromium		1.5		**193**	200.0	0	96.6	185.5	4.08	08/01/2024
Cobalt		1.0		**482**	500.0	0.1962	96.4	461.5	4.39	08/01/2024
Copper	*	1.0		**238**	250.0	2.536	94.3	231.8	2.80	08/01/2024
Lead		1.0		**509**	500.0	0	101.7	495.7	2.58	08/01/2024
Manganese		2.0		**655**	500.0	208.9	89.2	645.4	1.47	08/01/2024
Molybdenum		1.5		**492**	500.0	1.353	98.1	463.4	5.95	08/05/2024
Nickel		1.0		**469**	500.0	0.6884	93.7	455.4	3.02	08/01/2024
Selenium		1.0		**513**	500.0	0	102.6	491.5	4.26	08/01/2024
Silver		1.0		**43.4**	50.00	0	86.8	44.26	1.99	08/01/2024
Thallium		2.0		**246**	250.0	1.631	97.7	248.5	1.01	08/02/2024
Vanadium		5.0		**474**	500.0	0	94.8	456.2	3.84	08/01/2024
Zinc		15.0		**485**	500.0	7.030	95.7	468.5	3.54	08/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226459** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226459

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/02/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/05/2024
Antimony		1.0	S	**1.3**	0.4500	0	281.9	-100	100	08/01/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/01/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/01/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/01/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/02/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/01/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/01/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/01/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/01/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/01/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/01/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/01/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/01/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/01/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/01/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/01/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/01/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/01/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/01/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226459** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226459

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2010**	2000	0	100.3	80	120	08/02/2024
Antimony		1.0	B	**531**	500.0	0	106.2	80	120	08/01/2024
Arsenic		1.0		**510**	500.0	0	102.0	80	120	08/01/2024
Barium		1.0		**2040**	2000	0	102.0	80	120	08/01/2024
Beryllium		1.0		**50.3**	50.00	0	100.7	80	120	08/01/2024
Boron		25.0		**529**	500.0	0	105.8	80	120	08/02/2024
Cadmium	*	1.0		**50.1**	50.00	0	100.3	80	120	08/01/2024
Chromium		1.5		**194**	200.0	0	96.8	80	120	08/01/2024
Cobalt		1.0		**494**	500.0	0	98.8	80	120	08/01/2024
Iron		25.0		**2200**	2000	0	110.1	80	120	08/01/2024
Lead		1.0		**482**	500.0	0	96.4	80	120	08/01/2024
Lithium	*	3.0		**528**	500.0	0	105.7	80	120	08/01/2024
Manganese		2.0		**517**	500.0	0	103.4	80	120	08/01/2024
Molybdenum		1.5		**437**	500.0	0	87.4	80	120	08/01/2024
Nickel		1.0		**500**	500.0	0	100.0	80	120	08/01/2024
Selenium		1.0		**537**	500.0	0	107.5	80	120	08/01/2024
Silver		1.0		**46.0**	50.00	0	92.1	80	120	08/01/2024
Thallium		2.0		**219**	250.0	0	87.8	80	120	08/01/2024
Vanadium		5.0		**476**	500.0	0	95.3	80	120	08/01/2024
Zinc		15.0		**509**	500.0	0	101.8	80	120	08/01/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226542** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226542

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/05/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/05/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/05/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/05/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/05/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/05/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/05/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/05/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/06/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/06/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/05/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/05/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/05/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/05/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/05/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/05/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/05/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/05/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226542** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226542

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1840**	2000	0	92.2	80	120	08/05/2024
Antimony		1.0		**550**	500.0	0	110.0	80	120	08/08/2024
Arsenic		1.0		**498**	500.0	0	99.7	80	120	08/05/2024
Barium		1.0		**2100**	2000	0	104.9	80	120	08/05/2024
Beryllium		1.0		**48.1**	50.00	0	96.2	80	120	08/05/2024
Boron		25.0		**471**	500.0	0	94.2	80	120	08/05/2024
Cadmium	*	1.0		**49.2**	50.00	0	98.3	80	120	08/05/2024
Chromium		1.5		**183**	200.0	0	91.7	80	120	08/05/2024
Cobalt		1.0		**473**	500.0	0	94.5	80	120	08/05/2024
Copper	*	1.0		**236**	250.0	0	94.4	80	120	08/06/2024
Iron		25.0		**1890**	2000	0	94.4	80	120	08/06/2024
Lead		1.0		**483**	500.0	0	96.6	80	120	08/05/2024
Lithium	*	3.0		**489**	500.0	0	97.8	80	120	08/05/2024
Manganese		2.0		**500**	500.0	0	100.0	80	120	08/05/2024
Molybdenum		1.5		**407**	500.0	0	81.4	80	120	08/05/2024
Nickel		1.0		**481**	500.0	0	96.2	80	120	08/05/2024
Selenium		1.0		**526**	500.0	0	105.3	80	120	08/05/2024
Silver		1.0		**47.2**	50.00	0	94.5	80	120	08/05/2024
Thallium		2.0		**233**	250.0	0	93.1	80	120	08/05/2024
Vanadium		5.0		**482**	500.0	0	96.3	80	120	08/05/2024
Zinc		15.0		**477**	500.0	0	95.3	80	120	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226542 **SampType:** MS Units µg/L

SampID: 24071451-042BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**530**	500.0	0	105.9	75	125	08/08/2024
Arsenic		1.0		**484**	500.0	0.8165	96.7	75	125	08/05/2024
Barium		1.0		**2040**	2000	66.36	98.9	75	125	08/05/2024
Beryllium		1.0		**47.7**	50.00	0	95.4	75	125	08/05/2024
Boron		25.0		**498**	500.0	11.49	97.3	75	125	08/05/2024
Cadmium	*	1.0		**47.5**	50.00	0	95.1	75	125	08/05/2024
Chromium		1.5		**171**	200.0	0	85.7	75	125	08/05/2024
Cobalt		1.0		**437**	500.0	0.6914	87.2	75	125	08/05/2024
Lead		1.0		**469**	500.0	0	93.8	75	125	08/05/2024
Lithium	*	3.0		**499**	500.0	7.980	98.2	75	125	08/05/2024
Molybdenum		1.5		**403**	500.0	1.051	80.3	75	125	08/05/2024
Selenium		1.0		**516**	500.0	0	103.3	75	125	08/05/2024
Thallium		2.0		**227**	250.0	0	90.9	75	125	08/05/2024

Batch 226542 **SampType:** MSD Units µg/L RPD Limit **20**

SampID: 24071451-042BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**548**	500.0	0	109.5	529.7	3.32	08/08/2024
Arsenic		1.0		**484**	500.0	0.8165	96.7	484.5	0.01	08/05/2024
Barium		1.0		**2050**	2000	66.36	99.1	2044	0.21	08/05/2024
Beryllium		1.0		**50.6**	50.00	0	101.1	47.71	5.80	08/05/2024
Boron		25.0		**511**	500.0	11.49	99.8	497.9	2.53	08/05/2024
Cadmium	*	1.0		**47.4**	50.00	0	94.8	47.55	0.35	08/05/2024
Chromium		1.5		**175**	200.0	0	87.3	171.5	1.81	08/05/2024
Cobalt		1.0		**445**	500.0	0.6914	88.8	436.6	1.87	08/05/2024
Lead		1.0		**474**	500.0	0	94.8	469.2	1.04	08/05/2024
Lithium	*	3.0		**509**	500.0	7.980	100.1	498.9	1.92	08/05/2024
Molybdenum		1.5		**406**	500.0	1.051	81.0	402.6	0.87	08/05/2024
Selenium		1.0		**517**	500.0	0	103.3	516.4	0.04	08/05/2024
Thallium		2.0		**233**	250.0	0	93.2	227.3	2.45	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226550 **SampType:** MBLK Units **µg/L**

SampID: MBLK-226550

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/09/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/06/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/06/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/06/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/06/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/06/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/06/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/06/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/06/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/06/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/06/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/06/2024

Batch 226550 **SampType:** LCS Units **µg/L**

SampID: LCS-226550

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**538**	500.0	0	107.6	80	120	08/09/2024
Arsenic		1.0		**503**	500.0	0	100.6	80	120	08/06/2024
Barium		1.0		**2000**	2000	0	99.9	80	120	08/06/2024
Beryllium		1.0		**53.1**	50.00	0	106.1	80	120	08/06/2024
Boron		25.0		**533**	500.0	0	106.7	80	120	08/06/2024
Cadmium	*	1.0		**51.7**	50.00	0	103.4	80	120	08/06/2024
Chromium		1.5		**195**	200.0	0	97.6	80	120	08/06/2024
Cobalt		1.0		**500**	500.0	0	100.1	80	120	08/06/2024
Lead		1.0		**487**	500.0	0	97.5	80	120	08/08/2024
Molybdenum		1.5		**462**	500.0	0	92.4	80	120	08/06/2024
Selenium		1.0		**525**	500.0	0	105.0	80	120	08/06/2024
Thallium		2.0		**213**	250.0	0	85.2	80	120	08/06/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226569** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226569

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/06/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/05/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/06/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/05/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/05/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/06/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/06/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/05/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/05/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/05/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/05/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/06/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/05/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/05/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/05/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/05/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/05/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/05/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226569** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226569

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2090**	2000	0	104.4	80	120	08/06/2024
Antimony		1.0		**587**	500.0	0	117.5	80	120	08/05/2024
Arsenic		1.0		**523**	500.0	0	104.7	80	120	08/05/2024
Arsenic		1.0		**514**	500.0	0	102.8	80	120	08/06/2024
Barium		1.0		**2150**	2000	0	107.6	80	120	08/05/2024
Beryllium		1.0		**50.5**	50.00	0	101.0	80	120	08/06/2024
Boron		25.0		**505**	500.0	0	101.1	80	120	08/06/2024
Cadmium	*	1.0		**52.7**	50.00	0	105.4	80	120	08/05/2024
Chromium		1.5		**211**	200.0	0	105.3	80	120	08/05/2024
Cobalt		1.0		**528**	500.0	0	105.5	80	120	08/05/2024
Iron		25.0		**2240**	2000	0	112.1	80	120	08/06/2024
Lead		1.0		**509**	500.0	0	101.9	80	120	08/06/2024
Lead		1.0	S	**600**	500.0	0	120.1	80	120	08/05/2024
Lithium	*	3.0		**518**	500.0	0	103.6	80	120	08/06/2024
Manganese		2.0		**530**	500.0	0	106.0	80	120	08/05/2024
Molybdenum		1.5		**467**	500.0	0	93.3	80	120	08/05/2024
Selenium		1.0		**551**	500.0	0	110.1	80	120	08/05/2024
Silver		1.0		**49.4**	50.00	0	98.9	80	120	08/05/2024
Thallium		2.0		**211**	250.0	0	84.2	80	120	08/05/2024
Vanadium		5.0		**513**	500.0	0	102.6	80	120	08/05/2024
Zinc		15.0		**542**	500.0	0	108.4	80	120	08/05/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226569** **SampType:** **MS** Units **µg/L**
SampID: 24071451-035CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2150**	2000	39.01	105.3	75	125	08/06/2024
Antimony		1.0		**537**	500.0	0	107.5	75	125	08/06/2024
Arsenic		1.0		**511**	500.0	0	102.3	75	125	08/06/2024
Barium		1.0		**2060**	2000	52.07	100.2	75	125	08/06/2024
Beryllium		1.0		**52.4**	50.00	0	104.8	75	125	08/06/2024
Boron		25.0		**541**	500.0	0	108.1	75	125	08/06/2024
Cadmium	*	1.0		**51.0**	50.00	0	102.0	75	125	08/06/2024
Chromium		1.5		**207**	200.0	0	103.5	75	125	08/06/2024
Cobalt		1.0		**493**	500.0	0	98.5	75	125	08/06/2024
Iron		25.0		**2230**	2000	43.26	109.2	75	125	08/06/2024
Lead		1.0		**546**	500.0	0	109.2	75	125	08/06/2024
Lithium	*	3.0		**541**	500.0	1.655	108.0	75	125	08/06/2024
Manganese		2.0		**521**	500.0	13.24	101.5	75	125	08/06/2024
Molybdenum		1.5		**469**	500.0	0	93.9	75	125	08/06/2024
Nickel		1.0		**484**	500.0	1.259	96.6	75	125	08/06/2024
Selenium		1.0		**528**	500.0	0	105.5	75	125	08/06/2024
Silver		1.0		**48.1**	50.00	0	96.2	75	125	08/06/2024
Thallium		2.0		**221**	250.0	0	88.3	75	125	08/06/2024
Vanadium		5.0		**494**	500.0	0	98.8	75	125	08/06/2024
Zinc		15.0		**501**	500.0	0	100.3	75	125	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226569** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-035CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**2100**	2000	39.01	102.8	2145	2.32	08/06/2024
Antimony		1.0		**556**	500.0	0	111.2	537.3	3.41	08/06/2024
Arsenic		1.0		**507**	500.0	0	101.4	511.4	0.82	08/06/2024
Barium		1.0		**2110**	2000	52.07	103.0	2055	2.75	08/06/2024
Beryllium		1.0		**52.0**	50.00	0	104.1	52.38	0.65	08/06/2024
Boron		25.0		**531**	500.0	0	106.3	540.5	1.71	08/06/2024
Cadmium	*	1.0		**52.0**	50.00	0	104.0	51.01	1.93	08/06/2024
Chromium		1.5		**195**	200.0	0	97.7	207.0	5.73	08/06/2024
Cobalt		1.0		**479**	500.0	0	95.7	492.5	2.84	08/06/2024
Iron		25.0		**2150**	2000	43.26	105.2	2228	3.71	08/06/2024
Lead		1.0		**519**	500.0	0	103.8	545.8	5.04	08/06/2024
Lithium	*	3.0		**535**	500.0	1.655	106.6	541.4	1.26	08/06/2024
Manganese		2.0		**509**	500.0	13.24	99.1	520.6	2.33	08/06/2024
Molybdenum		1.5		**472**	500.0	0	94.5	469.5	0.60	08/06/2024
Nickel		1.0		**480**	500.0	1.259	95.8	484.5	0.91	08/06/2024
Selenium		1.0		**529**	500.0	0	105.7	527.7	0.16	08/06/2024
Silver		1.0		**51.3**	50.00	0	102.6	48.08	6.45	08/06/2024
Thallium		2.0		**211**	250.0	0	84.4	220.7	4.50	08/06/2024
Vanadium		5.0		**487**	500.0	0	97.5	493.8	1.29	08/06/2024
Zinc		15.0		**495**	500.0	0	99.0	501.4	1.32	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226612 **SampType:** MBLK Units **µg/L**

SampID: MBLK-226612

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/05/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/05/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/05/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/05/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/05/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/05/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/05/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/08/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/06/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/05/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/05/2024

Batch 226612 **SampType:** LCS Units **µg/L**

SampID: LCS-226612

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**546**	500.0	0	109.3	80	120	08/08/2024
Arsenic		1.0		**503**	500.0	0	100.5	80	120	08/05/2024
Barium		1.0		**2060**	2000	0	102.8	80	120	08/05/2024
Beryllium		1.0		**47.8**	50.00	0	95.6	80	120	08/05/2024
Boron		25.0		**501**	500.0	0	100.2	80	120	08/05/2024
Cadmium	*	1.0		**49.1**	50.00	0	98.1	80	120	08/05/2024
Chromium		1.5		**184**	200.0	0	92.1	80	120	08/05/2024
Cobalt		1.0		**475**	500.0	0	95.1	80	120	08/05/2024
Lead		1.0		**484**	500.0	0	96.8	80	120	08/05/2024
Lithium	*	3.0		**515**	500.0	0	102.9	80	120	08/08/2024
Molybdenum		1.5		**449**	500.0	0	89.8	80	120	08/06/2024
Selenium		1.0		**544**	500.0	0	108.7	80	120	08/05/2024
Thallium		2.0		**235**	250.0	0	94.1	80	120	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226612 **SampType:** MS Units **µg/L**

SampID: 24071451-077BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**542**	500.0	0.4677	108.4	75	125	08/08/2024
Arsenic		1.0		**519**	500.0	0	103.8	75	125	08/05/2024
Barium		1.0		**2240**	2000	129.2	105.8	75	125	08/05/2024
Beryllium		1.0		**51.5**	50.00	0	103.0	75	125	08/05/2024
Boron		25.0		**536**	500.0	25.54	102.2	75	125	08/05/2024
Cadmium	*	1.0		**50.6**	50.00	0	101.2	75	125	08/05/2024
Chromium		1.5		**187**	200.0	0	93.4	75	125	08/05/2024
Cobalt		1.0		**474**	500.0	0.4633	94.7	75	125	08/05/2024
Lead		1.0		**501**	500.0	0	100.1	75	125	08/05/2024
Lithium	*	3.0		**521**	500.0	3.259	103.6	75	125	08/08/2024
Molybdenum		1.5		**448**	500.0	1.109	89.4	75	125	08/06/2024
Selenium		1.0		**555**	500.0	0	111.0	75	125	08/05/2024
Thallium		2.0		**245**	250.0	0	98.1	75	125	08/05/2024

Batch 226612 **SampType:** MSD Units **µg/L** RPD Limit **20**

SampID: 24071451-077BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**551**	500.0	0.4677	110.2	542.3	1.68	08/08/2024
Arsenic		1.0		**494**	500.0	0	98.9	519.0	4.85	08/05/2024
Barium		1.0		**2200**	2000	129.2	103.4	2245	2.13	08/05/2024
Beryllium		1.0		**52.1**	50.00	0	104.3	51.51	1.20	08/05/2024
Boron		25.0		**534**	500.0	25.54	101.7	536.3	0.40	08/05/2024
Cadmium	*	1.0		**49.1**	50.00	0	98.1	50.62	3.15	08/05/2024
Chromium		1.5		**181**	200.0	0	90.3	186.9	3.41	08/05/2024
Cobalt		1.0		**454**	500.0	0.4633	90.6	473.8	4.35	08/05/2024
Lead		1.0		**492**	500.0	0	98.3	500.6	1.79	08/05/2024
Lithium	*	3.0		**523**	500.0	3.259	104.0	521.4	0.36	08/08/2024
Molybdenum		1.5		**468**	500.0	2.103	93.3	431.5	8.21	08/06/2024
Selenium		1.0		**528**	500.0	0	105.5	555.0	5.08	08/05/2024
Thallium		2.0		**242**	250.0	0	97.0	245.3	1.16	08/05/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226738** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226738

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/08/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/08/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/08/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/08/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/08/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/08/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/08/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/08/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/08/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/09/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/08/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/08/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/08/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/08/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/08/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/08/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/08/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226738 **SampType:** LCS Units µg/L

SampID: LCS-226738

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**539**	500.0	0	107.9	80	120	08/08/2024
Arsenic		1.0		**530**	500.0	0	105.9	80	120	08/08/2024
Barium		1.0		**2100**	2000	0	104.9	80	120	08/08/2024
Beryllium		1.0		**50.2**	50.00	0	100.5	80	120	08/08/2024
Boron		25.0		**529**	500.0	0	105.8	80	120	08/09/2024
Boron		25.0		**518**	500.0	0	103.5	80	120	08/08/2024
Cadmium	*	1.0		**50.4**	50.00	0	100.9	80	120	08/08/2024
Chromium		1.5		**208**	200.0	0	104.2	80	120	08/08/2024
Cobalt		1.0		**525**	500.0	0	104.9	80	120	08/08/2024
Copper	*	1.0		**255**	250.0	0	102.1	80	120	08/08/2024
Iron		25.0		**2260**	2000	0	113.1	80	120	08/09/2024
Lead		1.0		**495**	500.0	0	98.9	80	120	08/08/2024
Lithium	*	3.0		**521**	500.0	0	104.2	80	120	08/08/2024
Lithium	*	3.0		**538**	500.0	0	107.5	80	120	08/09/2024
Manganese		2.0		**520**	500.0	0	104.1	80	120	08/08/2024
Molybdenum		1.5		**477**	500.0	0	95.4	80	120	08/09/2024
Nickel		1.0		**514**	500.0	0	102.8	80	120	08/08/2024
Selenium		1.0		**531**	500.0	0	106.2	80	120	08/08/2024
Silver		1.0		**50.9**	50.00	0	101.7	80	120	08/08/2024
Thallium		2.0		**248**	250.0	0	99.2	80	120	08/08/2024
Zinc		15.0		**514**	500.0	0	102.9	80	120	08/08/2024

Batch 226738 **SampType:** MS Units µg/L

SampID: 24071451-012CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Boron		25.0		**556**	500.0	0	111.2	75	125	08/08/2024

Batch 226738 **SampType:** MSD Units µg/L RPD Limit **20**

SampID: 24071451-012CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Boron		25.0		**539**	500.0	0	107.8	556.1	3.13	08/08/2024

Batch 226738 **SampType:** MS Units µg/L

SampID: 24071451-030CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Iron		25.0		**2400**	2000	208.2	109.7	75	125	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226738 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24071451-030CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Iron		25.0		**2450**	2000	208.2	111.9	2403	1.75	08/09/2024

Batch 226774 **SampType:** MBLK Units µg/L

SampID: MBLK-226774

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	S	**2.6**	0.4500	0	568.1	-100	100	08/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/12/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/09/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/09/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/09/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/09/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/09/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/12/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/09/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/09/2024

Batch 226774 **SampType:** LCS Units µg/L

SampID: LCS-226774

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	B	**573**	500.0	0	114.6	80	120	08/09/2024
Arsenic		1.0		**549**	500.0	0	109.9	80	120	08/09/2024
Barium		1.0		**2220**	2000	0	110.9	80	120	08/09/2024
Beryllium		1.0		**47.2**	50.00	0	94.3	80	120	08/09/2024
Boron		25.0		**490**	500.0	0	98.0	80	120	08/09/2024
Cadmium	*	1.0		**51.2**	50.00	0	102.5	80	120	08/09/2024
Chromium		1.5		**199**	200.0	0	99.3	80	120	08/09/2024
Cobalt		1.0		**524**	500.0	0	104.9	80	120	08/09/2024
Lead		1.0		**519**	500.0	0	103.7	80	120	08/09/2024
Lithium	*	3.0		**567**	500.0	0	113.4	80	120	08/12/2024
Molybdenum		1.5		**480**	500.0	0	96.1	80	120	08/09/2024
Selenium		1.0		**593**	500.0	0	118.5	80	120	08/09/2024
Thallium		2.0		**255**	250.0	0	101.9	80	120	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226774 **SampType:** MS Units µg/L

SampID: 24071451-101BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0	B	**563**	500.0	0.5734	112.5	75	125	08/09/2024
Arsenic		1.0		**544**	500.0	0	108.7	75	125	08/09/2024
Barium		1.0		**2120**	2000	13.28	105.6	75	125	08/09/2024
Beryllium		1.0		**46.1**	50.00	0	92.2	75	125	08/09/2024
Boron		25.0		**2510**	500.0	2066	88.4	75	125	08/09/2024
Cadmium	*	1.0		**48.8**	50.00	0	97.6	75	125	08/09/2024
Chromium		1.5		**186**	200.0	0	93.2	75	125	08/09/2024
Cobalt		1.0		**488**	500.0	1.189	97.4	75	125	08/09/2024
Lead		1.0		**503**	500.0	0	100.7	75	125	08/09/2024
Lithium	*	3.0		**532**	500.0	4.417	105.6	75	125	08/12/2024
Molybdenum		1.5		**476**	500.0	0	95.2	75	125	08/09/2024
Selenium		1.0		**560**	500.0	0	111.9	75	125	08/09/2024
Thallium		2.0		**247**	250.0	0	98.8	75	125	08/09/2024

Batch 226774 **SampType:** MSD Units µg/L RPD Limit **20**

SampID: 24071451-101BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0	B	**591**	500.0	0.5734	118.0	563.2	4.78	08/09/2024
Arsenic		1.0		**547**	500.0	0	109.4	543.5	0.63	08/09/2024
Barium		1.0		**2210**	2000	13.28	109.8	2124	3.89	08/09/2024
Beryllium		1.0		**47.6**	50.00	0	95.1	46.09	3.12	08/09/2024
Boron		25.0		**2540**	500.0	2066	94.0	2508	1.13	08/09/2024
Cadmium	*	1.0		**51.5**	50.00	0	103.1	48.80	5.49	08/09/2024
Chromium		1.5		**193**	200.0	0	96.5	186.4	3.42	08/09/2024
Cobalt		1.0		**510**	500.0	1.189	101.7	488.3	4.32	08/09/2024
Lead		1.0		**518**	500.0	0	103.6	503.4	2.84	08/09/2024
Lithium	*	3.0		**570**	500.0	4.417	113.1	532.4	6.79	08/12/2024
Molybdenum		1.5		**498**	500.0	0	99.6	475.9	4.53	08/09/2024
Selenium		1.0		**565**	500.0	0	113.0	559.5	0.95	08/09/2024
Thallium		2.0		**254**	250.0	0	101.8	246.9	3.01	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226782** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226782

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/09/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/09/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/09/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/09/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/09/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/09/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/09/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/09/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/09/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/09/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/12/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/09/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/09/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/09/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/09/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/09/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/09/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/09/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/09/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226782** **SampType:** **LCS** Units **µg/L**

SampID: LCS-226782

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2100**	2000	0	104.8	80	120	08/09/2024
Antimony		1.0		**580**	500.0	0	116.0	80	120	08/12/2024
Antimony		1.0	S	**620**	500.0	0	124.0	80	120	08/09/2024
Arsenic		1.0		**549**	500.0	0	109.9	80	120	08/09/2024
Barium		1.0		**2320**	2000	0	116.1	80	120	08/09/2024
Beryllium		1.0		**43.4**	50.00	0	86.9	80	120	08/09/2024
Boron		25.0		**433**	500.0	0	86.6	80	120	08/09/2024
Cadmium	*	1.0		**51.6**	50.00	0	103.2	80	120	08/09/2024
Chromium		1.5		**200**	200.0	0	100.0	80	120	08/09/2024
Cobalt		1.0		**529**	500.0	0	105.8	80	120	08/09/2024
Copper	*	1.0		**247**	250.0	0	98.9	80	120	08/09/2024
Iron		25.0		**2230**	2000	0	111.3	80	120	08/12/2024
Lead		1.0		**526**	500.0	0	105.1	80	120	08/09/2024
Lithium	*	3.0		**532**	500.0	0	106.4	80	120	08/09/2024
Manganese		2.0		**592**	500.0	0	118.4	80	120	08/09/2024
Molybdenum		1.5		**483**	500.0	0	96.6	80	120	08/09/2024
Nickel		1.0		**560**	500.0	0	111.9	80	120	08/09/2024
Selenium		1.0		**585**	500.0	0	117.1	80	120	08/09/2024
Silver		1.0		**50.4**	50.00	0	100.9	80	120	08/09/2024
Thallium		2.0		**258**	250.0	0	103.1	80	120	08/09/2024
Vanadium		5.0		**562**	500.0	0	112.4	80	120	08/09/2024
Zinc		15.0		**533**	500.0	0	106.6	80	120	08/12/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226782** **SampType:** **MS** Units **µg/L**

SampID: 24071451-038CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1970**	2000	33.06	96.8	75	125	08/09/2024
Antimony		1.0		**572**	500.0	0	114.4	75	125	08/09/2024
Arsenic		1.0		**538**	500.0	1.876	107.3	75	125	08/09/2024
Barium		1.0		**2200**	2000	29.61	108.4	75	125	08/09/2024
Beryllium		1.0		**43.7**	50.00	0	87.4	75	125	08/09/2024
Boron		25.0		**1090**	500.0	576.0	102.7	75	125	08/09/2024
Cadmium	*	1.0		**50.5**	50.00	0	101.0	75	125	08/09/2024
Chromium		1.5		**186**	200.0	0	93.2	75	125	08/09/2024
Cobalt		1.0		**502**	500.0	0.4437	100.3	75	125	08/09/2024
Copper	*	1.0		**222**	250.0	0	88.7	75	125	08/09/2024
Iron		25.0		**4300**	2000	1931	118.3	75	125	08/12/2024
Lead		1.0		**510**	500.0	0	102.1	75	125	08/09/2024
Lithium	*	3.0		**589**	500.0	6.682	116.5	75	125	08/09/2024
Manganese		2.0		**1100**	500.0	513.3	116.4	75	125	08/12/2024
Molybdenum		1.5		**485**	500.0	0	96.9	75	125	08/09/2024
Nickel		1.0		**501**	500.0	0	100.2	75	125	08/09/2024
Selenium		1.0		**552**	500.0	0	110.3	75	125	08/09/2024
Silver		1.0		**47.6**	50.00	0	95.1	75	125	08/09/2024
Thallium		2.0		**253**	250.0	0	101.4	75	125	08/09/2024
Vanadium		5.0		**533**	500.0	0	106.7	75	125	08/09/2024
Zinc		15.0		**510**	500.0	0	102.0	75	125	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226782** **SampType:** **MSD** Units **µg/L** RPD Limit **20**

SampID: 24071451-038CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Aluminum		25.0		**1980**	2000	33.06	97.2	1968	0.42	08/09/2024
Antimony		1.0		**570**	500.0	0	114.1	571.9	0.25	08/09/2024
Arsenic		1.0		**531**	500.0	1.876	105.9	538.2	1.26	08/09/2024
Barium		1.0		**2160**	2000	29.61	106.4	2198	1.91	08/09/2024
Beryllium		1.0		**43.7**	50.00	0	87.5	43.70	0.11	08/09/2024
Boron		25.0		**1080**	500.0	576.0	101.0	1090	0.79	08/09/2024
Cadmium	*	1.0		**49.8**	50.00	0	99.6	50.48	1.35	08/09/2024
Chromium		1.5		**187**	200.0	0	93.3	186.4	0.08	08/09/2024
Cobalt		1.0		**496**	500.0	0.4437	99.0	502.0	1.30	08/09/2024
Copper	*	1.0		**220**	250.0	0	88.1	221.8	0.65	08/09/2024
Iron		25.0		**4420**	2000	1931	124.4	4297	2.80	08/12/2024
Lead		1.0		**513**	500.0	0	102.7	510.5	0.57	08/09/2024
Lithium	*	3.0		**575**	500.0	6.682	113.6	589.1	2.49	08/09/2024
Manganese		2.0		**1130**	500.0	513.3	122.5	1095	2.74	08/12/2024
Molybdenum		1.5		**480**	500.0	0	96.0	484.6	0.99	08/09/2024
Nickel		1.0		**499**	500.0	0	99.9	501.1	0.34	08/09/2024
Selenium		1.0		**544**	500.0	0	108.7	551.7	1.45	08/09/2024
Silver		1.0		**47.4**	50.00	0	94.8	47.56	0.33	08/09/2024
Thallium		2.0		**257**	250.0	0	102.8	253.4	1.38	08/09/2024
Vanadium		5.0		**545**	500.0	0	109.0	533.3	2.21	08/09/2024
Zinc		15.0		**518**	500.0	0	103.6	509.8	1.65	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226782** **SampType:** **MS** Units **µg/L**

SampID: 24071451-099CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Antimony		1.0		**588**	500.0	0	117.6	75	125	08/09/2024
Arsenic		1.0		**566**	500.0	0	113.3	75	125	08/09/2024
Barium		1.0		**2240**	2000	51.94	109.6	75	125	08/09/2024
Beryllium		1.0		**49.9**	50.00	0	99.8	75	125	08/09/2024
Boron		25.0		**511**	500.0	0	102.2	75	125	08/09/2024
Cadmium	*	1.0		**52.1**	50.00	0	104.3	75	125	08/09/2024
Chromium		1.5		**199**	200.0	0	99.5	75	125	08/09/2024
Cobalt		1.0		**507**	500.0	0	101.3	75	125	08/09/2024
Copper	*	1.0		**236**	250.0	0	94.4	75	125	08/09/2024
Lead		1.0		**527**	500.0	0	105.4	75	125	08/09/2024
Lithium	*	3.0		**580**	500.0	5.263	114.9	75	125	08/12/2024
Manganese		2.0		**655**	500.0	91.51	112.6	75	125	08/12/2024
Molybdenum		1.5		**495**	500.0	0	99.1	75	125	08/09/2024
Nickel		1.0		**535**	500.0	0	107.1	75	125	08/09/2024
Selenium		1.0		**600**	500.0	2.409	119.5	75	125	08/09/2024
Silver		1.0		**49.6**	50.00	0	99.3	75	125	08/09/2024
Thallium		2.0		**262**	250.0	0	104.7	75	125	08/09/2024
Vanadium		5.0		**563**	500.0	0	112.6	75	125	08/09/2024
Zinc		15.0		**541**	500.0	0	108.1	75	125	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226782 **SampType:** MSD Units µg/L RPD Limit 20

SampID: 24071451-099CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Antimony		1.0		**581**	500.0	0	116.3	587.9	1.13	08/09/2024
Arsenic		1.0		**550**	500.0	0	110.1	566.4	2.88	08/09/2024
Barium		1.0		**2240**	2000	51.94	109.6	2244	0.02	08/09/2024
Beryllium		1.0		**48.4**	50.00	0	96.7	49.88	3.07	08/09/2024
Boron		25.0		**517**	500.0	0	103.4	511.2	1.12	08/09/2024
Cadmium	*	1.0		**51.7**	50.00	0	103.3	52.14	0.89	08/09/2024
Chromium		1.5		**202**	200.0	0	100.9	198.9	1.40	08/09/2024
Cobalt		1.0		**511**	500.0	0	102.2	506.7	0.90	08/09/2024
Copper	*	1.0		**231**	250.0	0	92.5	235.9	1.98	08/09/2024
Lead		1.0		**527**	500.0	0	105.4	527.1	0.01	08/09/2024
Lithium	*	3.0		**567**	500.0	5.263	112.3	579.9	2.29	08/12/2024
Manganese		2.0		**638**	500.0	91.51	109.4	654.7	2.54	08/12/2024
Molybdenum		1.5		**490**	500.0	0	98.0	495.4	1.12	08/09/2024
Nickel		1.0		**536**	500.0	0	107.2	535.5	0.13	08/09/2024
Selenium		1.0		**588**	500.0	2.409	117.1	600.1	2.07	08/09/2024
Silver		1.0		**48.9**	50.00	0	97.7	49.64	1.59	08/09/2024
Thallium		2.0		**262**	250.0	0	104.8	261.7	0.11	08/09/2024
Vanadium		5.0		**573**	500.0	0	114.7	562.9	1.83	08/09/2024
Zinc		15.0		**525**	500.0	0	104.9	540.5	2.99	08/12/2024

Batch 226848 **SampType:** MBLK Units µg/L

SampID: MBLK-226848

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/09/2024

Batch 226848 **SampType:** LCS Units µg/L

SampID: LCS-226848

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Copper	*	1.0		**244**	250.0	0	97.7	80	120	08/09/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch **226877** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226877

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/12/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/12/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/12/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/12/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/12/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/12/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/12/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/12/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/12/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/12/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/12/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/12/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/12/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/12/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/12/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/12/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/12/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/12/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/12/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/12/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/12/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226877** **SampType:** **LCS** Units **µg/L**
SampID: LCS-226877

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1870**	2000	0	93.3	80	120	08/12/2024
Antimony		1.0		**511**	500.0	0	102.1	80	120	08/12/2024
Arsenic		1.0		**469**	500.0	0	93.7	80	120	08/12/2024
Barium		1.0		**1890**	2000	0	94.5	80	120	08/12/2024
Beryllium		1.0		**47.7**	50.00	0	95.3	80	120	08/12/2024
Boron		25.0		**467**	500.0	0	93.3	80	120	08/12/2024
Cadmium	*	1.0		**47.0**	50.00	0	93.9	80	120	08/12/2024
Chromium		1.5		**197**	200.0	0	98.3	80	120	08/12/2024
Cobalt		1.0		**469**	500.0	0	93.8	80	120	08/12/2024
Copper	*	1.0		**231**	250.0	0	92.4	80	120	08/12/2024
Iron		25.0		**1940**	2000	0	97.1	80	120	08/12/2024
Lead		1.0		**450**	500.0	0	90.0	80	120	08/12/2024
Lithium	*	3.0		**507**	500.0	0	101.4	80	120	08/12/2024
Manganese		2.0		**473**	500.0	0	94.7	80	120	08/12/2024
Molybdenum		1.5		**420**	500.0	0	83.9	80	120	08/12/2024
Nickel		1.0		**461**	500.0	0	92.2	80	120	08/12/2024
Selenium		1.0		**461**	500.0	0	92.2	80	120	08/12/2024
Silver		1.0		**51.0**	50.00	0	101.9	80	120	08/12/2024
Thallium		2.0		**209**	250.0	0	83.4	80	120	08/12/2024
Vanadium		5.0		**473**	500.0	0	94.6	80	120	08/12/2024
Zinc		15.0		**460**	500.0	0	92.0	80	120	08/12/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch **226881** **SampType:** **MBLK** Units **µg/L**

SampID: MBLK-226881

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	08/12/2024
Antimony		1.0	S	**1.2**	0.4500	0	261.1	-100	100	08/12/2024
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/12/2024
Barium		1.0		**< 1.0**	0.7000	0	0	-100	100	08/12/2024
Beryllium		1.0		**< 1.0**	0.2500	0	0	-100	100	08/12/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/12/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/12/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/12/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/12/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/12/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/12/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/12/2024
Lithium	*	3.0		**< 3.0**	1.450	0	0	-100	100	08/12/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/12/2024
Molybdenum		1.5		**< 1.5**	0.6000	0	0	-100	100	08/12/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/12/2024
Selenium		1.0		**< 1.0**	0.6000	0	0	-100	100	08/12/2024
Silver		1.0		**< 1.0**	0.1110	0	0	-100	100	08/12/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/12/2024
Vanadium		5.0	J	**4.3**	5.000	0	86.0	-100	100	08/12/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/12/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 226881 **SampType:** LCS Units µg/L

SampID: LCS-226881

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1840**	2000	0	91.8	80	120	08/12/2024
Antimony		1.0	B	**510**	500.0	0	101.9	80	120	08/12/2024
Arsenic		1.0		**468**	500.0	0	93.6	80	120	08/12/2024
Barium		1.0		**1900**	2000	0	95.0	80	120	08/12/2024
Beryllium		1.0		**48.8**	50.00	0	97.6	80	120	08/12/2024
Boron		25.0		**515**	500.0	0	103.0	80	120	08/12/2024
Cadmium	*	1.0		**48.2**	50.00	0	96.3	80	120	08/12/2024
Chromium		1.5		**199**	200.0	0	99.3	80	120	08/12/2024
Cobalt		1.0		**465**	500.0	0	93.0	80	120	08/12/2024
Copper	*	1.0		**231**	250.0	0	92.3	80	120	08/12/2024
Iron		25.0		**2030**	2000	0	101.4	80	120	08/12/2024
Lead		1.0		**464**	500.0	0	92.8	80	120	08/12/2024
Lithium	*	3.0		**518**	500.0	0	103.6	80	120	08/12/2024
Manganese		2.0		**477**	500.0	0	95.4	80	120	08/12/2024
Molybdenum		1.5		**412**	500.0	0	82.5	80	120	08/12/2024
Nickel		1.0		**462**	500.0	0	92.4	80	120	08/12/2024
Selenium		1.0		**469**	500.0	0	93.8	80	120	08/12/2024
Silver		1.0		**49.3**	50.00	0	98.7	80	120	08/12/2024
Thallium		2.0		**223**	250.0	0	89.2	80	120	08/12/2024
Vanadium		5.0	B	**484**	500.0	0	96.8	80	120	08/12/2024
Zinc		15.0		**464**	500.0	0	92.8	80	120	08/12/2024

Batch 226881 **SampType:** MS Units µg/L

SampID: 24071451-087BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**500**	500.0	1.969	99.6	75	125	08/13/2024

Batch 226881 **SampType:** MSD Units µg/L RPD Limit **20**

SampID: 24071451-087BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic		1.0		**485**	500.0	1.969	96.6	500.1	3.11	08/13/2024

Quality Control Results

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

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

Batch 227725 **SampType:** MBLK Units **µg/L**
SampID: MBLK-227725

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	09/04/2024
Antimony		1.0	S	**2.1**	0.4500	0	463.4	-100	100	08/29/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	08/30/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/30/2024
Cadmium	*	1.0		**< 1.0**	0.1340	0	0	-100	100	08/29/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	08/29/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/29/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	08/29/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/30/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/29/2024
Manganese		2.0		**< 2.0**	0.7500	0	0	-100	100	08/29/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	08/29/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/30/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	08/29/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	08/29/2024

Batch 227725 **SampType:** LCS Units **µg/L**
SampID: LCS-227725

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**1950**	2000	0	97.7	80	120	09/04/2024
Antimony		1.0	B	**560**	500.0	0	112.0	80	120	08/29/2024
Boron		25.0		**569**	500.0	0	113.8	80	120	08/30/2024
Cadmium	*	1.0		**47.1**	50.00	0	94.2	80	120	08/29/2024
Chromium		1.5		**195**	200.0	0	97.7	80	120	08/29/2024
Cobalt		1.0		**492**	500.0	0	98.4	80	120	08/29/2024
Copper	*	1.0		**236**	250.0	0	94.5	80	120	08/29/2024
Iron		25.0		**2140**	2000	0	107.0	80	120	08/30/2024
Lead		1.0		**473**	500.0	0	94.6	80	120	08/29/2024
Manganese		2.0		**536**	500.0	0	107.1	80	120	08/29/2024
Nickel		1.0		**477**	500.0	0	95.4	80	120	08/29/2024
Thallium		2.0		**271**	250.0	0	108.4	80	120	08/30/2024
Vanadium		5.0		**499**	500.0	0	99.8	80	120	08/29/2024
Zinc		15.0		**497**	500.0	0	99.5	80	120	08/29/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 227726 **SampType:** MBLK Units µg/L

SampID: MBLK-227726

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic		1.0		**< 1.0**	0.3750	0	0	-100	100	08/29/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/30/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	09/04/2024
Cobalt		1.0		**< 1.0**	0.1150	0	0	-100	100	08/29/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	08/30/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	08/29/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	08/30/2024

Batch 227726 **SampType:** LCS Units µg/L

SampID: LCS-227726

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2110**	2000	0	105.5	80	120	09/03/2024
Antimony		1.0		**536**	500.0	0	107.3	80	120	09/03/2024
Arsenic		1.0		**542**	500.0	0	108.5	80	120	08/29/2024
Boron		25.0		**510**	500.0	0	102.0	80	120	09/04/2024
Cobalt		1.0		**477**	500.0	0	95.5	80	120	08/29/2024
Iron		25.0		**2050**	2000	0	102.7	80	120	09/03/2024
Lead		1.0		**483**	500.0	0	96.6	80	120	08/29/2024
Thallium		2.0		**222**	250.0	0	88.7	80	120	09/03/2024

Batch 227779 **SampType:** MBLK Units µg/L

SampID: MBLK-227779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	09/03/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	09/03/2024

Batch 227779 **SampType:** LCS Units µg/L

SampID: LCS-227779

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead		1.0		**529**	500.0	0	105.7	80	120	09/03/2024
Zinc		15.0		**507**	500.0	0	101.5	80	120	09/03/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

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

Batch 227783 **SampType:** MBLK Units **µg/L**

SampID: MBLK-227783

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**< 25.0**	12.50	0	0	-100	100	09/03/2024
Antimony		1.0		**< 1.0**	0.4500	0	0	-100	100	09/05/2024
Antimony		1.0	S	**1.0**	0.4500	0	224.5	-100	100	09/03/2024
Boron		25.0		**< 25.0**	9.250	0	0	-100	100	08/30/2024
Chromium		1.5		**< 1.5**	0.7000	0	0	-100	100	09/03/2024
Copper	*	1.0		**< 1.0**	0.2980	0	0	-100	100	09/03/2024
Iron		25.0		**< 25.0**	11.50	0	0	-100	100	09/03/2024
Lead		1.0		**< 1.0**	0.6000	0	0	-100	100	09/03/2024
Nickel		1.0		**< 1.0**	0.4300	0	0	-100	100	09/03/2024
Thallium		2.0		**< 2.0**	0.9500	0	0	-100	100	09/03/2024
Vanadium		5.0		**< 5.0**	5.000	0	0	-100	100	09/03/2024
Zinc		15.0		**< 15.0**	5.900	0	0	-100	100	09/03/2024

Batch 227783 **SampType:** LCS Units **µg/L**

SampID: LCS-227783

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Aluminum		25.0		**2090**	2000	0	104.6	80	120	09/03/2024
Antimony		1.0	B	**508**	500.0	0	101.6	80	120	09/03/2024
Boron		25.0		**455**	500.0	0	91.0	80	120	08/30/2024
Chromium		1.5		**203**	200.0	0	101.4	80	120	09/03/2024
Copper	*	1.0		**252**	250.0	0	100.9	80	120	09/03/2024
Iron		25.0		**1970**	2000	0	98.7	80	120	09/03/2024
Lead		1.0		**499**	500.0	0	99.8	80	120	09/03/2024
Nickel		1.0		**500**	500.0	0	100.0	80	120	09/03/2024
Thallium		2.0		**242**	250.0	0	96.7	80	120	09/03/2024
Vanadium		5.0		**511**	500.0	0	102.3	80	120	09/03/2024
Zinc		15.0		**476**	500.0	0	95.2	80	120	09/03/2024

SW-846 7470A (DISSOLVED)

Batch 226496 **SampType:** MS Units **µg/L**

SampID: 24071451-028DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.08**	5.000	0	101.5	75	125	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (DISSOLVED)

Batch 226496 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24071451-028DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.86**	5.000	0	97.1	5.076	4.43	08/02/2024

Batch 226793 **SampType:** MS Units µg/L

SampID: 24080359-001CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.07**	5.000	0	101.4	75	125	08/08/2024

Batch 226793 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24080359-001CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.00**	5.000	0	100.0	5.069	1.39	08/08/2024

Batch 226812 **SampType:** MS Units µg/L

SampID: 24071451-009CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.90**	5.000	0	98.0	75	125	08/08/2024

Batch 226812 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24071451-009CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.02**	5.000	0	100.3	4.901	2.32	08/08/2024

Batch 226813 **SampType:** MS Units µg/L

SampID: 24071451-102DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.16**	5.000	0	83.3	75	125	08/08/2024

Batch 226813 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24071451-102DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.15**	5.000	0	83.1	4.164	0.27	08/08/2024

Batch 226964 **SampType:** MS Units µg/L

SampID: 24071451-100DMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.76**	5.000	0	95.2	75	125	08/13/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (DISSOLVED)

Batch 226964 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24071451-100DMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.78**	5.000	0	95.5	4.760	0.34	08/13/2024

SW-846 7470A (TOTAL)

Batch 226496 **SampType:** MBLK Units µg/L

SampID: MBLK-226496

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/02/2024

Batch 226496 **SampType:** LCS Units µg/L

SampID: LCS-226496

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.32**	5.000	0	106.5	85	115	08/02/2024

Batch 226496 **SampType:** MS Units µg/L

SampID: 24071451-048CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.99**	5.000	0	99.8	75	125	08/02/2024

Batch 226496 **SampType:** MSD Units µg/L RPD Limit 15

SampID: 24071451-048CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.07**	5.000	0	101.4	4.992	1.52	08/02/2024

Batch 226518 **SampType:** MBLK Units µg/L

SampID: MBLK-226518

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/02/2024

Batch 226518 **SampType:** LCS Units µg/L

SampID: LCS-226518

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.75**	5.000	0	95.0	85	115	08/02/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (TOTAL)

Batch 226541 **SampType:** MS Units µg/L
SampID: 24071451-046CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.52**	5.000	0	110.4	75	125	08/05/2024

Batch 226541 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-046CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.43**	5.000	0	108.7	5.522	1.63	08/05/2024

Batch 226541 **SampType:** MS Units µg/L
SampID: 24071451-072BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.34**	5.000	0	106.9	75	125	08/05/2024

Batch 226541 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-072BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.28**	5.000	0	105.7	5.344	1.14	08/05/2024

Batch 226645 **SampType:** MBLK Units µg/L
SampID: MBLK-226645

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/06/2024

Batch 226645 **SampType:** LCS Units µg/L
SampID: LCS-226645

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.78**	5.000	0	95.6	85	115	08/06/2024

Batch 226645 **SampType:** MS Units µg/L
SampID: 24071451-054CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20	S	**1.41**	5.000	0	28.1	75	125	08/06/2024

Batch 226645 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-054CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20	S	**1.22**	5.000	0	24.4	1.406	14.03	08/06/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (TOTAL)

Batch 226758 **SampType:** MBLK Units µg/L
SampID: MBLK-226758

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/07/2024

Batch 226758 **SampType:** LCS Units µg/L
SampID: LCS-226758

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.97**	5.000	0	99.4	85	115	08/07/2024

Batch 226758 **SampType:** MS Units µg/L
SampID: 24071451-073BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.45**	5.000	0	88.9	75	125	08/07/2024

Batch 226758 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-073BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.32**	5.000	0	86.5	4.445	2.77	08/07/2024

Batch 226762 **SampType:** MBLK Units µg/L
SampID: MBLK-226762

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/07/2024

Batch 226762 **SampType:** LCS Units µg/L
SampID: LCS-226762

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.43**	5.000	0	88.7	85	115	08/07/2024

Batch 226762 **SampType:** MS Units µg/L
SampID: 24071451-025CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.20**	5.000	0	104.1	75	125	08/08/2024

Batch 226762 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-025CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.17**	5.000	0	103.4	5.203	0.64	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (TOTAL)

Batch 226762 **SampType:** MS Units µg/L
SampID: 24071451-034CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.38**	5.000	0	107.5	75	125	08/08/2024

Batch 226762 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-034CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.43**	5.000	0	108.6	5.376	0.98	08/08/2024

Batch 226776 **SampType:** MBLK Units µg/L
SampID: MBLK-226776

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/08/2024

Batch 226776 **SampType:** LCS Units µg/L
SampID: LCS-226776

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.31**	5.000	0	106.2	85	115	08/08/2024

Batch 226776 **SampType:** MS Units µg/L
SampID: 24071451-036CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.13**	5.000	0	102.6	75	125	08/08/2024

Batch 226776 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-036CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.25**	5.000	0	105.1	5.132	2.33	08/08/2024

Batch 226776 **SampType:** MS Units µg/L
SampID: 24071451-067BMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.88**	5.000	0	97.6	75	125	08/08/2024

Batch 226776 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-067BMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.84**	5.000	0	96.7	4.879	0.87	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (TOTAL)

Batch 226793 **SampType:** MBLK Units µg/L
SampID: MBLK-226793

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/08/2024

Batch 226793 **SampType:** LCS Units µg/L
SampID: LCS-226793

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.14**	5.000	0	102.8	85	115	08/08/2024

Batch 226793 **SampType:** MS Units µg/L
SampID: 24071451-008CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.25**	5.000	0	105.1	75	125	08/08/2024

Batch 226793 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-008CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.14**	5.000	0	102.7	5.253	2.23	08/08/2024

Batch 226812 **SampType:** MBLK Units µg/L
SampID: MBLK-226812

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/08/2024

Batch 226812 **SampType:** LCS Units µg/L
SampID: LCS-226812

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.77**	5.000	0	95.4	85	115	08/08/2024

Batch 226812 **SampType:** MS Units µg/L
SampID: 24071451-088CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**4.95**	5.000	0	98.9	75	125	08/08/2024

Batch 226812 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-088CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**4.88**	5.000	0	97.7	4.946	1.26	08/08/2024

Client: Ramboll **Work Order:** 24071451

Client Project: COF-24Q3 **Report Date:** 13-Sep-24

SW-846 7470A (TOTAL)

Batch 226813 **SampType:** MBLK Units µg/L
SampID: MBLK-226813

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/08/2024

Batch 226884 **SampType:** MBLK Units µg/L
SampID: MBLK-226884

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/12/2024

Batch 226884 **SampType:** LCS Units µg/L
SampID: LCS-226884

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.44**	5.000	0	108.8	85	115	08/12/2024

Batch 226884 **SampType:** MS Units µg/L
SampID: 24071451-044CMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.58**	5.000	0	111.6	75	125	08/13/2024

Batch 226884 **SampType:** MSD Units µg/L RPD Limit **15**
SampID: 24071451-044CMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Mercury		0.20		**5.44**	5.000	0	108.8	5.580	2.52	08/13/2024

Batch 226964 **SampType:** MBLK Units µg/L
SampID: MBLK-226964

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**< 0.20**	0.0550	0	0	-100	100	08/12/2024

Batch 226964 **SampType:** LCS Units µg/L
SampID: LCS-226964

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Mercury		0.20		**5.51**	5.000	0	110.2	85	115	08/12/2024

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll
Client Project: COF-24Q3

Work Order: 24071451
Report Date: 13-Sep-24

Carrier: Daniel Crump

Received By: AMD

Completed by: Amber Dilallo
On: 30-Jul-24

Reviewed by: Ellie Hopkins
On: 12-Aug-24

Pages to follow: Chain of custody 31 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 5.9
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

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

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

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

Samples were received on 7/30/24 at 1615 on ice/blue ice [5.9C - LTG#5]. Additional Nitric Acid (98584) was needed upon arrival at the laboratory for G277. pH strip #89660/96651. - amberdilallo - 7/30/2024 4:58:45 PM

Samples were received on 7/31/24 at 16:30 on ice [15.9C - LTG#5]. - pschultz - 8/1/2024 8:09:51 AM
pH strip #96651/89660. - pschultz - 8/1/2024 8:10:48 AM
Additional Nitric Acid (98584) preservative was needed for G219, G303, G313, G314, G314D, and G316 upon arrival at the laboratory. - pschultz - 8/1/2024 8:10:56 AM
Additional Sodium Hydroxide (95443) preservative was needed for G278 upon arrival at the laboratory. - pschultz - 8/1/2024 8:10:58 AM
Sample G278 was filtered for the dissolved parameters upon arrival at the laboratory. Unable to dissolve for the metals analyses because the container was already preserved. - pschultz - 8/1/2024 8:11:02 AM

Samples were received on 8/1/24 at 1558 on ice [14.3C - LTG#5]. pH strip #89660/96651. Additional Sodium Hydroxide (95443) was needed upon arrival at the laboratory for G153. Additional Nitric Acid (99172) was needed upon arrival at the laboratory for G402, G403 and G407. - amberdilallo - 8/1/2024 4:41:25 PM

Samples were received on 8/2/24 at 1310 on ice [11.3C - LTG#5]. Additional Sodium Hydroxide (95443) was needed upon arrival at the laboratory. pH strip #89660/96651. - amberdilallo - 8/2/2024 1:49:30 PM

Samples were received on 8/5/24 at 1708 on ice [18.5C - LTG#5]. Additional Sodium Hydroxide (95443) was needed upon arrival at the laboratory for G125. Additional Nitric Acid (99172) was needed upon arrival at the laboratory for G312. pH strip #89660/96651. - amberdilallo - 8/6/2024 8:40:05 AM

Receiving Check List

http://www.teklabinc.com/

Client: Ramboll

Client Project: COF-24Q3

Work Order: 24071451

Report Date: 13-Sep-24

Samples were received on 8/6/24 at 1500 on ice [8.7C - LTG#5]. pH strip #89660/96651. Preservation checks for O&G analysis are to be completed by the laboratory technician prior to analysis. - amberdilallo - 8/6/2024 3:45:00 PM

Samples were received on 8/7/24 at 1727 on ice [14.4C - LTG#5]. pH strip #89660/96651. Preservation checks for O&G analysis are to be completed by the laboratory technician prior to analysis. - amberdilallo - 8/8/2024 8:33:37 AM

Additional nitric acid (99472) was needed in G28S, L201, L202 and L203 upon arrival at the laboratory. - NO/ehopkins - 8/8/2024 8:48:50 AM

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AIR
OTHER	

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				5	2	1	1		1										X												24071451-017
2	G123	WT	G				5	2	1	1		1										X												24071451-018
3	G124	WT	G				5	2	1	1		1										X												24071451-019
4	G125	WT	G				6	2	1	2		1									X	X												24071451-020
5	G126	WT	G				5	2	1	1		1										X												24071451-021
6	G151	WT	G				4	2		1		1																			X			24071451-022
7	G152	WT	G				4	2		1		1																			X			24071451-023
8	G153	WT	G				4	2		1		1																			X			24071451-024
9	G154	WT	G				4	2		2		1																	X		X			24071451-025
10	G155	WT	G				4	2		1		1																			X			24071451-026
11	G200	WT	G				6	2	1	2		1							X		X				X					X				24071451-027
12	G206	WT	G	7-30-24	1337		6	2	1	2		1							X						X					X				24071451-028
13	G206D	WT	G	7-30-24	1306		2	1		1									X						X									24071451-029
14	G207	WT	G	7-30-24	1224		6	2	1	2		1																		X				24071451-030
15	G208	WT	G	7-30-24	1016		6	2	1	2		1																		X				24071451-031
16	G209	WT	G	7-30-24	1109		6	2	1	2		1							X						X					X				24071451-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q3 Rev 0	[illegible]	7-30	1615	[illegible]	7/30/24	1615	5.9	Y	N	Y
							1716.5			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

Added HNO3(98584) to G277 total. pH ✓ 9[illegible]/89[illegible]
DM 7/30/24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com
	Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G	7-28-24	1147		6	2	1	2		1																		X			24071451-033
2	G211	WT	G				6	2	1	2		1																		X			24071451-034
3	G212	WT	G				6	2	1	2		1							X						X					X			24071451-035
4	G213	WT	G				6	2	1	2		1							X						X					X			24071451-036
5	G214	WT	G				6	2	1	2		1																		X			24071451-037
6	G215	WT	G				6	2	1	2		1							X						X					X			24071451-038
7	G216	WT	G				6	2	1	2		1																		X			24071451-039
8	G217	WT	G				6	2	1	2		1							X						X					X			24071451-040
9	G218	WT	G				6	2	1	2		1							X						X					X			24071451-041
10	G219	WT	G				3	1		2																X							24071451-042
11	G220	WT	G				3	1		2																X							24071451-043
12	G270	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-044
13	G271	WT	G				6	2	1	2		1								X						X				X			24071451-045
14	G272	WT	G				6	2	1	2		1																		X			24071451-046
15	G273	WT	G				6	2	1	2		1								X						X				X			24071451-047
16	G274	WT	G	7-30	1351		6	2	1	2		1																		X			24071451-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[illegible]	7-30	1615	[illegible]	7/30/24	1615				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: [illegible]

SIGNATURE of SAMPLER: Justin Calp DATE Signed (MM/DD/YY): 7-30-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 763-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X				X				24071451-049
2	G275D	WT	G				2	1		1										X						X								24071451-050
3	G276	WT	G				6	2	1	2		1								X						X				X				24071451-051
4	G277	WT	G	7-30	1239		6	2	1	2		1								X						X				X				24071451-052
5	G278	WT	G				6	2	1	2		1																		X				24071451-053
6	G279	WT	G	7-30	1056		6	2	1	2		1								X						X			X	X				24071451-054
7	G280	WT	G	7-30	1150		6	2	1	2		1						X		X				X		X			X	X				24071451-055
8	G281	WT	G	7-30	1013		4	1		2		1					X	X					X	X					X					24071451-056
9	G283	WT	G				2	1		1										X						X								24071451-057
10	G284	WT	G				2	1		1										X						X								24071451-058
11	G285	WT	G				2	1		1										X						X								24071451-059
12	G301	WT	G				2	1		1							X						X											24071451-060
13	G302	WT	G				2	1		1							X						X											24071451-061
14	G303	WT	G				2	1		1							X						X											24071451-062
15	G305	WT	G				2	1		1							X						X											24071451-063
16	G306	WT	G				2	1		1							X						X											24071451-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[illegible]	7-30	1615	[illegible]	7/30/24	1615				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [illegible] DATE Signed (MM/DD/YY): 7-30-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																		X			24071451-033
2	G211	WT	G				6	2	1	2		1																		X			24071451-034
3	G212	WT	G				6	2	1	2		1							X						X					X			24071451-035
4	G213	WT	G				6	2	1	2		1							X						X					X			24071451-036
5	G214	WT	G				6	2	1	2		1																		X			24071451-037
6	G215	WT	G				6	2	1	2		1							X						X					X			24071451-038
7	G216	WT	G				6	2	1	2		1																		X			24071451-039
8	G217	WT	G				6	2	1	2		1							X						X					X			24071451-040
9	G218	WT	G	7-31	1003		6	2	1	2		1							X						X					X			24071451-041
10	G219	WT	G	7-31	1116		3	1		2																	X						24071451-042
11	G220	WT	G				3	1		2																	X						24071451-043
12	G270	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-044
13	G271	WT	G	7-31	1124		6	2	1	2		1								X						X				X			24071451-045
14	G272	WT	G	7-31	1043		6	2	1	2		1																		X			24071451-046
15	G273	WT	G	7-31	1002		6	2	1	2		1								X						X				X			24071451-047
16	G274	WT	G				6	2	1	2		1																		X			24071451-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q3 Rev 0	J. Colp	7-31	1630	[illegible]	7/31/24	1630	15.9	Y	N	Y
							LTCS			
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 7-31-24

pH J96651/89660

Added HNO_3 (98584) to G219, G303, G313, G314, G314D, G316

Added NaOH (95443) to G278 PS 811

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X				X				24071451-049
2	G275D	WT	G				2	1		1										X						X								24071451-050
3	G276	WT	G	7-31	1233		6	2	1	2		1								X						X				X				24071451-051
4	G277	WT	G				6	2	1	2		1								X						X				X				24071451-052
5	Filter in lab G278	WT	G	7-31	1359		6	2	1	2		1																		X				24071451-053
6	G279	WT	G				6	2	1	2		1								X						X			X	X				24071451-054
7	G280	WT	G				6	2	1	2		1						X		X				X		X			X	X				24071451-055
8	G281	WT	G				4	1		2		1					X	X					X	X					X					24071451-056
9	G283	WT	G				2	1		1										X						X								24071451-057
10	G284	WT	G				2	1		1										X						X								24071451-058
11	G285	WT	G				2	1		1										X						X								24071451-059
12	G301	WT	G				2	1		1							X						X											24071451-060
13	G302	WT	G				2	1		1							X						X											24071451-061
14	G303	WT	G	7.31.24	1349		2	1		1							X						X											24071451-062
15	G305	WT	G				2	1		1							X						X											24071451-063
16	G306	WT	G				2	1		1							X						X											24071451-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	J. Colp	7-31	1630	[illegible signature]	7/31/24	1630				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 7-31-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1							X						X											24071451-065
2	G307D	WT	G				2	1		1							X						X											24071451-066
3	G308	WT	G				2	1		1							X						X											24071451-067
4	G310	WT	G				2	1		1							X						X											24071451-068
5	G312	WT	G				2	1		1							X						X											24071451-069
6	G313	WT	G	7.31.24	1253		2	1		1							X						X											24071451-070
7	G314	WT	G	7.31.24	1148		2	1		1							X						X											24071451-071
8	G314D	WT	G	7.31.24	1052		2	1		1							X						X											24071451-072
9	G315	WT	G	7.31.24	1438		2	1		1							X						X											24071451-073
10	G316	WT	G	7.31.24	953		2	1		1							X						X											24071451-074
11	G401	WT	G				4	1		2	1							X						X					X					24071451-075
12	G402	WT	G				4	1		2	1							X						X					X					24071451-076
13	G403	WT	G				4	1		2	1							X						X					X					24071451-077
14	G404	WT	G	7-31	1219		4	1		2	1							X						X					X					24071451-078
15	G405	WT	G	7-31	1257		4	1		2	1							X						X					X					24071451-079
16	G406	WT	G				4	1		2	1							X						X					X					24071451-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
COF-24Q3 Rev 0	J Colp	7-31	1630	Gordon DeSalle	7/31/24	1630	

SAMPLE CONDITIONS	Y	N	
Temp in °C			
Received on Ice (Y/N)			
Custody Sealed Cooler (Y/N)			
Samples Intact (Y/N)			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 7-31-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				5	2	1	1		1										X												24071451-017
2	G123	WT	G				5	2	1	1		1										X												24071451-018
3	G124	WT	G				5	2	1	1		1										X												24071451-019
4	G125	WT	G				6	2	1	2		1									X	X												24071451-020
5	G126	WT	G				5	2	1	1		1										X												24071451-021
6	G151	WT	G	8-1	1148		4	2		1		1																			X			24071451-022
7	G152	WT	G				4	2		1		1																			X			24071451-023
8	G153	WT	G	8-1	1355		4	2		1		1																			X			24071451-024
9	G154	WT	G	8-1	1309		4	2		2		1																	X		X			24071451-025
10	G155	WT	G	8-1	1236		4	2		1		1																			X			24071451-026
11	G200	WT	G				6	2	1	2		1							X		X				X					X				24071451-027
12	G206	WT	G				6	2	1	2		1							X						X					X				24071451-028
13	G206D	WT	G				2	1		1									X						X									24071451-029
14	G207	WT	G				6	2	1	2		1																		X				24071451-030
15	G208	WT	G				6	2	1	2		1																		X				24071451-031
16	G209	WT	G				6	2	1	2		1							X						X					X				24071451-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS		
COF-24Q3 Rev 0	[signature]	8-1	1558	[signature]	8/1/24	1558	14.3	Y	Y
							UCS		

Added NaOH (95443) to G153.

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER:	Justin Cole
SIGNATURE of SAMPLER:	[signature]
DATE Signed (MM/DD/YY):	8-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

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	Coffeen, IL 62017
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Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

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Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																		X			24071451-033
2	G211	WT	G	8-1	948		6	2	1	2		1																		X			24071451-034
3	G212	WT	G	8-1	1020		6	2	1	2		1							X						X					X			24071451-035
4	G213	WT	G	8-1	1113		6	2	1	2		1							X						X					X			24071451-036
5	G214	WT	G				6	2	1	2		1																		X			24071451-037
6	G215	WT	G				6	2	1	2		1							X						X					X			24071451-038
7	G216	WT	G				6	2	1	2		1																		X			24071451-039
8	G217	WT	G				6	2	1	2		1							X						X					X			24071451-040
9	G218	WT	G				6	2	1	2		1							X						X					X			24071451-041
10	G219	WT	G				3	1		2																X							24071451-042
11	G220	WT	G				3	1		2																X							24071451-043
12	G270	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-044
13	G271	WT	G				6	2	1	2		1								X						X				X			24071451-045
14	G272	WT	G				6	2	1	2		1																		X			24071451-046
15	G273	WT	G				6	2	1	2		1								X						X				X			24071451-047
16	G274	WT	G				6	2	1	2		1																		X			24071451-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-1	1557	[signature]	8/1/24	1558				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillman

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G	8-1	1228		6	2	1	2		1								X						X				X			24071451-049
2	G275D	WT	G	8-1	1214		2	1		1										X						X							24071451-050
3	G276	WT	G				6	2	1	2		1								X						X				X			24071451-051
4	G277	WT	G				6	2	1	2		1								X						X				X			24071451-052
5	G278	WT	G				6	2	1	2		1																		X			24071451-053
6	G279	WT	G				6	2	1	2		1								X						X			X	X			24071451-054
7	G280	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-055
8	G281	WT	G				4	1		2		1					X	X					X	X					X				24071451-056
9	G283	WT	G				2	1		1										X						X							24071451-057
10	G284	WT	G				2	1		1										X						X							24071451-058
11	G285	WT	G				2	1		1										X						X							24071451-059
12	G301	WT	G				2	1		1							X						X										24071451-060
13	G302	WT	G				2	1		1							X						X										24071451-061
14	G303	WT	G				2	1		1							X						X										24071451-062
15	G305	WT	G	8.1.24	1028		2	1		1							X						X										24071451-063
16	G306	WT	G	8.1.24	944		2	1		1							X						X										24071451-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-1	1558	[signature]	8/1/24	1558				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Brett Gillman

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-1-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106761-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G	8.1.24	1213		2	1		1							X						X											24071451-065
2	G307D	WT	G	8.1.24	1141		2	1		1							X						X											24071451-066
3	G308	WT	G	8.1.24	1251		2	1		1							X						X											24071451-067
4	G310	WT	G	8.1.24	1347		2	1		1							X						X											24071451-068
5	G312	WT	G				2	1		1							X						X											24071451-069
6	G313	WT	G				2	1		1							X						X											24071451-070
7	G314	WT	G				2	1		1							X						X											24071451-071
8	G314D	WT	G				2	1		1							X						X											24071451-072
9	G315	WT	G				2	1		1							X						X											24071451-073
10	G316	WT	G				2	1		1							X						X											24071451-074
11	G401	WT	G				4	1		2		1						X						X					X					24071451-075
12	G402	WT	G	8-1	1416		4	1		2		1						X						X					X					24071451-076
13	G403	WT	G	8-1	0916		4	1		2		1						X						X					X					24071451-077
14	G404	WT	G				4	1		2		1						X						X					X					24071451-078
15	G405	WT	G				4	1		2		1						X						X					X					24071451-079
16	G406	WT	G	8-1	1000		4	1		2		1						X						X					X					24071451-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-1	1958	[signature]	8/1/24	1558				

SAMPLER NAME AND SIGNATURE			
PRINT Name of SAMPLER:	Justin Cole		
SIGNATURE of SAMPLER:	[signature]	DATE Signed (MM/DD/YY):	8-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 759-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AIR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G	8-1	1051		4	1		2		1						X						X					X				24071451-081
2	G410	WT	G				4	1		2		1																	X				24071451-082
3	G411	WT	G				4	1		2		1																	X				24071451-083
4	L201	WT	G				2	1		1											X												24071451-084
5	L202	WT	G				2	1		1											X												24071451-085
6	L203	WT	G				2	1		1											X												24071451-086
7	NE Riser	WT	G				2	1		1									X						X								24071451-087
8	R104	WT	G				7	2	2	2		1										X								X			24071451-088
9	R201	WT	G				6	2	1	2		1							X		X				X					X			24071451-089
10	R205	WT	G				6	2	1	2		1																		X			24071451-090
11	SG-02	WT	G				0										X	X					X	X									24071451-091
12	SG-03	WT	G				0										X	X					X	X									24071451-092
13	T127	WT	G				6	2	1	2		1									X	X											24071451-093
14	T128	WT	G				5	2	1	1		1										X											24071451-094
15	X201	WT	G				2	1		1										X						X							24071451-095
16	XSG-01	WT	G				0										X						X										24071451-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-1	1558	[signature]	8/1/24	1558				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cold

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-1-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AIR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1								X						X									24071451-001
2	G1001	WT	G	8-2	1026		2	1		1								X						X									24071451-002
3	G1003	WT	G				2	1		1								X						X				X					24071451-003
4	G101	WT	G				5	2	1	1		1										X											24071451-004
5	G102	WT	G				7	2	2	2		1									X	X								X			24071451-005
6	G103	WT	G				7	2	2	2		1										X								X			24071451-006
7	G105	WT	G				7	2	2	2		1										X								X			24071451-007
8	G106	WT	G				7	2	2	2		1									X	X								X			24071451-008
9	G107	WT	G				5	2	1	1		1										X											24071451-009
10	G108	WT	G				5	2	1	1		1										X											24071451-010
11	G109	WT	G				5	2	1	1		1										X											24071451-011
12	G110	WT	G				6	2	1	2		1									X	X											24071451-012
13	G111	WT	G				5	2	1	1		1										X											24071451-013
14	G119	WT	G				5	2	1	1		1										X											24071451-014
15	G120	WT	G				6	2	1	2		1									X	X											24071451-015
16	G121	WT	G				5	2	1	1		1										X											24071451-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[illegible]	8-2	1310	[signature]	8/2/24	1310				
								X		

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-2-24

Temp in °C: 11.3 LTG5

Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

PH-√ 96651/89660
added NaOH (95443)
to G401

LH 8/2/24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1							X						X											24071451-065
2	G307D	WT	G				2	1		1							X						X											24071451-066
3	G308	WT	G				2	1		1							X						X											24071451-067
4	G310	WT	G				2	1		1							X						X											24071451-068
5	G312	WT	G				2	1		1							X						X											24071451-069
6	G313	WT	G				2	1		1							X						X											24071451-070
7	G314	WT	G				2	1		1							X						X											24071451-071
8	G314D	WT	G				2	1		1							X						X											24071451-072
9	G315	WT	G				2	1		1							X						X											24071451-073
10	G316	WT	G				2	1		1							X						X											24071451-074
11	G401	WT	G	8-2	0924		4	1		2		1						X						X					X					24071451-075
12	G402	WT	G				4	1		2		1						X						X					X					24071451-076
13	G403	WT	G				4	1		2		1						X						X					X					24071451-077
14	G404	WT	G				4	1		2		1						X						X					X					24071451-078
15	G405	WT	G				4	1		2		1						X						X					X					24071451-079
16	G406	WT	G				4	1		2		1						X						X					X					24071451-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	J. Colp	8-2	1300	[illegible]	8/2/24	1310				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [illegible]

DATE Signed (MM/DD/YY): 8-2-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X					X				24071451-081
2	G410	WT	G	8-2-24	0912		4	1		2		1																	X				24071451-082
3	G411	WT	G	8-2-24	1002		4	1		2		1																	X				24071451-083
4	L201	WT	G				2	1		1											X												24071451-084
5	L202	WT	G				2	1		1											X												24071451-085
6	L203	WT	G				2	1		1											X												24071451-086
7	NE Riser	WT	G				2	1		1									X						X								24071451-087
8	R104	WT	G				7	2	2	2		1										X								X			24071451-088
9	R201	WT	G				6	2	1	2		1							X		X				X					X			24071451-089
10	R205	WT	G				6	2	1	2		1																		X			24071451-090
11	SG-02	WT	G				0										X	X					X	X									24071451-091
12	SG-03	WT	G				0										X	X					X	X									24071451-092
13	T127	WT	G				6	2	1	2		1									X	X											24071451-093
14	T128	WT	G				5	2	1	1		1										X											24071451-094
15	X201	WT	G				2	1		1										X						X							24071451-095
16	XSG-01	WT	G				0										X						X										24071451-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	J. Colp	8-2	1310	[signature]	8/2/24	1310				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-2-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speranao: Rich.Speranao@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes:

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Preservatives; Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1								X						X									24071451-001
2	G1001	WT	G				2	1		1								X						X									24071451-002
3	G1003	WT	G				2	1		1								X						X				X					24071451-003
4	G101	WT	G	8-5-24	1437		5	2	1	1		1										X											24071451-004
5	G102	WT	G				7	2	2	2		1									X	X								X			24071451-005
6	G103	WT	G				7	2	2	2		1										X								X			24071451-006
7	G105	WT	G				7	2	2	2		1										X								X			24071451-007
8	G106	WT	G				7	2	2	2		1									X	X								X			24071451-008
9	G107	WT	G				5	2	1	1		1										X											24071451-009
10	G108	WT	G	8-5-24	0931		5	2	1	1		1										X											24071451-010
11	G109	WT	G	8-5-24	0951		5	2	1	1		1										X											24071451-011
12	G110	WT	G	8-5	1004		6	2	1	2		1									X	X											24071451-012
13	G111	WT	G	8-5	1028		5	2	1	1		1										X											24071451-013
14	G119	WT	G	8-5	1215		5	2	1	1		1										X											24071451-014
15	G120	WT	G	8-5	1242		6	2	1	2		1									X	X											24071451-015
16	G121	WT	G	8-5	1258		5	2	1	1		1										X											24071451-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q3 Rev 0		8-5	1708		8/5/24	1708

SAMPLE CONDITIONS

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
18.5	Y	N	
UG5 on ice			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 8-5-24

Added NaOH(95443) to G125. Added HNO3(99172) to G312. pH ✓ 89ceeo/9ceeo57. Am 8/6/24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911 Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G	8-5	1313		5	2	1	1		1										X												24071451-017
2	G123	WT	G				5	2	1	1		1										X												24071451-018
3	G124	WT	G	8-5	1358		5	2	1	1		1										X												24071451-019
4	G125	WT	G	8-5	1410		6	2	1	2		1									X	X												24071451-020
5	G126	WT	G	8-5	1045		5	2	1	1		1										X												24071451-021
6	G151	WT	G				4	2		1		1																			X			24071451-022
7	G152	WT	G	8/5/24	1516		4	2		1		1																			X			24071451-023
8	G153	WT	G				4	2		1		1																			X			24071451-024
9	G154	WT	G				4	2		2		1																	X		X			24071451-025
10	G155	WT	G				4	2		1		1																			X			24071451-026
11	G200	WT	G				8	2	1	2		1							X		X				X					X				24071451-027
12	G206	WT	G				8	2	1	2		1							X						X					X				24071451-028
13	G206D	WT	G				2	1		1									X						X									24071451-029
14	G207	WT	G				6	2	1	2		1																		X				24071451-030
15	G208	WT	G				6	2	1	2		1																		X				24071451-031
16	G209	WT	G				6	2	1	2		1							X						X					X				24071451-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-5	1708	[signature]	8/5/24	1708				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cop

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-5-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX: DRINKING WATER DW, WATER WT, WASTE WATER WW, PRODUCT P, SOIL/SOLID SL, OIL OL, WIPE WP, AIR AR, OTHER	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275		WT	G				6	2	1	2		1								X						X				X			24071451-049
2	G275D		WT	G				2	1		1										X						X							24071451-050
3	G276		WT	G				6	2	1	2		1								X						X				X			24071451-051
4	G277		WT	G				6	2	1	2		1								X						X				X			24071451-052
5	G278		WT	G				6	2	1	2		1																		X			24071451-053
6	G279		WT	G				6	2	1	2		1								X						X			X	X			24071451-054
7	G280		WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-055
8	G281		WT	G				4	1		2		1					X	X					X	X					X				24071451-056
9	G283		WT	G				2	1		1										X						X							24071451-057
10	G284		WT	G				2	1		1										X						X							24071451-058
11	G285		WT	G				2	1		1										X						X							24071451-059
12	G301		WT	G	8/5/24	1036		2	1		1							X						X										24071451-060
13	G302		WT	G	8/5	TETZSSIUB		2	1		1							X						X										24071451-061
14	G303		WT	G				2	1		1							X						X										24071451-062
15	G305		WT	G				2	1		1							X						X										24071451-063
16	G306		WT	G				2	1		1							X						X										24071451-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8/5/24	1708	[signature]	8/5/24	1708				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carret

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8/5/2

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AIR; OTHER

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G307	WT	G				2	1		1							X						X											24071451-065
2	G307D	WT	G				2	1		1							X						X											24071451-066
3	G308	WT	G				2	1		1							X						X											24071451-067
4	G310	WT	G				2	1		1							X						X											24071451-068
5	G312	WT	G	8/5	1255		2	1		1							X						X											24071451-069
6	G313	WT	G				2	1		1							X						X											24071451-070
7	G314	WT	G				2	1		1							X						X											24071451-071
8	G314D	WT	G				2	1		1							X						X											24071451-072
9	G315	WT	G				2	1		1							X						X											24071451-073
10	G316	WT	G				2	1		1							X						X											24071451-074
11	G401	WT	G				4	1		2		1						X						X					X					24071451-075
12	G402	WT	G				4	1		2		1						X						X					X					24071451-076
13	G403	WT	G				4	1		2		1						X						X					X					24071451-077
14	G404	WT	G				4	1		2		1						X						X					X					24071451-078
15	G405	WT	G				4	1		2		1						X						X					X					24071451-079
16	G406	WT	G				4	1		2		1						X						X					X					24071451-080

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8/5/24	1708	[signature]	8/5/24	1708				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carrel

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8/5/24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X					X				24071451-081
2	G410	WT	G				4	1		2		1																	X				24071451-082
3	G411	WT	G				4	1		2		1																	X				24071451-083
4	L201	WT	G				2	1		1											X												24071451-084
5	L202	WT	G				2	1		1											X												24071451-085
6	L203	WT	G				2	1		1											X												24071451-086
7	NE Riser	WT	G				2	1		1									X						X								24071451-087
8	R104	WT	G				7	2	2	2		1										X								X			24071451-088
9	R201	WT	G				6	2	1	2		1							X		X				X					X			24071451-089
10	R205	WT	G				6	2	1	2		1																		X			24071451-090
11	SG-02	WT	G				0										X	X					X	X									24071451-091
12	SG-03	WT	G				0										X	X					X	X									24071451-092
13	T127	WT	G	8-5	1128		6	2	1	2		1									X	X											24071451-093
14	T128	WT	G	8-5	1149		5	2	1	1		1										X											24071451-094
15	X201	WT	G				2	1		1										X						X							24071451-095
16	XSG-01	WT	G				0										X						X										24071451-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-5	1708	[signature]	8/5/24	1708				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Cole

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-5-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G				7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-097
2	G102 Duplicate	WT	G				7	2	2	2		1									X	X								X			24071451-098
3	G200 Duplicate	WT	G				6	2	1	2		1							X		X				X					X			24071451-099
4	G217 Duplicate	WT	G				6	2	1	2		1							X						X					X			24071451-100
5	G301 Duplicate	WT	G	8/5/24	1036		2	1		1							X						X										24071451-101
6	R201 Duplicate	WT	G				6	2	1	2		1							X		X				X					X			24071451-102
7	Equipment Blank 1	WT	G				7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-103
8																																	
9																																	
10																																	
11																																	
12																																	
13																																	
14																																	
15																																	
16																																	

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0		8/5/24	1708		8/5/24	1708				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: Tracy Carroll — DATE Signed (MM/DD/YY): 8/5/24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24071451

CHAIN-OF-CUSTODY / Analytical Request Document

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Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

Matrix Codes (see valid codes to left); Sample Type (G=GRAB C=COMP)

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G				2	1		1								X						X									24071451-001
2	G1001	WT	G				2	1		1								X						X									24071451-002
3	G1003	WT	G				2	1		1								X						X				X					24071451-003
4	G101	WT	G				5	2	1	1		1										X											24071451-004
5	G102	WT	G	8-6	0913		7	2	2	2		1									X	X								X			24071451-005
6	G103	WT	G	8-6	1014		7	2	2	2		1										X								X			24071451-006
7	G105	WT	G	8-6	1101		7	2	2	2		1										X								X			24071451-007
8	G106	WT	G	8-6	1122		7	2	2	2		1									X	X								X			24071451-008
9	G107	WT	G	8-6	1144		5	2	1	1		1										X											24071451-009
10	G108	WT	G				5	2	1	1		1										X											24071451-010
11	G109	WT	G				5	2	1	1		1										X											24071451-011
12	G110	WT	G				6	2	1	2		1									X	X											24071451-012
13	G111	WT	G	8-6	0945		5	2	1	1		1										X											24071451-013
14	G119	WT	G				5	2	1	1		1										X											24071451-014
15	G120	WT	G				6	2	1	2		1									X	X											24071451-015
16	G121	WT	G				5	2	1	1		1										X											24071451-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	Z	
COF-24Q3 Rev 0	[signature]	8-6	1500	[signature]	8/6/24	1500	8.7			
							LTCJ			

	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Culp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-6-24

pH ✓ 8/6/24 | 8/6/24
LMD 8/6/24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

Valid Matrix Codes

MATRIX	
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				5	2	1	1		1										X												24071451-017
2	G123	WT	G				5	2	1	1		1										X												24071451-018
3	G124	WT	G				5	2	1	1		1										X												24071451-019
4	G125	WT	G				6	2	1	2		1									X	X												24071451-020
5	G126	WT	G				5	2	1	1		1										X												24071451-021
6	G151	WT	G				4	2		1		1																			X			24071451-022
7	G152	WT	G				4	2		1		1																			X			24071451-023
8	G153	WT	G				4	2		1		1																			X			24071451-024
9	G154	WT	G				4	2		2		1																	X		X			24071451-025
10	G155	WT	G				4	2		1		1																			X			24071451-026
11	G200	WT	G	8-6	1216		6	2	1	2		1							X		X				X					X				24071451-027
12	G206	WT	G				6	2	1	2		1							X						X					X				24071451-028
13	G206D	WT	G				2	1		1									X						X									24071451-029
14	G207	WT	G				6	2	1	2		1																		X				24071451-030
15	G208	WT	G				6	2	1	2		1																		X				24071451-031
16	G209	WT	G				6	2	1	2		1							X						X					X				24071451-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-6	1500	[signature]	8/6/24	1500				

SAMPLER NAME AND SIGNATURE			
PRINT Name of SAMPLER:	Justin Lolp		
SIGNATURE of SAMPLER:	[signature]	DATE Signed (MM/DD/YY):	8-6-24

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																		X			24071451-033
2	G211	WT	G				6	2	1	2		1																		X			24071451-034
3	G212	WT	G				6	2	1	2		1							X						X					X			24071451-035
4	G213	WT	G				6	2	1	2		1							X						X					X			24071451-036
5	G214	WT	G	8.6.24	1218		6	2	1	2		1																		X			24071451-037
6	G215	WT	G	8.6.24	1119		6	2	1	2		1							X						X					X			24071451-038
7	G216	WT	G	8.6.24	1037		6	2	1	2		1																		X			24071451-039
8	G217	WT	G	8.6.24	939		6	2	1	2		1							X						X					X			24071451-040
9	G218	WT	G				6	2	1	2		1							X						X					X			24071451-041
10	G219	WT	G				3	1		2																X							24071451-042
11	G220	WT	G				3	1		2																X							24071451-043
12	G270	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-044
13	G271	WT	G				6	2	1	2		1								X						X				X			24071451-045
14	G272	WT	G				6	2	1	2		1																		X			24071451-046
15	G273	WT	G				6	2	1	2		1								X						X				X			24071451-047
16	G274	WT	G				6	2	1	2		1																		X			24071451-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-6	1500	[signature]	8/6/24	1500				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: Tracy Carroll

DATE Signed (MM/DD/YY): 8.6.24

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X					X				24071451-081
2	G410	WT	G				4	1		2		1																	X				24071451-082
3	G411	WT	G				4	1		2		1																	X				24071451-083
4	L201	WT	G				2	1		1											X												24071451-084
5	L202	WT	G				2	1		1											X												24071451-085
6	L203	WT	G				2	1		1											X												24071451-086
7	NE Riser	WT	G				2	1		1									X						X								24071451-087
8	R104	WT	G	8-6	1037		7	2	2	2		1										X								X			24071451-088
9	R201	WT	G	8-6	1304		6	2	1	2		1							X		X				X					X			24071451-089
10	R205	WT	G	8.6.24	1306		6	2	1	2		1																		X			24071451-090
11	SG-02	WT	G				0										X	X					X	X									24071451-091
12	SG-03	WT	G				0										X	X					X	X									24071451-092
13	T127	WT	G				8	2	1	2		1									X	X											24071451-093
14	T128	WT	G				5	2	1	1		1										X											24071451-094
15	X201	WT	G				2	1		1										X						X							24071451-095
16	XSG-01	WT	G				0										X						X										24071451-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8/6	1500	[signature]	8/6/24	1500				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Coy

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-6-24

24071451

CHAIN-OF-CUSTODY / Analytical Request Document

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Fax:	
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	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G				7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-097
2	G102 Duplicate	WT	G	8-6	0913		7	2	2	2		1									X	X								X			24071451-098
3	G200 Duplicate	WT	G	8-6	1216		6	2	1	2		1							X		X				X					X			24071451-099
4	G217 Duplicate	WT	G	8.6.24	939		6	2	1	2		1							X						X					X			24071451-100
5	G301 Duplicate	WT	G				2	1		1							X						X										24071451-101
6	R201 Duplicate	WT	G	8-6	1304		6	2	1	2		1							X		X				X					X			24071451-102
7	Equipment Blank 1	WT	G				7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-103
8																																		
9																																		
10																																		
11																																		
12																																		
13																																		
14																																		
15																																		
16																																		

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q3 Rev 0	[signature]	8-6	1500	[signature]	8/6/24	1500

SAMPLE CONDITIONS

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Y	N	

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Justin Colp

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8-6-24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	AP2D	WT	G	8.7.24	9:40		2	1		1								X						X									24071451-001
2	G1001	WT	G				2	1		1								X						X									24071451-002
3	G1003	WT	G				2	1		1								X						X				X					24071451-003
4	G101	WT	G				5	2	1	1		1										X											24071451-004
5	G102	WT	G				7	2	2	2		1									X	X								X			24071451-005
6	G103	WT	G				7	2	2	2		1										X								X			24071451-006
7	G105	WT	G				7	2	2	2		1										X								X			24071451-007
8	G106	WT	G				7	2	2	2		1									X	X								X			24071451-008
9	G107	WT	G				5	2	1	1		1										X											24071451-009
10	G108	WT	G				5	2	1	1		1										X											24071451-010
11	G109	WT	G				5	2	1	1		1										X											24071451-011
12	G110	WT	G				6	2	1	2		1									X	X											24071451-012
13	G111	WT	G				5	2	1	1		1										X											24071451-013
14	G119	WT	G				5	2	1	1		1										X											24071451-014
15	G120	WT	G				6	2	1	2		1									X	X											24071451-015
16	G121	WT	G				5	2	1	1		1										X											24071451-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
COF-24Q3 Rev 0	Tracy Carroll	8.7.24	1727	Samantha Davies	8/7/24	1727	LTGS	Y	N	
							14.4	Y		

SAMPLER NAME AND SIGNATURE			
PRINT Name of SAMPLER:	Tracy Carroll		
SIGNATURE of SAMPLER:	Tracy Carroll	DATE Signed (MM/DD/YY):	8.7.24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

W 9/6/24 / 8/9/24

Added HNO3 to G285, L201, L202, L203, (99472)

NO 8/8

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

ITEM #	Section B Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G122	WT	G				5	2	1	1		1										X											24071451-017
2	G123	WT	G	8.7.24	1532		5	2	1	1		1										X											24071451-018
3	G124	WT	G				5	2	1	1		1										X											24071451-019
4	G125	WT	G				6	2	1	2		1									X	X											24071451-020
5	G126	WT	G				5	2	1	1		1										X											24071451-021
6	G151	WT	G				4	2		1		1																			X		24071451-022
7	G152	WT	G				4	2		1		1																			X		24071451-023
8	G153	WT	G				4	2		1		1																			X		24071451-024
9	G154	WT	G				4	2		2		1																	X		X		24071451-025
10	G155	WT	G				4	2		1		1																			X		24071451-026
11	G200	WT	G				6	2	1	2		1							X		X				X					X			24071451-027
12	G206	WT	G				6	2	1	2		1							X						X					X			24071451-028
13	G206D	WT	G				2	1		1									X						X								24071451-029
14	G207	WT	G				6	2	1	2		1																	X				24071451-030
15	G208	WT	G				6	2	1	2		1																	X				24071451-031
16	G209	WT	G				6	2	1	2		1							X						X					X			24071451-032

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	Tran Carrell	8.7.24	1727	[illegible]	8/7/24	1727				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tran Carrell

SIGNATURE of SAMPLER: Tran Carrell DATE Signed (MM/DD/YY): 8.7.24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	Brian.Voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G210	WT	G				6	2	1	2		1																		X			24071451-033
2	G211	WT	G				6	2	1	2		1																		X			24071451-034
3	G212	WT	G				6	2	1	2		1							X						X					X			24071451-035
4	G213	WT	G				6	2	1	2		1							X						X					X			24071451-036
5	G214	WT	G				6	2	1	2		1																		X			24071451-037
6	G215	WT	G				6	2	1	2		1							X						X					X			24071451-038
7	G216	WT	G				6	2	1	2		1																		X			24071451-039
8	G217	WT	G				6	2	1	2		1							X						X					X			24071451-040
9	G218	WT	G				6	2	1	2		1							X						X					X			24071451-041
10	G219	WT	G				3	1		2																X							24071451-042
11	G220	WT	G	8.7.24	1303		3	1		2																X							24071451-043
12	G270	WT	G	8.7.24	1029		6	2	1	2		1						X		X				X		X			X	X			24071451-044
13	G271	WT	G				6	2	1	2		1								X						X				X			24071451-045
14	G272	WT	G				6	2	1	2		1																		X			24071451-046
15	G273	WT	G				6	2	1	2		1								X						X				X			24071451-047
16	G274	WT	G				6	2	1	2		1																		X			24071451-048

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	Tracy Carroll	8.7.24	1727	[illegible]	8/7/24	1727				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: Tracy Carroll DATE Signed (MM/DD/YY): 8.7.24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone:	(217) 753-8911
Fax:	
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G275	WT	G				6	2	1	2		1								X						X				X			24071451-049
2	G275D	WT	G				2	1		1										X						X							24071451-050
3	G276	WT	G				6	2	1	2		1								X						X				X			24071451-051
4	G277	WT	G				6	2	1	2		1								X						X				X			24071451-052
5	G278	WT	G				6	2	1	2		1																		X			24071451-053
6	G279	WT	G				6	2	1	2		1								X						X			X	X			24071451-054
7	G280	WT	G				6	2	1	2		1						X		X				X		X			X	X			24071451-055
8	G281	WT	G				4	1		2		1					X	X					X	X					X				24071451-056
9	G283	WT	G	8.7.24	1352		2	1		1										X						X							24071451-057
10	G284	WT	G	8.7.24	1125		2	1		1										X						X							24071451-058
11	G285	WT	G	8.7.24	1203		2	1		1										X						X							24071451-059
12	G301	WT	G				2	1		1							X						X										24071451-060
13	G302	WT	G				2	1		1							X						X										24071451-061
14	G303	WT	G				2	1		1							X						X										24071451-062
15	G305	WT	G				2	1		1							X						X										24071451-063
16	G306	WT	G				2	1		1							X						X										24071451-064

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	Tracy Carroll	8.7.24	1727	Sam Davies	8/7/24	1727				
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: Tracy Carroll DATE Signed (MM/DD/YY): 8.7.24

CHAIN-OF-CUSTODY / Analytical Request Document

24071451

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	Vistra Corp-Coffeen
Address:	134 CIPS Lane
	Coffeen, IL 62017
Email To:	brian.voelker@VistraCorp.com
Phone: (217) 753-8911	Fax:
Requested Due Date/TAT:	10 day

Section B Required Project Information:

Report To:	Brian Voelker
Copy To:	Sam Davies: samantha.davies@vistracorp.com
	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com
Purchase Order No.:	
Project Name:	COF 2024 GW
Project Number:	1940106781-003

Section C Invoice Information:

Attention:	Brian Voelker
Company Name:	Vistra Corp
Address:	see Section A
Quote Reference:	
Project Manager:	
Profile #:	

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	G407	WT	G				4	1		2		1						X						X					X				24071451-081
2	G410	WT	G				4	1		2		1																	X				24071451-082
3	G411	WT	G				4	1		2		1																	X				24071451-083
4	L201	WT	G	8.7.24	1415		2	1		1											X												24071451-084
5	L202	WT	G	8.7.24	1420		2	1		1											X												24071451-085
6	L203	WT	G	8.7.24	1420		2	1		1											X												24071451-086
7	NE Riser	WT	G	8.7.24	1435		2	1		1									X						X								24071451-087
8	R104	WT	G				7	2	2	2		1										X								X			24071451-088
9	R201	WT	G				6	2	1	2		1							X		X				X					X			24071451-089
10	R205	WT	G				6	2	1	2		1																		X			24071451-090
11	SG-02	WT	G				0										X	X					X	X									24071451-091
12	SG-03	WT	G				0										X	X					X	X									24071451-092
13	T127	WT	G				8	2	1	2		1									X	X											24071451-093
14	T128	WT	G				5	2	1	1		1										X											24071451-094
15	X201	WT	G	8.7.24	1445		2	1		1										X						X							24071451-095
16	XSG-01	WT	G				0										X						X										24071451-096

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
COF-24Q3 Rev 0	Tracy Carroll	8-7-24	1727	Urban Dillard	8/7/24	1727

SAMPLE CONDITIONS: Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: Tracy Carroll DATE Signed (MM/DD/YY): 8-7-24

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

24071451

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: Vistra Corp-Coffeen	Report To: Brian Voelker	Attention: Brian Voelker
Address: 134 CIPS Lane	Copy To: Sam Davies: samantha.davies@vistracorp.com	Company Name: Vistra Corp
Coffeen, IL 62017	John Romang: John.Romang@vistracorp.com Rich Speraneo: Rich.Speraneo@vistracorp.com	Address: see Section A
Email To: Brian.Voelker@VistraCorp.com	Purchase Order No.:	Quote Reference:
Phone: (217) 753-8911 Fax:	Project Name: COF 2024 GW	Project Manager:
Requested Due Date/TAT: 10 day	Project Number: 1940106781-003	Profile #:

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: IL

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

MATRIX: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED DATE	COLLECTED TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	COF-257-101	COF-257-102	COF-257-103	COF-257-104	COF-257-105	COF-811-105	COF-845-101	COF-845-102	COF-845-103	COF-845-104	COF-NE-103	COF-SUP-000	COF-WPCP-102	COF-WPCP-103-104	COF-WPCP-106	Residual Chlorine (Y/N)	Project No./ Lab I.D.
1	Field Blank	WT	G	8-7-24	1449		7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-097
2	G102 Duplicate	WT	G				7	2	2	2		1									X	X								X			24071451-098
3	G200 Duplicate	WT	G				6	2	1	2		1							X		X				X					X			24071451-099
4	G217 Duplicate	WT	G				6	2	1	2		1							X						X					X			24071451-100
5	G301 Duplicate	WT	G				2	1		1							X						X										24071451-101
6	R201 Duplicate	WT	G				6	2	1	2		1							X		X				X					X			24071451-102
7	Equipment Blank 1	WT	G				7	2	2	2		1					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		24071451-103
8																																	
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ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Y	N	
COF-24Q3 Rev 0	[signature]	8-7-24	1727	[signature]	8/7/24	1727	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tracy Carroll

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8.7.24

APPENDIX C
COFFEEN GMF STACK POND UPDATE TO THE GEOCHEMICAL CONCEPTUAL SITE MODEL (NATURE)

Geosyntec consultants

engineers | scientists | innovators

Geochemical Conceptual Site Model - Addendum

Coffeen Power Plant – Gypsum Management Facility Gypsum Stack Pond

(CCR Unit #103)

Prepared for

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June 2025

TABLE OF CONTENTS

1. INTRODUCTION 1

2. UPDATES TO THE GEOCHEMICAL CONCEPTUAL SITE MODEL 2
   2.1 Constituent Transport and Fate 2
   2.2 Solids Characterization 2
      2.2.1 Loss on Ignitions and Cation Exchange Capacity 3
      2.2.2 Sequential Extraction Procedure Analysis 3
      2.2.3 Mineralogical Analysis 4
   2.3 Aqueous Characterization 5
      2.3.1 Redox/pH Summary 5
      2.3.2 Exceedance Parameters 6
      2.3.3 Pourbaix Diagrams 6
      2.3.4 Total and Dissolved Iron and Manganese Concentrations 7
      2.3.5 Major Ion Distribution and Groundwater Signatures 7

3. EXTENSION AND MODIFICATION OF GEOCHEMICAL SITE CONDITIONS 9
   3.1 Source and Mobilization Mechanisms 9
   3.2 Potential and Observed Attenuation Mechanisms 9

4. REFERENCES 10

LIST OF FIGURES

Figure 1 Iron Pourbaix Diagram, Ferrihydrite – UA

Figure 2 Manganese Pourbaix Diagram – UA

Figure 3 Piper Diagram

LIST OF TABLES

Table 1 CEC and LOI of UA Solids

Table 2 SEP Analytical Results for Select Parameters

Table 3 XRD Analysis of UA Solids – Full Mineralogy

Table 4 XRD Analysis of UA Solids – Clay-sized Fraction Mineralogy

Table 5 Groundwater Sampling Results – Additional 2024 Data

Table 6 Eh-pH Diagram Inputs

LIST OF ATTACHMENTS

Attachment A: Site Layout

Attachment B: G219 and G220 Boring Logs

Attachment C: Aquifer Solids CEC Laboratory Analytical Data

Attachment D: Aquifer Solids SEP and LOI Laboratory Analytical Data

Attachment E: X-Ray Diffraction Analytical Data

ACRONYMS AND ABBREVIATIONS

CEC	cation exchange capacity
CCR	coal combustion residuals
COCs	constituents of concern
CPP	Coffeen Power Plant
GCSM	geochemical conceptual site model
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	groundwater protection standards
HSU	hydrostratigraphic unit
I.A.C.	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
LOI	loss on ignition
meq/100 g	milliequivalents per 100 grams
mg/L	milligrams per liter
N&E	nature and extent
ORP	oxidation-reduction potential
SEP	sequential extraction procedure
SU	standard units
TDS	total dissolved solids
UA	uppermost aquifer
XRD	X-Ray diffraction

1. INTRODUCTION

This report is an addendum to the geochemical conceptual site model (GCSM) to describe subsurface conditions at the Coffeen Power Plant (CPP) Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) coal combustion residuals (CCR) unit (Unit #103) with the results of an additional investigation to further characterize the site. The initial GCSM described the geochemical processes that contribute to the mobilization, distribution, and attenuation of chemicals in the environment. The initial GCSM was prepared as an appendix to the GMF GSP Nature and Extent (N&E) Report prepared by Ramboll Americas Engineering Solutions. Inc. (Ramboll) and submitted to the Illinois Environmental Protection Agency (IEPA) in June 2024 (Ramboll 2024). Subsequent to the N&E report submittal, an additional investigation was conducted to further characterize the site, including the following:

- Installation of the following monitoring wells within the uppermost aquifer (UA) hydrostratigraphic unit (HSU): G219 and G220;
- Collection of solids samples from two intervals at each well boring;
- Collection of groundwater samples from G219 and G220 in May, July, and October of 2024.

Exceedances of the groundwater protection standards (GWPS) addressed in the initial GCSM included sulfate at compliance well G215, exceeding the sulfate GWPS of 400 milligrams per liter (mg/L).[1] The additional monitoring wells G219 and G220 were installed downgradient of the GMF GSP and compliance well G215 to the east, with G220 located further downgradient than G219.

The N&E report described a previous sulfate exceedance within the GMF GSP UA at well G215. Exceedances reported in the UA since submittal of the N&E report include total dissolved solids (TDS) at well G215 and sulfate and TDS at well G217. Of the samples collected from G219 and G220 in 2024 to support supplemental investigation of the GSP, none exceeded the sulfate or TDS GWPS.

[1] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or groundwater protection standards (GWPSs) as described in the proposed groundwater monitoring program which was submitted to the IEPA in October 2021 as part of Illinois Power Resource Generating, LLC's operating permit application for the Coffeen Power Plant Gypsum Management Facility Gypsum Stack Pond. That operating permit application, including the proposed groundwater monitoring program, remains under review by the IEPA and therefore Illinois Power Resource Generating, LLC has not identified any actual exceedances.

2. UPDATES TO THE GEOCHEMICAL CONCEPTUAL SITE MODEL

The GMF GSP GCSM (Geosyntec 2024), which was submitted as Appendix B to the N&E Report (Ramboll 2024) provides an overview of the geochemical conditions at the GMF GSP. This addendum provides details on the additional investigation samples, and an interpretation of how these samples align with or modify the GCSM for the Site provided in the 2024 GCSM document. Specifically, this addendum discusses the aquifer solids characterization, redox status, and the constituents of concern (sulfate and TDS) for aqueous samples collected at monitoring locations outside of the proposed groundwater monitoring network during 2024 sampling events.

2.1 Constituent Transport and Fate

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

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

2.2 Solids Characterization

Additional solids were characterized from two intervals at G219 and G220 to determine the type and abundance of minerals present in the UA, their geochemical properties, and their effect on the geochemistry of the groundwater system. Solids were collected at the following locations:

- G219, located to the east of G217 and downgradient of the GMF GSP. Solids were collected from two intervals mostly within the screened interval (5 to 15 feet below ground surface [bgs]) of well G219, representative of the UA. One sample was collected from 9.5 to 10 feet bgs from a sandy silt interval, and another sample was collected as a composite sample from 11 to 20 feet bgs from a silty clay interval with some sand.

- G220, located to the east of G219 and downgradient of the GMF GSP. Solids were collected from two intervals within the screened interval (15 to 25 feet bgs) of well G220, representative of the UA. One sample was collected from 19.5 to 20 feet bgs from a sand interval, and another sample was collected as a composite sample from 21 to 25 feet bgs from a silty clay interval.

The monitoring well locations are shown on Attachment A. Boring logs for these locations are provided in Attachment B.

2.2.1 Loss on Ignitions and Cation Exchange Capacity

Loss on ignition (LOI) represents the combustible portions of a solid material and is often used as an approximation of organic matter in a sample. The cation exchange capacity (CEC) of a solid represents the total negative surface charge of that material, which is related to the material's surface potential to sorb cations. Amorphous iron hydroxides, organic matter, and clays all tend to possess high negative surface charges and therefore tend to contribute higher to CEC values. The CEC and LOI values for solids are presented in Table 1, laboratory analytical results for CEC values are provided as Attachment C, and LOI for solids samples is included as a component of Attachment D.

CEC values for the additional samples collected in 2024 ranged from 5.76 to 19.4 milliequivalents per 100 grams of solid (meq/100g), while LOI ranged from 12% to 16% (Table 1). CEC results confirm a greater ability of the silty clay within the UA to sorb aqueous cations compared to sandier intervals within the HSU. LOI results are similar in all four samples, suggesting that organic content does not differ notably based on lithology in the UA.

2.2.2 Sequential Extraction Procedure Analysis

Material from each of the four additional samples was submitted for sequential extraction procedure (SEP) for multiple analytes[2] to inform understanding of classes of solid phase which may interact with groundwater chemistry in preferential ways. SEPs use progressively stronger reagents to solubilize metals from increasingly recalcitrant phases. Although these procedures do not identify the discrete solid phases in a soil/aquifer matrix, they do provide a means to evaluate the class of solids and relative stability in relation to general solubility, changes in oxidation/reduction (redox) conditions, and pH fluctuations (Tessier et al. 1979, Kuo et al., 1983, Sposito et al., 1984, Hickey and Kittrick 1984, Gruebel et al., 1988). Therefore, SEP data are useful to infer the mechanism and potential reversibility of attenuation processes for individual analytes. The results of the 7-step extraction procedure and analysis are provided in Table 2 and are included as Attachment D.

[2]Analytes included in SEP analyses were aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, lithium, manganese, molybdenum, selenium, and thallium.

SEP results for common insoluble complex-forming metals (aluminum, iron, manganese) that largely control sulfate mobility via sorption are shown in Table 2.[3] Results for all four samples suggest that aluminum is associated primarily with the residual phase (83 to 88%), but the second most prevalent association is the sulfide fraction (10 to 14%). Iron within these samples is bound within multiple phases, most notably sulfides (37 to 44%), metal oxides (19 to 44%), residual metals (11 to 28%), and non-crystalline materials (1 to 14%). Manganese in these samples is most strongly associated with non-crystalline materials (9 to 46%) and metal oxides (33 to 41%), with lessor components associated with all other fractions.

These results support the conclusion of the initial GCSM that some degree of sulfate attenuation is expected to occur as a result of sorption to iron oxides and hydroxides. Notable components of total iron and manganese are associated with the oxide and non-crystalline fractions, suggesting that iron and manganese oxyhydroxides exist within UA soil at the GMF GSP. However, aluminum, iron, and manganese SEP results also indicated notable components associated with the sulfide fraction, suggesting the presence of metal sulfides as well as oxyhydroxides. Both material types constitute potential attenuation sites for sulfate; however, both are susceptible to dissolution with changing geochemical conditions, which would lead to subsequent mobilization of sorbed sulfate.

2.2.3 Mineralogical Analysis

X-Ray diffraction (XRD) was conducted for identification of minerals in solid samples. XRD is an analytical technique that provides information about the identity of the crystalline material within a sample but does not provide information about non-crystalline or amorphous phases. XRD results are normalized to 100% of the total sample weight, meaning that material not characterized by XRD is ignored in the percentage calculation. XRD was completed for the bulk material from each of the four samples (Table 3) as well as for the clay-sized fraction separated from the bulk material via wet-sieving of each sample (Table 4). Additional details regarding sample preparation for XRD analyses are provided in the laboratory analytical report provided as Attachment E.[4]

The 2024 solids samples were predominantly composed of quartz, ranging from 56.9 wt.% in the silty clay sample to 86.9 wt. % in the sand sample (Table 3, Attachment E). Dolomite is the second most abundant mineral in all samples except for the sand sample, with results up to 27.2 wt.% in the silty clay sample. Plagioclase feldspar (2.8 to 9.5 wt.%), K-feldspar (1.0 to 2.6 wt.%), mica (1.1 to 4.4 wt.%), chlorite/vermiculite (0.0 to 4.6 wt.%) kaolinite (0.0 to 0.9 wt.%) and calcite (0.0 to 3.0 wt.%) were reported as additional major crystalline phases. These results are generally consistent with the previously collected solid samples near the GMF GSP, which also indicated a

[3] Results from additional analytes are excluded from Table 2 and the associated discussion to emphasize findings relevant to sulfate behavior in groundwater.

[4] 2021 solids samples included in the GCSM were analyzed by SGS Minerals (Ontario, Canada), whereas 2024 solid samples were analyzed by Eurofins Built Environmental Testing (Pasadena, Texas).

majority component of quartz with a substantial carbonate (dolomite and calcite) component and additional feldspars and clays.

No crystalline forms of metal oxides or iron sulfides were detected in the additional solid samples. The previous XRD samples from the GMF GSP contained a component of iron-bearing carbonate mineral ankerite (4.3 to 5.2 wt.%), but this mineral was not detected in the 2024 samples. Iron-bearing mineralogy in the additional samples was limited to chlorite.

XRD analysis of the clay-sized fraction (<38 µm) was completed on all four 2024 samples (Table 4). Clay-sized fraction results indicate a dominant quartz component, as well as substantial dolomite. Results of these analyses are generally similar to the XRD results of the bulk samples, suggesting that clay minerals do not dominate the clay-sized fraction and are present in the GMF GSP UA in limited abundances, primarily as chlorite/vermiculite and kaolinite.

2.3 Aqueous Characterization

Monitoring well locations at the GMF GSP are shown on Attachment A. As discussed in Section 1, installation of additional monitoring wells G219 and G220 was completed to investigate concentrations of sulfate and TDS at locations further downgradient from the GMF GSP and the wells with identified GWPS exceedances (G215 and G217). Additional groundwater sampling at locations associated with the GMF GSP was completed in 2024 to evaluate the nature and extent of sulfate and TDS exceedances.

2.3.1 Redox/pH Summary

The redox and pH conditions in aqueous systems are major controls on the speciation of redox-active chemicals such as iron, manganese, and sulfate. Measured UA groundwater pH had previously varied between 6.5 to 7.8 at compliance locations, which overlapped with the pH values of 6.7 to 7.7 measured at GSP UA background locations. During the 2024 sampling events, GMF GSP monitoring wells, including G219 and G220, had reported pH values within the previously reported range (Table 5).[5]

ORP values reported previously for UA wells ranged from positive to negative indicating variable oxidizing and reducing conditions across GMF GSP groundwater, with values at background locations generally comparable to values at compliance locations. Measured UA groundwater ORP values reported during additional 2024 sampling events demonstrate the same pattern, with values ranging from -149 millivolts (mV) at G218 to 171 mV at G213 (Table 5). The measured ORP at newly installed locations G219 and G220 ranged from -58 mV to 31 mV in 2024.

[5] Table 5 displays results of GMF GSP background monitoring wells, compliance monitoring wells determined to be potentially impacted by the GSP, new monitoring wells G219 and G220, and porewater sampling location NE Riser. Other GMF GSP compliance monitoring wells were excluded from the table and subsequent discussion to emphasize findings relevant to sulfate behavior in groundwater.

2.3.2 Exceedance Parameters

Total sulfate is present at concentrations above the GWPS of 400 mg/L for 2024 additional groundwater samples at wells G215, G217, and G218 (Table 5). TDS is present at concentrations above the GWPS of 1,200 mg/L for some 2024 groundwater samples at wells G215, G217, and G218. Statistical evaluation of wells G215 and G217 have determined that they contain sulfate and TDS GWPS exceedances. Although concentrations of sulfate and TDS at G218 are greater than their respective GWPS in some sampling events, well G218 has not been determined to have GWPS exceedances. Newly installed wells G219 and G220, both located further downgradient of G217 (Attachment A), do not contain total sulfate or TDS concentrations in excess of GWPS.

Sulfate is the largest contributor to TDS at monitoring wells G215, G217, and G218, and TDS concentration trends at these locations are therefore considered to be related primarily to reported sulfate concentrations.

2.3.3 Pourbaix Diagrams

Eh-pH (Pourbaix) diagrams can be used to illustrate the predicted stability of specific phases at thermodynamic equilibrium under the conditions observed for a groundwater sample. Select crystalline mineral species were suppressed to be representative of anticipated groundwater condition (e.g. mineral formation not anticipated to be kinetically favored), except when identified in XRD data from GMF GSP UA solids.

Using conditions detected at well G215 on 31 October 2024 to represent groundwater within the UA in the area of interest on the east side of the GMF GSP (Table 6), some samples from some GSP monitoring wells during the 2024 do not favor ferrihydrite (an amorphous iron oxyhydroxide, $Fe[OH]_3$) stability. While this finding is consistent with the GCSM, using G215 groundwater data from October 2024 to construct the species stability boundaries results in favorable conditions for aqueous ferrous (2+) iron, whereas previously the samples that did not plot within ferrihydrite thermodynamic stability favored siderite (iron carbonate mineral $FeCO_3$) stability (Geosyntec 2024). These October 2024 findings align with XRD results which did not indicate the presence of any iron-bearing carbonate minerals within the samples collected from G219 and G220. Ankerite (an iron-bearing carbonate mineral) was detected in XRD results presented in the initial GCSM but was not detected in G219 or G220 samples.

Figure 1 demonstrates variability in iron speciation within the GSP groundwater monitoring network and within individual wells, with some samples favoring stability of solid-phase ferrihydrite and others favoring aqueous iron. The contrast to the findings of the initial GCSM which indicated some stability of siderite further illustrates the dynamic nature of iron speciation within the GSP UA. Overall, these modeling results demonstrate that amorphous iron oxides, the formation of which is more thermodynamically favorable than crystalline oxides, are likely to be present at some locations within the GSP UA, but the stability of individual iron phases may fluctuate with changing groundwater geochemical conditions.

A review of Eh-pH conditions for manganese found that solid phase manganese minerals, including manganese oxides, are not predicted to be stable under conditions within the GSP UA for any 2024 groundwater samples (Figure 2), which is consistent with the findings of the initial GCSM (Geosyntec 2024).

2.3.4 Total and Dissolved Iron and Manganese Concentrations

The distribution of iron and manganese between total and dissolved phases can provide insights on site redox conditions and constituent behavior. A comparison of the total and dissolved iron data is provided in Table 5.[6] Total iron was detected in all samples for which it was analyzed during the 2024 sampling, with reported values ranging from 0.0115 mg/L at G200 to 5.08 mg/L at R201. Groundwater samples from newly installed wells G219 and G220 were not analyzed for total iron.

Dissolved iron was also detected in every 2024 sample for which it was analyzed except for samples from background location G200. Dissolved iron concentrations at newly installed wells G219 and G220 consistent with monitoring locations in the GMF GSP monitoring network. Dissolved iron concentrations are a fraction of associated total iron concentrations from the same sample in every instance, with 2024 samples containing average dissolved iron concentrations that are 39% of total iron results. This observation demonstrates that iron in GSP UA groundwater samples is largely associated with particulates suspended in the sample. Dissolved iron concentrations are lower than total iron in every instance, but dissolved iron was detected in almost every 2024 sample for which it was analyzed, indicating that a notable dissolved iron component is present in GSP UA groundwater, as expected based on the thermodynamic modeling which suggests disequilibrium between solid and aqueous iron species based on 2024 sampling data (Figure 1).

Total and dissolved manganese were detected in every sample for which they were analyzed (Table 5). While the samples from G219 and G220 were not analyzed for total manganese, the reported concentrations for dissolved manganese were consistent with monitoring locations in the GMF GSP network. Although dissolved manganese concentrations are lower than associated total manganese concentrations, average dissolved manganese concentrations are 80% of total manganese concentrations for 2024 samples, double the ratio observed in iron. This indicates that manganese is less associated with particulate material and exists in GSP UA groundwater primarily as dissolved ions, as suggested by thermodynamic modeling (Figure 2).

2.3.5 Major Ion Distribution and Groundwater Signatures

A Piper diagram was constructed using 2024 data from select locations associated with the GMF GSP to visualize major ion distributions in groundwater (Figure 3). Piper diagrams are a common

[6] See Note 5.

tool for assessing geochemical similarities or differences in terms of the major ion distributions between aqueous samples.

The major cation signature for all wells within the network is similar and contains nearly even proportions of major cations (Figure 3). The GMF GSP porewater (represented on the Piper diagram as 'NE Riser') major cation signature is distinct from monitoring wells due to the comparatively greater magnesium contribution. The anion component of GMF GSP groundwater is dominated by alkalinity for background wells G200 and R201; however, wells G215, G217, and G218 (all of which are located east of the GSP) contain a greater sulfate component and lower alkalinity component relative to background. This influence of sulfate on the anion composition of groundwater at these locations was documented in the initial GCSM and was attributed to influence of the GSP on these wells (Geosyntec 2024). The anion composition of the newly installed wells G219 and G220, which were installed further downgradient of G217 and the GSP, are dominated by alkalinity similar to the background. This suggests that impacts from GSP porewater to downgradient groundwater do not extend to the locations of G219 and G220.

3. EXTENSION AND MODIFICATION OF GEOCHEMICAL SITE CONDITIONS

3.1 Source and Mobilization Mechanisms

Sulfate is concentrated in flue gas desulfurization wastewater, as gypsum is the main solid component formed in the blowdown and the majority of sulfate mineral phases are soluble under environmental conditions such that sulfate associated with flue gas desulfurization wastewater is leachable (Koralegedara et al., 2019). The likely primary source of sulfate to the UA is GMF GSP CCR porewater. Sulfate was identified in the CCR leachate at concentrations up to 10,300 mg/L in 2024 samples (Table 5).

3.2 Potential and Observed Attenuation Mechanisms

Sulfate exceedances are currently limited to the UA. Sulfate is typically considered to be a geochemically conservative species within groundwater at neutral pH conditions, although sorption onto mineral or organic material surfaces is a potential attenuation mechanism. Sulfate attenuation is expected to occur primarily as the result of sorption onto charged surfaces of insoluble iron minerals. While crystalline iron oxide or sulfide phases were not identified in either the XRD results discussed in the initial GCSM nor the G219 and G220 solid samples (Tables 3 and 4), solid phase iron is detected at notable concentrations in aquifer solid samples and is observed to be associated primarily with the oxide and sulfide fractions of the solid material (Table 2). These SEP results suggest that some oxides and sulfides are present in aquifer solids at abundances that are unable to be detected by XRD, or, in the case of iron oxides, in amorphous phases. Thermodynamic modeling of 2024 redox conditions indicates that geochemical conditions at multiple GSP UA wells fluctuate such that the systems are in disequilibrium between amorphous iron oxides and aqueous iron (Figure 1). Evaluation of total and dissolved iron concentrations in 2024 groundwater samples indicates that notable amounts of iron exist in both the particulate and dissolved phases (Table 5), providing further support for the UA being in a state of disequilibrium between solid and aqueous iron phases. Attenuation of sulfate to iron phases is hindered by this disequilibrium, as dissolution of iron oxyhydroxides or other solid phases would result in mobilization of sorbed sulfate. Sulfate attenuation is therefore considered limited.

Overall, the results of the additional sampling support the limited potential attenuation mechanisms for sulfate described in the previously submitted GCSM (Geosyntec 2024). It is expected that attenuation or mobilization of sulfate would influence TDS concentrations at wells with TDS exceedances.

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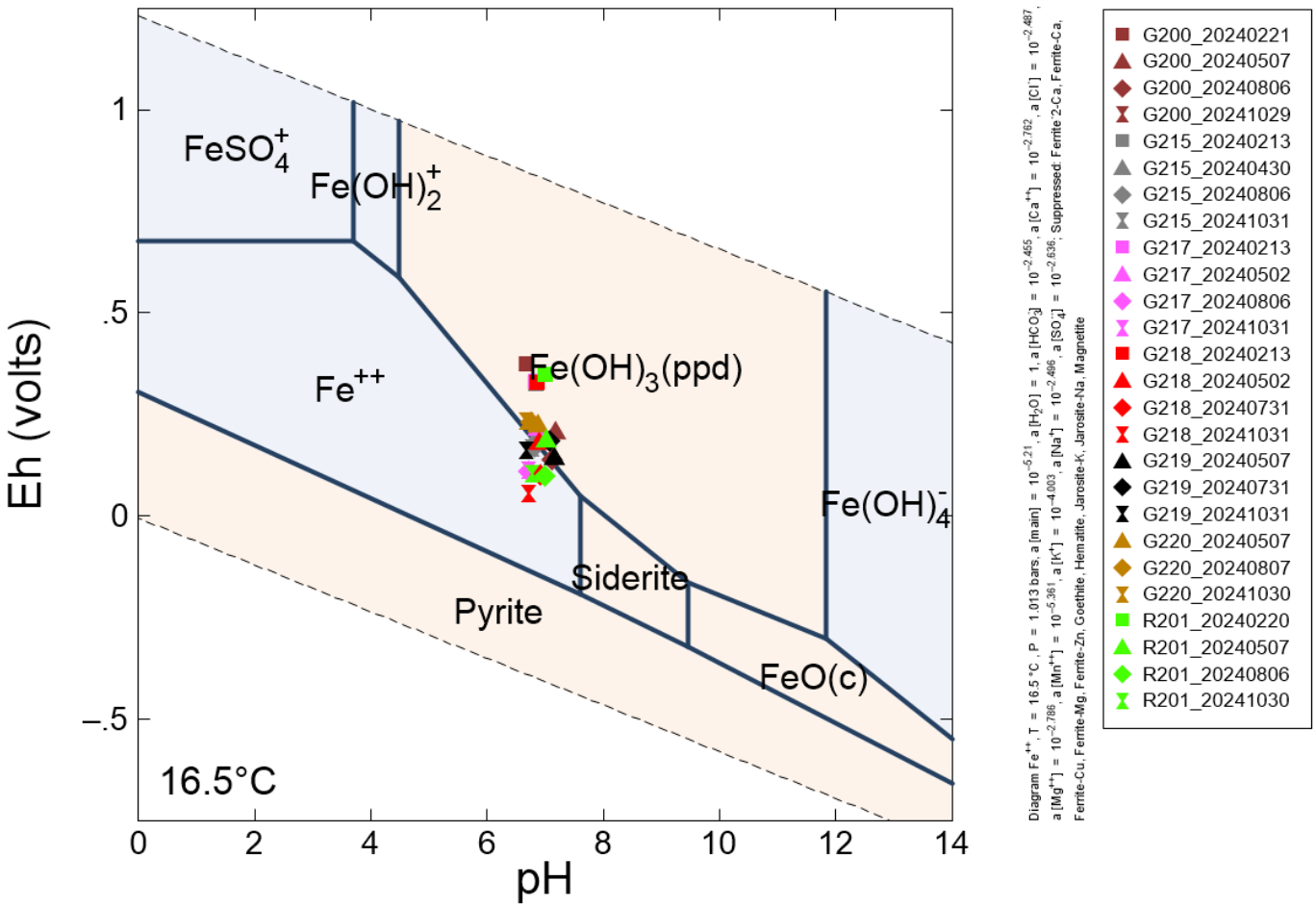
FIGURES



Notes:

1. Diagram was generated using conditions observed at well G215 on 10/31/2024.
2. The most recent available pH and ORP data points for each location are displayed.
3. Hematite, ferrite, goethite, crystalline iron oxide, magnetite, and jarosite were suppressed during model generation.
4. 2024 sampling results are displayed for Coffeen Gypsum Stack Pond background monitoring wells, compliance wells with sulfate concentrations above the GWPS, and new monitoring wells G219 and G220.

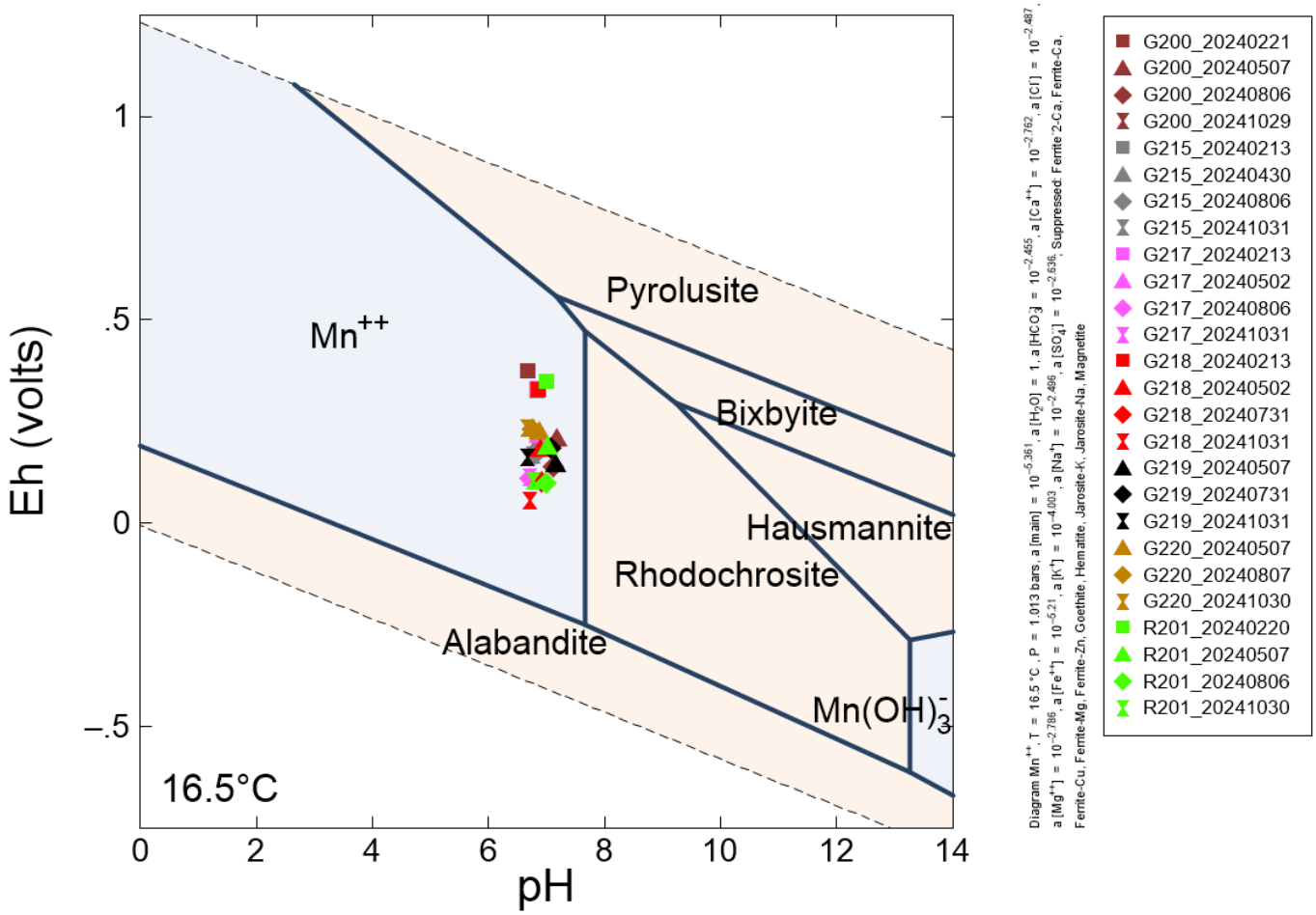
Iron Pourbaix Diagram, Ferrihydrite – UA
Coffeen Power Plant – Gypsum Stack Pond
Additional Investigation

Geosyntec consultants

Columbus, Ohio | June 2025

Figure **1**

Vistra - Groundwater Compliance - Documents\General\GCSM\Baldwin\Figures



Notes:

1. Diagram was generated using conditions observed at well G215 on 10/31/2024.
2. The most recent available pH and ORP data points for each location are displayed.
3. 2024 sampling results are displayed for Coffeen Gypsum Stack Pond background monitoring wells, compliance wells with sulfate concentrations above the GWPS, and new monitoring wells G219 and G220.

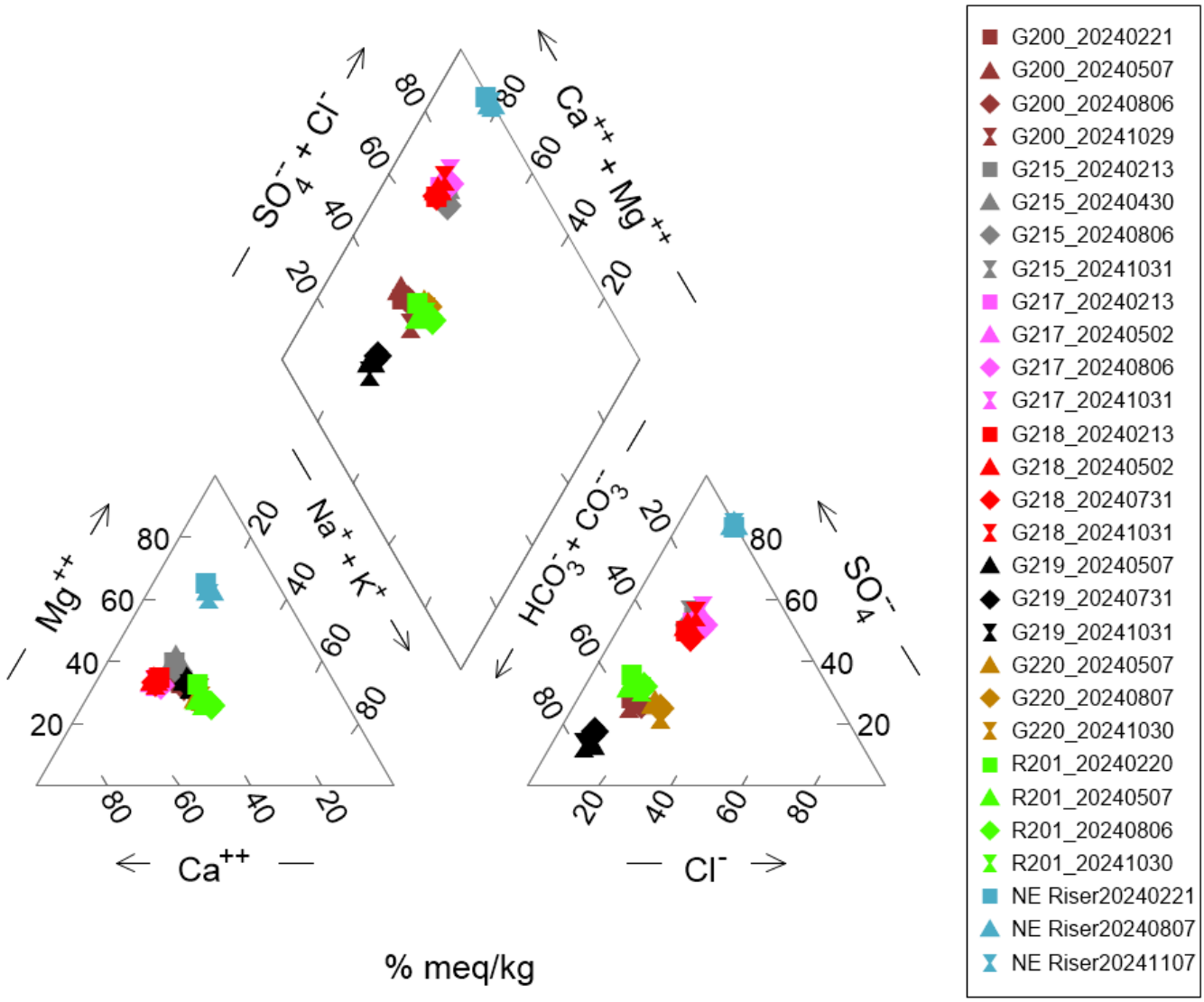
Manganese Pourbaix Diagram – UA
Coffeen Power Plant – Gypsum Stack Pond
Additional Investigation

Geosyntec consultants

Columbus, Ohio | June 2025

Figure **2**

Vistra - Groundwater Compliance - Documents\General\GCSM\Baldwin\Figures



Notes:

1. Groundwater samples collected in 2024 are displayed on the piper diagram.
2. % meq/kg: percent milliequivalents per kilogram
3. 2024 sampling results are displayed for Coffeen Gypsum Stack Pond background monitoring wells, porewater sampling location NE Riser, compliance wells with sulfate concentrations above the GWPS, and new monitoring wells G219 and G220.

Piper Diagram
Coffeen Power Plant – Gypsum Stack Pond
Additional Investigation

Geosyntec consultants

Columbus, Ohio | June 2025

Figure 3

Vistra - Groundwater Compliance - Documents\General\GCSM\Baldwin\Figures

TABLES

Table 1. CEC and LOI of UA Solids
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant - Gypsum Management Facility Stack Pond

Well ID	**G219**	**G219**	**G220**	**G220**
Depth (ft bgs)	**(9-10.5)**	**(11-20)**	**(19.5-20)**	**(21-25)**
Sampled Aquifer Unit	**UA**	**UA**	**UA**	**UA**
Field Boring Log Description	**Sandy silt**	**Silty clay with sand**	**Sand**	**Silty clay**
CEC (meq/100 g solid)	8.92	7.08	5.76	19.4
LOI (%)	15	16	12	16

Notes
Sample depth is shown in feet below ground surface (ft bgs)
CEC: cation exchange capacity
meq/100 g solid: milliequivalents per 100 grams solids
LOI: loss on ignition
UA: uppermost aquifer

Table 2. SEP Analytical Results for Select Parameters
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant - Gypsum Stack Pond

Well ID			**G219**		**G219**		**G220**		**G220**	
Sample Depth (ft bgs)			**(9-10.5)**		**(11-20)**		**(19.5-20)**		**(21-25)**	
Sampled Aquifer Unit			**UA**		**UA**		**UA**		**UA**	
Field Boring Description			**Sandy silt**		**Silty clay with sand**		**Sand**		**Silty clay**	
Fraction	**Reagent**	**Aluminium SEP**	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total
1	$MgSO_4$	Exchangeable Metals	< 7.1	-	< 6.8	-	< 7.2	-	< 6.8	-
2	Sodium acetate, acetic acid	Bound to Carbonates	7.4 J	0%	18 J	0%	6.4 J	0%	18 J	0%
3	Ammonium oxalate	Bound to Non-Crystalline Materials	74	0%	84	0%	81	0%	79	0%
4	Hydroxylamine HCl and acetic acid	Bound to Metal Oxides	520	2%	290	1%	1200	6%	270	1%
5	NaClO	Bound to Organic Material	240	1%	160	1%	160 J	1%	110 J	0%
6	HNO_3, HCl, and H_2O	Bound to Sulfides	3,400	14%	2900	10%	2000	10%	2800	11%
7	HF, HNO_3, HCl, and H_3BO_3	Residual Metals	20,000	83%	26,000	88%	16,000	82%	23,000	88%
SEP Sum			**24,000**	-	**29,000**	-	**20,000**	-	**26,000**	-
Fraction	**Reagent**	**Iron SEP**	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total
1	$MgSO_4$	Exchangeable Metals	< 13	-	< 12	-	< 13	-	< 12	-
2	Sodium acetate, acetic acid	Bound to Carbonates	< 9.7	-	220	2%	< 9.8	-	290	2%
3	Ammonium oxalate	Bound to Non-Crystalline Materials	190	2%	2,100	14%	120	1%	1,700	12%
4	Hydroxylamine HCl and acetic acid	Bound to Metal Oxides	4,500	38%	2,800	19%	7,600	44%	2,800	19%
5	NaClO	Bound to Organic Material	< 49	-	< 47	-	< 50	-	< 47	-
6	HNO_3, HCl, and H_2O	Bound to Sulfides	4,400	37%	5,400	37%	7,500	44%	6,400	44%
7	HF, HNO_3, HCl, and H_3BO_3	Residual Metals	2,700	23%	4,000	28%	1,900	11%	3,300	23%
SEP Sum			**12,000**	-	**15,000**	-	**17,000**	-	**15,000**	-
Fraction	**Reagent**	**Manganese SEP**	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total	µg/g	% of Total
1	$MgSO_4$	Exchangeable Metals	0.27 J	0%	12	3%	1.3 J	0%	12	3%
2	Sodium acetate, acetic acid	Bound to Carbonates	7.2	1%	49	14%	1.5 J	0%	53	14%
3	Ammonium oxalate	Bound to Non-Crystalline Materials	210 B	44%	40 B	11%	470 B	46%	36 B	9%
4	Hydroxylamine HCl and acetic acid	Bound to Metal Oxides	160	33%	140	39%	380	37%	160	41%
5	NaClO	Bound to Organic Material	12 J	2%	7.5 J	2%	4.9 J	0%	21	5%
6	HNO_3, HCl, and H_2O	Bound to Sulfides	59	12%	54	15%	130	13%	71	18%
7	HF, HNO_3, HCl, and H_3BO_3	Residual Metals	34	7%	60	17%	27	3%	38	10%
SEP Sum			**480**	-	**360**	-	**1,000**	-	**390**	-

Notes

SEP totals provided in laboratory analytical report (Attachment D). Percent of total for each fraction was calculated using the sum of the reported concentrations for each fraction.
Sample depth is shown in feet below ground surface (ft bgs)
Non-detect values are shown as less than the detection limit
SEP - sequential extraction procedure
µg/g - microgram per gram
B - indicates compound was found in the blank and sample
J - indicates result is less than the reporting limit but greater than or equal to the detection limit and the concentration is an approximate value
UA: uppermost aquifer

Table 3. XRD Analysis of UA Solids - Full Mineralogy
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant Gypsum Management Facility Stack Pond

Well ID			**G219**	**G219**	**G220**	**G220**
Depth (ft bgs)			**(9-10.5)**	**(11-20)**	**(19.5-20)**	**(21-25)**
Sampled Aquifer Unit			**UA**	**UA**	**UA**	**UA**
Field Boring Log Description			**Sandy silt**	**Silty clay with sand**	**Sand**	**Silty clay**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	72.2	65.0	86.9	56.9
Dolomite	$CaMg(CO_3)_2$	Carbonate	17.8	24.3	-	27.2
Feldspar	$(Na,Ca)(Si,Al)_4O_8$	Feldspar	3.7	3.0	9.5	2.8
K-feldspar	$KAlSi_3O_8$	Feldspar	2.6	1.4	2.6	1.0
Mica	$KAl_2(Si_3Al)O_{10}(OH,F)_2$	Mica	2.6	2.4	1.1	4.4
Chlorite/Vermiculite	$(Mg,Fe)_5Al(Si_3Al)O_{10}(OH)_8$	Clay	0.1	0.6	-	4.6
Kaolinite	$Al_2Si_2O_5(OH)_4$	Clay	0.9	0.9	-	-
Calcite	$CaCO_3$	Carbonate	-	2.4	-	3.0

Notes
Sample depth is shown in feet below ground surface (ft bgs).
ft bgs: feet below ground surface
wt %: percentage by weight
UA: uppermost aquifer
Dashes indicate the mineral was not identified by the laboratory

Table 4. XRD Analysis of UA Solids - Clay-Sized Fraction Mineralogy
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant Gypsum Management Facility Stack Pond

Well ID			**G219**	**G219**	**G220**	**G220**
Depth (ft bgs)			**(9-10.5)**	**(11-20)**	**(19.5-20)**	**(21-25)**
Sampled Aquifer Unit			**UA**	**UA**	**UA**	**UA**
Field Boring Log Description			**Sandy silt**	**Silty clay with sand**	**Sand**	**Silty clay**
Mineral/Compound	**Formula**	**Mineral Type**	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	SiO_2	Silicate	55.4	46.5	76.1	44.5
Dolomite	$CaMg(CO_3)_2$	Carbonate	26.3	27.3	-	28.8
Mica	$KAl_2(Si_3Al)O_{10}(OH,F)_2$	Mica	9.5	7.6	7.6	9.3
Feldspar	$(Na,Ca)(Si,Al)_4O_8$	Feldspar	3.3	5.6	7.4	4.0
K-feldspar	$KAlSi_3O_8$	Feldspar	2.5	2.7	4.2	2.2
Chlorite/Vermiculite	$(Mg,Fe)_5Al(Si_3Al)O_{10}(OH)_8$	Clay	1.9	3.0	3.6	4.7
Kaolinite	$Al_2Si_2O_5(OH)_4$	Clay	1.2	2.6	1.2	2.4
Calcite	$CaCO_3$	Carbonate	-	4.6	-	4.1

Notes
Clay-sized fraction samples were prepared as indicated in the analytical report (Attachment E).
Sample depth is shown in feet below ground surface (ft bgs).
ft bgs: feet below ground surface
wt %: percentage by weight
UA: uppermost aquifer
Dashes indicate the mineral was not identified by the laboratory

Table 5. Groundwater Sampling Results - Additional 2024 Data
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant Gypsum Stack Pond

Location Name	Sample Date	ORP (mV)	pH (SU)	Dissolved Iron (mg/L)	Total Iron (mg/L)	Dissolved Manganese (mg/L)	Total Manganese (mg/L)	Total Sulfate (mg/L)	TDS (mg/L)
G200	2024/02/21	171	6.69	< 0.0115	0.635	0.0188	0.105	109	496
	2024/05/07	6	7.19	< 0.0115	1.5	0.0395	0.084	110	534
	2024/08/06	-65	7.12	< 0.0115	0.0304	0.0701	0.0671	113	546
	2024/10/29	-14	6.87	< 0.0115	0.266	0.132	0.827	103	558
G215	2024/02/13	122	6.85	0.761	1.85	0.596	0.652	566	1,260
	2024/04/30	-8	6.87	1.3	2.2	0.578	0.62	555	1,370
	2024/08/06	-32	6.82	0.868	1.93	0.523	0.513	489	1,270
	2024/10/31	-36	6.79	0.846	2.47	0.572	0.563	569	1,330
G217	2024/02/13	129	6.85	0.327	0.91	0.356	0.365	428	950
	2024/05/02	13	6.88	0.198	0.719	0.352	0.427	460	1,160
	2024/08/06	-93	6.72	0.638	0.564	0.496	0.511	480	1,390
	2024/10/31	-90	6.73	0.465	0.614	0.515	0.515	554	1,390
G218	2024/02/13	125	6.86	0.752	2.38	0.389	0.39	396	835
	2024/05/02	-21	6.9	0.582	2.24	0.29	0.333	423	1,100
	2024/07/31	-101	6.92	1.39	2.36	0.984	1.33	422	1,190
	2024/10/31	-149	6.72	1.47	3.21	0.62	0.671	534	1,460
G219	2024/05/07	-58	7.17	-	-	-	-	49	472
	2024/07/31	-17	7.09	0.337	-	0.187	-	74	530
	2024/10/31	-40	6.69	0.293	-	0.172	-	48.7	536
G220	2024/05/07	21	6.89	-	-	-	-	152	824
	2024/08/07	27	6.76	0.012	-	0.293	-	160	844
	2024/10/30	31	6.69	0.018	-	0.23	-	134	882
R201	2024/02/20	147	7	0.156	1.61	0.568	0.641	185	555
	2024/05/07	-14	7.03	0.259	0.66	0.35	0.439	155	668
	2024/08/06	-105	7	1.82	2.37	0.292	0.295	184	674
	2024/10/30	-100	6.78	1.17	5.08	0.269	0.351	165	695
NE Riser	2024/02/21	182	6.54	-	-	-	-	8460	11,100
	2024/08/07	133	6.15	-	-	-	-	9060	3,770
	2024/11/07	212	6.47	-	-	-	-	10300	9,000

Notes
2024 sampling results are displayed for Coffeen Gypsum Stack Pond background monitoring wells, porewater sampling location NE Riser, compliance wells with sulfate exceedances, and new monitoring wells G219 and G220
SU: standard units
mg/L: milligrams per liter
mV: millivolts
ORP: oxidation-reduction potential
TDS: total dissolved solids
<: Sample was not detected above the provided method detection limit
Dashes indicate analyte information is not available for sample date

Table 6. Eh-pH Diagram Inputs
Geochemical Conceptual Site Model - Addendum
Coffeen Power Plant - Gypsum Stack Pond

Well ID		**G215**
Sample Date		**10/31/2024**
Input Parameter	**Unit**	
Temperature	°C	16.5
pH	SU	6.79
Calcium	mg/L	169
Chloride	mg/L	139
Bicarbonate Alkalinity	mg/L	348
Magnesium	mg/L	93.5
Sodium	mg/L	88.6
Potassium	mg/L	4.68
Sulfate	mg/L	569
Dissolved Manganese	mg/L	0.572
Dissolved Iron	mg/L	0.846

Notes
°C - degrees Celsius
mg/L - milligrams per liter
SU - standard units

Attachment A
Site Layout

MONITORING WELL
LEACHATE WELL

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

0 325 650 Feet

SITE LAYOUT

ATTACHMENT A

NATURE AND EXTENT ADDENDUM
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Attachment B
G219 and G220 Boring Logs

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G219

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/18/2024	3/18/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
G219	Feet (NAVD88)	617.04 Feet (NAVD88)	6.0 inches

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

State Plane 876,384.36 N, 2,516,476.36 E E/W

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

Lat 39° 4' 15.1464"

Long -89° 23' 31.722"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 92		1 2 3 4 5 6 7 8 9 10 11 12	0 - 8' **SILTY CLAY:** CL/ML, dark yellowish brown (10YR 3/4), sand (0-5%), very stiff, plastic, moist.	CL/ML									
				5' - 7' reddish gray (5YR 5/2) lenses (10%), reddish gray (5YR 5/2) orange oxidation (10%).										
				7' - 8' orange oxidation (10%).										
				8 - 9' **SILTY CLAY WITH SAND:** (CL/ML)S, grayish brown (2.5Y 5/2), orange oxidation (10%), fine sand, sbangular to subrounded sand, fine gravel (0-5%), very stiff, medium plasticity, moist.	(CL/ML)S									
				9 - 10.5' **SANDY SILT:** s(ML), light olive brown (2.5Y 5/6), medium plasticity, soft, wet.	s(ML)									
2 CS	120 120			10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist.	(CL/ML)S									Soil sample collected from 9.5-10 feet below ground surface (ft bgs).

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

Signature

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

Boring Number G219

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist. *(continued)*										
			13											
			14											
			15											
			16		(CL/ML)S									Soil sample collected from 11-20 ft bgs.
			17											
			18											
			19											
			20	20' End of Boring.										

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G220

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/19/2024	3/19/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
G220	Feet (NAVD88)	628.03 Feet (NAVD88)	6.0 inches

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

State Plane 876,432.62 N, 2,516,980.01 E E/W

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

Lat 39° 4' 15.5784"

Long -89° 23' 25.332"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 96			0 - 0.5' **SILT WITH SAND:** (ML)s, organic material, wet.	(ML)s									
			1	0.5 - 3.5' **FAT CLAY:** CH, dark yellowish brown (10YR 4/4), firm to stiff, high plasticity, moist.										
			2		CH									
			3											
			4	3.5 - 8' **SILTY CLAY:** CL/ML, dark brown (10YR 3/3), firm to soft, low to medium plasticicity, moist.										
			5											
			6		CL/ML									
			7											
			8	8 - 10' **CLAYEY SILT:** ML/CL, very dark grayish brown (10YR 3/2), firm to soft, low plasticity to non-plastic, moist.										
			9		ML/CL									
			10	10 - 13' **LEAN CLAY:** CL, very dark grayish brown (10YR 3/2), orange mottling (20%), low to medium plasticity.										
2 CS	120 120		11		CL									
			12											

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

Signature

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

Boring Number G220

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				10 - 13' **LEAN CLAY:** CL, very dark grayish brown (10YR 3/2), orange mottling (20%), low to medium plasticity. *(continued)*	CL									
			13	13 - 15' **FAT CLAY:** CH, very dark gray (5YR 3/1), sand (0-5%), high plasticity, moist.	CH									
			14											
			15	15 - 17.5' **LEAN CLAY WITH SAND:** (CL)s, brown (10YR 4/3), medium plasticity, moist.	(CL)s									
			16											
			17											
			18	17.5 - 19' **SANDY SILT:** s(ML), light olive brown (2.5Y 5/6), medium plasticity, moist to wet.	s(ML)									Soil sample collected from 18-19.5 feet below ground surface (ft bgs).
			19	19 - 20' **POORLY-GRADED SAND:** SP, dark yellowish brown (10YR 4/4), silt (0-5%).	SP									
3 CS	60 60		20	20 - 25' **SILTY CLAY:** CL/ML, very dark grayish brown (10YR 3/2), sand (0-5%), stiff, low to medium plasticity, moist.	CL/ML									Soil sample collected from 19.5-20 ft bgs.
			21											
			22											
			23											Soil sample collected from 21-25 ft bgs.
			24											
			25	25' End of Boring.										

Attachment C
Aquifer Solids CEC Laboratory Analytical Data

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Kristen Theesfeld
Ramboll Americas Engineering Solutions
1999 Broadway
Suite 2225
Denver, Colorado 80202

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JOB DESCRIPTION

Coffeen Nature & Extent CEC Analysis

JOB NUMBER

860-76883-1

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477

See page two for job notes and contact information.

my EOL

Eurofins Houston

Job Notes

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Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization

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Authorized for release by
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Table of Contents

Cover Page 1
Table of Contents 3
Definitions/Glossary 4
State Forms 5
TRRP Checklist 5
Case Narrative 9
Detection Summary 10
Client Sample Results 11
QC Sample Results 12
QC Association Summary 13
Lab Chronicle 15
Certification Summary 17
Method Summary 18
Sample Summary 19
Chain of Custody 20
Receipt Checklists 21

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

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

Appendix A

Laboratory Data Package Cover Page - Page 1 of 4

This data package is for Job No. 860-76883-1 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

- ☑ R1- Field chain-of-custody documentation;
- ☑ R2 - Sample identification cross-reference;
- ☑ R3 - Test reports (analytical data sheets) for each environmental sample that includes:
  - a. Items consistent with NELAC Chapter 5,
  - b. dilution factors,
  - c. preparation methods,
  - d. cleanup methods, and
  - e. if required for the project, tentatively identified coumpounds (TICs).
- ☐ R4 - Surrogate recovery data including:
  - a. Calculated recovery (%R), and
  - b. The laboratory's surrogate QC limits.
- ☑ R5 - Test reports/summary forms for blank samples;
- ☑ R6 - Test reports/summary forms for laboratory control samples (LCSs) including:
  - a. LCS spiking amounts,
  - b. Calculated %R for each analyte, and
  - c. The laboratory's LCS QC limits.
- ☑ R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  - a. Samples associated with the MS/MSD clearly identified,
  - b. MS/MSD spiking amounts,
  - c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  - d. Calculated %Rs and relative percent differences (RPDs), and
  - e. The laboratory's MS/MSD QC limits
- ☑ R8 - Laboratory analytical duplicate (if applicable) recovery and precision:
  - a. The amount of analyte measured in the duplicate,
  - b. The calculated RPD, and
  - c. The laboratory's QC limits for analytical duplicates.
- ☑ R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;
- ☑ R10 - Other problems or anomalies.
- ☐ Exception Report for every "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program .

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: ☐ This laboratory meets an exception under 30 TAC §25.6 and was last inspected by ☐ TCEQ or ☐ _____ on __/__/__. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date

Laboratory Data Package Cover Page - Page 2 of 4

Laboratory Name: Eurofins Houston	LRC Date: 07/22/2024
Project Name: Coffeen Nature & Extent CEC Analysis	Laboratory Job Number: 860-76883-1
Reviewer Name:	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
		Were all departures from standard conditions described in an exception report?	✓				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?		✓			1
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	✓				
		Were calculations checked by a peer or supervisor?	✓				
		Were all analyte identifications checked by a peer or supervisor?	✓				
		Were sample detection limits reported for all analytes not detected?	✓				
		Were all results for soil and sediment samples reported on a dry weight basis?	✓				
		Were % moisture (or solids) reported for all soil and sediment samples?	✓				
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			✓		
		If required for the project, are TICs reported?			✓		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			✓		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	✓				
		Were blanks analyzed at the appropriate frequency?	✓				
		Were method blanks taken through the entire analytical process , including preparation and, if applicable, cleanup procedures?	✓				
		Were blank concentrations < MQL?	✓				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	✓				
		Was each LCS taken through the entire analytical procedure , including prep and cleanup steps?	✓				
		Were LCSs analyzed at the required frequency?	✓				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	✓				
		Was the LCSD RPD within QC limits?	✓				
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	✓				
		Were MS/MSD analyzed at the appropriate frequency?	✓				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		✓			2
		Were MS/MSD RPDs within laboratory QC limits?	✓				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?	✓				
		Were analytical duplicates analyzed at the appropriate frequency?	✓				
		Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	✓				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	✓				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	✓				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	✓				

Laboratory Data Package Cover Page - Page 3 of 4

Laboratory Name: Eurofins Houston	LRC Date: 07/22/2024
Project Name: Coffeen Nature & Extent CEC Analysis	Laboratory Job Number: 860-76883-1
Reviewer Name:	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	✓				
		Were percent RSDs or correlation coefficient criteria met?	✓				
		Was the number of standards recommended in the method used for all analytes?	✓				
		Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
		Are ICAL data available for all instruments used?	✓				
		Has the initial calibration curve been verified using an appropriate second source standard?	✓				
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**					
		Was the CCV analyzed at the method-required frequency?	✓				
		Were percent differences for each analyte within the method-required QC limits?	✓				
		Was the ICAL curve verified for each analyte?	✓				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	✓				
S3	O	**Mass spectral tuning**					
		Was the appropriate compound for the method used for tuning?			✓		
		Were ion abundance data within the method-required QC limits?			✓		
S4	O	**Internal standards (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			✓		
S5	OI	**Raw data (NELAC Section 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
		Were data associated with manual integrations flagged on the raw data?	✓				
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			✓		
S7	O	**Tentatively identified compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
S8	I	**Interference Check Sample (ICS) results**					
		Were percent recoveries within method QC limits?	✓				
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	✓				
		Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
S11	OI	**Proficiency test reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	✓				
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	✓				
		Is documentation of the analyst's competency up-to-date and on file?	✓				
S15	OI	**Verification/validation documentation for methods (NELAC Chapter 5)**					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
S16	OI	**Laboratory standard operating procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	✓				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP -required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Data Package Cover Page - Page 4 of 4

Laboratory Name: Eurofins Houston	LRC Date: 07/22/2024
Project Name: Coffeen Nature & Extent CEC Analysis	Laboratory Job Number: 860-76883-1
Reviewer Name:	

ER#[1]	Description
1	Method Moisture: The following sample was received outside of holding time: C2219 9-10.5 (860-76883-1). Method Moisture: The following samples were received outside of holding time: C 2219 11-20 (860-76883-2) and C2220 21-25 (860-76883-4). Method Moisture: The following sample was received outside of holding time: C2219 9-10.5 (860-76883-1). Method Moisture: The following sample was received outside of holding time: C2220 19.5-20 (860-76883-3).
2	Method 6010D: Due to the high concentration of Sodium, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 860-168201 and analytical batch 860-168474 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

Job Narrative
860-76883-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 6/22/2024 9:10 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.7°C.

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

General Chemistry
Method Moisture: The following sample was received outside of holding time: C2219 9-10.5 (860-76883-1).

Method Moisture: The following samples were received outside of holding time: C2219 11-20 (860-76883-2) and C2220 21-25 (860-76883-4).

Method Moisture: The following sample was received outside of holding time: C2219 9-10.5 (860-76883-1).

Method Moisture: The following sample was received outside of holding time: C2220 19.5-20 (860-76883-3).

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

Detection Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Client Sample ID: C2219 9-10.5 — Lab Sample ID: 860-76883-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sodium	129		51.4	12.7	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	8.92		0.586	0.586	meq/100gm	1	☼	9081	Total/NA

Client Sample ID: C2219 11-20 — Lab Sample ID: 860-76883-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sodium	137		48.4	11.9	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	7.08		0.561	0.561	meq/100gm	1	☼	9081	Total/NA

Client Sample ID: C2220 19.5-20 — Lab Sample ID: 860-76883-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sodium	111		49.3	12.2	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	5.76		0.571	0.571	meq/100gm	1	☼	9081	Total/NA

Client Sample ID: C2220 21-25 — Lab Sample ID: 860-76883-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sodium	145		49.4	12.2	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	19.4		0.583	0.583	meq/100gm	1	☼	9081	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Job ID: 860-76883-1
Project/Site: Coffeen Nature & Extent CEC Analysis

Client Sample ID: C2219 9-10.5
Lab Sample ID: 860-76883-1
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 85.3

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	129		51.4	12.7	mg/Kg	☼	06/26/24 11:59	06/27/24 11:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	8.92		0.586	0.586	meq/100gm	☼	07/19/24 18:43	07/22/24 11:35	1

Client Sample ID: C2219 11-20
Lab Sample ID: 860-76883-2
Date Collected: 03/19/24 11:36
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 89.1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	137		48.4	11.9	mg/Kg	☼	06/26/24 11:59	06/27/24 11:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	7.08		0.561	0.561	meq/100gm	☼	07/19/24 18:43	07/22/24 11:35	1

Client Sample ID: C2220 19.5-20
Lab Sample ID: 860-76883-3
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 87.5

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	111		49.3	12.2	mg/Kg	☼	06/26/24 11:59	06/27/24 11:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	5.76		0.571	0.571	meq/100gm	☼	07/19/24 18:43	07/22/24 11:35	1

Client Sample ID: C2220 21-25
Lab Sample ID: 860-76883-4
Date Collected: 03/19/24 14:38
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 85.8

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	145		49.4	12.2	mg/Kg	☼	06/26/24 11:59	06/27/24 11:05	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	19.4		0.583	0.583	meq/100gm	☼	07/19/24 18:43	07/22/24 11:35	1

QC Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 860-168201/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 168474 — **Prep Batch: 168201**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	12.3	U	50.0	12.3	mg/Kg		06/26/24 11:59	06/27/24 10:26	1

Lab Sample ID: LCS 860-168201/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 168474 — **Prep Batch: 168201**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Sodium			2500	2390		mg/Kg		96	80 - 120		

Lab Sample ID: LCSD 860-168201/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 168474 — **Prep Batch: 168201**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Sodium			2500	2390		mg/Kg		96	80 - 120	0	20

Method: 9081 - Cation Exchange Capacity (CEC)

Lab Sample ID: MB 860-171438/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 175457 — **Prep Batch: 171438**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity	0.500	U	0.500	0.500	meq/100gm		07/19/24 18:43	07/22/24 11:35	1

QC Association Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Metals

Prep Batch: 168201

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-1	C2219 9-10.5	Total/NA	Solid	3051A	
860-76883-2	C2219 11-20	Total/NA	Solid	3051A	
860-76883-3	C2220 19.5-20	Total/NA	Solid	3051A	
860-76883-4	C2220 21-25	Total/NA	Solid	3051A	
MB 860-168201/1-A	Method Blank	Total/NA	Solid	3051A	
LCS 860-168201/2-A	Lab Control Sample	Total/NA	Solid	3051A	
LCSD 860-168201/3-A	Lab Control Sample Dup	Total/NA	Solid	3051A	

Analysis Batch: 168474

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-1	C2219 9-10.5	Total/NA	Solid	6010D	168201
860-76883-2	C2219 11-20	Total/NA	Solid	6010D	168201
860-76883-3	C2220 19.5-20	Total/NA	Solid	6010D	168201
860-76883-4	C2220 21-25	Total/NA	Solid	6010D	168201
MB 860-168201/1-A	Method Blank	Total/NA	Solid	6010D	168201
LCS 860-168201/2-A	Lab Control Sample	Total/NA	Solid	6010D	168201
LCSD 860-168201/3-A	Lab Control Sample Dup	Total/NA	Solid	6010D	168201

General Chemistry

Analysis Batch: 168046

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-1	C2219 9-10.5	Total/NA	Solid	Moisture	
MB 860-168046/1	Method Blank	Total/NA	Solid	Moisture	

Analysis Batch: 168048

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-2	C2219 11-20	Total/NA	Solid	Moisture	
860-76883-4	C2220 21-25	Total/NA	Solid	Moisture	
MB 860-168048/1	Method Blank	Total/NA	Solid	Moisture	

Analysis Batch: 168269

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 860-168269/1	Method Blank	Total/NA	Solid	Moisture	

Analysis Batch: 168987

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-3	C2220 19.5-20	Total/NA	Solid	Moisture	
MB 860-168987/1	Method Blank	Total/NA	Solid	Moisture	
860-76883-3 DU	C2220 19.5-20	Total/NA	Solid	Moisture	

Prep Batch: 171438

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-1	C2219 9-10.5	Total/NA	Solid	9081	
860-76883-2	C2219 11-20	Total/NA	Solid	9081	
860-76883-3	C2220 19.5-20	Total/NA	Solid	9081	
860-76883-4	C2220 21-25	Total/NA	Solid	9081	
MB 860-171438/1-A	Method Blank	Total/NA	Solid	9081	

QC Association Summary

Client: Ramboll Americas Engineering Solutions
Job ID: 860-76883-1
Project/Site: Coffeen Nature & Extent CEC Analysis

General Chemistry

Analysis Batch: 175457

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-76883-1	C2219 9-10.5	Total/NA	Solid	9081	171438
860-76883-2	C2219 11-20	Total/NA	Solid	9081	171438
860-76883-3	C2220 19.5-20	Total/NA	Solid	9081	171438
860-76883-4	C2220 21-25	Total/NA	Solid	9081	171438
MB 860-171438/1-A	Method Blank	Total/NA	Solid	9081	171438

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Client Sample ID: C2219 9-10.5
Lab Sample ID: 860-76883-1
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 09:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			168046	06/25/24 15:40	JC	EET HOU

Client Sample ID: C2219 9-10.5
Lab Sample ID: 860-76883-1
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 85.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			.57 g	50 mL	168201	06/26/24 11:59	PB	EET HOU
Total/NA	Analysis	6010D		1			168474	06/27/24 11:00	JDM	EET HOU
Total/NA	Prep	9081			2.57 g	50 mL	171438	07/19/24 18:43	PB	EET HOU
Total/NA	Analysis	9081		1			175457	07/22/24 11:35	JDM	EET HOU

Client Sample ID: C2219 11-20
Lab Sample ID: 860-76883-2
Date Collected: 03/19/24 11:36
Matrix: Solid
Date Received: 06/22/24 09:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			168048	06/25/24 15:46	JC	EET HOU

Client Sample ID: C2219 11-20
Lab Sample ID: 860-76883-2
Date Collected: 03/19/24 11:36
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 89.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			.58 g	50 mL	168201	06/26/24 11:59	PB	EET HOU
Total/NA	Analysis	6010D		1			168474	06/27/24 11:02	JDM	EET HOU
Total/NA	Prep	9081			2.51 g	50 mL	171438	07/19/24 18:43	PB	EET HOU
Total/NA	Analysis	9081		1			175457	07/22/24 11:35	JDM	EET HOU

Client Sample ID: C2220 19.5-20
Lab Sample ID: 860-76883-3
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 09:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			168987	07/01/24 09:35	JC	EET HOU

Client Sample ID: C2220 19.5-20
Lab Sample ID: 860-76883-3
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 09:10
Percent Solids: 87.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			.58 g	50 mL	168201	06/26/24 11:59	PB	EET HOU
Total/NA	Analysis	6010D		1			168474	06/27/24 11:04	JDM	EET HOU
Total/NA	Prep	9081			2.54 g	50 mL	171438	07/19/24 18:43	PB	EET HOU
Total/NA	Analysis	9081		1			175457	07/22/24 11:35	JDM	EET HOU

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Client Sample ID: C2220 21-25

Lab Sample ID: 860-76883-4

Date Collected: 03/19/24 14:38

Matrix: Solid

Date Received: 06/22/24 09:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			168048	06/25/24 15:46	JC	EET HOU

Client Sample ID: C2220 21-25

Lab Sample ID: 860-76883-4

Date Collected: 03/19/24 14:38

Matrix: Solid

Date Received: 06/22/24 09:10

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	3051A			.59 g	50 mL	168201	06/26/24 11:59	PB	EET HOU
Total/NA	Analysis	6010D		1			168474	06/27/24 11:05	JDM	EET HOU
Total/NA	Prep	9081			2.56 g	50 mL	171438	07/19/24 18:43	PB	EET HOU
Total/NA	Analysis	9081		1			175457	07/22/24 11:35	JDM	EET HOU

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Accreditation/Certification Summary

Client: Ramboll Americas Engineering Solutions
Job ID: 860-76883-1
Project/Site: Coffeen Nature & Extent CEC Analysis

Laboratory: Eurofins Houston

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	88-00759	08-03-24
Florida	NELAP	E871002	06-30-25
Louisiana (All)	NELAP	03054	06-30-25
Oklahoma	NELAP	1306	08-31-24
Oklahoma	State	2023-139	08-31-24
Texas	NELAP	T104704215	06-30-25
Texas	TCEQ Water Supply	T104704215	12-28-25
USDA	US Federal Programs	525-23-79-79507	03-20-26

Method Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Method	Method Description	Protocol	Laboratory
6010D	Metals (ICP)	SW846	EET HOU
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU
Moisture	Percent Moisture	EPA	EET HOU
3051A	Preparation, Metals, Microwave Assisted	SW846	EET HOU
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent CEC Analysis

Job ID: 860-76883-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
860-76883-1	C2219 9-10.5	Solid	03/19/24 11:35	06/22/24 09:10
860-76883-2	C2219 11-20	Solid	03/19/24 11:36	06/22/24 09:10
860-76883-3	C2220 19.5-20	Solid	03/19/24 14:37	06/22/24 09:10
860-76883-4	C2220 21-25	Solid	03/19/24 14:38	06/22/24 09:10

Eurofins Houston
4145 Greenbriar Dr
Stafford, TX 77477
Phone (281) 240-4200

Chain of Custody Record

eurofins | Environment Testing America

7/22/2024

Client Information	Sampler: Lauren Anderson	Lab PM: Sachin Kudchadkar	Carrier Tracking No(s):	COC No: 860-9401-3272.1
Client Contact: Bryan Donaldson, Eric Baker	Phone: 920 251 8254	E-Mail: sachin.kudchadkar@et.eurofinsus.com	State of Origin:	Page: Page
Company: Rambow	PWSID:			Job #:
Address: 234 W Florida St FL 5	Due Date Requested: Standard turn			
City: Milwaukee	TAT Requested (days):			
State, Zip: WI 53204	Compliance Project: Δ Yes Δ No			
Phone: 920 255 4997	PO #:			
Email: BDONALDSON@RAMBOW.COM, ERIC.BAKER@RAMBOW.COM	WO #:			
Project Name: COFFEEN NATURE + EXTENT	Project #: 19401072T4			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, J DI Water, K EDTA, L EDA, M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-5, Z other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9081 Cation Exchange Capacity	Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N			
G219 9-10.5	3/19/24	1135	G	S	N	N	X		1	
G219 11-20	↓	1136	↓	↓	↓	↓	X		1	
G220 19.5-20	↓	1437	↓	↓	↓	↓	X		1	
G220 21-25	↓	1438	↓	↓	↓	↓	X		1	

LCA 6/20/24

LCA 6/20/24

LCA ~~Water~~

Temp: 4.5 IR ID: HOU-368
C/F +0.2
Corrected Temp: 4.7

860-76883 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Rambow	Date/Time:	Company	Received by:	Date/Time: 6/21/24 1003	Company: Eurofins
Relinquished by:	Date/Time: 6/21/24 1630	Company: Eurofins	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: Nuamar	Date/Time: 6/22/24 910	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Ver 01/16/2019

Login Sample Receipt Checklist

Client: Ramboll Americas Engineering Solutions

Job Number: 860-76883-1

Login Number: 76883

List Source: Eurofins Houston

List Number: 1

Creator: Jimenez, Nicanor

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	

Login Sample Receipt Checklist

Client: Ramboll Americas Engineering Solutions

Job Number: 860-76883-1

Login Number: 76883
List Number: 2
Creator: Jimenez, Nicanor

List Source: Eurofins Houston

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.		
The cooler's custody seal, if present, is intact.		
Sample custody seals, if present, are intact.		
The cooler or samples do not appear to have been compromised or tampered with.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
Is the Field Sampler's name present on COC?		
There are no discrepancies between the containers received and the COC.		
Samples are received within Holding Time (excluding tests with immediate HTs)		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
Appropriate sample containers are used.		
Sample bottles are completely filled.		
Sample Preservation Verified.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").		
Multiphasic samples are not present.		
Samples do not require splitting or compositing.		
Residual Chlorine Checked.		

Attachment D

Aquifer Solids SEP and LOI Laboratory Analytical Data

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Kristen Theesfeld
Ramboll Americas Engineering Solutions
1999 Broadway
Suite 2225
Denver, Colorado 80202

Generated 7/26/2024 8:51:44 AM

JOB DESCRIPTION

Coffeen Nature & Extent SEP

JOB NUMBER

140-37282-1

Eurofins Knoxville
5815 Middlebrook Pike
Knoxville TN 37921

See page two for job notes and contact information.

my EOL

Eurofins Knoxville

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

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

Ryan Henry

Generated
7/26/2024 8:51:44 AM

Authorized for release by
Ryan Henry, Project Manager I
WilliamR.Henry@et.eurofinsus.com
(865)291-3006

Table of Contents

Cover Page 1
Table of Contents 3
Definitions/Glossary 4
Case Narrative 5
Sample Summary 8
Client Sample Results 9
Default Detection Limits 25
QC Sample Results 29
QC Association Summary 44
Lab Chronicle 50
Certification Summary 62
Method Summary 63
Chain of Custody 64

Definitions/Glossary

Client: Ramboll Americas Engineering Solutions
Job ID: 140-37282-1
Project/Site: Coffeen Nature & Extent SEP

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F3	Duplicate RPD exceeds the control limit
F5	Duplicate RPD exceeds limit, and one or both sample results are less than 5 times RL, and the absolute difference between results is < the upper reporting limits for both.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
F3	Duplicate RPD exceeds the control limit

Glossary

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

Job Narrative
140-37282-1

Receipt
The samples were received on 6/22/2024 at 10:15am and arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.1º C.

Receipt Exceptions
Method Loss On Ignit.: The following samples were received outside of holding time: G219 9-10.5 (140-37282-1), G219 11-20 (140-37282-2), G220 19.5-20 (140-37282-3) and G220 21-25 (140-37282-4).

Metals
7 Step Sequential Extraction Procedure

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

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

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

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

Results were calculated using the following equation:

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

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

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

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

SEP Report Notes:

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

Magnesium was not reported for step 1 because the extraction solution for this step (magnesium sulfate) contains high levels of magnesium.

Sodium was not reported for steps 2 and 5 since the extraction solution for these steps contain high levels of sodium.

The sum of steps 1 through 7 is much higher than the total result for sodium and magnesium due to the magnesium and sodium introduced by the extraction solutions.

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

The serial diilution is analyzed at an additional 5 fold dilution using the dilution factors applied to the duplicate and the associated original sample. Due to a limitation of the expanded deliverable forms, the dilutions of the duplicate and serial dilution in the expanded deliverable are not expressed on a per analyte basis.

Please refer to the summary section of the report for the duplicate information as it contains the dilution factors at which the sample was analyzed.

Method 6010B: The serial dilution performed for the following samples associated with batch 140-89131 was outside control limits: G220 19.5-20 (140-37282-3) and (140-37282-A-3-A SD ^5)

Methods 6010B, 6010B SEP: The following samples were diluted due to the presence of Silicon which interferes with Arsenic, Cobalt, Lead, Selenium and Thallium: G219 9-10.5 (140-37282-1), G219 11-20 (140-37282-2), G220 19.5-20 (140-37282-3) and G220 21-25 (140-37282-4). Elevated reporting limits (RLs) are provided.

Method 6010B: The following samples were diluted due to the nature of the sample matrix: G219 9-10.5 (140-37282-1), G219 11-20 (140-37282-2), G220 19.5-20 (140-37282-3) and G220 21-25 (140-37282-4). Elevated reporting limits (RLs) are provided for Aluminum, Barium and Calcium.

Method 6010B: The serial dilution performed for the following samples associated with batch 140-89170 was outside control limits: G220 19.5-20 (140-37282-3) and (140-37282-A-3-A SD ^10)

Method 6010B SEP: The sample duplicate (DUP) precision for preparation batch 140-88488 and 140-88516 and analytical batch 140-88772 was outside control limits. Sample non-homogeneity is suspected.

Method 6010B SEP: The sample duplicate (DUP) precision for preparation batch 140-88588, 140-88679, 140-88764, 140-88807 and 140-88823 and analytical batch 140-89073 was outside control limits. Sample non-homogeneity is suspected.

Method 6010B SEP: The method blank for step 4 has Selenium detected above the reporting limit. Selenium is historically known to be high in the leachate solution used during the extraction procedure. Affected samples include:G219 9-10.5 (140-37282-1), G219 11-20 (140-37282-2), G220 19.5-20 (140-37282-3), G220 21-25 (140-37282-4) and (MB 140-88588/10-B).

Method 6010B SEP: The following samples were diluted due to the nature of the sample matrix: G219 9-10.5 (140-37282-1), G219 11-20 (140-37282-2), G220 19.5-20 (140-37282-3) and G220 21-25 (140-37282-4). Elevated reporting limits (RLs) are provided for Aluminum.

Method 6010B SEP: The following sample was diluted due to the nature of the sample matrix: G219 11-20 (140-37282-2). Elevated reporting limits (RLs) are provided for Calcium.

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

General Chemistry
Loss On Ignition: Loss on Ignition (LOI) is based on ASTM test method D 7348. LOI is analyzed in a manner that is similar to ash content in that the data collection process is the same, although the ignition conditions may be different. The result expresses the

Job ID: 140-37282-1 (Continued)

sample lost during ignition as a percentage instead of measuring the concentration of sample residue retained under the ignition conditions. LOI applies only to solid samples.

One gram of a solid sample is ignited in an air atmosphere at 750°C (combustion industries or for general information) or 950°C (cement industry). The sample weight lost during the ignition is calculated as a percentage of the original sample weight.

Method Loss On Ignit.: The sample duplicate was outside control limits. Sample non-homogeneity is suspected. Samples G219 9-10.5 (140-37282-1) and (140-37282-A-1 DU) are affected.

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

Sample Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-37282-1	G219 9-10.5	Solid	03/19/24 11:35	06/22/24 10:15
140-37282-2	G219 11-20	Solid	03/19/24 11:36	06/22/24 10:15
140-37282-3	G220 19.5-20	Solid	03/19/24 14:37	06/22/24 10:15
140-37282-4	G220 21-25	Solid	03/19/24 14:38	06/22/24 10:15

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 9-10.5

Date Collected: 03/19/24 11:35
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-1

Matrix: Solid
Percent Solids: 89.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		45	7.1	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Antimony	ND		13	1.2	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Arsenic	ND		2.2	0.58	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Barium	**1.3**	**J**	11	0.54	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Beryllium	ND		1.1	0.34	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Cadmium	ND		1.1	0.071	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Calcium	**760**	**J**	1100	8.5	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Chromium	ND		2.2	0.31	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Cobalt	ND		11	0.20	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Iron	ND		22	13	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Lead	ND		2.2	0.49	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Lithium	ND		11	0.67	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Manganese	**0.27**	**J**	3.3	0.14	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Molybdenum	ND		8.9	0.37	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Selenium	ND		2.2	0.76	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4
Thallium	ND		7.8	0.94	mg/Kg	☼	07/09/24 07:00	07/15/24 12:32	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**7.4**	**J**	33	5.4	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Antimony	ND		10	0.94	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Arsenic	ND		1.7	0.44	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Barium	**1.8**	**J**	8.4	0.40	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Beryllium	**0.089**	**J B**	0.84	0.054	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Cadmium	ND		0.84	0.037	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Calcium	**2300**		840	7.4	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Chromium	ND		1.7	0.23	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Cobalt	ND		8.4	0.21	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Iron	ND		17	9.7	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Lead	ND		1.7	0.37	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Lithium	ND		8.4	0.50	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Manganese	**7.2**		2.5	0.94	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Molybdenum	ND		6.7	0.27	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Selenium	ND		1.7	0.57	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3
Thallium	ND		5.9	0.70	mg/Kg	☼	07/09/24 07:00	07/15/24 13:46	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**74**		11	2.3	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Antimony	ND		3.3	0.31	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Arsenic	**0.23**	**J**	0.56	0.15	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Barium	**3.2**		2.8	0.13	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Beryllium	**0.055**	**J**	0.28	0.017	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Calcium	**8.4**	**J**	280	1.7	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Chromium	**0.18**	**J**	0.56	0.078	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Cobalt	**4.2**		2.8	0.050	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Iron	**190**		5.6	3.2	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Lead	ND		0.56	0.12	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Lithium	ND		2.8	0.17	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1

Client Sample ID: G219 9-10.5

Date Collected: 03/19/24 11:35
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-1

Matrix: Solid
Percent Solids: 89.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**210**	**B**	0.84	0.030	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Molybdenum	ND		2.2	0.091	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Selenium	ND		0.56	0.19	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1
Thallium	ND		2.0	0.23	mg/Kg	☼	07/10/24 07:00	07/15/24 15:01	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**520**		11	1.8	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Antimony	ND		3.3	0.50	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Arsenic	**0.84**		0.56	0.25	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Barium	**32**		2.8	0.13	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Beryllium	**0.11**	**J**	0.28	0.018	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Calcium	**11000**		280	2.5	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Chromium	**1.5**	**B**	0.56	0.078	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Cobalt	**3.2**		2.8	0.059	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Iron	**4500**		5.6	3.2	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Lead	**4.9**		0.56	0.12	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Lithium	**1.1**	**J**	2.8	0.17	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Manganese	**160**		0.84	0.15	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Molybdenum	ND		2.2	0.091	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Selenium	**0.58**	**B**	0.56	0.52	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1
Thallium	ND		2.0	0.32	mg/Kg	☼	07/16/24 07:00	07/22/24 12:35	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**240**		170	26	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Antimony	ND		50	4.7	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Arsenic	ND		8.4	2.1	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Barium	**8.4**	**J**	42	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Beryllium	ND		4.2	0.35	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Cadmium	ND		4.2	0.18	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Calcium	**7700**		4200	12	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Chromium	**1.7**	**J**	8.4	1.2	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Cobalt	ND		42	0.67	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Iron	ND		84	49	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Lead	ND		8.4	1.8	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Lithium	**2.6**	**J**	42	2.5	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Manganese	**12**	**J**	13	2.1	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Molybdenum	ND		33	1.4	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Selenium	ND		8.4	2.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5
Thallium	ND		29	3.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:49	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**3400**		11	1.8	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Antimony	ND		3.3	0.31	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Arsenic	**1.1**		0.56	0.17	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Barium	**7.5**		2.8	0.13	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Beryllium	**0.10**	**J**	0.28	0.013	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1

Client Sample ID: G219 9-10.5

Date Collected: 03/19/24 11:35
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-1

Matrix: Solid
Percent Solids: 89.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Calcium	**4400**		280	2.3	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Chromium	**4.8**		0.56	0.078	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Cobalt	**1.9**	**J**	2.8	0.051	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Iron	**4400**		5.6	3.2	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Lead	**2.5**		0.56	0.12	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Lithium	**4.3**		2.8	0.17	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Manganese	**59**		0.84	0.28	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Molybdenum	ND		2.2	0.11	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Selenium	ND		0.56	0.19	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1
Thallium	ND		2.0	0.23	mg/Kg	☼	07/16/24 11:00	07/22/24 15:04	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**20000**		110	18	mg/Kg	☼	07/17/24 07:00	07/23/24 13:36	10
Antimony	ND		3.3	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Arsenic	**1.2**		1.1	0.67	mg/Kg	☼	07/17/24 07:00	07/24/24 11:42	2
Barium	**200**		2.8	0.051	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Beryllium	**0.27**	**J**	0.28	0.018	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Calcium	**1600**		280	6.4	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Chromium	**9.7**		0.56	0.078	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Cobalt	**0.63**	**J**	5.6	0.058	mg/Kg	☼	07/17/24 07:00	07/24/24 11:42	2
Iron	**2700**		5.6	4.6	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Lead	**2.3**		1.1	0.25	mg/Kg	☼	07/17/24 07:00	07/24/24 11:42	2
Lithium	**7.4**		2.8	0.17	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Manganese	**34**		0.84	0.35	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Molybdenum	ND		2.2	0.091	mg/Kg	☼	07/17/24 07:00	07/23/24 15:43	1
Selenium	ND		1.1	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 11:42	2
Thallium	**0.81**	**J**	3.9	0.40	mg/Kg	☼	07/17/24 07:00	07/24/24 11:42	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**24000**		10	1.6	mg/Kg			07/25/24 13:48	1
Antimony	ND		3.0	0.14	mg/Kg			07/25/24 13:48	1
Arsenic	**3.4**		0.50	0.13	mg/Kg			07/25/24 13:48	1
Barium	**250**		2.5	0.12	mg/Kg			07/25/24 13:48	1
Beryllium	**0.63**		0.25	0.0075	mg/Kg			07/25/24 13:48	1
Cadmium	ND		0.25	0.011	mg/Kg			07/25/24 13:48	1
Calcium	**28000**		250	0.74	mg/Kg			07/25/24 13:48	1
Chromium	**18**		0.50	0.070	mg/Kg			07/25/24 13:48	1
Cobalt	**9.9**		2.5	0.023	mg/Kg			07/25/24 13:48	1
Iron	**12000**		5.0	4.1	mg/Kg			07/25/24 13:48	1
Lead	**9.7**		0.50	0.11	mg/Kg			07/25/24 13:48	1
Lithium	**15**		2.5	0.15	mg/Kg			07/25/24 13:48	1
Manganese	**480**		0.75	0.052	mg/Kg			07/25/24 13:48	1
Molybdenum	ND		2.0	0.082	mg/Kg			07/25/24 13:48	1
Selenium	**0.58**		0.50	0.17	mg/Kg			07/25/24 13:48	1
Thallium	**0.81**	**J**	1.8	0.18	mg/Kg			07/25/24 13:48	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 9-10.5

Date Collected: 03/19/24 11:35
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-1

Matrix: Solid
Percent Solids: 89.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	9400		110	18	mg/Kg	☼	07/17/24 07:00	07/23/24 14:34	10
Antimony	ND		3.3	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Arsenic	3.5		1.1	0.67	mg/Kg	☼	07/17/24 07:00	07/24/24 12:41	2
Barium	340		28	0.51	mg/Kg	☼	07/17/24 07:00	07/23/24 14:34	10
Beryllium	0.48		0.28	0.018	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Calcium	36000		2800	64	mg/Kg	☼	07/17/24 07:00	07/23/24 14:34	10
Chromium	18	B	0.56	0.078	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Cobalt	7.2		5.6	0.058	mg/Kg	☼	07/17/24 07:00	07/24/24 12:41	2
Iron	12000		5.6	4.6	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Lead	11		1.1	0.25	mg/Kg	☼	07/17/24 07:00	07/24/24 12:41	2
Lithium	13		2.8	0.17	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Manganese	380		0.84	0.35	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Molybdenum	0.10	J	2.2	0.091	mg/Kg	☼	07/17/24 07:00	07/23/24 16:44	1
Selenium	ND		1.1	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 12:41	2
Thallium	0.58	J	3.9	0.40	mg/Kg	☼	07/17/24 07:00	07/24/24 12:41	2

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Loss on Ignition (SPCC Loss On Ignit.)	15		0.33	0.33	%			07/02/24 13:38	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

Matrix: Solid
Percent Solids: 94.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		42	6.8	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Antimony	ND		13	1.2	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Arsenic	ND		2.1	0.55	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Barium	ND		11	0.51	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Beryllium	ND		1.1	0.33	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Cadmium	ND		1.1	0.068	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Calcium	**960**	**J**	1100	8.1	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Chromium	ND		2.1	0.30	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Cobalt	ND		11	0.19	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Iron	ND		21	12	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Lead	ND		2.1	0.47	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Lithium	ND		11	0.64	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Manganese	**12**		3.2	0.13	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Molybdenum	ND		8.5	0.35	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Selenium	ND		2.1	0.72	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4
Thallium	ND		7.4	0.89	mg/Kg	☼	07/09/24 07:00	07/15/24 12:37	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**18**	**J**	32	5.1	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Antimony	ND		9.5	0.89	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Arsenic	ND		1.6	0.41	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Barium	**1.2**	**J**	7.9	0.38	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Beryllium	**0.064**	**J B**	0.79	0.051	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Cadmium	ND		0.79	0.035	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Calcium	**13000**		790	7.0	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Chromium	**0.24**	**J**	1.6	0.22	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Cobalt	**0.39**	**J**	7.9	0.20	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Iron	**220**		16	9.2	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Lead	**0.73**	**J**	1.6	0.35	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Lithium	ND		7.9	0.48	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Manganese	**49**		2.4	0.89	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Molybdenum	ND		6.4	0.26	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Selenium	ND		1.6	0.54	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3
Thallium	ND		5.6	0.67	mg/Kg	☼	07/09/24 07:00	07/15/24 13:51	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**84**		11	2.2	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Antimony	ND		3.2	0.30	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Arsenic	**0.83**		0.53	0.14	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Barium	**0.52**	**J**	2.6	0.13	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Beryllium	**0.037**	**J**	0.26	0.016	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Cadmium	ND		0.26	0.012	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Calcium	**7.4**	**J**	260	1.6	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Chromium	**0.52**	**J**	0.53	0.074	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Cobalt	**0.43**	**J**	2.6	0.048	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Iron	**2100**		5.3	3.1	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Lead	ND		0.53	0.12	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Lithium	ND		2.6	0.16	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

Matrix: Solid
Percent Solids: 94.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**40**	**B**	0.79	0.029	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Molybdenum	**0.12**	**J**	2.1	0.087	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Selenium	ND		0.53	0.18	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1
Thallium	ND		1.9	0.22	mg/Kg	☼	07/10/24 07:00	07/15/24 15:16	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**290**		11	1.7	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Antimony	ND		3.2	0.48	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Arsenic	**0.30**	**J**	0.53	0.23	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Barium	**11**		2.6	0.13	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Beryllium	**0.059**	**J**	0.26	0.017	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Cadmium	ND		0.26	0.012	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Calcium	**21000**		260	2.3	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Chromium	**1.1**	**B**	0.53	0.074	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Cobalt	**0.65**	**J**	2.6	0.056	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Iron	**2800**		5.3	3.1	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Lead	**2.4**		0.53	0.12	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Lithium	**1.5**	**J**	2.6	0.16	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Manganese	**140**		0.79	0.14	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Molybdenum	**0.090**	**J**	2.1	0.087	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Selenium	**0.63**	**B**	0.53	0.50	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1
Thallium	ND		1.9	0.31	mg/Kg	☼	07/16/24 07:00	07/22/24 12:40	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**160**		160	25	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Antimony	ND		48	4.5	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Arsenic	ND		7.9	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Barium	**3.1**	**J**	40	1.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Beryllium	ND		4.0	0.33	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Cadmium	ND		4.0	0.17	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Calcium	**8800**		4000	12	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Chromium	**1.8**	**J**	7.9	1.1	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Cobalt	ND		40	0.64	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Iron	ND		79	47	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Lead	ND		7.9	1.7	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Lithium	ND		40	2.3	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Manganese	**7.5**	**J**	12	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Molybdenum	ND		32	1.3	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Selenium	ND		7.9	2.8	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5
Thallium	ND		28	3.7	mg/Kg	☼	07/17/24 07:00	07/22/24 13:54	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2900**		11	1.7	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Antimony	ND		3.2	0.30	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Arsenic	**2.3**		0.53	0.16	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Barium	**6.6**		2.6	0.13	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Beryllium	**0.096**	**J**	0.26	0.013	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

Matrix: Solid
Percent Solids: 94.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.26	0.012	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Calcium	**7400**		260	2.2	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Chromium	**4.7**		0.53	0.074	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Cobalt	**1.8**	**J**	2.6	0.049	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Iron	**5400**		5.3	3.1	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Lead	**2.2**		0.53	0.12	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Lithium	**5.9**		2.6	0.16	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Manganese	**54**		0.79	0.26	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Molybdenum	**0.14**	**J**	2.1	0.10	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Selenium	ND		0.53	0.18	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1
Thallium	ND		1.9	0.22	mg/Kg	☼	07/16/24 11:00	07/22/24 15:19	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**26000**		110	17	mg/Kg	☼	07/17/24 07:00	07/23/24 13:41	10
Antimony	ND		3.2	0.15	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Arsenic	**1.4**		1.1	0.64	mg/Kg	☼	07/17/24 07:00	07/24/24 11:47	2
Barium	**230**		2.6	0.049	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Beryllium	**0.44**		0.26	0.017	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Cadmium	ND		0.26	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Calcium	**3400**		2600	60	mg/Kg	☼	07/17/24 07:00	07/23/24 13:41	10
Chromium	**12**		0.53	0.074	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Cobalt	**0.93**	**J**	5.3	0.055	mg/Kg	☼	07/17/24 07:00	07/24/24 11:47	2
Iron	**4000**		5.3	4.3	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Lead	**2.9**		1.1	0.23	mg/Kg	☼	07/17/24 07:00	07/24/24 11:47	2
Lithium	**8.2**		2.6	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Manganese	**60**		0.79	0.33	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Molybdenum	ND		2.1	0.087	mg/Kg	☼	07/17/24 07:00	07/23/24 15:48	1
Selenium	ND		1.1	0.36	mg/Kg	☼	07/17/24 07:00	07/24/24 11:47	2
Thallium	**1.1**	**J**	3.7	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 11:47	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**29000**		10	1.6	mg/Kg			07/25/24 13:48	1
Antimony	ND		3.0	0.14	mg/Kg			07/25/24 13:48	1
Arsenic	**4.8**		0.50	0.13	mg/Kg			07/25/24 13:48	1
Barium	**250**		2.5	0.12	mg/Kg			07/25/24 13:48	1
Beryllium	**0.69**		0.25	0.0075	mg/Kg			07/25/24 13:48	1
Cadmium	ND		0.25	0.011	mg/Kg			07/25/24 13:48	1
Calcium	**54000**		250	0.74	mg/Kg			07/25/24 13:48	1
Chromium	**20**		0.50	0.070	mg/Kg			07/25/24 13:48	1
Cobalt	**4.2**		2.5	0.023	mg/Kg			07/25/24 13:48	1
Iron	**15000**		5.0	4.1	mg/Kg			07/25/24 13:48	1
Lead	**8.2**		0.50	0.11	mg/Kg			07/25/24 13:48	1
Lithium	**16**		2.5	0.15	mg/Kg			07/25/24 13:48	1
Manganese	**360**		0.75	0.052	mg/Kg			07/25/24 13:48	1
Molybdenum	**0.35**	**J**	2.0	0.082	mg/Kg			07/25/24 13:48	1
Selenium	**0.63**		0.50	0.17	mg/Kg			07/25/24 13:48	1
Thallium	**1.1**	**J**	1.8	0.18	mg/Kg			07/25/24 13:48	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

Matrix: Solid
Percent Solids: 94.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**19000**		110	17	mg/Kg	☼	07/17/24 07:00	07/23/24 14:39	10
Antimony	ND		3.2	0.15	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Arsenic	**6.2**		1.1	0.64	mg/Kg	☼	07/17/24 07:00	07/24/24 12:46	2
Barium	**270**		26	0.49	mg/Kg	☼	07/17/24 07:00	07/23/24 14:39	10
Beryllium	**0.48**		0.26	0.017	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Cadmium	ND		0.26	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Calcium	**55000**		2600	60	mg/Kg	☼	07/17/24 07:00	07/23/24 14:39	10
Chromium	**17**	**B**	0.53	0.074	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Cobalt	**4.3**	**J**	5.3	0.055	mg/Kg	☼	07/17/24 07:00	07/24/24 12:46	2
Iron	**11000**		5.3	4.3	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Lead	**8.3**		1.1	0.23	mg/Kg	☼	07/17/24 07:00	07/24/24 12:46	2
Lithium	**13**		2.6	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Manganese	**280**		0.79	0.33	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Molybdenum	**0.73**	**J**	2.1	0.087	mg/Kg	☼	07/17/24 07:00	07/23/24 16:50	1
Selenium	ND		1.1	0.36	mg/Kg	☼	07/17/24 07:00	07/24/24 12:46	2
Thallium	ND		3.7	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 12:46	2

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Loss on Ignition (SPCC Loss On Ignit.)	**16**		0.31	0.31	%			07/02/24 13:38	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 19.5-20

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-3

Matrix: Solid
Percent Solids: 88.8

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		45	7.2	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Antimony	ND		14	1.3	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Arsenic	ND		2.3	0.59	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Barium	**1.8**	**J**	11	0.54	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Beryllium	ND		1.1	0.35	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Cadmium	ND		1.1	0.072	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Calcium	**390**	**J**	1100	8.6	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Chromium	ND		2.3	0.32	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Cobalt	ND		11	0.20	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Iron	ND		23	13	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Lead	ND		2.3	0.50	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Lithium	ND		11	0.68	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Manganese	**1.3**	**J**	3.4	0.14	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Molybdenum	ND		9.0	0.37	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Selenium	ND		2.3	0.77	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4
Thallium	ND		7.9	0.95	mg/Kg	☼	07/09/24 07:00	07/15/24 12:42	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.4**	**J**	34	5.4	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Antimony	ND		10	0.95	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Arsenic	ND		1.7	0.44	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Barium	**1.3**	**J**	8.4	0.41	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Beryllium	**0.079**	**J B**	0.84	0.054	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Cadmium	ND		0.84	0.037	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Calcium	**54**	**J**	840	7.4	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Chromium	ND		1.7	0.24	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Cobalt	ND		8.4	0.21	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Iron	ND		17	9.8	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Lead	ND		1.7	0.37	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Lithium	ND		8.4	0.51	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Manganese	**1.5**	**J**	2.5	0.95	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Molybdenum	ND		6.8	0.28	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Selenium	ND		1.7	0.57	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3
Thallium	ND		5.9	0.71	mg/Kg	☼	07/09/24 07:00	07/15/24 13:56	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**81**		11	2.4	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Antimony	ND		3.4	0.32	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Arsenic	**0.67**		0.56	0.15	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Barium	**24**		2.8	0.14	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Beryllium	**0.036**	**J**	0.28	0.017	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Cadmium	**0.033**	**J**	0.28	0.012	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Calcium	**5.7**	**J**	280	1.7	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Chromium	**0.25**	**J**	0.56	0.079	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Cobalt	**1.3**	**J**	2.8	0.051	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Iron	**120**		5.6	3.3	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Lead	**1.1**		0.56	0.12	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Lithium	ND		2.8	0.17	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1

Client Sample ID: G220 19.5-20

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-3

Matrix: Solid
Percent Solids: 88.8

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**470**	**B**	0.84	0.030	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Molybdenum	**0.11**	**J**	2.3	0.092	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Selenium	ND		0.56	0.19	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1
Thallium	ND		2.0	0.24	mg/Kg	☼	07/10/24 07:00	07/15/24 15:21	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		11	1.8	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Antimony	ND		3.4	0.51	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Arsenic	**1.7**		0.56	0.25	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Barium	**37**		2.8	0.14	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Beryllium	**0.10**	**J**	0.28	0.018	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Calcium	**220**	**J**	280	2.5	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Chromium	**3.3**	**B**	0.56	0.079	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Cobalt	**2.5**	**J**	2.8	0.060	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Iron	**7600**		5.6	3.3	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Lead	**3.1**		0.56	0.12	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Lithium	**1.2**	**J**	2.8	0.17	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Manganese	**380**		0.84	0.15	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Molybdenum	**0.17**	**J**	2.3	0.092	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Selenium	**0.62**	**B**	0.56	0.53	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1
Thallium	ND		2.0	0.33	mg/Kg	☼	07/16/24 07:00	07/22/24 12:45	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**160**	**J**	170	26	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Antimony	ND		51	4.7	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Arsenic	ND		8.4	2.1	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Barium	**4.9**	**J**	42	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Beryllium	ND		4.2	0.35	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Cadmium	ND		4.2	0.18	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Calcium	**52**	**J**	4200	12	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Chromium	**1.7**	**J**	8.4	1.2	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Cobalt	ND		42	0.68	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Iron	ND		84	50	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Lead	ND		8.4	1.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Lithium	ND		42	2.5	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Manganese	**4.9**	**J**	13	2.1	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Molybdenum	ND		34	1.4	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Selenium	ND		8.4	2.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5
Thallium	ND		30	3.9	mg/Kg	☼	07/17/24 07:00	07/22/24 13:59	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2000**		11	1.8	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Antimony	ND		3.4	0.32	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Arsenic	**2.2**		0.56	0.17	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Barium	**12**		2.8	0.14	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Beryllium	**0.059**	**J**	0.28	0.014	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1

Client Sample ID: G220 19.5-20

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-3

Matrix: Solid
Percent Solids: 88.8

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Calcium	**130**	**J**	280	2.4	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Chromium	**2.4**		0.56	0.079	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Cobalt	**1.7**	**J**	2.8	0.052	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Iron	**7500**		5.6	3.3	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Lead	**0.91**		0.56	0.12	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Lithium	**2.4**	**J**	2.8	0.17	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Manganese	**130**		0.84	0.28	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Molybdenum	ND		2.3	0.11	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Selenium	ND		0.56	0.19	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1
Thallium	ND		2.0	0.24	mg/Kg	☼	07/16/24 11:00	07/22/24 15:24	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**16000**		110	18	mg/Kg	☼	07/17/24 07:00	07/23/24 13:45	10
Antimony	**0.28**	**J**	3.4	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Arsenic	**1.6**		1.1	0.68	mg/Kg	☼	07/17/24 07:00	07/24/24 11:52	2
Barium	**170**		2.8	0.052	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Beryllium	**0.22**	**J**	0.28	0.018	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Calcium	**1700**		280	6.4	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Chromium	**5.6**		0.56	0.079	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Cobalt	**0.51**	**J**	5.6	0.059	mg/Kg	☼	07/17/24 07:00	07/24/24 11:52	2
Iron	**1900**		5.6	4.6	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Lead	**2.1**		1.1	0.25	mg/Kg	☼	07/17/24 07:00	07/24/24 11:52	2
Lithium	**5.8**		2.8	0.17	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Manganese	**27**		0.84	0.35	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Molybdenum	ND		2.3	0.092	mg/Kg	☼	07/17/24 07:00	07/23/24 15:53	1
Selenium	ND		1.1	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 11:52	2
Thallium	**0.68**	**J**	3.9	0.41	mg/Kg	☼	07/17/24 07:00	07/24/24 11:52	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**20000**		10	1.6	mg/Kg			07/25/24 13:48	1
Antimony	**0.28**	**J**	3.0	0.14	mg/Kg			07/25/24 13:48	1
Arsenic	**6.1**		0.50	0.13	mg/Kg			07/25/24 13:48	1
Barium	**250**		2.5	0.12	mg/Kg			07/25/24 13:48	1
Beryllium	**0.50**		0.25	0.0075	mg/Kg			07/25/24 13:48	1
Cadmium	**0.033**	**J**	0.25	0.011	mg/Kg			07/25/24 13:48	1
Calcium	**2600**		250	0.74	mg/Kg			07/25/24 13:48	1
Chromium	**13**		0.50	0.070	mg/Kg			07/25/24 13:48	1
Cobalt	**5.9**		2.5	0.023	mg/Kg			07/25/24 13:48	1
Iron	**17000**		5.0	4.1	mg/Kg			07/25/24 13:48	1
Lead	**7.2**		0.50	0.11	mg/Kg			07/25/24 13:48	1
Lithium	**9.4**		2.5	0.15	mg/Kg			07/25/24 13:48	1
Manganese	**1000**		0.75	0.052	mg/Kg			07/25/24 13:48	1
Molybdenum	**0.28**	**J**	2.0	0.082	mg/Kg			07/25/24 13:48	1
Selenium	**0.62**		0.50	0.17	mg/Kg			07/25/24 13:48	1
Thallium	**0.68**	**J**	1.8	0.18	mg/Kg			07/25/24 13:48	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 19.5-20

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-3

Matrix: Solid
Percent Solids: 88.8

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	23000		110	18	mg/Kg	☼	07/17/24 07:00	07/23/24 14:44	10
Antimony	ND		3.4	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Arsenic	5.3		1.1	0.68	mg/Kg	☼	07/17/24 07:00	07/24/24 12:51	2
Barium	270		28	0.52	mg/Kg	☼	07/17/24 07:00	07/23/24 14:44	10
Beryllium	0.37		0.28	0.018	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Cadmium	ND		0.28	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Calcium	2800		2800	64	mg/Kg	☼	07/17/24 07:00	07/23/24 14:44	10
Chromium	12	B	0.56	0.079	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Cobalt	3.7	J	5.6	0.059	mg/Kg	☼	07/17/24 07:00	07/24/24 12:51	2
Iron	11000		5.6	4.6	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Lead	6.9		1.1	0.25	mg/Kg	☼	07/17/24 07:00	07/24/24 12:51	2
Lithium	8.5		2.8	0.17	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Manganese	370		0.84	0.35	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Molybdenum	0.27	J	2.3	0.092	mg/Kg	☼	07/17/24 07:00	07/23/24 16:56	1
Selenium	ND		1.1	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 12:51	2
Thallium	0.69	J	3.9	0.41	mg/Kg	☼	07/17/24 07:00	07/24/24 12:51	2

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Loss on Ignition (SPCC Loss On Ignit.)	12		0.32	0.32	%			07/02/24 13:38	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 21-25

Date Collected: 03/19/24 14:38
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-4

Matrix: Solid
Percent Solids: 93.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		43	6.8	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Antimony	ND		13	1.2	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Arsenic	ND		2.1	0.56	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Barium	ND		11	0.51	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Beryllium	ND		1.1	0.33	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Cadmium	ND		1.1	0.068	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Calcium	**890**	**J**	1100	8.1	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Chromium	ND		2.1	0.30	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Cobalt	ND		11	0.19	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Iron	ND		21	12	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Lead	ND		2.1	0.47	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Lithium	ND		11	0.64	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Manganese	**12**		3.2	0.13	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Molybdenum	ND		8.5	0.35	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Selenium	ND		2.1	0.73	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4
Thallium	ND		7.5	0.90	mg/Kg	☼	07/09/24 07:00	07/15/24 12:52	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**18**	**J**	32	5.1	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Antimony	ND		9.6	0.90	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Arsenic	ND		1.6	0.42	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Barium	**1.2**	**J**	8.0	0.38	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Beryllium	**0.093**	**J B**	0.80	0.051	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Cadmium	ND		0.80	0.035	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Calcium	**12000**		800	7.0	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Chromium	**0.26**	**J**	1.6	0.22	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Cobalt	**0.45**	**J**	8.0	0.20	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Iron	**290**		16	9.3	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Lead	**0.71**	**J**	1.6	0.35	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Lithium	ND		8.0	0.48	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Manganese	**53**		2.4	0.90	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Molybdenum	ND		6.4	0.26	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Selenium	ND		1.6	0.54	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3
Thallium	ND		5.6	0.67	mg/Kg	☼	07/09/24 07:00	07/15/24 14:21	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**79**		11	2.2	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Antimony	ND		3.2	0.30	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Arsenic	**0.74**		0.53	0.14	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Barium	**0.35**	**J**	2.7	0.13	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Beryllium	**0.028**	**J**	0.27	0.016	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Cadmium	ND		0.27	0.012	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Calcium	**7.7**	**J**	270	1.6	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Chromium	**0.62**		0.53	0.075	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Cobalt	**0.41**	**J**	2.7	0.048	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Iron	**1700**		5.3	3.1	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Lead	ND		0.53	0.12	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Lithium	ND		2.7	0.16	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1

Client Sample ID: G220 21-25

Date Collected: 03/19/24 14:38
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-4

Matrix: Solid
Percent Solids: 93.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**36**	**B**	0.80	0.029	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Molybdenum	**0.13**	**J**	2.1	0.088	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Selenium	ND		0.53	0.18	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1
Thallium	ND		1.9	0.22	mg/Kg	☼	07/10/24 07:00	07/15/24 15:32	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**270**		11	1.7	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Antimony	ND		3.2	0.48	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Arsenic	ND		0.53	0.23	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Barium	**8.7**		2.7	0.13	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Beryllium	**0.052**	**J**	0.27	0.017	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Cadmium	ND		0.27	0.012	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Calcium	**22000**		270	2.3	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Chromium	**1.1**	**B**	0.53	0.075	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Cobalt	**0.66**	**J**	2.7	0.057	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Iron	**2800**		5.3	3.1	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Lead	**2.2**		0.53	0.12	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Lithium	**1.6**	**J**	2.7	0.16	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Manganese	**160**		0.80	0.14	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Molybdenum	ND		2.1	0.088	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Selenium	**0.63**	**B**	0.53	0.50	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1
Thallium	ND		1.9	0.31	mg/Kg	☼	07/16/24 07:00	07/22/24 12:55	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**110**	**J**	160	25	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Antimony	ND		48	4.5	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Arsenic	**3.3**	**J**	8.0	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Barium	**2.3**	**J**	40	1.9	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Beryllium	ND		4.0	0.34	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Cadmium	ND		4.0	0.17	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Calcium	**8400**		4000	12	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Chromium	**2.2**	**J**	8.0	1.1	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Cobalt	ND		40	0.64	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Iron	ND		80	47	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Lead	ND		8.0	1.8	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Lithium	ND		40	2.3	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Manganese	**21**		12	2.0	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Molybdenum	ND		32	1.3	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Selenium	ND		8.0	2.8	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5
Thallium	ND		28	3.7	mg/Kg	☼	07/17/24 07:00	07/22/24 14:24	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2800**		11	1.7	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Antimony	ND		3.2	0.30	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Arsenic	**3.5**		0.53	0.16	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Barium	**6.5**		2.7	0.13	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Beryllium	**0.096**	**J**	0.27	0.013	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1

Client Sample ID: G220 21-25

Date Collected: 03/19/24 14:38
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-4

Matrix: Solid
Percent Solids: 93.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.27	0.012	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Calcium	**10000**		270	2.2	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Chromium	**4.5**		0.53	0.075	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Cobalt	**2.2**	**J**	2.7	0.049	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Iron	**6400**		5.3	3.1	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Lead	**2.2**		0.53	0.12	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Lithium	**6.2**		2.7	0.16	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Manganese	**71**		0.80	0.27	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Molybdenum	**0.28**	**J**	2.1	0.11	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Selenium	ND		0.53	0.18	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1
Thallium	ND		1.9	0.22	mg/Kg	☼	07/16/24 11:00	07/22/24 15:34	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**23000**		110	17	mg/Kg	☼	07/17/24 07:00	07/23/24 14:10	10
Antimony	ND		3.2	0.15	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Arsenic	**1.6**		1.1	0.64	mg/Kg	☼	07/17/24 07:00	07/24/24 12:02	2
Barium	**200**		2.7	0.049	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Beryllium	**0.39**		0.27	0.017	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Cadmium	ND		0.27	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Calcium	**2100**		270	6.1	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Chromium	**13**		0.53	0.075	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Cobalt	**0.86**	**J**	5.3	0.056	mg/Kg	☼	07/17/24 07:00	07/24/24 12:02	2
Iron	**3300**		5.3	4.4	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Lead	**2.5**		1.1	0.23	mg/Kg	☼	07/17/24 07:00	07/24/24 12:02	2
Lithium	**8.4**		2.7	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Manganese	**38**		0.80	0.33	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Molybdenum	ND		2.1	0.088	mg/Kg	☼	07/17/24 07:00	07/23/24 16:03	1
Selenium	ND		1.1	0.36	mg/Kg	☼	07/17/24 07:00	07/24/24 12:02	2
Thallium	**0.72**	**J**	3.7	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 12:02	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**26000**		10	1.6	mg/Kg			07/25/24 13:48	1
Antimony	ND		3.0	0.14	mg/Kg			07/25/24 13:48	1
Arsenic	**9.2**		0.50	0.13	mg/Kg			07/25/24 13:48	1
Barium	**220**		2.5	0.12	mg/Kg			07/25/24 13:48	1
Beryllium	**0.66**		0.25	0.0075	mg/Kg			07/25/24 13:48	1
Cadmium	ND		0.25	0.011	mg/Kg			07/25/24 13:48	1
Calcium	**55000**		250	0.74	mg/Kg			07/25/24 13:48	1
Chromium	**21**		0.50	0.070	mg/Kg			07/25/24 13:48	1
Cobalt	**4.5**		2.5	0.023	mg/Kg			07/25/24 13:48	1
Iron	**15000**		5.0	4.1	mg/Kg			07/25/24 13:48	1
Lead	**7.7**		0.50	0.11	mg/Kg			07/25/24 13:48	1
Lithium	**16**		2.5	0.15	mg/Kg			07/25/24 13:48	1
Manganese	**390**		0.75	0.052	mg/Kg			07/25/24 13:48	1
Molybdenum	**0.41**	**J**	2.0	0.082	mg/Kg			07/25/24 13:48	1
Selenium	**0.63**		0.50	0.17	mg/Kg			07/25/24 13:48	1
Thallium	**0.72**	**J**	1.8	0.18	mg/Kg			07/25/24 13:48	1

Client Sample Results

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 21-25

Date Collected: 03/19/24 14:38
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-4

Matrix: Solid
Percent Solids: 93.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	14000		110	17	mg/Kg	☼	07/17/24 07:00	07/23/24 15:08	10
Antimony	0.18	J	3.2	0.15	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Arsenic	8.8		1.1	0.64	mg/Kg	☼	07/17/24 07:00	07/24/24 13:01	2
Barium	260		27	0.49	mg/Kg	☼	07/17/24 07:00	07/23/24 15:08	10
Beryllium	0.48		0.27	0.017	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Cadmium	ND		0.27	0.012	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Calcium	59000		2700	61	mg/Kg	☼	07/17/24 07:00	07/23/24 15:08	10
Chromium	17	B	0.53	0.075	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Cobalt	4.7	J	5.3	0.056	mg/Kg	☼	07/17/24 07:00	07/24/24 13:01	2
Iron	12000		5.3	4.4	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Lead	8.8		1.1	0.23	mg/Kg	☼	07/17/24 07:00	07/24/24 13:01	2
Lithium	14		2.7	0.16	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Manganese	300		0.80	0.33	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Molybdenum	1.1	J	2.1	0.088	mg/Kg	☼	07/17/24 07:00	07/23/24 17:06	1
Selenium	ND		1.1	0.36	mg/Kg	☼	07/17/24 07:00	07/24/24 13:01	2
Thallium	0.70	J	3.7	0.38	mg/Kg	☼	07/17/24 07:00	07/24/24 13:01	2

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Loss on Ignition (SPCC Loss On Ignit.)	16		0.36	0.36	%			07/02/24 13:38	1

Default Detection Limits

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

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

Prep: 3010A

SEP: Exchangeable

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.077	mg/Kg
Cadmium	0.25	0.016	mg/Kg
Calcium	250	1.9	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.031	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Prep: 3010A

SEP: Carbonate

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	2.2	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.063	mg/Kg
Iron	5.0	2.9	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.28	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Prep: 3010A

SEP: Non-Crystalline

Analyte	RL	MDL	Units
Aluminum	10	2.1	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.015	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	1.5	mg/Kg
Chromium	0.50	0.070	mg/Kg

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

Analyte	RL	MDL	Units
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.027	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.45	mg/Kg
Arsenic	0.50	0.22	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	2.2	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.053	mg/Kg
Iron	5.0	2.9	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.13	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.47	mg/Kg
Thallium	1.8	0.29	mg/Kg

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

Analyte	RL	MDL	Units
Aluminum	30	4.7	mg/Kg
Antimony	9.0	0.84	mg/Kg
Arsenic	1.5	0.38	mg/Kg
Barium	7.5	0.36	mg/Kg
Beryllium	0.75	0.063	mg/Kg
Cadmium	0.75	0.032	mg/Kg
Calcium	750	2.2	mg/Kg
Chromium	1.5	0.21	mg/Kg
Cobalt	7.5	0.12	mg/Kg
Iron	15	8.8	mg/Kg
Lead	1.5	0.33	mg/Kg
Lithium	7.5	0.44	mg/Kg
Manganese	2.3	0.37	mg/Kg
Molybdenum	6.0	0.25	mg/Kg
Selenium	1.5	0.52	mg/Kg
Thallium	5.3	0.70	mg/Kg

Default Detection Limits

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

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

SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.15	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.012	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	2.1	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.046	mg/Kg
Iron	5.0	2.9	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.25	mg/Kg
Molybdenum	2.0	0.099	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Prep: Residual

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.30	mg/Kg
Barium	2.5	0.046	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	5.7	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.31	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	mg/Kg

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

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.0075	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	0.74	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.023	mg/Kg
Iron	5.0	4.1	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg

Default Detection Limits

Client: Ramboll Americas Engineering Solutions
Job ID: 140-37282-1
Project/Site: Coffeen Nature & Extent SEP

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

Analyte	RL	MDL	Units
Manganese	0.75	0.052	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	mg/Kg

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

Prep: Total

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.30	mg/Kg
Barium	2.5	0.046	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cadmium	0.25	0.011	mg/Kg
Calcium	250	5.7	mg/Kg
Chromium	0.50	0.070	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg
Lead	0.50	0.11	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.31	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	mg/Kg

General Chemistry

Analyte	RL	RL	Units
Loss on Ignition	0.50	0.50	%

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

Lab Sample ID: MB 140-88304/10-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 88304

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Antimony	ND		3.0	0.14	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Arsenic	ND		0.50	0.30	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Barium	ND		2.5	0.046	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Beryllium	ND		0.25	0.016	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Cadmium	ND		0.25	0.011	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Calcium	ND		250	5.7	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Chromium	0.0735	J	0.50	0.070	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Cobalt	ND		2.5	0.026	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Iron	ND		5.0	4.1	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Lead	ND		0.50	0.11	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Lithium	ND		2.5	0.15	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Manganese	ND		0.75	0.31	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Selenium	ND		0.50	0.17	mg/Kg		07/17/24 07:00	07/23/24 13:21	1
Thallium	ND		1.8	0.18	mg/Kg		07/17/24 07:00	07/23/24 13:21	1

Lab Sample ID: LCS 140-88304/11-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 88304

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	99.9		mg/Kg		100	80 - 120
Antimony	25.0	25.1		mg/Kg		100	80 - 125
Arsenic	5.00	4.95		mg/Kg		99	80 - 120
Barium	5.00	5.16		mg/Kg		103	80 - 120
Beryllium	2.50	2.53		mg/Kg		101	80 - 120
Cadmium	2.50	2.55		mg/Kg		102	80 - 125
Calcium	2500	2570		mg/Kg		103	80 - 120
Chromium	10.0	10.6		mg/Kg		106	80 - 120
Cobalt	5.00	5.15		mg/Kg		103	80 - 125
Iron	50.0	52.6		mg/Kg		105	80 - 120
Lead	5.00	4.87		mg/Kg		97	80 - 120
Lithium	5.00	5.14		mg/Kg		103	80 - 120
Manganese	5.00	5.21		mg/Kg		104	80 - 120
Molybdenum	25.0	25.7		mg/Kg		103	80 - 125
Selenium	7.50	7.28		mg/Kg		97	80 - 120
Thallium	20.0	20.4		mg/Kg		102	80 - 120

Lab Sample ID: LCSD 140-88304/12-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 88304

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	99.6		mg/Kg		100	80 - 120	0	30
Antimony	25.0	25.0		mg/Kg		100	80 - 125	0	30
Arsenic	5.00	5.01		mg/Kg		100	80 - 120	1	30
Barium	5.00	5.14		mg/Kg		103	80 - 120	0	30
Beryllium	2.50	2.54		mg/Kg		101	80 - 120	0	30

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

Lab Sample ID: LCSD 140-88304/12-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 89131 — **Prep Batch: 88304**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Cadmium	2.50	2.56		mg/Kg		102	80 - 125	0	30
Calcium	2500	2560		mg/Kg		103	80 - 120	0	30
Chromium	10.0	10.6		mg/Kg		106	80 - 120	0	30
Cobalt	5.00	5.15		mg/Kg		103	80 - 125	0	30
Iron	50.0	52.7		mg/Kg		105	80 - 120	0	30
Lead	5.00	4.88		mg/Kg		98	80 - 120	0	30
Lithium	5.00	5.15		mg/Kg		103	80 - 120	0	30
Manganese	5.00	5.24		mg/Kg		105	80 - 120	0	30
Molybdenum	25.0	25.7		mg/Kg		103	80 - 125	0	30
Selenium	7.50	7.28		mg/Kg		97	80 - 120	0	30
Thallium	20.0	20.5		mg/Kg		103	80 - 120	1	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 89131 — **Prep Batch: 88304**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Aluminum	23000		24200		mg/Kg	☼	7	30
Barium	270		335		mg/Kg	☼	21	30
Calcium	2800		2960		mg/Kg	☼	6	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 89131 — **Prep Batch: 88304**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Antimony	ND		ND		mg/Kg	☼	NC	30
Beryllium	0.37		0.436		mg/Kg	☼	15	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Chromium	12	B	13.6		mg/Kg	☼	16	30
Iron	11000		12000		mg/Kg	☼	11	30
Lithium	8.5		8.51		mg/Kg	☼	0.09	30
Manganese	370		417		mg/Kg	☼	13	30
Molybdenum	0.27	J	0.320	J	mg/Kg	☼	17	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 89170 — **Prep Batch: 88304**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	5.3		6.51		mg/Kg	☼	20	30
Cobalt	3.7	J	4.25	J	mg/Kg	☼	13	30
Lead	6.9		7.30		mg/Kg	☼	5	30
Selenium	ND		ND		mg/Kg	☼	NC	30
Thallium	0.69	J	0.787	J	mg/Kg	☼	13	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-88305/10-B ^4
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 88472

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		40	6.4	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Antimony	ND		12	1.1	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Arsenic	ND		2.0	0.52	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Barium	ND		10	0.48	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Beryllium	ND		1.0	0.31	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Cadmium	ND		1.0	0.064	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Calcium	ND		1000	7.6	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Chromium	ND		2.0	0.28	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Cobalt	ND		10	0.18	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Iron	ND		20	12	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Lead	ND		2.0	0.44	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Lithium	ND		10	0.60	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Manganese	ND		3.0	0.12	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Molybdenum	ND		8.0	0.33	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Selenium	ND		2.0	0.68	mg/Kg		07/09/24 07:00	07/15/24 12:17	4
Thallium	ND		7.0	0.84	mg/Kg		07/09/24 07:00	07/15/24 12:17	4

Lab Sample ID: LCS 140-88305/11-B ^5
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 88472

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	87.4		mg/Kg		87	80 - 120
Antimony	25.0	23.1		mg/Kg		92	80 - 120
Arsenic	5.00	4.35		mg/Kg		87	80 - 120
Barium	5.00	4.66	J	mg/Kg		93	80 - 120
Beryllium	2.50	2.52		mg/Kg		101	80 - 120
Cadmium	2.50	2.32		mg/Kg		93	80 - 120
Calcium	2500	2300		mg/Kg		92	80 - 120
Chromium	10.0	9.49		mg/Kg		95	80 - 120
Cobalt	5.00	4.68	J	mg/Kg		94	80 - 120
Iron	50.0	47.4		mg/Kg		95	80 - 120
Lead	5.00	4.66		mg/Kg		93	80 - 120
Lithium	5.00	4.46	J	mg/Kg		89	80 - 120
Manganese	5.00	4.83		mg/Kg		97	80 - 120
Molybdenum	25.0	23.0		mg/Kg		92	80 - 120
Selenium	7.50	6.60		mg/Kg		88	80 - 120
Thallium	20.0	18.7		mg/Kg		93	80 - 120

Lab Sample ID: LCSD 140-88305/12-B ^5
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 88472

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	86.6		mg/Kg		87	80 - 120	1	30
Antimony	25.0	23.0		mg/Kg		92	80 - 120	0	30
Arsenic	5.00	4.50		mg/Kg		90	80 - 120	4	30
Barium	5.00	4.51	J	mg/Kg		90	80 - 120	3	30
Beryllium	2.50	2.43		mg/Kg		97	80 - 120	4	30

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

Lab Sample ID: LCSD 140-88305/12-B ^5 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Step 1**
Analysis Batch: 88772 — **Prep Batch: 88472**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Cadmium	2.50	2.25		mg/Kg		90	80 - 120	3	30
Calcium	2500	2220		mg/Kg		89	80 - 120	4	30
Chromium	10.0	9.24		mg/Kg		92	80 - 120	3	30
Cobalt	5.00	4.51	J	mg/Kg		90	80 - 120	4	30
Iron	50.0	45.5		mg/Kg		91	80 - 120	4	30
Lead	5.00	4.63		mg/Kg		93	80 - 120	1	30
Lithium	5.00	4.41	J	mg/Kg		88	80 - 120	1	30
Manganese	5.00	4.67		mg/Kg		93	80 - 120	3	30
Molybdenum	25.0	22.2		mg/Kg		89	80 - 120	3	30
Selenium	7.50	6.74		mg/Kg		90	80 - 120	2	30
Thallium	20.0	17.9		mg/Kg		90	80 - 120	4	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Step 1**
Analysis Batch: 88772 — **Prep Batch: 88472**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Aluminum	ND		ND		mg/Kg	☼	NC	30
Antimony	ND		ND		mg/Kg	☼	NC	30
Arsenic	ND		ND		mg/Kg	☼	NC	30
Barium	1.8	J	1.97	J	mg/Kg	☼	7	30
Beryllium	ND		ND		mg/Kg	☼	NC	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Calcium	390	J	394	J	mg/Kg	☼	2	30
Chromium	ND		ND		mg/Kg	☼	NC	30
Cobalt	ND		ND		mg/Kg	☼	NC	30
Iron	ND		ND		mg/Kg	☼	NC	30
Lead	ND		ND		mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Manganese	1.3	J	1.21	J	mg/Kg	☼	11	30
Molybdenum	ND		ND		mg/Kg	☼	NC	30
Selenium	ND		ND		mg/Kg	☼	NC	30
Thallium	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: MB 140-88451/10-B ^3 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Step 2**
Analysis Batch: 88772 — **Prep Batch: 88476**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		30	4.8	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Antimony	ND		9.0	0.84	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Arsenic	ND		1.5	0.39	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Barium	ND		7.5	0.36	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Beryllium	0.0780	J	0.75	0.048	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Cadmium	ND		0.75	0.033	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Calcium	ND		750	6.6	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Chromium	ND		1.5	0.21	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Cobalt	ND		7.5	0.19	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Iron	ND		15	8.7	mg/Kg		07/09/24 07:00	07/15/24 13:31	3

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

Lab Sample ID: MB 140-88451/10-B ^3
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 88476

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.5	0.33	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Lithium	ND		7.5	0.45	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Manganese	ND		2.3	0.84	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Molybdenum	ND		6.0	0.25	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Selenium	ND		1.5	0.51	mg/Kg		07/09/24 07:00	07/15/24 13:31	3
Thallium	ND		5.3	0.63	mg/Kg		07/09/24 07:00	07/15/24 13:31	3

Lab Sample ID: LCS 140-88451/11-B ^5
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 88476

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	ND		mg/Kg		-2	
Antimony	25.0	20.4		mg/Kg		82	70 - 120
Arsenic	5.00	3.65		mg/Kg		73	60 - 120
Barium	5.00	2.24	J	mg/Kg		45	30 - 60
Beryllium	2.50	1.46		mg/Kg		58	40 - 70
Cadmium	2.50	2.40		mg/Kg		96	80 - 120
Calcium	2500	699	J	mg/Kg		28	10 - 40
Chromium	10.0	8.31		mg/Kg		83	60 - 120
Cobalt	5.00	4.67	J	mg/Kg		93	80 - 120
Iron	50.0	ND		mg/Kg		3	
Lead	5.00	4.50		mg/Kg		90	70 - 120
Lithium	5.00	4.48	J	mg/Kg		90	80 - 120
Manganese	5.00	4.84		mg/Kg		97	80 - 120
Molybdenum	25.0	20.4		mg/Kg		82	70 - 120
Selenium	7.50	6.45		mg/Kg		86	70 - 120
Thallium	20.0	18.4		mg/Kg		92	80 - 120

Lab Sample ID: LCSD 140-88451/12-B ^5
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 88476

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	ND		mg/Kg		-0.6		90	
Antimony	25.0	19.9		mg/Kg		80	70 - 120	2	30
Arsenic	5.00	3.88		mg/Kg		78	60 - 120	6	30
Barium	5.00	2.20	J	mg/Kg		44	30 - 60	2	30
Beryllium	2.50	1.42		mg/Kg		57	40 - 70	3	30
Cadmium	2.50	2.36		mg/Kg		95	80 - 120	1	30
Calcium	2500	675	J	mg/Kg		27	10 - 40	4	30
Chromium	10.0	8.09		mg/Kg		81	60 - 120	3	30
Cobalt	5.00	4.61	J	mg/Kg		92	80 - 120	1	30
Iron	50.0	ND		mg/Kg		3		11	
Lead	5.00	4.32		mg/Kg		86	70 - 120	4	30
Lithium	5.00	4.43	J	mg/Kg		89	80 - 120	1	30
Manganese	5.00	4.72		mg/Kg		94	80 - 120	3	30
Molybdenum	25.0	20.1		mg/Kg		80	70 - 120	2	30
Selenium	7.50	6.38		mg/Kg		85	70 - 120	1	30

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

Lab Sample ID: LCSD 140-88451/12-B ^5
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 88476

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Thallium			20.0	18.3		mg/Kg		92	80 - 120	0	30

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: G220 19.5-20
Prep Type: Step 2
Prep Batch: 88476

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Aluminum	6.4	J		6.79	J	mg/Kg	☼			5	
Antimony	ND			ND		mg/Kg	☼			NC	30
Arsenic	ND			ND		mg/Kg	☼			NC	30
Barium	1.3	J		1.49	J	mg/Kg	☼			12	30
Beryllium	0.079	J B		0.0946	J	mg/Kg	☼			17	30
Cadmium	ND			ND		mg/Kg	☼			NC	30
Calcium	54	J		51.7	J	mg/Kg	☼			4	30
Chromium	ND			ND		mg/Kg	☼			NC	30
Cobalt	ND			ND		mg/Kg	☼			NC	30
Iron	ND			ND		mg/Kg	☼			NC	
Lead	ND			ND		mg/Kg	☼			NC	30
Lithium	ND			ND		mg/Kg	☼			NC	30
Manganese	1.5	J		1.57	J	mg/Kg	☼			4	30
Molybdenum	ND			ND		mg/Kg	☼			NC	30
Selenium	ND			ND		mg/Kg	☼			NC	30
Thallium	ND			ND		mg/Kg	☼			NC	30

Lab Sample ID: MB 140-88488/10-B
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 88516

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	2.1	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Antimony	ND		3.0	0.28	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Arsenic	ND		0.50	0.13	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Barium	ND		2.5	0.12	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Beryllium	ND		0.25	0.015	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Cadmium	ND		0.25	0.011	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Calcium	ND		250	1.5	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Chromium	ND		0.50	0.070	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Cobalt	ND		2.5	0.045	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Iron	ND		5.0	2.9	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Lead	ND		0.50	0.11	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Lithium	ND		2.5	0.15	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Manganese	0.0880	J	0.75	0.027	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Selenium	ND		0.50	0.17	mg/Kg		07/10/24 07:00	07/15/24 14:47	1
Thallium	ND		1.8	0.21	mg/Kg		07/10/24 07:00	07/15/24 14:47	1

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

Lab Sample ID: LCS 140-88488/11-B
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 88516

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	95.8		mg/Kg		96	80 - 120
Antimony	25.0	24.7		mg/Kg		99	80 - 120
Arsenic	5.00	4.84		mg/Kg		97	80 - 120
Barium	5.00	4.98		mg/Kg		100	70 - 120
Beryllium	2.50	2.60		mg/Kg		104	80 - 120
Cadmium	2.50	1.76		mg/Kg		70	10 - 120
Calcium	2500	46.9	J	mg/Kg		2	
Chromium	10.0	10.2		mg/Kg		102	80 - 120
Cobalt	5.00	5.11		mg/Kg		102	80 - 120
Iron	50.0	50.2		mg/Kg		100	80 - 120
Lead	5.00	ND		mg/Kg		2	
Lithium	5.00	4.86		mg/Kg		97	80 - 120
Manganese	5.00	5.16		mg/Kg		103	80 - 120
Molybdenum	25.0	24.9		mg/Kg		99	80 - 120
Selenium	7.50	7.57		mg/Kg		101	80 - 120
Thallium	20.0	20.3		mg/Kg		102	80 - 120

Lab Sample ID: LCSD 140-88488/12-B
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 88516

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	93.8		mg/Kg		94	80 - 120	2	30
Antimony	25.0	24.2		mg/Kg		97	80 - 120	2	30
Arsenic	5.00	4.76		mg/Kg		95	80 - 120	2	30
Barium	5.00	4.89		mg/Kg		98	70 - 120	2	30
Beryllium	2.50	2.56		mg/Kg		102	80 - 120	2	30
Cadmium	2.50	1.71		mg/Kg		68	10 - 120	3	30
Calcium	2500	46.8	J	mg/Kg		2		0	
Chromium	10.0	10.1		mg/Kg		101	80 - 120	1	30
Cobalt	5.00	5.02		mg/Kg		100	80 - 120	2	30
Iron	50.0	49.4		mg/Kg		99	80 - 120	2	30
Lead	5.00	ND		mg/Kg		2		6	
Lithium	5.00	4.82		mg/Kg		96	80 - 120	1	30
Manganese	5.00	5.12		mg/Kg		102	80 - 120	1	30
Molybdenum	25.0	24.5		mg/Kg		98	80 - 120	2	30
Selenium	7.50	7.40		mg/Kg		99	80 - 120	2	30
Thallium	20.0	20.0		mg/Kg		100	80 - 120	2	30

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: G220 19.5-20
Prep Type: Step 3
Prep Batch: 88516

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Aluminum	81		79.1		mg/Kg	☼	2	30
Antimony	ND		ND		mg/Kg	☼	NC	30
Arsenic	0.67		0.568		mg/Kg	☼	16	30
Barium	24		14.2	F3	mg/Kg	☼	52	30
Beryllium	0.036	J	0.0327	J	mg/Kg	☼	10	30

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

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 88772

Client Sample ID: G220 19.5-20
Prep Type: Step 3
Prep Batch: 88516

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cadmium	0.033	J	0.0265	J	mg/Kg	☼	23	30
Calcium	5.7	J	6.00	J	mg/Kg	☼	6	
Chromium	0.25	J	0.217	J	mg/Kg	☼	15	30
Cobalt	1.3	J	1.24	J	mg/Kg	☼	3	30
Iron	120		117		mg/Kg	☼	7	30
Lead	1.1		0.929		mg/Kg	☼	14	
Lithium	ND		ND		mg/Kg	☼	NC	30
Manganese	470	B	417		mg/Kg	☼	12	30
Molybdenum	0.11	J	0.0963	J	mg/Kg	☼	16	30
Selenium	ND		ND		mg/Kg	☼	NC	30
Thallium	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: MB 140-88588/10-B
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 88764

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Antimony	ND		3.0	0.45	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Arsenic	ND		0.50	0.22	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Barium	ND		2.5	0.12	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Beryllium	ND		0.25	0.016	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Cadmium	ND		0.25	0.011	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Calcium	ND		250	2.2	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Chromium	0.0965	J	0.50	0.070	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Cobalt	ND		2.5	0.053	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Iron	ND		5.0	2.9	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Lead	ND		0.50	0.11	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Lithium	ND		2.5	0.15	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Manganese	ND		0.75	0.13	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Selenium	0.754		0.50	0.47	mg/Kg		07/16/24 07:00	07/22/24 12:20	1
Thallium	ND		1.8	0.29	mg/Kg		07/16/24 07:00	07/22/24 12:20	1

Lab Sample ID: LCS 140-88588/11-B
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 88764

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	91.5		mg/Kg		92	80 - 120
Antimony	25.0	23.0		mg/Kg		92	80 - 130
Arsenic	5.00	4.72		mg/Kg		94	80 - 130
Barium	5.00	4.68		mg/Kg		94	80 - 120
Beryllium	2.50	2.48		mg/Kg		99	80 - 120
Cadmium	2.50	2.36		mg/Kg		94	80 - 120
Calcium	2500	2320		mg/Kg		93	80 - 120
Chromium	10.0	9.65		mg/Kg		97	80 - 120
Cobalt	5.00	4.74		mg/Kg		95	80 - 120
Iron	50.0	47.1		mg/Kg		94	80 - 120

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

Lab Sample ID: LCS 140-88588/11-B — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Step 4**
Analysis Batch: 89073 — **Prep Batch: 88764**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			5.00	4.62		mg/Kg		92	80 - 120		
Lithium			5.00	4.70		mg/Kg		94	80 - 120		
Manganese			5.00	4.81		mg/Kg		96	80 - 120		
Molybdenum			25.0	24.0		mg/Kg		96	80 - 120		
Selenium			7.50	0.904		mg/Kg		12			
Thallium			20.0	17.6		mg/Kg		88	80 - 120		

Lab Sample ID: LCSD 140-88588/12-B — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Step 4**
Analysis Batch: 89073 — **Prep Batch: 88764**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum			100	95.8		mg/Kg		96	80 - 120	5	30
Antimony			25.0	23.8		mg/Kg		95	80 - 130	4	30
Arsenic			5.00	4.90		mg/Kg		98	80 - 130	4	30
Barium			5.00	4.85		mg/Kg		97	80 - 120	3	30
Beryllium			2.50	2.56		mg/Kg		102	80 - 120	3	30
Cadmium			2.50	2.44		mg/Kg		98	80 - 120	3	30
Calcium			2500	2410		mg/Kg		96	80 - 120	4	30
Chromium			10.0	9.92		mg/Kg		99	80 - 120	3	30
Cobalt			5.00	4.90		mg/Kg		98	80 - 120	3	30
Iron			50.0	49.1		mg/Kg		98	80 - 120	4	30
Lead			5.00	4.75		mg/Kg		95	80 - 120	3	30
Lithium			5.00	4.84		mg/Kg		97	80 - 120	3	30
Manganese			5.00	4.95		mg/Kg		99	80 - 120	3	30
Molybdenum			25.0	24.8		mg/Kg		99	80 - 120	3	30
Selenium			7.50	0.832		mg/Kg		11		8	
Thallium			20.0	18.2		mg/Kg		91	80 - 120	3	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Step 4**
Analysis Batch: 89073 — **Prep Batch: 88764**

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Aluminum	1200			1110		mg/Kg	☼			6	30
Antimony	ND			ND		mg/Kg	☼			NC	30
Arsenic	1.7			1.68		mg/Kg	☼			1	30
Barium	37			18.6	F3	mg/Kg	☼			67	30
Beryllium	0.10	J		0.0963	J	mg/Kg	☼			3	30
Cadmium	ND			ND		mg/Kg	☼			NC	30
Calcium	220	J		213	J	mg/Kg	☼			5	30
Chromium	3.3	B		3.18		mg/Kg	☼			3	30
Cobalt	2.5	J		2.21	J	mg/Kg	☼			12	30
Iron	7600			8170		mg/Kg	☼			7	30
Lead	3.1			2.97		mg/Kg	☼			3	30
Lithium	1.2	J		1.10	J	mg/Kg	☼			12	30
Manganese	380			210	F3	mg/Kg	☼			58	30
Molybdenum	0.17	J		0.157	J	mg/Kg	☼			6	30
Selenium	0.62	B		0.667		mg/Kg	☼			7	

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

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: G220 19.5-20
Prep Type: Step 4
Prep Batch: 88764

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Thallium	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: MB 140-88679/10-B ^5
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 88823

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		150	24	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Antimony	ND		45	4.2	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Arsenic	ND		7.5	1.9	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Barium	ND		38	1.8	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Beryllium	ND		3.8	0.32	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Cadmium	ND		3.8	0.16	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Calcium	ND		3800	11	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Chromium	ND		7.5	1.1	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Cobalt	ND		38	0.60	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Iron	ND		75	44	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Lead	ND		7.5	1.7	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Lithium	ND		38	2.2	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Manganese	ND		11	1.9	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Molybdenum	ND		30	1.3	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Selenium	3.20	J	7.5	2.6	mg/Kg		07/17/24 07:00	07/22/24 13:34	5
Thallium	ND		26	3.5	mg/Kg		07/17/24 07:00	07/22/24 13:34	5

Lab Sample ID: LCS 140-88679/11-B ^5
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 88823

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	300	ND		mg/Kg		7	
Antimony	75.0	69.1		mg/Kg		92	80 - 120
Arsenic	15.0	10.9		mg/Kg		73	60 - 100
Barium	15.0	8.06	J	mg/Kg		54	40 - 70
Beryllium	7.50	3.29	J	mg/Kg		44	40 - 70
Cadmium	7.50	7.35		mg/Kg		98	80 - 130
Calcium	7500	2070	J	mg/Kg		28	20 - 50
Chromium	30.0	30.0		mg/Kg		100	80 - 130
Cobalt	15.0	3.41	J	mg/Kg		23	1 - 60
Iron	150	ND		mg/Kg		2	
Lead	15.0	10.3		mg/Kg		69	40 - 80
Lithium	15.0	16.4	J	mg/Kg		109	80 - 150
Manganese	15.0	3.12	J	mg/Kg		21	1 - 60
Molybdenum	75.0	53.4		mg/Kg		71	60 - 100
Selenium	22.5	25.0		mg/Kg		111	80 - 140
Thallium	60.0	11.5	J	mg/Kg		19	

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

Lab Sample ID: LCSD 140-88679/12-B ^5
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 88823

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum			300	ND		mg/Kg		7		2	
Antimony			75.0	70.5		mg/Kg		94	80 - 120	2	30
Arsenic			15.0	11.0		mg/Kg		73	60 - 100	1	30
Barium			15.0	7.97	J	mg/Kg		53	40 - 70	1	30
Beryllium			7.50	3.53	J	mg/Kg		47	40 - 70	7	30
Cadmium			7.50	7.58		mg/Kg		101	80 - 130	3	30
Calcium			7500	2080	J	mg/Kg		28	20 - 50	1	30
Chromium			30.0	30.3		mg/Kg		101	80 - 130	1	30
Cobalt			15.0	3.57	J	mg/Kg		24	1 - 60	5	30
Iron			150	ND		mg/Kg		0.5		125	
Lead			15.0	10.1		mg/Kg		67	40 - 80	2	30
Lithium			15.0	16.2	J	mg/Kg		108	80 - 150	1	30
Manganese			15.0	2.75	J	mg/Kg		18	1 - 60	13	30
Molybdenum			75.0	56.2		mg/Kg		75	60 - 100	5	30
Selenium			22.5	23.5		mg/Kg		104	80 - 140	6	30
Thallium			60.0	4.72	J	mg/Kg		8		84	

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: G220 19.5-20
Prep Type: Step 5
Prep Batch: 88823

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Aluminum	160	J		154	J	mg/Kg	☼			2	
Antimony	ND			ND		mg/Kg	☼			NC	30
Arsenic	ND			ND		mg/Kg	☼			NC	30
Barium	4.9	J		2.12	J F5	mg/Kg	☼			79	30
Beryllium	ND			ND		mg/Kg	☼			NC	30
Cadmium	ND			ND		mg/Kg	☼			NC	30
Calcium	52	J		63.3	J	mg/Kg	☼			20	30
Chromium	1.7	J		1.99	J	mg/Kg	☼			19	30
Cobalt	ND			ND		mg/Kg	☼			NC	30
Iron	ND			ND		mg/Kg	☼			NC	
Lead	ND			ND		mg/Kg	☼			NC	30
Lithium	ND			ND		mg/Kg	☼			NC	30
Manganese	4.9	J		3.18	J F5	mg/Kg	☼			43	30
Molybdenum	ND			ND		mg/Kg	☼			NC	30
Selenium	ND			ND		mg/Kg	☼			NC	30
Thallium	ND			ND		mg/Kg	☼			NC	

Lab Sample ID: MB 140-88807/10-A
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 88807

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Antimony	ND		3.0	0.28	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Arsenic	ND		0.50	0.15	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Barium	ND		2.5	0.12	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Beryllium	ND		0.25	0.012	mg/Kg		07/16/24 11:00	07/22/24 14:50	1

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

Lab Sample ID: MB 140-88807/10-A
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 88807

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.25	0.011	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Calcium	ND		250	2.1	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Chromium	ND		0.50	0.070	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Cobalt	ND		2.5	0.046	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Iron	ND		5.0	2.9	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Lead	ND		0.50	0.11	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Lithium	ND		2.5	0.15	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Manganese	ND		0.75	0.25	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Molybdenum	ND		2.0	0.099	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Selenium	ND		0.50	0.17	mg/Kg		07/16/24 11:00	07/22/24 14:50	1
Thallium	ND		1.8	0.21	mg/Kg		07/16/24 11:00	07/22/24 14:50	1

Lab Sample ID: LCS 140-88807/11-A
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 88807

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	98.9		mg/Kg		99	80 - 120
Antimony	25.0	25.5		mg/Kg		102	80 - 120
Arsenic	5.00	5.13		mg/Kg		103	80 - 120
Barium	5.00	4.98		mg/Kg		100	80 - 120
Beryllium	2.50	2.65		mg/Kg		106	80 - 120
Cadmium	2.50	2.57		mg/Kg		103	80 - 120
Calcium	2500	2490		mg/Kg		100	80 - 120
Chromium	10.0	10.2		mg/Kg		102	80 - 120
Cobalt	5.00	5.11		mg/Kg		102	80 - 120
Iron	50.0	50.4		mg/Kg		101	80 - 120
Lead	5.00	5.03		mg/Kg		101	80 - 120
Lithium	5.00	5.04		mg/Kg		101	80 - 120
Manganese	5.00	5.11		mg/Kg		102	80 - 120
Molybdenum	25.0	25.5		mg/Kg		102	80 - 120
Selenium	7.50	7.85		mg/Kg		105	80 - 120
Thallium	20.0	21.0		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 140-88807/12-A
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 88807

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	99.1		mg/Kg		99	80 - 120	0	30
Antimony	25.0	25.2		mg/Kg		101	80 - 120	1	30
Arsenic	5.00	5.07		mg/Kg		101	80 - 120	1	30
Barium	5.00	4.98		mg/Kg		100	80 - 120	0	30
Beryllium	2.50	2.62		mg/Kg		105	80 - 120	1	30
Cadmium	2.50	2.55		mg/Kg		102	80 - 120	1	30
Calcium	2500	2480		mg/Kg		99	80 - 120	0	30
Chromium	10.0	10.2		mg/Kg		102	80 - 120	1	30
Cobalt	5.00	5.07		mg/Kg		101	80 - 120	1	30
Iron	50.0	50.4		mg/Kg		101	80 - 120	0	30

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

Lab Sample ID: LCSD 140-88807/12-A
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 88807

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			5.00	5.04		mg/Kg		101	80 - 120	0	30
Lithium			5.00	4.97		mg/Kg		99	80 - 120	1	30
Manganese			5.00	5.07		mg/Kg		101	80 - 120	1	30
Molybdenum			25.0	25.2		mg/Kg		101	80 - 120	1	30
Selenium			7.50	7.81		mg/Kg		104	80 - 120	1	30
Thallium			20.0	20.9		mg/Kg		104	80 - 120	1	30

Lab Sample ID: 140-37282-3 DU
Matrix: Solid
Analysis Batch: 89073

Client Sample ID: G220 19.5-20
Prep Type: Step 6
Prep Batch: 88807

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Aluminum	2000			1810		mg/Kg	☼			8	30
Antimony	ND			ND		mg/Kg	☼			NC	30
Arsenic	2.2			1.89		mg/Kg	☼			16	30
Barium	12			3.57	F3	mg/Kg	☼			107	30
Beryllium	0.059	J		0.0546	J	mg/Kg	☼			8	30
Cadmium	ND			ND		mg/Kg	☼			NC	30
Calcium	130	J		127	J	mg/Kg	☼			4	30
Chromium	2.4			2.28		mg/Kg	☼			6	30
Cobalt	1.7	J		1.35	J	mg/Kg	☼			20	30
Iron	7500			6700		mg/Kg	☼			11	30
Lead	0.91			0.863		mg/Kg	☼			5	30
Lithium	2.4	J		2.19	J	mg/Kg	☼			9	30
Manganese	130			105		mg/Kg	☼			24	30
Molybdenum	ND			ND		mg/Kg	☼			NC	30
Selenium	ND			ND		mg/Kg	☼			NC	30
Thallium	ND			ND		mg/Kg	☼			NC	30

Lab Sample ID: MB 140-88837/10-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 88837

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Antimony	ND		3.0	0.14	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Arsenic	ND		0.50	0.30	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Barium	ND		2.5	0.046	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Beryllium	ND		0.25	0.016	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Cadmium	ND		0.25	0.011	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Calcium	ND		250	5.7	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Chromium	ND		0.50	0.070	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Cobalt	ND		2.5	0.026	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Iron	ND		5.0	4.1	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Lead	ND		0.50	0.11	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Lithium	ND		2.5	0.15	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Manganese	ND		0.75	0.31	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/17/24 07:00	07/23/24 13:06	1
Selenium	ND		0.50	0.17	mg/Kg		07/17/24 07:00	07/23/24 13:06	1

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

Lab Sample ID: MB 140-88837/10-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 88837

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	ND		1.8	0.18	mg/Kg		07/17/24 07:00	07/23/24 13:06	1

Lab Sample ID: LCS 140-88837/11-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 88837

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	100	101		mg/Kg		101	80 - 120
Antimony	25.0	25.2		mg/Kg		101	80 - 125
Arsenic	5.00	5.06		mg/Kg		101	80 - 120
Barium	5.00	5.20		mg/Kg		104	80 - 120
Beryllium	2.50	2.56		mg/Kg		102	80 - 120
Cadmium	2.50	2.56		mg/Kg		103	80 - 125
Calcium	2500	2580		mg/Kg		103	80 - 120
Chromium	10.0	10.6		mg/Kg		106	80 - 120
Cobalt	5.00	5.19		mg/Kg		104	80 - 125
Iron	50.0	53.1		mg/Kg		106	80 - 120
Lead	5.00	5.00		mg/Kg		100	80 - 120
Lithium	5.00	5.26		mg/Kg		105	80 - 120
Manganese	5.00	5.27		mg/Kg		105	80 - 120
Molybdenum	25.0	25.8		mg/Kg		103	80 - 125
Selenium	7.50	7.30		mg/Kg		97	80 - 120
Thallium	20.0	20.6		mg/Kg		103	80 - 120

Lab Sample ID: LCSD 140-88837/12-A
Matrix: Solid
Analysis Batch: 89131

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 88837

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Aluminum	100	99.6		mg/Kg		100	80 - 120	1	30
Antimony	25.0	24.9		mg/Kg		100	80 - 125	1	30
Arsenic	5.00	4.98		mg/Kg		100	80 - 120	2	30
Barium	5.00	5.14		mg/Kg		103	80 - 120	1	30
Beryllium	2.50	2.52		mg/Kg		101	80 - 120	2	30
Cadmium	2.50	2.55		mg/Kg		102	80 - 125	1	30
Calcium	2500	2560		mg/Kg		102	80 - 120	1	30
Chromium	10.0	10.5		mg/Kg		105	80 - 120	1	30
Cobalt	5.00	5.15		mg/Kg		103	80 - 125	1	30
Iron	50.0	52.4		mg/Kg		105	80 - 120	1	30
Lead	5.00	4.91		mg/Kg		98	80 - 120	2	30
Lithium	5.00	5.12		mg/Kg		102	80 - 120	3	30
Manganese	5.00	5.21		mg/Kg		104	80 - 120	1	30
Molybdenum	25.0	25.6		mg/Kg		102	80 - 125	1	30
Selenium	7.50	7.37		mg/Kg		98	80 - 120	1	30
Thallium	20.0	20.4		mg/Kg		102	80 - 120	1	30

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

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Step 7**
Analysis Batch: 89131 — **Prep Batch: 88837**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Aluminum	16000		16300		mg/Kg	☼	0.3	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Step 7**
Analysis Batch: 89131 — **Prep Batch: 88837**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Antimony	0.28	J	0.224	J	mg/Kg	☼	21	30
Barium	170		191		mg/Kg	☼	10	30
Beryllium	0.22	J	0.228	J	mg/Kg	☼	3	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Calcium	1700		1340		mg/Kg	☼	26	30
Chromium	5.6		5.52		mg/Kg	☼	0.8	30
Iron	1900		1870		mg/Kg	☼	3	30
Lithium	5.8		5.73		mg/Kg	☼	0.8	30
Manganese	27		23.8		mg/Kg	☼	12	30
Molybdenum	ND		ND		mg/Kg	☼	NC	30

Lab Sample ID: 140-37282-3 DU — **Client Sample ID: G220 19.5-20**
Matrix: Solid — **Prep Type: Step 7**
Analysis Batch: 89170 — **Prep Batch: 88837**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	1.6		1.19		mg/Kg	☼	30	30
Cobalt	0.51	J	0.482	J	mg/Kg	☼	6	30
Lead	2.1		2.04		mg/Kg	☼	3	30
Selenium	ND		ND		mg/Kg	☼	NC	30
Thallium	0.68	J	0.787	J	mg/Kg	☼	14	30

Method: Loss On Ignit. - Loss On Ignition

Lab Sample ID: MB 140-88351/1 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 88351

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Loss on Ignition	ND		0.49	0.49	%			07/02/24 13:38	1

Lab Sample ID: 140-37282-1 DU — **Client Sample ID: G219 9-10.5**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 88351

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Loss on Ignition	15		19.8	F3	%		27	10

Metals

Prep Batch: 88304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Total/NA	Solid	Total	
140-37282-2	G219 11-20	Total/NA	Solid	Total	
140-37282-3	G220 19.5-20	Total/NA	Solid	Total	
140-37282-4	G220 21-25	Total/NA	Solid	Total	
MB 140-88304/10-A	Method Blank	Total/NA	Solid	Total	
LCS 140-88304/11-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-88304/12-A	Lab Control Sample Dup	Total/NA	Solid	Total	
140-37282-3 DU	G220 19.5-20	Total/NA	Solid	Total	

SEP Batch: 88305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 1	Solid	Exchangeable	
140-37282-2	G219 11-20	Step 1	Solid	Exchangeable	
140-37282-3	G220 19.5-20	Step 1	Solid	Exchangeable	
140-37282-4	G220 21-25	Step 1	Solid	Exchangeable	
MB 140-88305/10-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-88305/11-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-88305/12-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	
140-37282-3 DU	G220 19.5-20	Step 1	Solid	Exchangeable	

SEP Batch: 88451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 2	Solid	Carbonate	
140-37282-2	G219 11-20	Step 2	Solid	Carbonate	
140-37282-3	G220 19.5-20	Step 2	Solid	Carbonate	
140-37282-4	G220 21-25	Step 2	Solid	Carbonate	
MB 140-88451/10-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-88451/11-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-88451/12-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	
140-37282-3 DU	G220 19.5-20	Step 2	Solid	Carbonate	

Prep Batch: 88472

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 1	Solid	3010A	88305
140-37282-2	G219 11-20	Step 1	Solid	3010A	88305
140-37282-3	G220 19.5-20	Step 1	Solid	3010A	88305
140-37282-4	G220 21-25	Step 1	Solid	3010A	88305
MB 140-88305/10-B ^4	Method Blank	Step 1	Solid	3010A	88305
LCS 140-88305/11-B ^5	Lab Control Sample	Step 1	Solid	3010A	88305
LCSD 140-88305/12-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	88305
140-37282-3 DU	G220 19.5-20	Step 1	Solid	3010A	88305

Prep Batch: 88476

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 2	Solid	3010A	88451
140-37282-2	G219 11-20	Step 2	Solid	3010A	88451
140-37282-3	G220 19.5-20	Step 2	Solid	3010A	88451
140-37282-4	G220 21-25	Step 2	Solid	3010A	88451
MB 140-88451/10-B ^3	Method Blank	Step 2	Solid	3010A	88451
LCS 140-88451/11-B ^5	Lab Control Sample	Step 2	Solid	3010A	88451
LCSD 140-88451/12-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	88451

Metals (Continued)

Prep Batch: 88476 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-3 DU	G220 19.5-20	Step 2	Solid	3010A	88451

SEP Batch: 88488

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 3	Solid	Non-Crystalline	
140-37282-2	G219 11-20	Step 3	Solid	Non-Crystalline	
140-37282-3	G220 19.5-20	Step 3	Solid	Non-Crystalline	
140-37282-4	G220 21-25	Step 3	Solid	Non-Crystalline	
MB 140-88488/10-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-88488/11-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-88488/12-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	
140-37282-3 DU	G220 19.5-20	Step 3	Solid	Non-Crystalline	

Prep Batch: 88516

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 3	Solid	3010A	88488
140-37282-2	G219 11-20	Step 3	Solid	3010A	88488
140-37282-3	G220 19.5-20	Step 3	Solid	3010A	88488
140-37282-4	G220 21-25	Step 3	Solid	3010A	88488
MB 140-88488/10-B	Method Blank	Step 3	Solid	3010A	88488
LCS 140-88488/11-B	Lab Control Sample	Step 3	Solid	3010A	88488
LCSD 140-88488/12-B	Lab Control Sample Dup	Step 3	Solid	3010A	88488
140-37282-3 DU	G220 19.5-20	Step 3	Solid	3010A	88488

SEP Batch: 88588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 4	Solid	Metal Hydroxide	
140-37282-2	G219 11-20	Step 4	Solid	Metal Hydroxide	
140-37282-3	G220 19.5-20	Step 4	Solid	Metal Hydroxide	
140-37282-4	G220 21-25	Step 4	Solid	Metal Hydroxide	
MB 140-88588/10-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-88588/11-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-88588/12-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	
140-37282-3 DU	G220 19.5-20	Step 4	Solid	Metal Hydroxide	

SEP Batch: 88679

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 5	Solid	Organic-Bound	
140-37282-2	G219 11-20	Step 5	Solid	Organic-Bound	
140-37282-3	G220 19.5-20	Step 5	Solid	Organic-Bound	
140-37282-4	G220 21-25	Step 5	Solid	Organic-Bound	
MB 140-88679/10-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-88679/11-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-88679/12-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	
140-37282-3 DU	G220 19.5-20	Step 5	Solid	Organic-Bound	

Prep Batch: 88764

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 4	Solid	3010A	88588
140-37282-2	G219 11-20	Step 4	Solid	3010A	88588
140-37282-3	G220 19.5-20	Step 4	Solid	3010A	88588

Metals (Continued)

Prep Batch: 88764 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-4	G220 21-25	Step 4	Solid	3010A	88588
MB 140-88588/10-B	Method Blank	Step 4	Solid	3010A	88588
LCS 140-88588/11-B	Lab Control Sample	Step 4	Solid	3010A	88588
LCSD 140-88588/12-B	Lab Control Sample Dup	Step 4	Solid	3010A	88588
140-37282-3 DU	G220 19.5-20	Step 4	Solid	3010A	88588

Analysis Batch: 88772

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 1	Solid	6010B SEP	88472
140-37282-1	G219 9-10.5	Step 2	Solid	6010B SEP	88476
140-37282-1	G219 9-10.5	Step 3	Solid	6010B SEP	88516
140-37282-2	G219 11-20	Step 1	Solid	6010B SEP	88472
140-37282-2	G219 11-20	Step 2	Solid	6010B SEP	88476
140-37282-2	G219 11-20	Step 3	Solid	6010B SEP	88516
140-37282-3	G220 19.5-20	Step 1	Solid	6010B SEP	88472
140-37282-3	G220 19.5-20	Step 2	Solid	6010B SEP	88476
140-37282-3	G220 19.5-20	Step 3	Solid	6010B SEP	88516
140-37282-4	G220 21-25	Step 1	Solid	6010B SEP	88472
140-37282-4	G220 21-25	Step 2	Solid	6010B SEP	88476
140-37282-4	G220 21-25	Step 3	Solid	6010B SEP	88516
MB 140-88305/10-B ^4	Method Blank	Step 1	Solid	6010B SEP	88472
MB 140-88451/10-B ^3	Method Blank	Step 2	Solid	6010B SEP	88476
MB 140-88488/10-B	Method Blank	Step 3	Solid	6010B SEP	88516
LCS 140-88305/11-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	88472
LCS 140-88451/11-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	88476
LCS 140-88488/11-B	Lab Control Sample	Step 3	Solid	6010B SEP	88516
LCSD 140-88305/12-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	88472
LCSD 140-88451/12-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	88476
LCSD 140-88488/12-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	88516
140-37282-3 DU	G220 19.5-20	Step 1	Solid	6010B SEP	88472
140-37282-3 DU	G220 19.5-20	Step 2	Solid	6010B SEP	88476
140-37282-3 DU	G220 19.5-20	Step 3	Solid	6010B SEP	88516

SEP Batch: 88807

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 6	Solid	Acid/Sulfide	
140-37282-2	G219 11-20	Step 6	Solid	Acid/Sulfide	
140-37282-3	G220 19.5-20	Step 6	Solid	Acid/Sulfide	
140-37282-4	G220 21-25	Step 6	Solid	Acid/Sulfide	
MB 140-88807/10-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-88807/11-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-88807/12-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	
140-37282-3 DU	G220 19.5-20	Step 6	Solid	Acid/Sulfide	

Prep Batch: 88823

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 5	Solid	3010A	88679
140-37282-2	G219 11-20	Step 5	Solid	3010A	88679
140-37282-3	G220 19.5-20	Step 5	Solid	3010A	88679
140-37282-4	G220 21-25	Step 5	Solid	3010A	88679
MB 140-88679/10-B ^5	Method Blank	Step 5	Solid	3010A	88679

Metals (Continued)

Prep Batch: 88823 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 140-88679/11-B ^5	Lab Control Sample	Step 5	Solid	3010A	88679
LCSD 140-88679/12-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	88679
140-37282-3 DU	G220 19.5-20	Step 5	Solid	3010A	88679

Prep Batch: 88837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 7	Solid	Residual	
140-37282-2	G219 11-20	Step 7	Solid	Residual	
140-37282-3	G220 19.5-20	Step 7	Solid	Residual	
140-37282-4	G220 21-25	Step 7	Solid	Residual	
MB 140-88837/10-A	Method Blank	Step 7	Solid	Residual	
LCS 140-88837/11-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-88837/12-A	Lab Control Sample Dup	Step 7	Solid	Residual	
140-37282-3 DU	G220 19.5-20	Step 7	Solid	Residual	

Analysis Batch: 89073

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 4	Solid	6010B SEP	88764
140-37282-1	G219 9-10.5	Step 5	Solid	6010B SEP	88823
140-37282-1	G219 9-10.5	Step 6	Solid	6010B SEP	88807
140-37282-2	G219 11-20	Step 4	Solid	6010B SEP	88764
140-37282-2	G219 11-20	Step 5	Solid	6010B SEP	88823
140-37282-2	G219 11-20	Step 6	Solid	6010B SEP	88807
140-37282-3	G220 19.5-20	Step 4	Solid	6010B SEP	88764
140-37282-3	G220 19.5-20	Step 5	Solid	6010B SEP	88823
140-37282-3	G220 19.5-20	Step 6	Solid	6010B SEP	88807
140-37282-4	G220 21-25	Step 4	Solid	6010B SEP	88764
140-37282-4	G220 21-25	Step 5	Solid	6010B SEP	88823
140-37282-4	G220 21-25	Step 6	Solid	6010B SEP	88807
MB 140-88588/10-B	Method Blank	Step 4	Solid	6010B SEP	88764
MB 140-88679/10-B ^5	Method Blank	Step 5	Solid	6010B SEP	88823
MB 140-88807/10-A	Method Blank	Step 6	Solid	6010B SEP	88807
LCS 140-88588/11-B	Lab Control Sample	Step 4	Solid	6010B SEP	88764
LCS 140-88679/11-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	88823
LCS 140-88807/11-A	Lab Control Sample	Step 6	Solid	6010B SEP	88807
LCSD 140-88588/12-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	88764
LCSD 140-88679/12-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	88823
LCSD 140-88807/12-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	88807
140-37282-3 DU	G220 19.5-20	Step 4	Solid	6010B SEP	88764
140-37282-3 DU	G220 19.5-20	Step 5	Solid	6010B SEP	88823
140-37282-3 DU	G220 19.5-20	Step 6	Solid	6010B SEP	88807

Analysis Batch: 89131

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 7	Solid	6010B SEP	88837
140-37282-1	G219 9-10.5	Step 7	Solid	6010B SEP	88837
140-37282-1	G219 9-10.5	Total/NA	Solid	6010B	88304
140-37282-1	G219 9-10.5	Total/NA	Solid	6010B	88304
140-37282-2	G219 11-20	Step 7	Solid	6010B SEP	88837
140-37282-2	G219 11-20	Step 7	Solid	6010B SEP	88837
140-37282-2	G219 11-20	Total/NA	Solid	6010B	88304

Metals (Continued)

Analysis Batch: 89131 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-2	G219 11-20	Total/NA	Solid	6010B	88304
140-37282-3	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3	G220 19.5-20	Total/NA	Solid	6010B	88304
140-37282-3	G220 19.5-20	Total/NA	Solid	6010B	88304
140-37282-4	G220 21-25	Step 7	Solid	6010B SEP	88837
140-37282-4	G220 21-25	Step 7	Solid	6010B SEP	88837
140-37282-4	G220 21-25	Total/NA	Solid	6010B	88304
140-37282-4	G220 21-25	Total/NA	Solid	6010B	88304
MB 140-88304/10-A	Method Blank	Total/NA	Solid	6010B	88304
MB 140-88837/10-A	Method Blank	Step 7	Solid	6010B SEP	88837
LCS 140-88304/11-A	Lab Control Sample	Total/NA	Solid	6010B	88304
LCS 140-88837/11-A	Lab Control Sample	Step 7	Solid	6010B SEP	88837
LCSD 140-88304/12-A	Lab Control Sample Dup	Total/NA	Solid	6010B	88304
LCSD 140-88837/12-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	88837
140-37282-3 DU	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3 DU	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3 DU	G220 19.5-20	Total/NA	Solid	6010B	88304
140-37282-3 DU	G220 19.5-20	Total/NA	Solid	6010B	88304

Analysis Batch: 89170

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Step 7	Solid	6010B SEP	88837
140-37282-1	G219 9-10.5	Total/NA	Solid	6010B	88304
140-37282-2	G219 11-20	Step 7	Solid	6010B SEP	88837
140-37282-2	G219 11-20	Total/NA	Solid	6010B	88304
140-37282-3	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3	G220 19.5-20	Total/NA	Solid	6010B	88304
140-37282-4	G220 21-25	Step 7	Solid	6010B SEP	88837
140-37282-4	G220 21-25	Total/NA	Solid	6010B	88304
140-37282-3 DU	G220 19.5-20	Step 7	Solid	6010B SEP	88837
140-37282-3 DU	G220 19.5-20	Total/NA	Solid	6010B	88304

Analysis Batch: 89227

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Sum of Steps 1-7	Solid	6010B SEP	
140-37282-2	G219 11-20	Sum of Steps 1-7	Solid	6010B SEP	
140-37282-3	G220 19.5-20	Sum of Steps 1-7	Solid	6010B SEP	
140-37282-4	G220 21-25	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 88351

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Total/NA	Solid	Loss On Ignit.	
140-37282-2	G219 11-20	Total/NA	Solid	Loss On Ignit.	
140-37282-3	G220 19.5-20	Total/NA	Solid	Loss On Ignit.	
140-37282-4	G220 21-25	Total/NA	Solid	Loss On Ignit.	
MB 140-88351/1	Method Blank	Total/NA	Solid	Loss On Ignit.	
LCS 140-88351/2	Lab Control Sample	Total/NA	Solid	Loss On Ignit.	
LCSD 140-88351/3	Lab Control Sample Dup	Total/NA	Solid	Loss On Ignit.	

General Chemistry (Continued)

Analysis Batch: 88351 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1 DU	G219 9-10.5	Total/NA	Solid	Loss On Ignit.	

Analysis Batch: 88450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-37282-1	G219 9-10.5	Total/NA	Solid	Moisture	
140-37282-2	G219 11-20	Total/NA	Solid	Moisture	
140-37282-3	G220 19.5-20	Total/NA	Solid	Moisture	
140-37282-4	G220 21-25	Total/NA	Solid	Moisture	
140-37282-1 DU	G219 9-10.5	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 9-10.5

Lab Sample ID: 140-37282-1
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 10:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			89227	07/25/24 13:48	KNC	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Loss On Ignit.		1	1.5256 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			88450	07/08/24 08:59	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G219 9-10.5

Lab Sample ID: 140-37282-1
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 89.6

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		10			89131	07/23/24 14:34	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 16:44	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		2			89170	07/24/24 12:41	KNC	EET KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:32	KNC	EET KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 13:46	KNC	EET KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 15:01	KNC	EET KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:35	KNC	EET KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:49	KNC	EET KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 15:04	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 9-10.5

Date Collected: 03/19/24 11:35
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-1

Matrix: Solid
Percent Solids: 89.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		10			89131	07/23/24 13:36	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 15:43	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		2			89170	07/24/24 11:42	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

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			89227	07/25/24 13:48	KNC	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Loss On Ignit.		1	1.6252 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			88450	07/08/24 08:59	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G219 11-20

Date Collected: 03/19/24 11:36
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-2

Matrix: Solid
Percent Solids: 94.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		10			89131	07/23/24 14:39	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 16:50	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		2			89170	07/24/24 12:46	KNC	EET KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:37	KNC	EET KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 13:51	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G219 11-20

Lab Sample ID: 140-37282-2
Date Collected: 03/19/24 11:36
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 94.4

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			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 15:16	KNC	EET KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:40	KNC	EET KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:54	KNC	EET KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 15:19	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		10			89131	07/23/24 13:41	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 15:48	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		2			89170	07/24/24 11:47	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: G220 19.5-20

Lab Sample ID: 140-37282-3
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 10:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			89227	07/25/24 13:48	KNC	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Loss On Ignit.		1	1.5824 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			88450	07/08/24 08:59	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G220 19.5-20

Lab Sample ID: 140-37282-3
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 88.8

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		10			89131	07/23/24 14:44	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: G220 19.5-20

Lab Sample ID: 140-37282-3

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Matrix: Solid
Percent Solids: 88.8

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 16:56	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		2			89170	07/24/24 12:51	KNC	EET KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:42	KNC	EET KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 13:56	KNC	EET KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 15:21	KNC	EET KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:45	KNC	EET KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:59	KNC	EET KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 15:24	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		10			89131	07/23/24 13:45	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 15:53	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		2			89170	07/24/24 11:52	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: G220 21-25

Lab Sample ID: 140-37282-4

Date Collected: 03/19/24 14:38
Date Received: 06/22/24 10:15

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			89227	07/25/24 13:48	KNC	EET KNX
	Instrument ID:	NOEQUIP								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 21-25

Lab Sample ID: 140-37282-4

Date Collected: 03/19/24 14:38
Matrix: Solid
Date Received: 06/22/24 10:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Loss On Ignit.		1	1.3998 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
Total/NA	Analysis	Moisture		1			88450	07/08/24 08:59	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G220 21-25

Lab Sample ID: 140-37282-4

Date Collected: 03/19/24 14:38
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 93.6

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		10			89131	07/23/24 15:08	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 17:06	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		2			89170	07/24/24 13:01	KNC	EET KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:52	KNC	EET KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 14:21	KNC	EET KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 15:32	KNC	EET KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:55	KNC	EET KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 14:24	KNC	EET KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 15:34	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		10			89131	07/23/24 14:10	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 21-25

Lab Sample ID: 140-37282-4
Date Collected: 03/19/24 14:38
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 93.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 16:03	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		2			89170	07/24/24 12:02	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank

Lab Sample ID: MB 140-88304/10-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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 13:21	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank

Lab Sample ID: MB 140-88305/10-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	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:17	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank

Lab Sample ID: MB 140-88351/1
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	Analysis	Loss On Ignit.		1	1.0123 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: Method Blank

Lab Sample ID: MB 140-88451/10-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			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 13:31	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: Method Blank — Lab Sample ID: MB 140-88488/10-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			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 14:47	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank — Lab Sample ID: MB 140-88588/10-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	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:20	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank — Lab Sample ID: MB 140-88679/10-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	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:34	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank — Lab Sample ID: MB 140-88807/10-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			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 14:50	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Method Blank — Lab Sample ID: MB 140-88837/10-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			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 13:06	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88304/11-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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 13:26	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88305/11-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	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		5			88772	07/15/24 12:22	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88351/2

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	Analysis	Loss On Ignit.		1	1.0543 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88451/11-B ^5

Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		5			88772	07/15/24 13:36	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88488/11-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			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 14:52	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88588/11-B

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:25	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88679/11-B ^5

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:39	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88807/11-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 14:55	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-88837/11-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 13:11	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88304/12-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 13:31	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88305/12-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	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		5			88772	07/15/24 12:27	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88351/3

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
Total/NA	Analysis	Loss On Ignit.		1	1.3115 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88451/12-B ^5

Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		5			88772	07/15/24 13:41	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88488/12-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			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 14:56	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-88588/12-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	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:30	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-88679/12-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	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 13:44	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-88807/12-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			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 14:59	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-88837/12-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			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 13:16	KNC	EET KNX
	Instrument ID:	DUO								

Client Sample ID: G219 9-10.5
Lab Sample ID: 140-37282-1 DU
Date Collected: 03/19/24 11:35
Matrix: Solid
Date Received: 06/22/24 10:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Loss On Ignit.		1	1.3850 g	1 g	88351	07/02/24 13:38	SJF	EET KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			88450	07/08/24 08:59	SJF	EET KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: G220 19.5-20
Lab Sample ID: 140-37282-3 DU
Date Collected: 03/19/24 14:37
Matrix: Solid
Date Received: 06/22/24 10:15
Percent Solids: 88.8

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		10			89131	07/23/24 15:03	KNC	EET KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		1			89131	07/23/24 17:01	KNC	EET KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Client Sample ID: G220 19.5-20

Date Collected: 03/19/24 14:37
Date Received: 06/22/24 10:15

Lab Sample ID: 140-37282-3 DU

Matrix: Solid
Percent Solids: 88.8

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	88304	07/17/24 07:00	JDM	EET KNX
Total/NA	Analysis	6010B		2			89170	07/24/24 12:56	KNC	EET KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	88305	07/08/24 07:00	JDM	EET KNX
Step 1	Prep	3010A			5 mL	50 mL	88472	07/09/24 07:00	JDM	EET KNX
Step 1	Analysis	6010B SEP		4			88772	07/15/24 12:47	KNC	EET KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	88451	07/08/24 10:00	JDM	EET KNX
Step 2	Prep	3010A			5 mL	50 mL	88476	07/09/24 07:00	JDM	EET KNX
Step 2	Analysis	6010B SEP		3			88772	07/15/24 14:16	KNC	EET KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	88488	07/09/24 07:00	JDM	EET KNX
Step 3	Prep	3010A			5 mL	50 mL	88516	07/10/24 07:00	JDM	EET KNX
Step 3	Analysis	6010B SEP		1			88772	07/15/24 15:26	KNC	EET KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	88588	07/11/24 07:00	JDM	EET KNX
Step 4	Prep	3010A			5 mL	50 mL	88764	07/16/24 07:00	JDM	EET KNX
Step 4	Analysis	6010B SEP		1			89073	07/22/24 12:50	KNC	EET KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	88679	07/15/24 07:00	JDM	EET KNX
Step 5	Prep	3010A			5 mL	50 mL	88823	07/17/24 07:00	JDM	EET KNX
Step 5	Analysis	6010B SEP		5			89073	07/22/24 14:19	KNC	EET KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	88807	07/16/24 11:00	JDM	EET KNX
Step 6	Analysis	6010B SEP		1			89073	07/22/24 15:29	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		10			89131	07/23/24 14:05	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		1			89131	07/23/24 15:58	KNC	EET KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	88837	07/17/24 07:00	JDM	EET KNX
Step 7	Analysis	6010B SEP		2			89170	07/24/24 11:57	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: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Laboratory: Eurofins Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-25
ANAB	Dept. of Energy	L2311.01	02-13-25
ANAB	ISO/IEC 17025	L2311	02-13-25
Arkansas DEQ	State	88-0688	06-17-25
Colorado	State	TN00009	02-28-25
Connecticut	State	PH-0223	10-01-26
Florida	NELAP	E87177	06-30-25
Georgia (DW)	State	906	07-27-25
Hawaii	State	NA	07-27-24
Kansas	NELAP	E-10349	10-31-24
Kentucky (DW)	State	90101	12-31-24
Louisiana (All)	NELAP	83979	06-30-25
Louisiana (DW)	State	LA019	12-31-24
Maryland	State	277	03-31-25
Michigan	State	9933	07-27-25
Nevada	State	TN00009	07-31-24
New Hampshire	NELAP	2999	01-17-25
New Jersey	NELAP	TN001	06-30-25
New York	NELAP	10781	03-31-25
North Carolina (DW)	State	21705	07-31-25
North Carolina (WW/SW)	State	64	12-31-24
Oklahoma	State	9415	08-31-24
Oregon	NELAP	TNI0189	01-01-25
Pennsylvania	NELAP	68-00576	12-31-24
Tennessee	State	02014	07-27-25
Texas	NELAP	T104704380-23-18	08-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	525-22-279-18762	10-06-25
Utah	NELAP	TN00009	07-31-24
Virginia	NELAP	460176	09-14-24
Washington	State	C593	01-19-25
West Virginia (DW)	State	9955C	12-31-24
West Virginia DEP	State	345	04-30-25
Wisconsin	State	998044300	08-31-24

Method Summary

Client: Ramboll Americas Engineering Solutions
Project/Site: Coffeen Nature & Extent SEP

Job ID: 140-37282-1

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	EET KNX
6010B SEP	SEP Metals (ICP)	SW846	EET KNX
Loss On Ignit.	Loss On Ignition	SPCC	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
SPCC = Society for Protective Coatings
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

TestAmerica Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

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

Client Contact	Project Manager: BRYAN DONALDSON	Site Contact: Lauren Anderson	Date: 6/20/24	COC No: 07274-0324
Company Name: Rambow	Tel/Fax: BDONALDSON@RAMBOW.COM	Lab Contact: RYAN HERRY	Carrier:	1 of 1 COCs
Address: 234 W FLORIDA ST FL 5	Analysis Turnaround Time			Sampler: Lauren Anderson
City/State/Zip Milwaukee, WI 53204	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(xxx) xxx-xxxx Phone 920 255 4997	TAT if different from Below ☑ standard turn			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name: COFFEEN NATURE + EXTENT	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
PO #	☐ 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)	7-STEP SEP	LOI									Sample Specific Notes:
G219 9-10.5	3/19/24	1135	G	S	2	N	N	X	X									
G219 11-20	↓	1136	↓	↓	↓	↓	↓	X	X									
G220 19.5-20	↓	1437	↓	↓	↓	↓	↓	X	X									
G220 21-25	↓	1438	↓	↓	↓	↓	↓	X	X									
LKA 6/20/24																		
								1	1									

LKA 6/20/24

140-37282 Chain of Custody

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

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

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

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

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

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ | Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature] / Rambow	—		[signature]	Eurofins	6/21/24 1003
[signature]	Eurofins 6/21/24	1630	[signature]	ETAKNX	6/22/24 10:15
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.8, dated 11/04/2015

Loc: 140
37282

EUROFINS 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 : SC74 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

Custody Seals Intact
Received at RT: 1.0 | CT: 1.1°C
DH 6/22/24
1 Cooler FedEx 7414 0291 4850 P05
1S) LOT

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 #: 14007409 PM Instructions:

Sample Receiving Associate: Dean Heath Date: 6/22/24

QA026R33.doc, 11/10/23

Attachment E

X-Ray Diffraction Analytical Data

eurofins | Built Environment Testing

For:
Bryan Donaldson
Ramboll Americal Engineering Solutions, Inc.
234 W. Florida Street FL 5
Milwaukee, WI 53204

RE:
Eurofins Built Environment Testing – Pasadena, Texas
XRD Mineral Characterization of Drill Core by Full and Clay Mineral Scans
Project ID: Coffeen Nature & Extent
Project #: PO #1940009332
EMLab ID: 3687379

Approved By:

Scott M. Ward, Ph.D.

Analyst: Carlos Duane Salinas

Eurofins Built Environment Testing (EBET) is an analytical laboratory accredited for the analysis of asbestos in air and bulk samples by X-Ray Powder Diffraction (XRD), Analytical Transmission Electron Microscopy (ATEM), and Polarized Light Microscopy (PLM) by the National Voluntary Laboratory Accreditation Program (NVLAP) {Lab Code 200525 (Houston) and Lab Code 600120 (Pasadena)}, and the American Industrial Hygiene Association Lab Code 157714 (Pasadena)}.

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received and tested. The results include an inherent uncertainty of measurement associated with estimating percentages by the analytical method utilized.

Eurofins Built Environement Testing located in Pasadena, TX, a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor

eurofins | Built Environment Testing

Report: 3687379

Mineralogy of Drill Core Samples
XRD (Full and Clay Mineral) Analysis
Project Name: Coffeen Nature & Extent
Project #: PO #1940009332

For:

Bryan Donaldson
Ramboll Americas Engineering Solutions, Inc.
234 W. Florida Street FL 5
Milwaukee, WI 53204

By:

Carlos Duane Salinas
Technical Expert
Eurofins Built Environmental Testing
3113 Red Bluff Road
Pasadena, Texas 77503

July 26, 2024

eurofins | Built Environment Testing

July 26, 2024

Bryan Donaldson
Ramboll Americas Engineering Solutions, Inc.
234 W. Florida Street FL 5
Milwaukee, WI 53204

Dear Bryan,

Eurofins Built Environmental Testing (EBET) is an analytical laboratory accredited for the analysis of asbestos in air and bulk samples by X-Ray Powder Diffraction (XRD), Analytical Transmission Electron Microscopy (ATEM), and Polarized Light Microscopy (PLM) by the National Voluntary Laboratory Accreditation Program (NVLAP) {Lab Code 200525 (Houston) and Lab Code 600120 (Pasadena)}, and the American Industrial Hygiene Association Laboratory Accreditation Program (AIHA-LAP,LLC) {Lab Code 157714 (Pasadena)}.

EBET received four (4) samples on June 21, 2024, to determine their mineralogy by X-Ray Powder Diffraction (XRD). The samples were orange-brown and gray soils consisting mostly of clay, silt, sand and pebbles. The samples were contained in four individually labeled 8 oz wide mouth glass jars. The chain of custody matched the labeled sample ID's as follows:

Client Sample Number	**EMLab ID Number**
G219 9-10.5	3687379-1
G219 11-20	3687379-2
G220 19.5-20	3687379-3
G220 21-25	3687379-4

EBET prepped and analyzed the samples using X-Ray Powder Diffraction.

3687379 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. EBET will not discuss any part of this study with personnel other than those authorized by the client. The results described in this report only apply to the samples analyzed. This report shall not be reproduced except in full, without written approval from EBET. The samples will be kept in our secure storage facility for a minimum of three (3) months from the report date.

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Full Mineral Scan Sample Preparation

A representative grab sample of the soil was dried overnight at 110 degrees Celsius in our drying oven. The dried sample was then crushed using a large mortar and pestle. The crushed sample was coned and quartered to acquire a representative sample to be further prepared. This sample was ground and homogenized by hand using a mortar and pestle, and then passed through a No. 35 Tyler Mesh (500 um) sieve. The sieved sample was then milled in a McCrone XRD Micro Mill for 15 minutes, utilizing agate grinding elements to produce a powder that was prepped and scanned in our Cubix3/Panalytical XRD using a mineral scan program.

Clay Mineral Scan Sample Preparation

A representative grab sample of the soil was collected and placed into a 100 ml plastic screw-cap container, filled with DI water and then shaken and wet sieved through a No. 400 Tyler Mesh (38 um) sieve. The <38 um material was collected in a 150 ml Pyrex beaker and placed into our drying oven overnight at a temperature of 110 degrees Celsius. The dried sample was then crushed by hand using a ceramic mortar and pestle to produce a powder that was prepped and scanned in our Cubix3/Panalytical XRD using a mineral scan program.

The results of this study can be found in the attached document. If you should have any questions about this report, please feel free to call us at 713-290-0223.

Sincerely,

Carlos Duane Salinas
Technical Expert
EBET – Pasadena, Texas

Mineralogy Report – July 2024.

This report was prepared at the request of Carlos Salinas, Technical Expert at Eurofins Built Environment Testing

I. Quantitative XRD analysis of powder samples

Table 1 - Scans of the following samples were evaluated.

Sample ID	
7379-1FM~1	Drill Core Sample
7379-2FM~1	Drill Core Sample
7379-3FM~1	Drill Core Sample
7379-4FM~1	Drill Core Sample
7379-1CM~1	Drill Core Sample
7379-2CM~1	Drill Core Sample
7379-3CM~1	Drill Core Sample
7379-4CM~1	Drill Core Sample

For QXRD analysis the software High score plus version 2.0.1 available from Malvern Panalytical was used.

II. Instrument and measurement conditions

Cubix3/PANalytical

Instrument settings:
Tube: Ceramic Cu long fine focus
Radiation: Copper (Cu)
Diffractometer radius: 200mm
Sample stage: Sample spinner stage

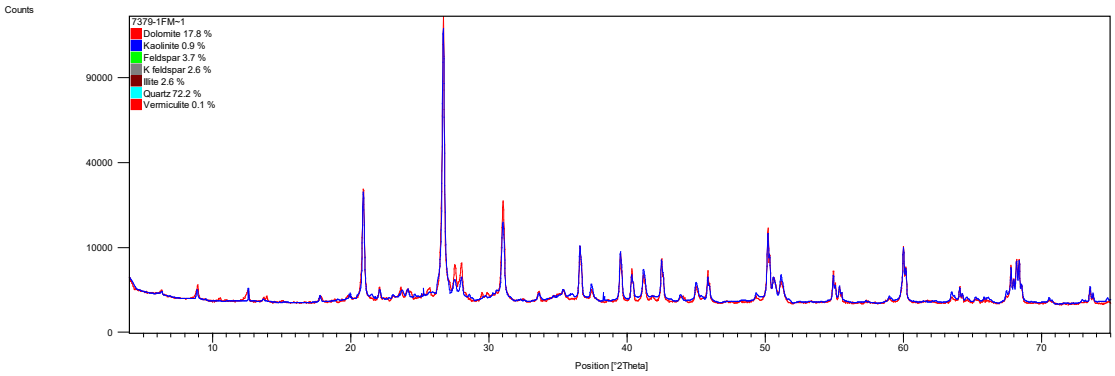
Incident optics:
BBHD
Divergence slit: Fixed 1/2 °
Soller slit: 0.04 radians
Mask: 10mm
Anti scatter slit: Fixed 2°

Diffracted optics:
Soller slit: 0.04 radians
Filter: Not present
Anti scatter slit: Fixed 5.5°
Detector: X'Celerator

Measurement conditions:
Applied power: 45KV, 40mA
Scan range: 4-75º 2Theta
Step size 0,016 º 2Theta
Time per step: 4.82sec
Scan type: continuous

III. QXRD analysis of Drill core samples:

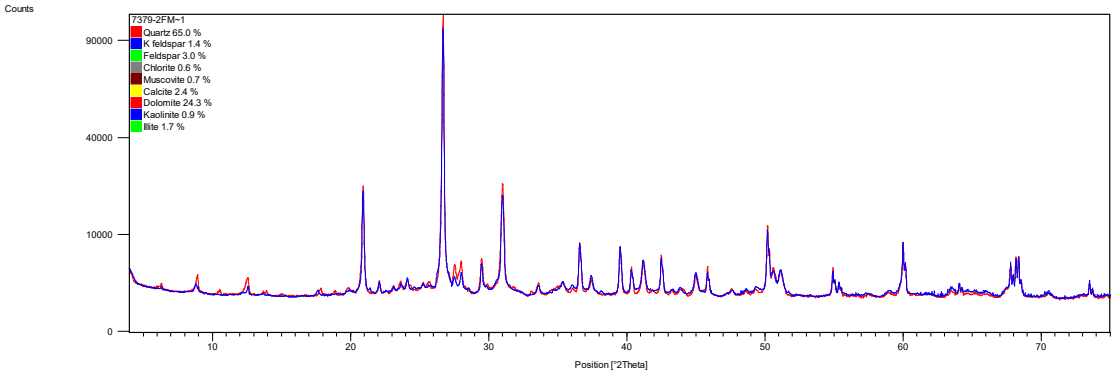
1) Sample 7379-1FM~1



Phase	Formula	%
Quartz	SiO2	72.2
Dolomite	CaMg(CO3)2	17.8
Feldspar	(Na,Ca)(Si,Al)4O8	3.7
K-feldspar	KAlSi3O8	2.6
Mica	KAl2(Si3Al)O10(OH,F)2	2.6
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	0.1
Kaolinite	Al2Si2O5(OH)4	0.9

Figure 1 – Results of X-ray diffraction - 7379-1FM~1

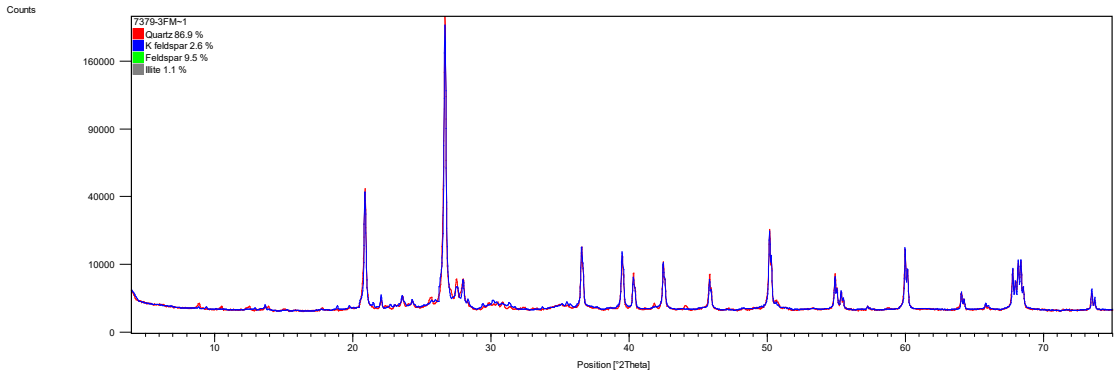
2) Sample 7379-2FM~1



Phase	Formula	%
Quartz	SiO2	65.0
Dolomite	CaMg(CO3)2	24.3
Feldspar	(Na,Ca)(Si,Al)4O8	3.0
K-feldspar	KAlSi3O8	1.4
Mica	KAl2(Si3Al)O10(OH,F)2	2.4
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	0.6
Kaolinite	Al2Si2O5(OH)4	0.9
Calcite	CaCO3	2.4

Figure 2 – Results of X-ray diffraction - 7379-2FM~1

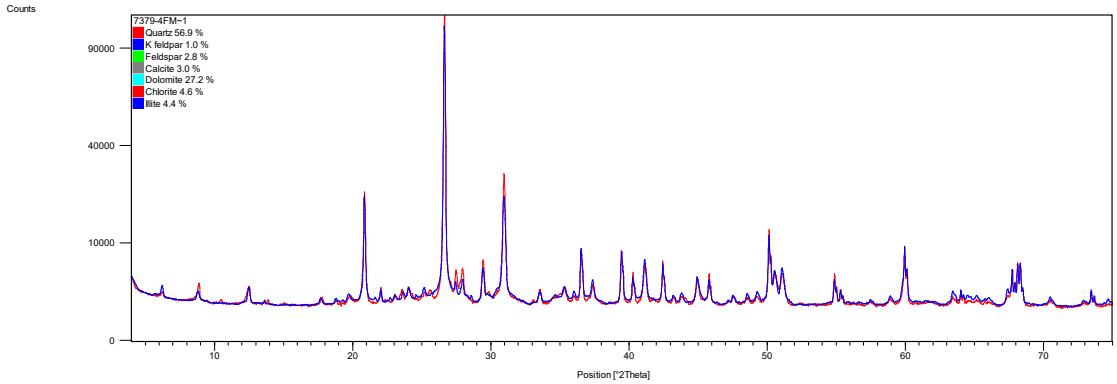
3) Sample 7379-3FM~1



Phase	Formula	%
Quartz	SiO2	86.9
Feldspar	(Na,Ca)(Si,Al)4O8	9.5
K-feldspar	KAlSi3O8	2.6
Mica	KAl2(Si3Al)O10(OH,F)2	1.1

Figure 3 – Results of X-ray diffraction - 7379-3FM~1

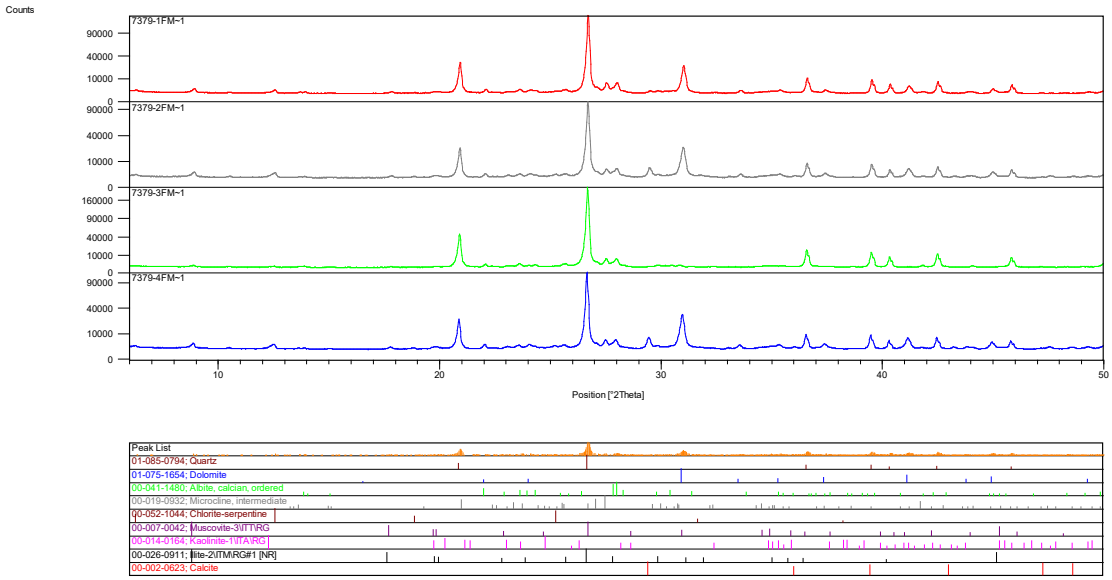
4) Sample 7379-4FM~1



Phase	Formula	%
Quartz	SiO2	56.9
Dolomite	CaMg(CO3)2	27.2
Feldspar	(Na,Ca)(Si,Al)4O8	2.8
K-feldspar	KAlSi3O8	1.0
Mica	KAl2(Si3Al)O10(OH,F)2	4.4
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	4.6
Calcite	CaCO3	3.0

Figure 4 – Results of X-ray diffraction - 7379-4FM~1

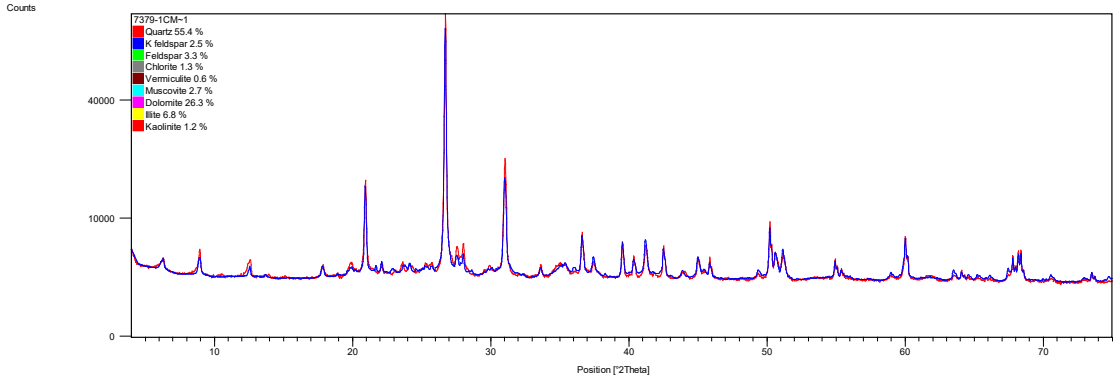
5) FM samples comparison



Sample	%							
	Quartz	Dolomite	Feldspar	K-feldspar	Mica	Chlorite/Vermiculite	Calcite	Kaolinite
7379-1FM~1	72.2	17.8	3.7	2.6	2.6	0.1	-	0.9
7379-2FM~1	65.0	24.3	3.0	1.4	2.4	0.6	2.4	0.9
7379-3FM~1	86.9	-	9.5	2.6	1.1	-	-	-
7379-4FM~1	56.9	27.2	2.8	1.0	4.4	4.6	3.0	-

Figure 5 - The comparison of the x-ray diffraction (XRD) results

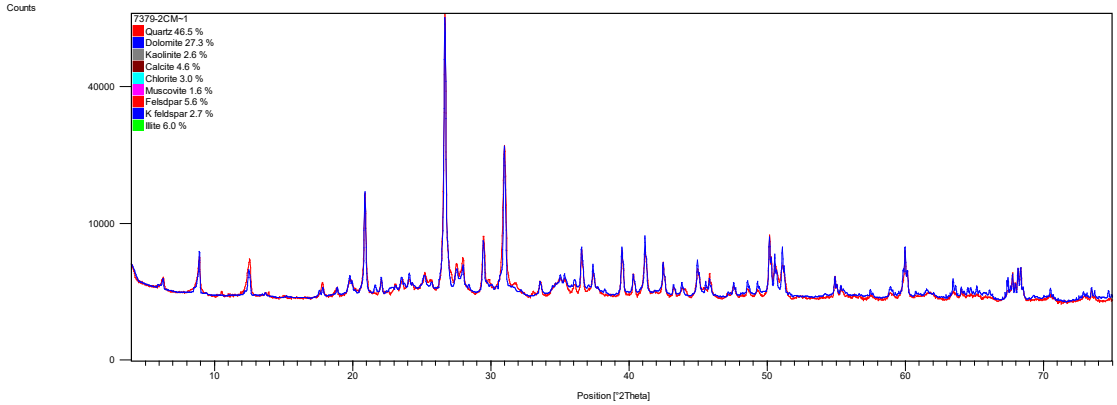
6) Sample 7379-1CM~1



Phase	Formula	%
Quartz	SiO2	55.4
Dolomite	CaMg(CO3)2	26.3
Mica	KAl2(Si3Al)O10(OH,F)2	9.5
Feldspar	(Na,Ca)(Si,Al)4O8	3.3
K-feldspar	KAlSi3O8	2.5
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	1.9
Kaolinite	Al2Si2O5(OH)4	1.2

Figure 6 – Results of X-ray diffraction - 7379-1CM~1

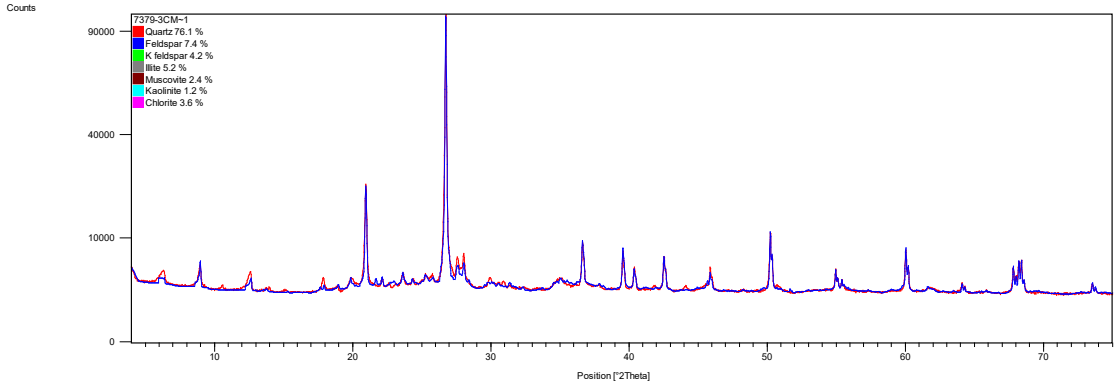
7) Sample 7379-2CM~1



Phase	Formula	%
Quartz	SiO2	46.5
Dolomite	CaMg(CO3)2	27.3
Mica	KAl2(Si3Al)O10(OH,F)2	7.6
Feldspar	(Na,Ca)(Si,Al)4O8	5.6
Calcite	CaCO3	4.6
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	3.0
K-feldspar	KAlSi3O8	2.7
Kaolinite	Al2Si2O5(OH)4	2.6

Figure 7 – Results of X-ray diffraction - 7379-2CM~1

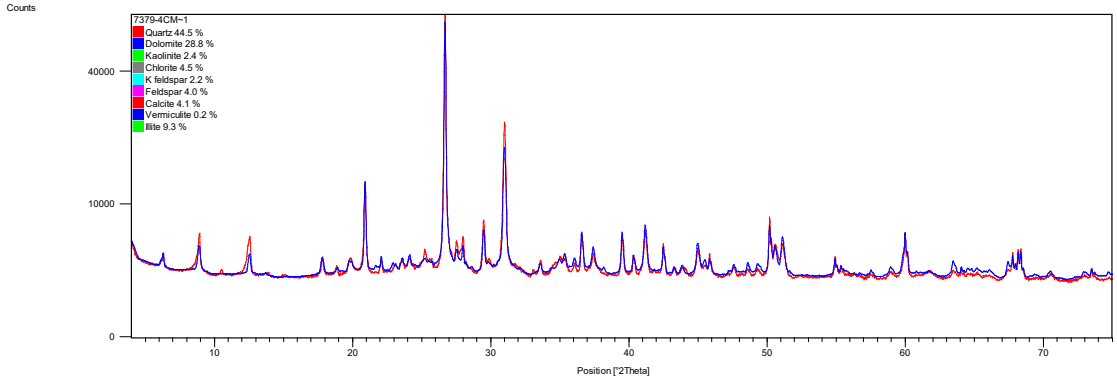
8) Sample 7379-3CM~1



Phase	Formula	%
Quartz	SiO2	76.1
Mica	KAl2(Si3Al)O10(OH,F)2	7.6
Feldspar	(Na,Ca)(Si,Al)4O8	7.4
K-feldspar	KAlSi3O8	4.2
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	3.6
Kaolinite	Al2Si2O5(OH)4	1.2

Figure 8 – Results of X-ray diffraction - 7379-3CM~1

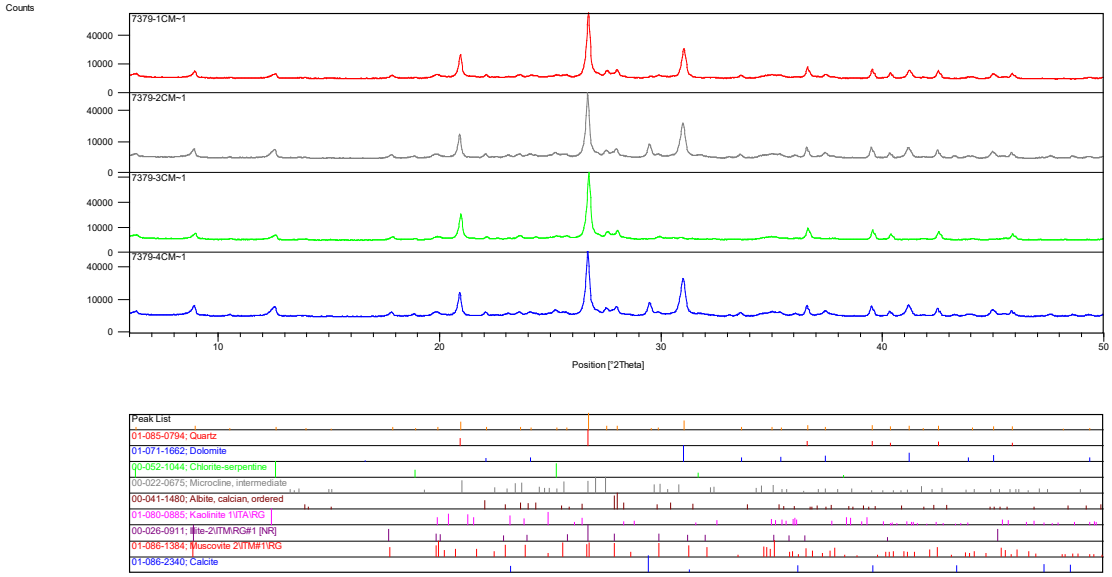
9) Sample 7379-4CM~1



Phase	Formula	%
Quartz	SiO2	44.5
Dolomite	CaMg(CO3)2	28.8
Mica	KAl2(Si3Al)O10(OH,F)2	9.3
Chlorite/Vermiculite	(Mg,Fe)5Al(Si3Al)O10(OH)8	4.7
Calcite	CaCO3	4.1
Feldspar	(Na,Ca)(Si,Al)4O8	4.0
Kaolinite	Al2Si2O5(OH)4	2.4
K-feldspar	KAlSi3O8	2.2

Figure 9 – Results of X-ray diffraction - 7379-4CM~1

10) CM samples comparison



Sample	%							
	Quartz	Dolomite	Mica	Feldspar	K-feldspar	Chlorite/Vermiculite	Calcite	Kaolinite
7379-1CM~1	55.4	26.3	9.5	3.3	2.5	1.9		1.2
7379-2CM~1	46.5	27.3	7.6	5.6	2.7	3.0	4.6	2.6
7379-3CM~1	76.1		7.6	7.4	4.2	3.6		1.0
7379-4CM~1	44.5	28.8	9.3	4.0	2.2	4.7	4.1	2.4

Figure 10 - The comparison of the x-ray diffraction (XRD) results

IV. Comments

The samples have similar mineralogy, with differences in their proportions, composed mainly of quartz, feldspars, mica, kaolinite, chlorite/vermiculite and carbonates. Sample 3 is distinguished by the absence of carbonates.
It is necessary to validate the quantification by XRD with other techniques, preferably chemical analysis. The orientation of clay mineral particles affects the XRD intensities of powdered samples. Clay mineral particles exhibit platy characteristics, and some preparation methods can often produce preferred orientation of clay minerals.

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Appendix E

Groundwater Polishing Evaluation Report

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engineers | scientists | innovators

Groundwater Polishing Evaluation Report

Coffeen Power Plant – Gypsum Management Facility Gypsum Stack Pond

(IEPA ID No. W1350150004-03)

Prepared for

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June 2025

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1. INTRODUCTION 3

2. SITE BACKGROUND 4
   2.1 Site Overview 4
   2.2 Identified Exceedances of the GWPS 5
   2.3 Geochemical Conceptual Site Model 5

3. GROUNDWATER POLISHING REMEDY EVALUATION 7
   3.1 Methods 7
      3.1.1 Model Set-Up 8
   3.2 Results and Discussion 9
      3.2.1 Model Results 9
      3.2.2 Speciation Modeling 11
      3.2.3 Reaction modeling 11

4. CONCLUSIONS 13

5. REFERENCES 14

LIST OF TABLES

Table 1 Summary of Geochemical Model Inputs

Table 2 Geochemical Modeling Response of Sorbing Phases

LIST OF INTERNAL FIGURES

Figure 1 Percentage of Sorbed Sulfate

Figure 2 Modeled Sulfate Behavior

Figure 3 Modeled Sorbing Phase Behavior

LIST OF ATTACHMENTS

Attachment A	Potentiometric Surface Maps – August 2023
Attachment B	PHREEQC Input File and Thermodynamic Database
Attachment C	Details of Geochemical Model Parameterization
Attachment D	Complete Geochemical Modeling Outputs

ACRONYMS AND ABBREVIATIONS

%	percent
CAAA	Corrective Action Alternatives Analysis
CCR	Coal combustion residuals
COC	Constituent of concern
CPP	Coffeen Power Plant
DA	Deep aquifer
DCU	Deep confining unit
GCSM	Geochemical conceptual site model
GMF	Gypsum Management Facility
GSP	Gypsum Stack Pond
GWPS	Groundwater protection standard
IEPA	Illinois Environmental Protection Agency
LCU	Lowermost confining unit
mg/kg	milligrams per kilogram
redox	oxidation-reduction
RP	Recycle Pond
SEP	Sequential extraction procedure
UA	Uppermost aquifer
UCU	Uppermost confining unit
USEPA	United States Environmental Protection Agency
XRD	X-ray diffraction

EXECUTIVE SUMMARY

This document has been prepared as an attachment to the Corrective Action Alternatives Analysis (CAAA) prepared by Gradient for Coffeen Power Plant Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) Unit. The constituent of concern (COC) addressed in this document is sulfate, which has been identified as having exceedances[1] of the site-specific groundwater protection standards (GWPS) at the time of this analysis. Natural geochemical processes may be appropriate as a "polishing step" for residual plume management after effective source control implementation if there are no risks to receptors and/or the contaminant plume is not expanding (United States Environmental Protection Agency [USEPA] 1999; USEPA 2015). Source control is a major component of every corrective action considered in the CAAA, and there are no risks to human health or the environment at Coffeen GMF GSP.

Natural groundwater polishing processes, which include both physical and chemical mechanisms, reduce the concentration of COCs in the groundwater. After source control is implemented, a trailing geochemical gradient may form in the subsurface as conditions undergo a return to background water quality which could affect chemical groundwater polishing mechanisms (Savannah River National Laboratory, 2011). This report supports groundwater polishing as a component of the proposed corrective action by evaluating the contribution of chemical mechanisms to groundwater polishing under current conditions and after source control implementation. The groundwater flow and transport model estimated the time to reach the GWPS based on hydraulic properties of the aquifer. The results of this groundwater polishing evaluation contextualize these estimates by evaluating the potential for attenuation of COCs and for previously attenuated COCs to be mobilized to groundwater as groundwater quality returns to background conditions.

Groundwater polishing mechanisms were assessed using speciation and reaction geochemical models: speciation models assess the distribution of constituents between solid and aqueous phases, and reaction models evaluate how that distribution may change with changing site conditions (USEPA 2015). Inputs to the model include geochemically reactive solid mineral phases, compliance well groundwater composition, and background groundwater composition based on site-specific data.

The results of the groundwater polishing evaluation indicate that some chemical attenuation of sulfate is feasible under current conditions through sorption to iron and aluminum oxide solids and barite precipitation. Modeling indicates that sulfate attenuation via sorption onto mineral surfaces should remain stable under future conditions, as iron and aluminum oxide mineral phases are predicted to experience minor (if any) dissolution with background groundwater interaction. Additionally, barite precipitation was predicted in all future scenarios. Remobilization of sulfate

[1] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or Groundwater Protection Standards as described in the proposed groundwater monitoring program which was submitted to the IEPA on October 25, 2021 as part of Illinois Power Resource Generating, LLC's operating permit application for the Coffeen Power Plant Ash Pond No. 2. That operating permit application, including the proposed groundwater monitoring program, remains under review by the IEPA and therefore Illinois Power Resource Generating, LLC has not identified any actual exceedances.

is unlikely to affect the estimated time to reach the GWPS based on modeling results. These results will inform corrective action groundwater monitoring and adaptive site management, critical components of every corrective action considered in the CAAA.

1. INTRODUCTION

This document has been prepared as an attachment to the Corrective Action Alternatives Analysis (CAAA) prepared by Gradient for Coffeen Power Plant (CPP) Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) Unit. The purpose of the CAAA is to holistically evaluate potentially viable corrective actions to remediate groundwater and achieve compliance with site-specific GWPS for all monitored parameters under Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.600. The constituent of concern (COC) addressed in this document is sulfate, which has been identified as having an exceedance of the site-specific groundwater protection standard (GWPS) at the time of this analysis. In the CAAA, all corrective actions considered consist of source control and residual plume management. Natural geochemical processes may be appropriate as a "polishing step" for residual plume management after effective source control implementation, if there are no risks to receptors and/or the contaminant plume is not expanding (United States Environmental Protection Agency [USEPA] 1999; USEPA 2015). Source control is a major component of every corrective action considered in the CAAA, and there are no risks to human health or the environment at Coffeen GMF GSP.[2]

Groundwater polishing processes include both physical and chemical mechanisms within the groundwater which reduce the concentration of COCs in the groundwater. Physical components of groundwater polishing, including advection, dilution, and dispersion, are described by groundwater flow and transport modeling (Groundwater Modeling Report [Ramboll 2022]). Chemical mechanisms of groundwater polishing include sorption and mineral precipitation. After source control is implemented, a geochemical trailing gradient may form in the subsurface as conditions undergo a return to background water quality which could affect chemical groundwater polishing mechanisms (Savannah River National Laboratory [SRNL], 2011). The chemical mechanisms of groundwater polishing at Coffeen GMF GSP are evaluated herein using a geochemical modeling-based approach informed by site-specific data. This report uses geochemical modeling to evaluate the influence of chemical mechanisms to groundwater polishing under current conditions and after source control implementation.

The groundwater flow and transport model (Groundwater Modeling Report [Ramboll 2022]) estimated the time for sulfate (as a conservative surrogate) to reach the GWPS under different potential corrective actions based on physical components of groundwater polishing and did not incorporate any potential chemical controls on parameter distribution. This geochemical modeling effort supports the assessment of groundwater polishing as a component of the proposed corrective action by evaluating the potential for chemical attenuation of sulfate before and after source control as a means of contextualizing the times estimated in the flow and transport model. This analysis also provides an initial foundation for understanding groundwater chemistry to inform adaptive site management as a key component of the Corrective Action Groundwater Monitoring Plan[3].

---

[2] The Human Health and Ecological Risk Assessment serves as Appendix A of the CAAA to which this report is attached.

[3] The Corrective Action Groundwater Monitoring Plan serves as Appendix B to the Corrective Action Plan.

2. SITE BACKGROUND

2.1 Site Overview

A thorough overview of general site characteristics is presented in Section 1 of the CAAA to which this document is attached and summarized here. The CPP property is located approximately two miles south of the city of Coffeen, Illinois, and bordered by two lobes of Coffeen Lake to the west, east, and south, and by agricultural land to the north. The Coffeen GMF GSP impoundment is located to the north of the GMF Recycle Pond (RP) CCR unit. An Unnamed Tributary runs north to south to the east of the GMF GSP and RP. The GMF GSP is a 43.3-acre lined, state-permitted surface impoundment that received blowdown for the air emission scrubbers from 2010 to 2021. The GMF GSP was constructed with a composite high-density polyethylene liner with three feet of compacted soil and an inactive groundwater underdrain system.

A groundwater monitoring network was proposed in accordance with 35 I.A.C. § 845.630 to monitor groundwater quality which passes the waste boundary as part of the Operating Permit Application to Illinois Environmental Protection Agency (IEPA) for the GMF GSP unit (Burns & McDonnell 2021). The proposed groundwater monitoring network is shown in **Attachment A**. The monitoring network consists of 8 compliance monitoring wells (G206, G206D, G209, G212, G213, G215, G217, and G218) and 2 background wells (G200 and R201).

The geology underlying the Site in the vicinity of GMF GSP consists of five distinct hydrostratigraphic units (Ramboll 2021):

- **Upper Confining Unit (UCU):** The UCU consists of a Loess Unit and the upper portion of the Hagarstown Member, which has low permeability clays and silts with generally greater than 60 percent (%) fines. The UCU was encountered across most of the CPP.
- **Uppermost Aquifer (UA):** The UA comprises moderately permeable sands, silty sand, and clayey gravel of the Hagarstown Member and, in some portions of the Site, the Vandalia Member.
- **Lower Confining Unit (LCU):** The LCU underlies the UA. It consists of three low hydraulic conductivity soils: the sandy clay till of the Vandalia Member, the silt of the Mulberry Grove Formation, and the compacted clay till of the Smithboro Member.
- **Deep Aquifer (DA):** The DA is a thin (generally less than 5 feet thick), discontinuous unit composed of sands and silty sand units of the Yarmouth Soil.
- **Deep Confining Unit (DCU):** The DCU underlies the DA. It consists of the Lierle Clay of the Banner Formation and acts as an aquitard due to its low hydraulic conductivity.

There is a groundwater flow divide within the UA in the center of the CPP property between the two lobes of Coffeen Lake. Groundwater in the UA flows from the center of the CPP property west toward Coffeen Lake and east toward the Unnamed Tributary, the eastern lobe of Coffeen Lake, and the discharge flume. Groundwater flow in the vicinity of the GMF GSP is generally to the east to southeast, in the direction of the Unnamed Tributary. Groundwater flow within the UA has little vertical component due to the underlying low-permeability LCU. The flow direction in

the UA is consistent and likely influenced by the proximity to and hydraulic connection with Coffeen Lake. A map showing representative groundwater flow direction at the site is shown in **Attachment A**.

2.2 Identified Exceedances of the GWPS

The following GWPS exceedances at compliance groundwater monitoring wells likely attributable to Coffeen GMF GSP were observed from 2023 Q2 through 2023 Q4 (Ramboll, 2024):

- Sulfate – Observed at monitoring well G215.

The data set for geochemical modeling was finalized after the 2023 Q4 sampling event. Groundwater at G215 is representative of groundwater conditions downgradient of the unit, and samples may be referred to as downgradient groundwater.

Modeling parameters with observed exceedances is appropriate to the scope of the CAAA. Additionally, the selected remedy will meet the performance standards of 35 I.A.C. § 845.670(d) and the Corrective Action Plan will be submitted to the Agency on or before June 12, 2025. Once implemented and completed, the selected remedy will attain the GWPS.

The GWPS exceedance within the GMF GSP network is only present within the UA for sulfate. No GWPS exceedances were noted within other hydrostratigraphic units.

2.3 Geochemical Conceptual Site Model

A Geochemical Conceptual Site Model (GCSM)[4] was developed for Coffeen GMF GSP to describe the geochemical processes that contribute to mobilization and attenuation of constituents in the environment under current conditions, including evaluating whether chemical interactions of COCs with aquifer solids contribute to attenuation of aqueous concentrations at compliance monitoring wells. This discussion relies on lab reports and raw data previously presented in the Nature and Extent Report previously submitted to IEPA on June 12, 2024 (Ramboll 2024) in accordance with 35 I.A.C. § 845.650(d)(1) and provided again in full as Appendix D of the CAAA to which this report is attached.

The primary source of sulfate to groundwater of the UA within the monitoring network is GMF GSP CCR porewater. This finding is based on sulfate concentrations within the source and relationships to hydrogeological patterns at the Site.

Limited variability in pH or oxidation-reduction (redox) conditions is observed between upgradient (background) and downgradient locations, with pH values in the UA observed to be generally stable and circumneutral, with redox conditions observed to range from relatively oxidizing to relatively reducing. Within UA compliance wells, pH values are observed to generally decrease along a transect from G206 to G213, then G215 to G218, moving northeast and then north.

[4] The GCSM is a component of the Nature and Extent Report previously submitted to IEPA (Ramboll 2024) and is provided with updates as Appendix D of the CAAA to which this report is attached.

Sulfate in the groundwater system may be attenuated via adsorption and surface complexation reactions within portions of the UA. Sulfate sorption to iron oxyhydroxide phases in particular is well-studied and is potentially occurring within the subsurface near GMF GSP due to the ubiquitous nature of these materials. Groundwater conditions from the UA are predicted to favor amorphous iron oxide stability at some locations, including G215. With some locations experiencing groundwater conditions that are poised on the redox boundary between iron carbonates (siderite/ankerite) and amorphous iron oxides, dissolution of iron carbonate minerals may provide a source of iron for formation of amorphous iron oxide coatings. Crystalline iron oxides were not identified in analyzed aquifer solids samples. As such, iron oxides present in site solids are likely present in amorphous phases.

The GCSM findings suggest the potential for chemical attenuation of sulfate based on groundwater redox conditions favorable for the stability of amorphous iron-bearing sorbing surfaces.

3. GROUNDWATER POLISHING REMEDY EVALUATION

This groundwater polishing evaluation uses geochemical modeling to evaluate chemical attenuation of COCs under current conditions and to predict changes in attenuation at exceedance locations following source control. This evaluation will therefore further assess if chemical mechanisms of groundwater polishing will contribute to the remedy achieving the GWPS in a reasonable amount of time. Speciation and reaction models are geochemical models that can be used to evaluate the potential for chemical attenuation in groundwater. Speciation models assess the distribution of constituents between solid and aqueous phases, and reaction models evaluate how that distribution may change with changing site conditions (USEPA 2015). The results of geochemical modeling provide insight into groundwater polishing mechanisms and additional context for the time estimated to reach the GWPS determined by the groundwater flow and transport model (Ramboll 2022), which is based on hydraulic properties of the aquifer and does not take into account chemical interactions occurring within the hydrologic unit.

3.1 Methods

Geochemical modeling was done in PHREEQC Version 3 (USGS 2021) using a modified MINTEQ v4 thermodynamic database (as described in relevant sections below). The geochemical modeling of groundwater polishing under current conditions and conditions after source control is completed includes speciation and reaction modeling (USEPA 2015):

1. Speciation: To understand groundwater polishing mechanisms under current conditions, a solid phase representative of site conditions is equilibrated with current downgradient groundwater. The results of speciation modeling represent the association of COCs with the solid phase under current conditions through mechanisms such as sorption or precipitation.
2. Reaction: In the reaction modeling, the solid phase generated during the speciation modeling phase is reacted iteratively with background groundwater. These results represent the geochemical conditions expected after the source is controlled during which a trailing geochemical gradient may be created (SRNL 2011). The reactions with background groundwater assess the potential for a trailing geochemical gradient to drive changes in groundwater chemistry. Persistence of elevated groundwater COC concentrations over several reaction iterations suggests a trailing geochemical gradient may be more likely to affect the time to reach the GWPS.

The equilibrium thermodynamic modeling approach used herein allows that the solid and aqueous phases reach equilibrium during each step. The primary goal of this model is to inform the assessment of whether groundwater polishing is an appropriate remedy for the site by evaluating dominant geochemical reactions that may occur at time scales relevant to groundwater flow, including adsorption and certain mineral dissolution/precipitation (i.e., iron and aluminum (hydr)oxides, carbonates, and some sulfates) as identified in the GCSM[5]. The model therefore

[5] The GCSM is a component of the Nature and Extent Report previously submitted to IEPA (Ramboll 2024) and is provided with updates as Appendix D of the CAAA to which this report is attached.

includes those parameters that are expected to contribute to those reactions (as discussed below) and does not include every constituent of the solid phase and groundwater in order to capture "the salient aspects of the system's behavior without introducing unnecessary complexity" (USEPA 2015). This model is therefore a semi-quantitative estimation of chemical behavior in the subsurface rather than a prediction of groundwater quality, consistent with USEPA guidance that geochemical modeling "is often most helpful for identifying relative changes in contaminant speciation and distribution" (USEPA 2015).

3.1.1 Model Set-Up

Inputs to the model include solid phase composition, downgradient groundwater composition for the well with sulfate GWPS exceedances, and background groundwater composition. The PHREEQC input file and modified MINTEQ v4 database are provided in **Attachment B**. The data included for model parameterization is summarized in **Table 1** and discussed in greater detail in **Attachment C**. All data used in the model and discussed below are provided in the Nature and Extent Report[6].

3.1.1.1 Solid Phase Inputs

Iron hydroxide (ferrihydrite, [$Fe(OH)_3$]) and aluminum hydroxide (gibbsite, [$Al(OH)_3$]) are wide-spread in the environment known to act as sorbing phases for many groundwater constituents, including sulfate (Dzombak and Morel 1990; Karamalidis and Dzombak 2010). Model input concentrations for ferrihydrite and gibbsite are ideally derived from sequential extraction procedure (SEP) analyses of iron and aluminum respectively. Because SEP analyses for iron and aluminum were not completed for GMF GSP samples, model input concentrations for ferrihydrite for GMF GSP were derived using site-specific total metals and mineralogy (X-ray diffraction [XRD]) datasets which were refined using a SEP dataset compiled from analogous geological systems, as described in greater detail in **Attachment C**. Gibbsite input concentrations for GMF GSP were taken directly from the analogous compiled SEP dataset.

Metal oxide concentrations representing the 25th percentile, median, and 75th percentile of the observed data were used to test the sensitivity of the model to the amount of sorbing phase present]. Both ferrihydrite and gibbsite were allowed to dissolve or precipitate in the reaction phase of the model.

Calcite and dolomite were included as mineral phases in the model because carbonate mineral formation and dissolution are often major controls on groundwater pH (Stumm and Morgan 1996; Stackelberg et al. 2020). Calcite and dolomite are present in site aquifer solids in excess, and model input concentration were based on site-specific XRD results. Both calcite and dolomite were allowed to dissolve or precipitate in the reaction phase of the model.

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[6] The Nature and Extent Report was previously submitted to IEPA (Ramboll 2024) and is provided with updates as Appendix D of the CAAA to which this report is attached. The Nature and Extent report contains laboratory reports and tabulated results from solid phase analysis and tabulated results from groundwater analyses. Laboratory reports for groundwater data are provided quarterly to IEPA and posted to the facility's operating record in accordance with 35 I.A.C. § 845.800(d)(15).

Barite ($BaSO_4$) and gypsum ($CaSO_4$) are minerals that contain sulfate and have the potential to form under ambient environmental conditions in a timeframe consistent with the remedial effort. These minerals therefore may affect sulfate attenuation. Neither mineral phase was observed in mineralogical results for the site; therefore, both were made available to precipitate from the aqueous solution but did not have initial concentrations provided.

3.1.1.2 Aqueous Inputs

In addition to sulfate, the following parameters are included to capture the expected attenuation and mobilization mechanisms (see **Section 2.3**):

- Temperature, pH and pe (calculated from field-measured oxidation-reduction potential based on groundwater temperature).
- Major ions: Alkalinity, chloride, fluoride, calcium, magnesium, potassium, and sodium.
- Oxyanions: Silicon and phosphate.
- Redox-active metals: Aluminum, iron, and manganese.
- Remaining constituents regulated under 35 I.A.C. § 845.600[7].

This full suite of geochemical parameters for this model was measured in Quarter 2 and Quarter 3, 2023. The medians of these results were used in the model to represent average groundwater interacting with the solid phase. For well G215 (the only compliance well with an exceedance of sulfate (**Section 2.2**)), the median for each parameter was calculated individually. For background wells, a single median for each parameter was calculated using data from both background locations (see **Section 2.1**).

3.2 Results and Discussion

3.2.1 Model Results

Geochemical modeling results are shown on **Figures 1 through 3** below. Current geochemical conditions are represented in model output figures as 'Speciation Model' and subsequent reaction calculation results are represented with 'First Reaction' and 'Second Reaction'. Full modeling results are provided in **Attachment D**.

[7] Mercury, thallium, total dissolved solids, and radium were not included in the model. Mercury reactions within the environment are highly complex and would require a separate modeling effort, and the high frequency of non-detect concentrations in the groundwater indicate it would not contribute to model outcomes. Thallium forms a non-reactive monovalent cation and is rarely detected in the groundwater and is therefore not expected to contribute to model outcomes. Total dissolved solids are not a chemical parameter, but rather the result of other chemical abundances taken together. Radium is not included in most thermodynamic databases.

Figure 1: Percentage of Sorbed Sulfate

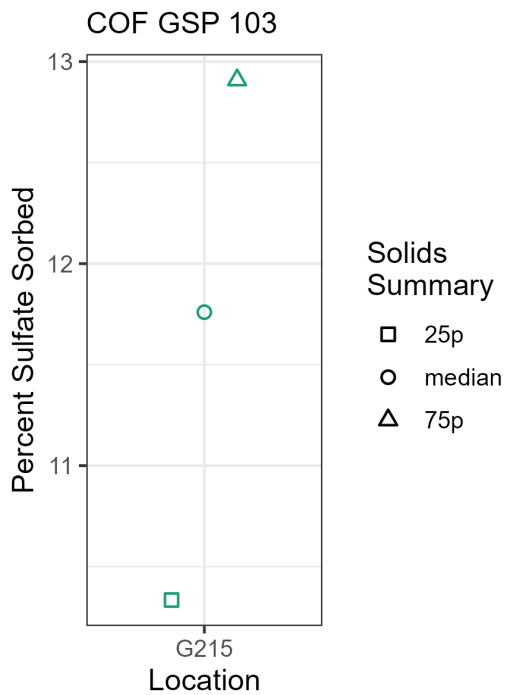


Figure 2: Modeled Sulfate Behavior

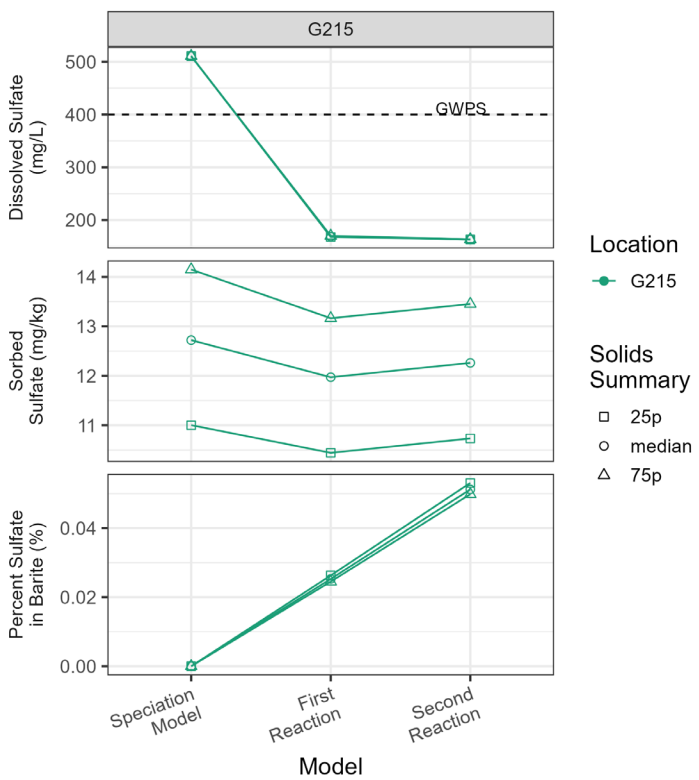
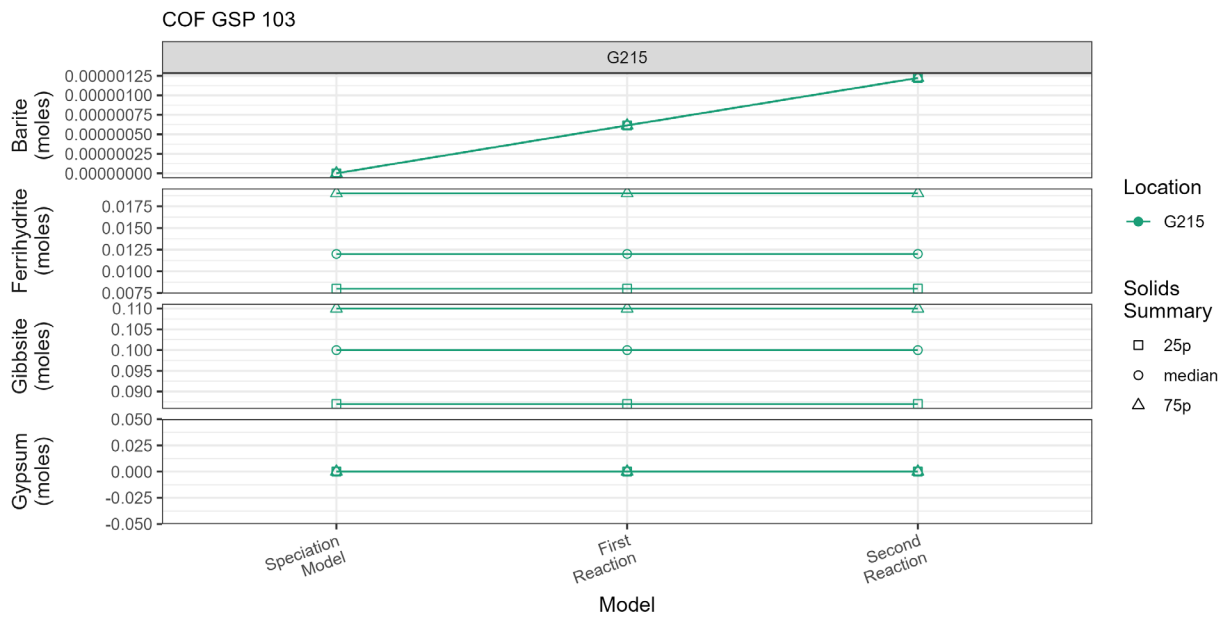


Figure 3: Modeled Sorbing Phase Behavior



3.2.2 Speciation Modeling

Results of speciation modeling support the determination of the GCSM that chemical attenuation of sulfate may occur. Speciation calculations for sulfate indicate that between 10 to 13% of sulfate present in groundwater at G215 will sorb to mineral surfaces (**Figure 1**). Sensitivity assessments demonstrate the limited influence of variable sorbing mineral mass inputs on sulfate sorption, with the 25th percentile and 75th percentile values for mineral mass accounting for differences of up to 3% of aqueous sulfate sorbed under current conditions. These results suggest that some degree of sulfate sorption is predicted under current geochemical conditions, and the absolute amount of sorbed sulfate is only somewhat sensitive to the amount of sorbent.

3.2.3 Reaction modeling

Reaction modeling results of conditions following source control demonstrate that aqueous sulfate concentrations change with background groundwater interaction. Aqueous sulfate concentrations are predicted to decrease at G215 with each iterative reaction, although the relative decrease in concentration between the first reaction and second reaction is a much smaller magnitude (**Figure 2**). Some minor degree of sulfate desorption is predicted with background groundwater interaction after the first iterative reaction; however, the impact of this desorption on aqueous sulfate concentrations is offset by background groundwater containing less aqueous sulfate. Barite precipitation is predicted in all post-source control scenarios, which provides an additional attenuation mechanism for aqueous sulfate (**Figure 3**). G215 is predicted to achieve the sulfate GWPS following the first iterative reaction, indicating that mobilization of currently attenuated sulfate is unlikely to affect the time to reach the GWPS.

Sulfate is predicted to sorb to ferrihydrite and gibbsite. Both minerals are predicted to be stable and exhibit minor (less than 0.01%, **Table 2**) predicted dissolution under post-source control conditions (**Figure 3**). Barite is predicted to precipitate under post-source control conditions in all

model scenarios. The predicted stability of sorbing mineral phases and precipitation of barite under post-source control conditions demonstrates the continued feasibility of sulfate chemical attenuation in groundwater downgradient of GMF GSP.

These results suggest that chemical attenuation of sulfate should remain feasible following source control efforts. Chemical attenuation mechanisms for sulfate are expected to include sorption to iron and aluminum oxide minerals and precipitation of barite. These results suggest that mobilization of currently attenuated sulfate is unlikely to affect the modeled time to reach the GWPS.

4. CONCLUSIONS

This report evaluated the contribution of chemical mechanisms to groundwater polishing via geochemical modeling. The results of the groundwater polishing evaluation also contextualize estimates of the modeled time to reach the GWPS by evaluating potential changes in sulfate attenuation as groundwater quality returns to background conditions.

Geochemical modeling of current GMF GSP geochemical conditions demonstrates chemical attenuation of sulfate via sorption to aquifer solids, particularly iron and aluminum oxides, and precipitation of barite. Modeling of anticipated future conditions predicts a minor component of desorption of sulfate from solids that will be offset by interaction with background groundwater containing lower aqueous sulfate concentrations, resulting in net aqueous sulfate concentration decreases at G215. Barite precipitation is predicted under future conditions, which will provide an additional attenuation mechanism for sulfate. Modeling also predicts that iron and aluminum oxide sorbing minerals phases will remain stable in post-source control conditions, and as a result this chemical attenuation mechanism will remain viable.

Results of the geochemical modeling suggest that mobilization of currently attenuated sulfate is unlikely to affect the modeled time to reach the GWPS. The results will inform corrective action groundwater monitoring and adaptive site management, critical components of every corrective action considered in the CAAA.

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TABLES

Table 1. Summary of Geochemical Model Inputs
Groundwater Polishing Evaluation Report
Coffeen Power Plant - Gypsum Management Facility Stack Pond

Model Component	Parameters	Data source(s)
Solid Phase	Iron (hydr)oxides, aluminum (hydr)oxides	Site-specific total metals and X-ray diffraction results from solid samples (crystalline iron oxides). Analoguous compiled sequential extraction procedure dataset (ferrihydrite and gibbsite).
	Calcite and dolomite	X-ray diffraction results
Downgradient groundwater (COC exceedance locations)	Sulfate, iron, manganese, major ions[1], 845 constituents[1]	Median concentrations per well from data collected in Q2 and Q3 2023
Background groundwater		Median concentrations from all network background wells using data collected in Q2 and Q3 2023

[1]See Section 3.1.1.2 for details.

Table 2 - Geochemical Modeling Response of Sorbing Phases
Groundwater Polishing Evaluation Report
Coffeen Power Plant - Gypsum Management Facility Gypsum Stack Pond

Parameter	Hydrostratigraphic Unit	Location	Summary Type	First Reaction Change		Second Reaction Change	
				mg/kg	%	mg/kg	%
Barite	UA	G215	25p	0.0268	NA	0.0534	99.27
			median	0.0268	NA	0.0533	99.05
			75p	0.0268	NA	0.0534	99.08
Ferrihydrite			25p	160	<0.01	160	<0.01
			median	240	<0.01	240	<0.01
			75p	380	<0.01	380	<0.01
Gibbsite			25p	1270	<0.01	1270	<0.01
			median	1460	<0.01	1460	<0.01
			75p	1600	<0.01	1600	<0.01

Notes:
% = percent
25p = 25th percentile
75p = 75th percentile
mg/kg = milligram/kilogram
UA = Uppermost Aquifer
NA = not applicable

ATTACHMENT A

Operating Permit Network Map and Potentiometric Surface (August 2023)

- COMPLIANCE MONITORING WELL
- BACKGROUND WELL
- 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
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

0 325 650 Feet

NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24-HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.
3. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

POTENTIOMETRIC SURFACE MAP AUGUST 8, 2023

2023 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT B

PHREEQC Input Files and Thermodynamic Database

25th Percentile Metal Oxides/No Charge Balance

```
SELECTED_OUTPUT 1
-file COF_845_103_25p_cb-false_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5
F 0.2695
Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - 25p
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.087
```

```
Ferrihydrite 0 0.008
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

25th Percentile Metal Oxides/Charge Balance on Chloride

```
SELECTED_OUTPUT 1
-file COF_845_103_25p_cb-true_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5 charge
F 0.2695
Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - 25p
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.087
```

```
Ferrihydrite 0 0.008
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

75th Percentile Metal Oxides/No Charge Balance

```
SELECTED_OUTPUT 1
-file COF_845_103_75p_cb-false_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5
F 0.2695
Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - 75p
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.11
```

```
Ferrihydrite 0 0.019
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

75th Percentile Metal Oxides/Charge Balance on Chloride

```
SELECTED_OUTPUT 1
-file COF_845_103_75p_cb-true_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5 charge
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Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - 75p
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.11
```

```
Ferrihydrite 0 0.019
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

Median Metal Oxides/No Charge Balance

```
SELECTED_OUTPUT 1
-file COF_845_103_median_cb-false_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5
F 0.2695
Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - median
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.1
```

```
Ferrihydrite 0 0.012
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

Median Metal Oxides/Charge Balance on Chloride

```
SELECTED_OUTPUT 1
-file COF_845_103_median_cb-true_out.csv
-charge_balance true
-percent_error true
-totals S(6) B Li As C(4) Cl F Ca Mg Na K Ba Si P Mn Fe Al Sb Be Cd Cr Co Pb Mo Se Hfo_s
Hfo_w Hao_
-molalities Hfo_wOH Hfo_wOH2+ Hfo_wOHSO4-2 Hfo_wSO4- Hfo_wOSi(OH)3
Hfo_wOSiO(OH)2- Hfo_wHCO3 Hfo_wCO3- Hfo_wPO4-2
Hfo_wHPO4- Hfo_wH2PO4 Hfo_sCO3- Hfo_sHCO3
Hfo_sHPO4- Hfo_sH2BO3 Hfo_sH2PO4 Hfo_sOSi(OH)3
Hfo_sOSiO(OH)2- Hfo_sOHSO4-2 Hfo_sSO4-
Hao_SO4- Hao_OHSO4-2 Hao_H2BO3 Hao_H3BO4-
-equilibrium_phases Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum
-saturation_indices Ferrihydrite Gibbsite Barite Calcite Dolomite(ordered) Gypsum

SOLUTION 1 #G215 (C - UA)
redox pe
units mg/l
density 1
pH 6.985
pe 4.325
temp 18.25
S(6) 510.5 as SO4
B 0.776
Li 0.0089
As 0.0077
C(4) 202 as CO3
Cl 128.5 charge
F 0.2695
Ca 175.5
Mg 87.25
Na 93.9
K 4.35
Ba 0.0426
Si 6.54
P 0.004475
Mn 0.5625
Fe 0.801
Al 0.005125
Sb 0.0002575
Be 0.0001975
Cd 0.000235
Cr 0.000875
Co 0.000685
Pb 0.00026
Mo 0.002235
Se 0.000335
end

EQUILIBRIUM_PHASES 1 #G215 (C - UA) - median
Barite 0 0
Gypsum 0 0
Gibbsite 0 0.1
```

```
Ferrihydrite 0 0.012
Calcite 0 2
Dolomite(ordered) 0 5

SURFACE 1
Hfo_wOH Ferrihydrite equilibrium_phase 0.2 53400
Hfo_sOH Ferrihydrite equilibrium_phase 0.005 53400
Hao_OH Gibbsite equilibrium_phase 0.033 2496
-equil 1
save surface 1
end

SOLUTION 2 #average background
redox pe
units mg/l
density 1
pH 7.2
pe 2.71
temp 22.2
S(6) 165
B 0.007275
Li 0.00775
As 0.0062
C(4) 216
Cl 77 charge
F 0.203
Ca 115
Mg 49.5
Na 88
K 1.37
Ba 0.114
Si 7.9
P 0.0421
Mn 0.17
Fe 1.65018
Al 0.0195
Sb 0.0006575
Be 0.0005625
Cd 0.00037
Cr 0.0067
Co 0.00377
Pb 0.00829
Mo 0.00058
Se 0.001635

SAVE solution 2

end

#FIRST REACTION

#G215 (C - UA) - First Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
```

```
end

#G215 (C - UA) - Second Reaction
USE SOLUTION 2
USE EQUILIBRIUM_PHASES 1
USE SURFACE 1
SAVE equilibrium_phases 1
SAVE surface 1
end
```

Database

```
#$Id: minteq.v4.dat 12387 2017-02-09 16:41:47Z dlpark $
SOLUTION_MASTER_SPECIES
Alkalinity CO3-2 2.0 HCO3 61.0173
E e- 0 0 0
O H2O 0 O 16.00
O(-2) H2O 0 O
O(0) O2 0 O
Ag Ag+ 0.0 Ag 107.868
Al Al+3 0.0 Al 26.9815
As H3AsO4 -1.0 As 74.9216
As(3) H3AsO3 0.0 As
As(5) H3AsO4 -1.0 As
B H3BO3 0.0 B 10.81
Ba Ba+2 0.0 Ba 137.33
Be Be+2 0.0 Be 9.0122
Br Br- 0.0 Br 79.904
C CO3-2 2.0 CO3 12.0111
C(4) CO3-2 2.0 CO3 12.0111
Cyanide Cyanide- 1.0 Cyanide 26.0177
Dom_a Dom_a 0.0 C 12.0111
Dom_b Dom_b 0.0 C 12.0111
Dom_c Dom_c 0.0 C 12.0111
Ca Ca+2 0.0 Ca 40.078
Cd Cd+2 0.0 Cd 112.41
Cl Cl- 0.0 Cl 35.453
Co Co+3 -1.0 Co 58.9332
Co(2) Co+2 0.0 Co
Co(3) Co+3 -1.0 Co
Cr CrO4-2 1.0 Cr 51.996
Cr(2) Cr+2 0.0 Cr
Cr(3) Cr(OH)2+ 0.0 Cr
Cr(6) CrO4-2 1.0 Cr
Cu Cu+2 0.0 Cu 63.546
Cu(1) Cu+ 0.0 Cu
Cu(2) Cu+2 0.0 Cu
F F- 0.0 F 18.9984
Fe Fe+3 -2.0 Fe 55.847
Fe(2) Fe+2 0.0 Fe
Fe(3) Fe+3 -2.0 Fe
H H+ -1.0 H 1.0079
H(0) H2 0 H
H(1) H+ -1.0 H
Hg Hg(OH)2 0.0 Hg 200.59
Hg(0) Hg 0.0 Hg
Hg(1) Hg2+2 0.0 Hg
Hg(2) Hg(OH)2 0.0 Hg
I I- 0.0 I 126.904
K K+ 0.0 K 39.0983
Li Li+ 0.0 Li 6.941
Mg Mg+2 0.0 Mg 24.305
Mn Mn+3 0.0 Mn 54.938
```

Mn(2) Mn+2 0.0 Mn
Mn(3) Mn+3 0.0 Mn
Mn(6) MnO4-2 0.0 Mn
Mn(7) MnO4- 0.0 Mn
Mo MoO4-2 0.0 Mo 95.94
N NO3- 0.0 N 14.0067
N(-3) NH4+ 0.0 N
N(3) NO2- 0.0 N
N(5) NO3- 0.0 N
Na Na+ 0.0 Na 22.9898
Ni Ni+2 0.0 Ni 58.69
P PO4-3 2.0 P 30.9738
Pb Pb+2 0.0 Pb 207.2
S SO4-2 0.0 SO4 32.066
S(-2) HS- 1.0 S
#S(0) S 0.0 S
S(6) SO4-2 0.0 SO4
Sb Sb(OH)6- 0.0 Sb 121.75
Sb(3) Sb(OH)3 0.0 Sb
Sb(5) Sb(OH)6- 0.0 Sb
Se SeO4-2 0.0 Se 78.96
Se(-2) HSe- 0.0 Se
Se(4) HSeO3- 0.0 Se
Se(6) SeO4-2 0.0 Se
Si H4SiO4 0.0 SiO2 28.0843
Sn Sn(OH)6-2 0.0 Sn 118.71
Sn(2) Sn(OH)2 0.0 Sn
Sn(4) Sn(OH)6-2 0.0 Sn
Sr Sr+2 0.0 Sr 87.62
Tl Tl(OH)3 0.0 Tl 204.383
Tl(1) Tl+ 0.0 Tl
Tl(3) Tl(OH)3 0.0 Tl
U UO2+2 0.0 U 238.029
U(3) U+3 0.0 U
U(4) U+4 -4.0 U
U(5) UO2+ 0.0 U
U(6) UO2+2 0.0 U
V VO2+ -2.0 V 50.94
V(2) V+2 0.0 V
V(3) V+3 -3.0 V
V(4) VO+2 0.0 V
V(5) VO2+ -2.0 V
Zn Zn+2 0.0 Zn 65.39
Benzoate Benzoate- 0.0 121.116 121.116
Phenylacetate Phenylacetate- 0.0 135.142 135.142
Isophthalate Isophthalate-2 0.0 164.117 164.117
Diethylamine Diethylamine 1.0 73.138 73.138
Butylamine Butylamine 1.0 73.138 73.138
Methylamine Methylamine 1.0 31.057 31.057
Dimethylamine Dimethylamine 1.0 45.084 45.084
Hexylamine Hexylamine 1.0 101.192 101.192
Ethylenediamine Ethylenediamine 2.0 60.099 60.099
Propylamine Propylamine 1.0 59.111 59.111
Isopropylamine Isopropylamine 1.0 59.111 59.111

```
Trimethylamine Trimethylamine 1.0 59.111 59.111
Citrate Citrate-3 2.0 189.102 189.102
Nta Nta-3 1.0 188.117 188.117
Edta Edta-4 2.0 288.214 288.214
Propionate Propionate- 1.0 73.072 73.072
Butyrate Butyrate- 1.0 87.098 87.098
Isobutyrate Isobutyrate- 1.0 87.098 87.098
Two_picoline Two_picoline 1.0 93.128 93.128
Three_picoline Three_picoline 1.0 93.128 93.128
Four_picoline Four_picoline 1.0 93.128 93.128
Formate Formate- 0.0 45.018 45.018
Isovalerate Isovalerate- 1.0 101.125 101.125
Valerate Valerate- 1.0 101.125 101.125
Acetate Acetate- 1.0 59.045 59.045
Tartarate Tartarate-2 0.0 148.072 148.072
Glycine Glycine- 1.0 74.059 74.059
Salicylate Salicylate-2 1.0 136.107 136.107
Glutamate Glutamate-2 1.0 145.115 145.115
Phthalate Phthalate-2 1.0 164.117 164.117
SOLUTION_SPECIES
e- = e-
log_k 0
H2O = H2O
log_k 0
Ag+ = Ag+
log_k 0
Al+3 = Al+3
log_k 0
H3AsO4 = H3AsO4
log_k 0
H3BO3 = H3BO3
log_k 0
Ba+2 = Ba+2
log_k 0
Be+2 = Be+2
log_k 0
Br- = Br-
log_k 0
CO3-2 = CO3-2
log_k 0
Cyanide- = Cyanide-
log_k 0
Dom_a = Dom_a
log_k 0
Dom_b = Dom_b
log_k 0
Dom_c = Dom_c
log_k 0
Ca+2 = Ca+2
log_k 0
Cd+2 = Cd+2
log_k 0
Cl- = Cl-
log_k 0
```

Co+3 = Co+3
log_k 0
CrO4-2 = CrO4-2
log_k 0
Cu+2 = Cu+2
log_k 0
F- = F-
log_k 0
Fe+3 = Fe+3
log_k 0
H+ = H+
log_k 0
Hg(OH)2 = Hg(OH)2
log_k 0
I- = I-
log_k 0
K+ = K+
log_k 0
Li+ = Li+
log_k 0
Mg+2 = Mg+2
log_k 0
Mn+3 = Mn+3
log_k 0
MoO4-2 = MoO4-2
log_k 0
NO3- = NO3-
log_k 0
Na+ = Na+
log_k 0
Ni+2 = Ni+2
log_k 0
PO4-3 = PO4-3
log_k 0
Pb+2 = Pb+2
log_k 0
SO4-2 = SO4-2
log_k 0
Sb(OH)6- = Sb(OH)6-
log_k 0
SeO4-2 = SeO4-2
log_k 0
H4SiO4 = H4SiO4
log_k 0
Sn(OH)6-2 = Sn(OH)6-2
log_k 0
Sr+2 = Sr+2
log_k 0
Tl(OH)3 = Tl(OH)3
log_k 0
UO2+2 = UO2+2
log_k 0
VO2+ = VO2+
log_k 0

Benzoate- = Benzoate-
log_k 0
Phenylacetate- = Phenylacetate-
log_k 0
Isophthalate-2 = Isophthalate-2
log_k 0
Zn+2 = Zn+2
log_k 0
Diethylamine = Diethylamine
log_k 0
Butylamine = Butylamine
log_k 0
Methylamine = Methylamine
log_k 0
Dimethylamine = Dimethylamine
log_k 0
Hexylamine = Hexylamine
log_k 0
Ethylenediamine = Ethylenediamine
log_k 0
Propylamine = Propylamine
log_k 0
Isopropylamine = Isopropylamine
log_k 0
Trimethylamine = Trimethylamine
log_k 0
Citrate-3 = Citrate-3
log_k 0
Nta-3 = Nta-3
log_k 0
Edta-4 = Edta-4
log_k 0
Propionate- = Propionate-
log_k 0
Butyrate- = Butyrate-
log_k 0
Isobutyrate- = Isobutyrate-
log_k 0
Two_picoline = Two_picoline
log_k 0
Three_picoline = Three_picoline
log_k 0
Four_picoline = Four_picoline
log_k 0
Formate- = Formate-
log_k 0
Isovalerate- = Isovalerate-
log_k 0
Valerate- = Valerate-
log_k 0
Acetate- = Acetate-
log_k 0
Tartarate-2 = Tartarate-2
log_k 0

```
Glycine- = Glycine-
log_k 0
Salicylate-2 = Salicylate-2
log_k 0
Glutamate-2 = Glutamate-2
log_k 0
Phthalate-2 = Phthalate-2
log_k 0
SOLUTION_SPECIES
Fe+3 + e- = Fe+2
log_k 13.032
delta_h -42.7 kJ
-gamma 0 0
# Id: 2802810
# log K source: Bard85
# Delta H source: Bard85
#T and ionic strength:
H3AsO4 + 2e- + 2H+ = H3AsO3 + H2O
log_k 18.898
delta_h -125.6 kJ
-gamma 0 0
# Id: 600610
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Sb(OH)6- + 2e- + 3H+ = Sb(OH)3 + 3H2O
log_k 24.31
delta_h 0 kJ
-gamma 0 0
# Id: 7407410
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + 3e- + 4H+ = U+3 + 2H2O
log_k 0.42
delta_h -42 kJ
-gamma 0 0
# Id: 8908930
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + 2e- + 4H+ = U+4 + 2H2O
log_k 9.216
delta_h -144.1 kJ
-gamma 0 0
# Id: 8918930
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + e- = UO2+
log_k 2.785
delta_h -13.8 kJ
-gamma 0 0
# Id: 8928930
```

```
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
e- + Mn+3 = Mn+2
log_k 25.35
delta_h -107.8 kJ
-gamma 0 0
# Id: 4704710
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Co+3 + e- = Co+2
log_k 32.4
delta_h 0 kJ
-gamma 0 0
# Id: 2002010
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Cu+2 + e- = Cu+
log_k 2.69
delta_h 6.9 kJ
-gamma 0 0
# Id: 2302310
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
V+3 + e- = V+2
log_k -4.31
delta_h 0 kJ
-gamma 0 0
# Id: 9009010
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
VO+2 + e- + 2H+ = V+3 + H2O
log_k 5.696
delta_h 0 kJ
-gamma 0 0
# Id: 9019020
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
VO2+ + e- + 2H+ = VO+2 + H2O
log_k 16.903
delta_h -122.7 kJ
-gamma 0 0
# Id: 9029030
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
SO4-2 + 9H+ + 8e- = HS- + 4H2O
log_k 33.66
delta_h -60.14 kJ
```

-gamma 0 0
Id: 7307320
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
Sn(OH)6-2 + 2e- + 4H+ = Sn(OH)2 + 4H2O
log_k 19.2
delta_h 0 kJ
-gamma 0 0
Id: 7907910
log K source: Bard85
Delta H source: MTQ3.11
#T and ionic strength:
Tl(OH)3 + 2e- + 3H+ = Tl+ + 3H2O
log_k 45.55
delta_h 0 kJ
-gamma 0 0
Id: 8708710
log K source: Bard85
Delta H source: MTQ3.11
#T and ionic strength:
HSeO3- + 6e- + 6H+ = HSe- + 3H2O
log_k 44.86
delta_h 0 kJ
-gamma 0 0
Id: 7607610
log K source: Bard85
Delta H source: MTQ3.11
#T and ionic strength:
SeO4-2 + 2e- + 3H+ = HSeO3- + H2O
log_k 36.308
delta_h -201.2 kJ
-gamma 0 0
Id: 7617620
log K source: Bard85
Delta H source: MTQ3.11
#T and ionic strength:
0.5Hg2+2 + e- = Hg
log_k 6.5667
delta_h -45.735 kJ
-gamma 0 0
Id: 3600000
log K source: NIST2.1.1
Delta H source: NIST2.1.1
#T and ionic strength:

2Hg(OH)2 + 4H+ + 2e- = Hg2+2 + 4H2O
log_k 43.185
delta_h -63.59 kJ
-gamma 0 0
Id: 3603610
log K source: Bard85
Delta H source: MTQ3.11
#T and ionic strength:

```
Cr(OH)2+ + 2H+ + e- = Cr+2 + 2H2O
log_k 2.947
delta_h 6.36 kJ
-gamma 0 0
# Id: 2102110
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
CrO4-2 + 6H+ + 3e- = Cr(OH)2+ + 2H2O
log_k 67.376
delta_h -103 kJ
-gamma 0 0
# Id: 2112120
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:

2H2O = O2 + 4H+ + 4e-
# Adjusted for equation to aqueous species
log_k -85.9951
-analytic 38.0229 7.99407E-03 -2.7655e+004 -1.4506e+001 199838.45

2 H+ + 2 e- = H2
log_k -3.15
delta_h -1.759 kcal

NO3- + 2 H+ + 2 e- = NO2- + H2O
log_k 28.570
delta_h -43.760 kcal
-gamma 3.0000 0.0000

NO3- + 10 H+ + 8 e- = NH4+ + 3 H2O
log_k 119.077
delta_h -187.055 kcal
-gamma 2.5000 0.0000

Mn+2 + 4H2O = MnO4- + 8H+ + 5e-
log_k -127.794
delta_h 822.67 kJ
-gamma 3 0
# Id: 4700020
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Mn+2 + 4H2O = MnO4-2 + 8H+ + 4e-
log_k -118.422
delta_h 711.07 kJ
-gamma 5 0
# Id: 4700021
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
HS- = S-2 + H+
log_k -17.3
delta_h 49.4 kJ
-gamma 5 0
# Id: 3307301
```

```
# log K source: LMa1987
# Delta H source: NIST2.1.1
#T and ionic strength: 0.00 25.0
HSe- = Se-2 + H+
log_k -15
delta_h 48.116 kJ
-gamma 0 0
# Id: 3307601
# log K source: SCD3.02 (1968 DKa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 3H+ = Tl+3 + 3H2O
log_k 3.291
delta_h 0 kJ
-gamma 0 0
# Id: 8713300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
0.5Hg2+2 + e- = Hg
log_k 6.5667
delta_h -45.735 kJ
-gamma 0 0
# Id: 3600000
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Hg(OH)2 + 2H+ = Hg+2 + 2H2O
log_k 6.194
delta_h -39.72 kJ
-gamma 0 0
# Id: 3613300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + 2H+ = Cr+3 + 2H2O
log_k 9.5688
delta_h -129.62 kJ
-gamma 0 0
# Id: 2113300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.10 20.0
H2O = OH- + H+
log_k -13.997
delta_h 55.81 kJ
-gamma 3.5 0
# Id: 3300020
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ = Sn+2 + 2H2O
log_k 7.094
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 7903301
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Sn(OH)2 + H+ = SnOH+ + H2O
log_k 3.697
delta_h 0 kJ
-gamma 0 0
# Id: 7903302
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Sn(OH)2 + H2O = Sn(OH)3- + H+
log_k -9.497
delta_h 0 kJ
-gamma 0 0
# Id: 7903303
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Sn(OH)2 + 2H+ = Sn2(OH)2+2 + 2H2O
log_k 9.394
delta_h 0 kJ
-gamma 0 0
# Id: 7903304
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
3Sn(OH)2 + 2H+ = Sn3(OH)4+2 + 2H2O
log_k 14.394
delta_h 0 kJ
-gamma 0 0
# Id: 7903305
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Sn(OH)2 = HSnO2- + H+
log_k -8.9347
delta_h 0 kJ
-gamma 0 0
# Id: 7903306
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Sn(OH)6-2 + 6H+ = Sn+4 + 6H2O
log_k 21.2194
delta_h 0 kJ
-gamma 0 0
# Id: 7913301
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Sn(OH)6-2 = SnO3-2 + 3H2O
```

```
log_k -2.2099
delta_h 0 kJ
-gamma 0 0
# Id: 7913302
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Pb+2 + H2O = PbOH+ + H+
log_k -7.597
delta_h 0 kJ
-gamma 0 0
# Id: 6003300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Pb+2 + 2H2O = Pb(OH)2 + 2H+
log_k -17.094
delta_h 0 kJ
-gamma 0 0
# Id: 6003301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Pb+2 + 3H2O = Pb(OH)3- + 3H+
log_k -28.091
delta_h 0 kJ
-gamma 0 0
# Id: 6003302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Pb+2 + H2O = Pb2OH+3 + H+
log_k -6.397
delta_h 0 kJ
-gamma 0 0
# Id: 6003303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
3Pb+2 + 4H2O = Pb3(OH)4+2 + 4H+
log_k -23.888
delta_h 115.24 kJ
-gamma 0 0
# Id: 6003304
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 4H2O = Pb(OH)4-2 + 4H+
log_k -39.699
delta_h 0 kJ
-gamma 0 0
# Id: 6003305
# log K source: MTQ3.11
# Delta H source: MTQ3.11
```

```
#T and ionic strength:
4Pb+2 + 4H2O = Pb4(OH)4+4 + 4H+
log_k -19.988
delta_h 88.24 kJ
-gamma 0 0
# Id: 6003306
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
H3BO3 + F- = BF(OH)3-
log_k -0.399
delta_h 7.7404 kJ
-gamma 2.5 0
# Id: 902700
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
H3BO3 + 2F- + H+ = BF2(OH)2- + H2O
log_k 7.63
delta_h 6.8408 kJ
-gamma 2.5 0
# Id: 902701
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
H3BO3 + 3F- + 2H+ = BF3OH- + 2H2O
log_k 13.22
delta_h -20.4897 kJ
-gamma 2.5 0
# Id: 902702
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Al+3 + H2O = AlOH+2 + H+
log_k -4.997
delta_h 47.81 kJ
-gamma 5.4 0
# Id: 303300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Al+3 + 2H2O = Al(OH)2+ + 2H+
log_k -10.094
delta_h 0 kJ
-gamma 5.4 0
# Id: 303301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Al+3 + 3H2O = Al(OH)3 + 3H+
log_k -16.791
delta_h 0 kJ
-gamma 0 0
# Id: 303303
```

```
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Al+3 + 4H2O = Al(OH)4- + 4H+
log_k -22.688
delta_h 173.24 kJ
-gamma 4.5 0
# Id: 303302
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl+ + H2O = TlOH + H+
log_k -13.207
delta_h 56.81 kJ
-gamma 0 0
# Id: 8703300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 2H+ = TlOH+2 + 2H2O
log_k 2.694
delta_h 0 kJ
-gamma 0 0
# Id: 8713301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + H+ = Tl(OH)2+ + H2O
log_k 1.897
delta_h 0 kJ
-gamma 0 0
# Id: 8713302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Tl(OH)3 + H2O = Tl(OH)4- + H+
log_k -11.697
delta_h 0 kJ
-gamma 0 0
# Id: 8713303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + H2O = ZnOH+ + H+
log_k -8.997
delta_h 55.81 kJ
-gamma 0 0
# Id: 9503300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Zn+2 + 2H2O = Zn(OH)2 + 2H+
log_k -17.794
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 9503301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 3H2O = Zn(OH)3- + 3H+
log_k -28.091
delta_h 0 kJ
-gamma 0 0
# Id: 9503302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 4H2O = Zn(OH)4-2 + 4H+
log_k -40.488
delta_h 0 kJ
-gamma 0 0
# Id: 9503303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cd+2 + H2O = CdOH+ + H+
log_k -10.097
delta_h 54.81 kJ
-gamma 0 0
# Id: 1603300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2H2O = Cd(OH)2 + 2H+
log_k -20.294
delta_h 0 kJ
-gamma 0 0
# Id: 1603301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cd+2 + 3H2O = Cd(OH)3- + 3H+
log_k -32.505
delta_h 0 kJ
-gamma 0 0
# Id: 1603302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Cd+2 + 4H2O = Cd(OH)4-2 + 4H+
log_k -47.288
delta_h 0 kJ
-gamma 0 0
# Id: 1603303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Cd+2 + H2O = Cd2OH+3 + H+
```

```
log_k -9.397
delta_h 45.81 kJ
-gamma 0 0
# Id: 1603304
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + H+ = HgOH+ + H2O
log_k 2.797
delta_h -18.91 kJ
-gamma 0 0
# Id: 3613302
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + H2O = Hg(OH)3- + H+
log_k -14.897
delta_h 0 kJ
-gamma 0 0
# Id: 3613303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+2 + H2O = CuOH+ + H+
log_k -7.497
delta_h 35.81 kJ
-gamma 4 0
# Id: 2313300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cu+2 + 2H2O = Cu(OH)2 + 2H+
log_k -16.194
delta_h 0 kJ
-gamma 0 0
# Id: 2313301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+2 + 3H2O = Cu(OH)3- + 3H+
log_k -26.879
delta_h 0 kJ
-gamma 0 0
# Id: 2313302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Cu+2 + 4H2O = Cu(OH)4-2 + 4H+
log_k -39.98
delta_h 0 kJ
-gamma 0 0
# Id: 2313303
# log K source: NIST46.3
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  1.00 25.0
2Cu+2 + 2H2O = Cu2(OH)2+2 + 2H+
log_k -10.594
delta_h 76.62 kJ
-gamma 0 0
# Id:  2313304
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ag+ + H2O = AgOH + H+
log_k -11.997
delta_h 0 kJ
-gamma 0 0
# Id:  203300
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Ag+ + 2H2O = Ag(OH)2- + 2H+
log_k -24.004
delta_h 0 kJ
-gamma 0 0
# Id:  203301
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Ni+2 + H2O = NiOH+ + H+
log_k -9.897
delta_h 51.81 kJ
-gamma 0 0
# Id:  5403300
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ni+2 + 2H2O = Ni(OH)2 + 2H+
log_k -18.994
delta_h 0 kJ
-gamma 0 0
# Id:  5403301
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Ni+2 + 3H2O = Ni(OH)3- + 3H+
log_k -29.991
delta_h 0 kJ
-gamma 0 0
# Id:  5403302
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Co+2 + H2O = CoOH+ + H+
log_k -9.697
delta_h 0 kJ
-gamma 0 0
# Id:  2003300
```

```
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + 2H2O = Co(OH)2 + 2H+
log_k -18.794
delta_h 0 kJ
-gamma 0 0
# Id: 2003301
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + 3H2O = Co(OH)3- + 3H+
log_k -31.491
delta_h 0 kJ
-gamma 0 0
# Id: 2003302
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + 4H2O = Co(OH)4-2 + 4H+
log_k -46.288
delta_h 0 kJ
-gamma 0 0
# Id: 2003303
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Co+2 + H2O = Co2OH+3 + H+
log_k -10.997
delta_h 0 kJ
-gamma 0 0
# Id: 2003304
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
4Co+2 + 4H2O = Co4(OH)4+4 + 4H+
log_k -30.488
delta_h 0 kJ
-gamma 0 0
# Id: 2003306
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + 2H2O = CoOOH- + 3H+
log_k -32.0915
delta_h 260.454 kJ
-gamma 0 0
# Id: 2003305
# log K source: NIST2.1.1
# Delta H source: MTQ3.11
#T and ionic strength:
Co+3 + H2O = CoOH+2 + H+
log_k -1.291
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2013300
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Fe+2 + H2O = FeOH+ + H+
log_k -9.397
delta_h 55.81 kJ
-gamma 5 0
# Id: 2803300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+2 + 2H2O = Fe(OH)2 + 2H+
log_k -20.494
delta_h 119.62 kJ
-gamma 0 0
# Id: 2803302
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+2 + 3H2O = Fe(OH)3- + 3H+
log_k -28.991
delta_h 126.43 kJ
-gamma 5 0
# Id: 2803301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+3 + H2O = FeOH+2 + H+
log_k -2.187
delta_h 41.81 kJ
-gamma 5 0
# Id: 2813300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+3 + 2H2O = Fe(OH)2+ + 2H+
log_k -4.594
delta_h 0 kJ
-gamma 5.4 0
# Id: 2813301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Fe+3 + 3H2O = Fe(OH)3 + 3H+
log_k -12.56
delta_h 103.8 kJ
-gamma 0 0
# Id: 2813302
# log K source: Nord90
# Delta H source: Nord90
#T and ionic strength: 0.00 25.0
Fe+3 + 4H2O = Fe(OH)4- + 4H+
```

```
log_k -21.588
delta_h 0 kJ
-gamma 5.4 0
# Id: 2813303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Fe+3 + 2H2O = Fe2(OH)2+4 + 2H+
log_k -2.854
delta_h 57.62 kJ
-gamma 0 0
# Id: 2813304
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
3Fe+3 + 4H2O = Fe3(OH)4+5 + 4H+
log_k -6.288
delta_h 65.24 kJ
-gamma 0 0
# Id: 2813305
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Mn+2 + H2O = MnOH+ + H+
log_k -10.597
delta_h 55.81 kJ
-gamma 5 0
# Id: 4703300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Mn+2 + 3H2O = Mn(OH)3- + 3H+
log_k -34.8
delta_h 0 kJ
-gamma 5 0
# Id: 4703301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Mn+2 + 4H2O = Mn(OH)4-2 + 4H+
log_k -48.288
delta_h 0 kJ
-gamma 5 0
# Id: 4703302
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Mn+2 + 4H2O = MnO4- + 8H+ + 5e-
log_k -127.794
delta_h 822.67 kJ
-gamma 3 0
# Id: 4700020
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
```

```
#T and ionic strength:
Mn+2 + 4H2O = MnO4-2 + 8H+ + 4e-
log_k -118.422
delta_h 711.07 kJ
-gamma 5 0
# Id: 4700021
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Cr(OH)2+ + H+ = Cr(OH)+2 + H2O
log_k 5.9118
delta_h -77.91 kJ
-gamma 0 0
# Id: 2113301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + H2O = Cr(OH)3 + H+
log_k -8.4222
delta_h 0 kJ
-gamma 0 0
# Id: 2113302
# log K source: SCD3.02 (1983 RCa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + 2H2O = Cr(OH)4- + 2H+
log_k -17.8192
delta_h 0 kJ
-gamma 0 0
# Id: 2113303
# log K source: SCD3.02 (1983 RCa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cr(OH)2+ = CrO2- + 2H+
log_k -17.7456
delta_h 0 kJ
-gamma 0 0
# Id: 2113304
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
V+2 + H2O = VOH+ + H+
log_k -6.487
delta_h 59.81 kJ
-gamma 0 0
# Id: 9003300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
V+3 + H2O = VOH+2 + H+
log_k -2.297
delta_h 43.81 kJ
-gamma 0 0
# Id: 9013300
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
V+3 + 2H2O = V(OH)2+ + 2H+
log_k -6.274
delta_h 0 kJ
-gamma 0 0
# Id: 9013301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
V+3 + 3H2O = V(OH)3 + 3H+
log_k -3.0843
delta_h 0 kJ
-gamma 0 0
# Id: 9013302
# log K source: SCD3.02 (1978 TKa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 20.0
2V+3 + 2H2O = V2(OH)2+4 + 2H+
log_k -3.794
delta_h 0 kJ
-gamma 0 0
# Id: 9013304
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2V+3 + 3H2O = V2(OH)3+3 + 3H+
log_k -10.1191
delta_h 0 kJ
-gamma 0 0
# Id: 9013303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
VO+2 + 2H2O = V(OH)3+ + H+
log_k -5.697
delta_h 0 kJ
-gamma 0 0
# Id: 9023300
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2VO+2 + 2H2O = H2V2O4+2 + 2H+
log_k -6.694
delta_h 53.62 kJ
-gamma 0 0
# Id: 9023301
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
U+4 + H2O = UOH+3 + H+
log_k -0.597
delta_h 47.81 kJ
```

```
-gamma 0 0
# Id: 8913300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
U+4 + 2H2O = U(OH)2+2 + 2H+
log_k -2.27
delta_h 74.1823 kJ
-gamma 0 0
# Id: 8913301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 3H2O = U(OH)3+ + 3H+
log_k -4.935
delta_h 94.7467 kJ
-gamma 0 0
# Id: 8913302
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 4H2O = U(OH)4 + 4H+
log_k -8.498
delta_h 103.596 kJ
-gamma 0 0
# Id: 8913303
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 5H2O = U(OH)5- + 5H+
log_k -13.12
delta_h 115.374 kJ
-gamma 0 0
# Id: 8913304
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
6U+4 + 15H2O = U6(OH)15+9 + 15H+
log_k -17.155
delta_h 0 kJ
-gamma 0 0
# Id: 8913305
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
UO2+2 + H2O = UO2OH+ + H+
log_k -5.897
delta_h 47.81 kJ
-gamma 0 0
# Id: 8933300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
2UO2+2 + 2H2O = (UO2)2(OH)2+2 + 2H+
```

```
log_k -5.574
delta_h 41.82 kJ
-gamma 0 0
# Id: 8933301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
3UO2+2 + 5H2O = (UO2)3(OH)5+ + 5H+
log_k -15.585
delta_h 108.05 kJ
-gamma 0 0
# Id: 8933302
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Be+2 + H2O = BeOH+ + H+
log_k -5.397
delta_h 0 kJ
-gamma 6.5 0
# Id: 1103301
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Be+2 + 2H2O = Be(OH)2 + 2H+
log_k -13.594
delta_h 0 kJ
-gamma 6.5 0
# Id: 1103302
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Be+2 + 3H2O = Be(OH)3- + 3H+
log_k -23.191
delta_h 0 kJ
-gamma 6.5 0
# Id: 1103303
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Be+2 + 4H2O = Be(OH)4-2 + 4H+
log_k -37.388
delta_h 0 kJ
-gamma 6.5 0
# Id: 1103304
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
2Be+2 + H2O = Be2OH+3 + H+
log_k -3.177
delta_h 0 kJ
-gamma 6.5 0
# Id: 1103305
# log K source: NIST46.4
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  0.10 25.0
3Be+2 + 3H2O = Be3(OH)3+3 + 3H+
log_k -8.8076
delta_h 0 kJ
-gamma 6.5 0
# Id:  1103306
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 25.0
Mg+2 + H2O = MgOH+ + H+
log_k -11.397
delta_h 67.81 kJ
-gamma 6.5 0
# Id:  4603300
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ca+2 + H2O = CaOH+ + H+
log_k -12.697
delta_h 64.11 kJ
-gamma 6 0
# Id:  1503300
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Sr+2 + H2O = SrOH+ + H+
log_k -13.177
delta_h 60.81 kJ
-gamma 5 0
# Id:  8003300
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ba+2 + H2O = BaOH+ + H+
log_k -13.357
delta_h 60.81 kJ
-gamma 5 0
# Id:  1003300
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
H+ + F- = HF
log_k 3.17
delta_h 13.3 kJ
-gamma 0 0
# Id:  3302700
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
H+ + 2F- = HF2-
log_k 3.75
delta_h 17.4 kJ
-gamma 3.5 0
# Id:  3302701
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
2F- + 2H+ = H2F2
log_k 6.768
delta_h 0 kJ
-gamma 0 0
# Id: 3302702
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Sb(OH)3 + F- + H+ = SbOF + 2H2O
log_k 6.1864
delta_h 0 kJ
-gamma 0 0
# Id: 7402700
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)3 + F- + H+ = Sb(OH)2F + H2O
log_k 6.1937
delta_h 0 kJ
-gamma 0 0
# Id: 7402702
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
H4SiO4 + 4H+ + 6F- = SiF6-2 + 4H2O
log_k 30.18
delta_h -68 kJ
-gamma 5 0
# Id: 7702700
# log K source: Nord90
# Delta H source: Nord90
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + F- = SnF+ + 2H2O
log_k 11.582
delta_h 0 kJ
-gamma 0 0
# Id: 7902701
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Sn(OH)2 + 2H+ + 2F- = SnF2 + 2H2O
log_k 14.386
delta_h 0 kJ
-gamma 0 0
# Id: 7902702
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Sn(OH)2 + 2H+ + 3F- = SnF3- + 2H2O
log_k 17.206
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 7902703
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Sn(OH)6-2 + 6H+ + 6F- = SnF6-2 + 6H2O
log_k 33.5844
delta_h 0 kJ
-gamma 0 0
# Id: 7912701
# log K source: Bard85
# Delta H source: MTQ3.11
#T and ionic strength:
Pb+2 + F- = PbF+
log_k 1.848
delta_h 0 kJ
-gamma 0 0
# Id: 6002700
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Pb+2 + 2F- = PbF2
log_k 3.142
delta_h 0 kJ
-gamma 0 0
# Id: 6002701
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Pb+2 + 3F- = PbF3-
log_k 3.42
delta_h 0 kJ
-gamma 0 0
# Id: 6002702
# log K source: SCD3.02 (1956 TKa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Pb+2 + 4F- = PbF4-2
log_k 3.1
delta_h 0 kJ
-gamma 0 0
# Id: 6002703
# log K source: SCD3.02 (1956 TKa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
H3BO3 + 3H+ + 4F- = BF4- + 3H2O
log_k 19.912
delta_h -18.67 kJ
-gamma 2.5 0
# Id: 902703
# log K source: NIST46.3
# Delta H source: NIST2.1.1
#T and ionic strength: 1.00 25.0
Al+3 + F- = AlF+2
```

```
log_k 7
delta_h 4.6 kJ
-gamma 5.4 0
# Id: 302700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Al+3 + 2F- = AlF2+
log_k 12.6
delta_h 8.3 kJ
-gamma 5.4 0
# Id: 302701
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Al+3 + 3F- = AlF3
log_k 16.7
delta_h 8.7 kJ
-gamma 0 0
# Id: 302702
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Al+3 + 4F- = AlF4-
log_k 19.4
delta_h 8.7 kJ
-gamma 4.5 0
# Id: 302703
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl+ + F- = TlF
log_k 0.1
delta_h 0 kJ
-gamma 0 0
# Id: 8702700
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + F- = ZnF+
log_k 1.3
delta_h 11 kJ
-gamma 0 0
# Id: 9502700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + F- = CdF+
log_k 1.2
delta_h 5 kJ
-gamma 0 0
# Id: 1602700
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
Cd+2 + 2F- = CdF2
log_k 1.5
delta_h 0 kJ
-gamma 0 0
# Id:  1602701
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
Hg(OH)2 + 2H+ + F- = HgF+ + 2H2O
log_k 7.763
delta_h -35.72 kJ
-gamma 0 0
# Id:  3612701
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.50 25.0
Cu+2 + F- = CuF+
log_k 1.8
delta_h 13 kJ
-gamma 0 0
# Id:  2312700
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ag+ + F- = AgF
log_k 0.4
delta_h 12 kJ
-gamma 0 0
# Id:  202700
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ni+2 + F- = NiF+
log_k 1.4
delta_h 7.1 kJ
-gamma 0 0
# Id:  5402700
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Co+2 + F- = CoF+
log_k 1.5
delta_h 9.2 kJ
-gamma 0 0
# Id:  2002700
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Fe+3 + F- = FeF+2
log_k 6.04
delta_h 10 kJ
-gamma 5 0
# Id:  2812700
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+3 + 2F- = FeF2+
log_k 10.4675
delta_h 17 kJ
-gamma 5 0
# Id: 2812701
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Fe+3 + 3F- = FeF3
log_k 13.617
delta_h 29 kJ
-gamma 0 0
# Id: 2812702
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Mn+2 + F- = MnF+
log_k 1.6
delta_h 11 kJ
-gamma 5 0
# Id: 4702700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + 2H+ + F- = CrF+2 + 2H2O
log_k 14.7688
delta_h -70.2452 kJ
-gamma 0 0
# Id: 2112700
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
VO+2 + F- = VOF+
log_k 3.778
delta_h 7.9 kJ
-gamma 0 0
# Id: 9022700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
VO+2 + 2F- = VOF2
log_k 6.352
delta_h 14 kJ
-gamma 0 0
# Id: 9022701
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
VO+2 + 3F- = VOF3-
log_k 7.902
delta_h 20 kJ
```

```
-gamma 0 0
# Id: 9022702
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
VO+2 + 4F- = VOF4-2
log_k 8.508
delta_h 26 kJ
-gamma 0 0
# Id: 9022703
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
VO2+ + F- = VO2F
log_k 3.244
delta_h 0 kJ
-gamma 0 0
# Id: 9032700
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
VO2+ + 2F- = VO2F2-
log_k 5.804
delta_h 0 kJ
-gamma 0 0
# Id: 9032701
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
VO2+ + 3F- = VO2F3-2
log_k 6.9
delta_h 0 kJ
-gamma 0 0
# Id: 9032702
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
VO2+ + 4F- = VO2F4-3
log_k 6.592
delta_h 0 kJ
-gamma 0 0
# Id: 9032703
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
U+4 + F- = UF+3
log_k 9.3
delta_h 21.1292 kJ
-gamma 0 0
# Id: 8912700
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
U+4 + 2F- = UF2+2
```

```
log_k 16.4
delta_h 30.1248 kJ
-gamma 0 0
# Id: 8912701
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
U+4 + 3F- = UF3+
log_k 21.6
delta_h 29.9156 kJ
-gamma 0 0
# Id: 8912702
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
U+4 + 4F- = UF4
log_k 23.64
delta_h 19.2464 kJ
-gamma 0 0
# Id: 8912703
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 5F- = UF5-
log_k 25.238
delta_h 20.2924 kJ
-gamma 0 0
# Id: 8912704
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 6F- = UF6-2
log_k 27.718
delta_h 13.8072 kJ
-gamma 0 0
# Id: 8912705
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + F- = UO2F+
log_k 5.14
delta_h 1 kJ
-gamma 0 0
# Id: 8932700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + 2F- = UO2F2
log_k 8.6
delta_h 2 kJ
-gamma 0 0
# Id: 8932701
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
UO2+2 + 3F- = UO2F3-
log_k 11
delta_h 2 kJ
-gamma 0 0
# Id:  8932702
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
UO2+2 + 4F- = UO2F4-2
log_k 11.9
delta_h 0.4 kJ
-gamma 0 0
# Id:  8932703
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Be+2 + F- = BeF+
log_k 5.249
delta_h 0 kJ
-gamma 0 0
# Id:  1102701
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Be+2 + 2F- = BeF2
log_k 9.1285
delta_h -4 kJ
-gamma 0 0
# Id:  1102702
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Be+2 + 3F- = BeF3-
log_k 11.9085
delta_h -8 kJ
-gamma 0 0
# Id:  1102703
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Mg+2 + F- = MgF+
log_k 2.05
delta_h 13 kJ
-gamma 4.5 0
# Id:  4602700
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ca+2 + F- = CaF+
log_k 1.038
delta_h 14 kJ
-gamma 5 0
# Id:  1502700
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
Sr+2 + F- = SrF+
log_k 0.548
delta_h 16 kJ
-gamma 0 0
# Id: 8002701
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 1.00 25.0
Na+ + F- = NaF
log_k -0.2
delta_h 12 kJ
-gamma 0 0
# Id: 5002700
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + Cl- = SnCl+ + 2H2O
log_k 8.734
delta_h 0 kJ
-gamma 0 0
# Id: 7901801
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + 2Cl- = SnCl2 + 2H2O
log_k 9.524
delta_h 0 kJ
-gamma 0 0
# Id: 7901802
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + 3Cl- = SnCl3- + 2H2O
log_k 8.3505
delta_h 0 kJ
-gamma 0 0
# Id: 7901803
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 2.00 25.0
Pb+2 + Cl- = PbCl+
log_k 1.55
delta_h 8.7 kJ
-gamma 0 0
# Id: 6001800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 2Cl- = PbCl2
log_k 2.2
delta_h 12 kJ
```

```
-gamma 0 0
# Id: 6001801
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 3Cl- = PbCl3-
log_k 1.8
delta_h 4 kJ
-gamma 0 0
# Id: 6001802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 4Cl- = PbCl4-2
log_k 1.46
delta_h 14.7695 kJ
-gamma 0 0
# Id: 6001803
# log K source: SCD3.02 (1984 SEa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Tl+ + Cl- = TlCl
log_k 0.51
delta_h -6.2 kJ
-gamma 0 0
# Id: 8701800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl+ + 2Cl- = TlCl2-
log_k 0.28
delta_h 0 kJ
-gamma 0 0
# Id: 8701801
# log K source: SCD3.02 (1992 RAb)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 3H+ + Cl- = TlCl+2 + 3H2O
log_k 11.011
delta_h 0 kJ
-gamma 0 0
# Id: 8711800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 3H+ + 2Cl- = TlCl2+ + 3H2O
log_k 16.771
delta_h 0 kJ
-gamma 0 0
# Id: 8711801
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 3H+ + 3Cl- = TlCl3 + 3H2O
```

```
log_k 19.791
delta_h 0 kJ
-gamma 0 0
# Id: 8711802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + 3H+ + 4Cl- = TlCl4- + 3H2O
log_k 21.591
delta_h 0 kJ
-gamma 0 0
# Id: 8711803
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + Cl- + 2H+ = TlOHCl+ + 2H2O
log_k 10.629
delta_h 0 kJ
-gamma 0 0
# Id: 8711804
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + Cl- = ZnCl+
log_k 0.4
delta_h 5.4 kJ
-gamma 4 0
# Id: 9501800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Zn+2 + 2Cl- = ZnCl2
log_k 0.6
delta_h 37 kJ
-gamma 0 0
# Id: 9501801
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Zn+2 + 3Cl- = ZnCl3-
log_k 0.5
delta_h 39.999 kJ
-gamma 4 0
# Id: 9501802
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + 4Cl- = ZnCl4-2
log_k 0.199
delta_h 45.8566 kJ
-gamma 5 0
# Id: 9501803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
```

```
#T and ionic strength:
Zn+2 + H2O + Cl- = ZnOHCl + H+
log_k -7.48
delta_h 0 kJ
-gamma 0 0
# Id: 9501804
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cd+2 + Cl- = CdCl+
log_k 1.98
delta_h 1 kJ
-gamma 0 0
# Id: 1601800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2Cl- = CdCl2
log_k 2.6
delta_h 3 kJ
-gamma 0 0
# Id: 1601801
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 3Cl- = CdCl3-
log_k 2.4
delta_h 10 kJ
-gamma 0 0
# Id: 1601802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + H2O + Cl- = CdOHCl + H+
log_k -7.404
delta_h 18.2213 kJ
-gamma 0 0
# Id: 1601803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Hg(OH)2 + 2H+ + Cl- = HgCl+ + 2H2O
log_k 13.494
delta_h -62.72 kJ
-gamma 0 0
# Id: 3611800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 2Cl- = HgCl2 + 2H2O
log_k 20.194
delta_h -92.42 kJ
-gamma 0 0
# Id: 3611801
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 3Cl- = HgCl3- + 2H2O
log_k 21.194
delta_h -94.02 kJ
-gamma 0 0
# Id: 3611802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 4Cl- = HgCl4-2 + 2H2O
log_k 21.794
delta_h -100.72 kJ
-gamma 0 0
# Id: 3611803
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + Cl- + I- + 2H+ = HgClI + 2H2O
log_k 25.532
delta_h -135.3 kJ
-gamma 0 0
# Id: 3611804
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Hg(OH)2 + H+ + Cl- = HgClOH + H2O
log_k 10.444
delta_h -42.72 kJ
-gamma 0 0
# Id: 3611805
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
Cu+2 + Cl- = CuCl+
log_k 0.2
delta_h 8.3 kJ
-gamma 4 0
# Id: 2311800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cu+2 + 2Cl- = CuCl2
log_k -0.26
delta_h 44.183 kJ
-gamma 0 0
# Id: 2311801
# log K source: SCD3.02 (1989 IPa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+2 + 3Cl- = CuCl3-
log_k -2.29
delta_h 57.279 kJ
```

```
-gamma 4 0
# Id: 2311802
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cu+2 + 4Cl- = CuCl4-2
log_k -4.59
delta_h 32.5515 kJ
-gamma 5 0
# Id: 2311803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cu+ + 2Cl- = CuCl2-
log_k 5.42
delta_h -1.7573 kJ
-gamma 4 0
# Id: 2301800
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+ + 3Cl- = CuCl3-2
log_k 4.75
delta_h 1.0878 kJ
-gamma 5 0
# Id: 2301801
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+ + Cl- = CuCl
log_k 3.1
delta_h 0 kJ
-gamma 0 0
# Id: 2301802
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + Cl- = AgCl
log_k 3.31
delta_h -12 kJ
-gamma 0 0
# Id: 201800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ag+ + 2Cl- = AgCl2-
log_k 5.25
delta_h -16 kJ
-gamma 0 0
# Id: 201801
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ag+ + 3Cl- = AgCl3-2
```

```
log_k 5.2
delta_h 0 kJ
-gamma 0 0
# Id: 201802
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + 4Cl- = AgCl4-3
log_k 5.51
delta_h 0 kJ
-gamma 0 0
# Id: 201803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Ni+2 + Cl- = NiCl+
log_k 0.408
delta_h 2 kJ
-gamma 0 0
# Id: 5401800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
Ni+2 + 2Cl- = NiCl2
log_k -1.89
delta_h 0 kJ
-gamma 0 0
# Id: 5401801
# log K source: SCD3.02 (1989 IPa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + Cl- = CoCl+
log_k 0.539
delta_h 2 kJ
-gamma 0 0
# Id: 2001800
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Co+3 + Cl- = CoCl+2
log_k 2.3085
delta_h 16 kJ
-gamma 0 0
# Id: 2011800
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Fe+3 + Cl- = FeCl+2
log_k 1.48
delta_h 23 kJ
-gamma 5 0
# Id: 2811800
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
Fe+3 + 2Cl- = FeCl2+
log_k 2.13
delta_h 0 kJ
-gamma 5 0
# Id:  2811801
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Fe+3 + 3Cl- = FeCl3
log_k 1.13
delta_h 0 kJ
-gamma 0 0
# Id:  2811802
# log K source:  Nord90
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Mn+2 + Cl- = MnCl+
log_k 0.1
delta_h 0 kJ
-gamma 5 0
# Id:  4701800
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 20.0
Mn+2 + 2Cl- = MnCl2
log_k 0.25
delta_h 0 kJ
-gamma 0 0
# Id:  4701801
# log K source:  Nord90
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Mn+2 + 3Cl- = MnCl3-
log_k -0.31
delta_h 0 kJ
-gamma 5 0
# Id:  4701802
# log K source:  Nord90
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Cr(OH)2+ + 2H+ + Cl- = CrCl+2 + 2H2O
log_k 9.6808
delta_h -103.62 kJ
-gamma 0 0
# Id:  2111800
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  1.00 25.0
Cr(OH)2+ + 2Cl- + 2H+ = CrCl2+ + 2H2O
log_k 8.658
delta_h -39.2208 kJ
-gamma 0 0
# Id:  2111801
```

```
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cr(OH)2+ + 2Cl- + H+ = CrOHCl2 + H2O
log_k 2.9627
delta_h 0 kJ
-gamma 0 0
# Id: 2111802
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
VO+2 + Cl- = VOCl+
log_k 0.448
delta_h 0 kJ
-gamma 0 0
# Id: 9021800
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
U+4 + Cl- = UCl+3
log_k 1.7
delta_h -20 kJ
-gamma 0 0
# Id: 8911800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + Cl- = UO2Cl+
log_k 0.21
delta_h 16 kJ
-gamma 0 0
# Id: 8931800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Be+2 + Cl- = BeCl+
log_k 0.2009
delta_h 0 kJ
-gamma 5 0
# Id: 1101801
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.70 20.0
Sn(OH)2 + 2H+ + Br- = SnBr+ + 2H2O
log_k 8.254
delta_h 0 kJ
-gamma 0 0
# Id: 7901301
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + 2Br- = SnBr2 + 2H2O
log_k 8.794
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 7901302
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + 3Br- = SnBr3- + 2H2O
log_k 7.48
delta_h 0 kJ
-gamma 0 0
# Id: 7901303
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 3.00 25.0
Pb+2 + Br- = PbBr+
log_k 1.7
delta_h 8 kJ
-gamma 0 0
# Id: 6001300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 2Br- = PbBr2
log_k 2.6
delta_h -4 kJ
-gamma 0 0
# Id: 6001301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl+ + Br- = TlBr
log_k 0.91
delta_h -12 kJ
-gamma 0 0
# Id: 8701300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl+ + 2Br- = TlBr2-
log_k -0.384
delta_h 12.36 kJ
-gamma 0 0
# Id: 8701301
# log K source: NIST46.3
# Delta H source: NIST2.1.1
#T and ionic strength: 4.00 25.0
Tl+ + Br- + Cl- = TlBrCl-
log_k 0.8165
delta_h 0 kJ
-gamma 0 0
# Id: 8701302
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl+ + I- + Br- = TlIBr-
```

```
log_k 2.185
delta_h 0 kJ
-gamma 0 0
# Id: 8703802
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl(OH)3 + 3H+ + Br- = TlBr+2 + 3H2O
log_k 12.803
delta_h 0 kJ
-gamma 0 0
# Id: 8711300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Tl(OH)3 + 3H+ + 2Br- = TlBr2+ + 3H2O
log_k 20.711
delta_h 0 kJ
-gamma 0 0
# Id: 8711301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Tl(OH)3 + 3Br- + 3H+ = TlBr3 + 3H2O
log_k 27.0244
delta_h 0 kJ
-gamma 0 0
# Id: 8711302
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl(OH)3 + 4Br- + 3H+ = TlBr4- + 3H2O
log_k 31.1533
delta_h 0 kJ
-gamma 0 0
# Id: 8711303
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + Br- = ZnBr+
log_k -0.07
delta_h 1 kJ
-gamma 0 0
# Id: 9501300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Zn+2 + 2Br- = ZnBr2
log_k -0.98
delta_h 0 kJ
-gamma 0 0
# Id: 9501301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
```

```
#T and ionic strength:
Cd+2 + Br- = CdBr+
log_k 2.15
delta_h -3 kJ
-gamma 0 0
# Id: 1601300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2Br- = CdBr2
log_k 3
delta_h -3 kJ
-gamma 0 0
# Id: 1601301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + Br- = HgBr+ + 2H2O
log_k 15.803
delta_h -81.92 kJ
-gamma 0 0
# Id: 3611301
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Hg(OH)2 + 2H+ + 2Br- = HgBr2 + 2H2O
log_k 24.2725
delta_h -127.12 kJ
-gamma 0 0
# Id: 3611302
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Hg(OH)2 + 2H+ + 3Br- = HgBr3- + 2H2O
log_k 26.7025
delta_h -138.82 kJ
-gamma 0 0
# Id: 3611303
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Hg(OH)2 + 2H+ + 4Br- = HgBr4-2 + 2H2O
log_k 27.933
delta_h -153.72 kJ
-gamma 0 0
# Id: 3611304
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.50 25.0
Hg(OH)2 + Br- + Cl- + 2H+ = HgBrCl + 2H2O
log_k 22.1811
delta_h -113.77 kJ
-gamma 0 0
# Id: 3611305
```

```
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Hg(OH)2 + Br- + I- + 2H+ = HgBrI + 2H2O
log_k 27.3133
delta_h -151.27 kJ
-gamma 0 0
# Id: 3611306
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Hg(OH)2 + Br- + 3I- + 2H+ = HgBrI3-2 + 2H2O
log_k 34.2135
delta_h 0 kJ
-gamma 0 0
# Id: 3611307
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Hg(OH)2 + 2Br- + 2I- + 2H+ = HgBr2I2-2 + 2H2O
log_k 32.3994
delta_h 0 kJ
-gamma 0 0
# Id: 3611308
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Hg(OH)2 + 3Br- + I- + 2H+ = HgBr3I-2 + 2H2O
log_k 30.1528
delta_h 0 kJ
-gamma 0 0
# Id: 3611309
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Hg(OH)2 + H+ + Br- = HgBrOH + H2O
log_k 12.433
delta_h 0 kJ
-gamma 0 0
# Id: 3613301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Ag+ + Br- = AgBr
log_k 4.6
delta_h 0 kJ
-gamma 0 0
# Id: 201300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + 2Br- = AgBr2-
log_k 7.5
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 201301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + 3Br- = AgBr3-2
log_k 8.1
delta_h 0 kJ
-gamma 0 0
# Id: 201302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ni+2 + Br- = NiBr+
log_k 0.5
delta_h 0 kJ
-gamma 0 0
# Id: 5401300
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cr(OH)2+ + Br- + 2H+ = CrBr+2 + 2H2O
log_k 7.5519
delta_h -46.9068 kJ
-gamma 0 0
# Id: 2111300
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Be+2 + Br- = BeBr+
log_k 0.1009
delta_h 0 kJ
-gamma 5 0
# Id: 1101301
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.70 20.0
Pb+2 + I- = PbI+
log_k 2
delta_h 0 kJ
-gamma 0 0
# Id: 6003800
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Pb+2 + 2I- = PbI2
log_k 3.2
delta_h 0 kJ
-gamma 0 0
# Id: 6003801
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Tl+ + I- = TlI
```

```
log_k 1.4279
delta_h 0 kJ
-gamma 0 0
# Id: 8703800
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl+ + 2I- = TlI2-
log_k 1.8588
delta_h 0 kJ
-gamma 0 0
# Id: 8703801
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl(OH)3 + 4I- + 3H+ = TlI4- + 3H2O
log_k 34.7596
delta_h 0 kJ
-gamma 0 0
# Id: 8713800
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + I- = ZnI+
log_k -2.0427
delta_h -4 kJ
-gamma 0 0
# Id: 9503800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 3.00 25.0
Zn+2 + 2I- = ZnI2
log_k -1.69
delta_h 0 kJ
-gamma 0 0
# Id: 9503801
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cd+2 + I- = CdI+
log_k 2.28
delta_h -9.6 kJ
-gamma 0 0
# Id: 1603800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2I- = CdI2
log_k 3.92
delta_h -12 kJ
-gamma 0 0
# Id: 1603801
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
Hg(OH)2 + 2H+ + I- = HgI+ + 2H2O
log_k 19.603
delta_h -111.22 kJ
-gamma 0 0
# Id:  3613801
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Hg(OH)2 + 2H+ + 2I- = HgI2 + 2H2O
log_k 30.8225
delta_h -182.72 kJ
-gamma 0 0
# Id:  3613802
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Hg(OH)2 + 2H+ + 3I- = HgI3- + 2H2O
log_k 34.6025
delta_h -194.22 kJ
-gamma 0 0
# Id:  3613803
# log K source:  NIST46.4
# Delta H source:  NIST2.1.1
#T and ionic strength:  0.50 25.0
Hg(OH)2 + 2H+ + 4I- = HgI4-2 + 2H2O
log_k 36.533
delta_h -220.72 kJ
-gamma 0 0
# Id:  3613804
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.50 25.0
Ag+ + I- = AgI
log_k 6.6
delta_h 0 kJ
-gamma 0 0
# Id:  203800
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 18.0
Ag+ + 2I- = AgI2-
log_k 11.7
delta_h 0 kJ
-gamma 0 0
# Id:  203801
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 18.0
Ag+ + 3I- = AgI3-2
log_k 12.6
delta_h -122 kJ
-gamma 0 0
# Id:  203802
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ag+ + 4I- = AgI4-3
log_k 14.229
delta_h 0 kJ
-gamma 0 0
# Id: 203803
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 2.00 25.0
Cr(OH)2+ + I- + 2H+ = CrI+2 + 2H2O
log_k 4.8289
delta_h 0 kJ
-gamma 0 0
# Id: 2113800
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
H+ + HS- = H2S
log_k 7.02
delta_h -22 kJ
-gamma 0 0
# Id: 3307300
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 2HS- = Pb(HS)2
log_k 15.27
delta_h 0 kJ
-gamma 0 0
# Id: 6007300
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Pb+2 + 3HS- = Pb(HS)3-
log_k 16.57
delta_h 0 kJ
-gamma 0 0
# Id: 6007301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Tl+ + HS- = TlHS
log_k 2.474
delta_h 0 kJ
-gamma 0 0
# Id: 8707300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
2Tl+ + HS- = Tl2HS+
log_k 5.974
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 8707301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
2Tl+ + 3HS- + H2O = Tl2OH(HS)3-2 + H+
log_k 1.0044
delta_h 0 kJ
-gamma 0 0
# Id: 8707302
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
2Tl+ + 2HS- + 2H2O = Tl2(OH)2(HS)2-2 + 2H+
log_k -11.0681
delta_h 0 kJ
-gamma 0 0
# Id: 8707303
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + 2HS- = Zn(HS)2
log_k 12.82
delta_h 0 kJ
-gamma 0 0
# Id: 9507300
# log K source: DHa1993
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 3HS- = Zn(HS)3-
log_k 16.1
delta_h 0 kJ
-gamma 0 0
# Id: 9507301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + 3HS- = ZnS(HS)2-2 + H+
log_k 6.12
delta_h 0 kJ
-gamma 0 0
# Id: 9507302
# log K source: DHa1993
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 2HS- + 2HS- = Zn(HS)4-2
log_k 14.64
delta_h 0 kJ
-gamma 0 0
# Id: 9507303
# log K source: DHa1993
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 2HS- = ZnS(HS)- + H+
```

```
log_k 6.81
delta_h 0 kJ
-gamma 0 0
# Id: 9507304
# log K source: DHa1993
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cd+2 + HS- = CdHS+
log_k 8.008
delta_h 0 kJ
-gamma 0 0
# Id: 1607300
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Cd+2 + 2HS- = Cd(HS)2
log_k 15.212
delta_h 0 kJ
-gamma 0 0
# Id: 1607301
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Cd+2 + 3HS- = Cd(HS)3-
log_k 17.112
delta_h 0 kJ
-gamma 0 0
# Id: 1607302
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Cd+2 + 4HS- = Cd(HS)4-2
log_k 19.308
delta_h 0 kJ
-gamma 0 0
# Id: 1607303
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Hg(OH)2 + 2HS- = HgS2-2 + 2H2O
log_k 29.414
delta_h 0 kJ
-gamma 0 0
# Id: 3617300
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
Hg(OH)2 + 2H+ + 2HS- = Hg(HS)2 + 2H2O
log_k 44.516
delta_h 0 kJ
-gamma 0 0
# Id: 3617301
# log K source: NIST46.3
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  1.00 20.0
Hg(OH)2 + H+ + 2HS- = HgHS2- + 2H2O
log_k 38.122
delta_h 0 kJ
-gamma 0 0
# Id:  3617302
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  1.00 20.0
Cu+2 + 3HS- = Cu(HS)3-
log_k 25.899
delta_h 0 kJ
-gamma 0 0
# Id:  2317300
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
Ag+ + HS- = AgHS
log_k 13.8145
delta_h 0 kJ
-gamma 0 0
# Id:  207300
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 20.0
Ag+ + 2HS- = Ag(HS)2-
log_k 17.9145
delta_h 0 kJ
-gamma 0 0
# Id:  207301
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 20.0
Fe+2 + 2HS- = Fe(HS)2
log_k 8.95
delta_h 0 kJ
-gamma 0 0
# Id:  2807300
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
Fe+2 + 3HS- = Fe(HS)3-
log_k 10.987
delta_h 0 kJ
-gamma 0 0
# Id:  2807301
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
HS- = S2-2 + H+
log_k -11.7828
delta_h 46.4 kJ
-gamma 0 0
-no_check
```

```
# Id: 7317300
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
HS- = S3-2 + H+
log_k -10.7667
delta_h 42.2 kJ
-gamma 0 0
-no_check
# Id: 7317301
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
HS- = S4-2 + H+
log_k -9.9608
delta_h 39.3 kJ
-gamma 0 0
-no_check
# Id: 7317302
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
HS- = S5-2 + H+
log_k -9.3651
delta_h 37.6 kJ
-gamma 0 0
-no_check
# Id: 7317303
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
HS- = S6-2 + H+
log_k -9.881
delta_h 0 kJ
-gamma 0 0
-no_check
# Id: 7317304
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
2Sb(OH)3 + 4HS- + 2H+ = Sb2S4-2 + 6H2O
log_k 49.3886
delta_h -321.78 kJ
-gamma 0 0
# Id: 7407300
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Cu+ + 2HS- = Cu(S4)2-3 + 2H+
log_k 3.39
delta_h 0 kJ
-gamma 23 0
-no_check
# Id: 2307300
```

```
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cu+ + 2HS- = CuS4S5-3 + 2H+
log_k 2.66
delta_h 0 kJ
-gamma 25 0
-no_check
# Id: 2307301
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Ag+ + 2HS- = Ag(S4)2-3 + 2H+
log_k 0.991
delta_h 0 kJ
-gamma 22 0
-no_check
# Id: 207302
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Ag+ + 2HS- = AgS4S5-3 + 2H+
log_k 0.68
delta_h 0 kJ
-gamma 24 0
-no_check
# Id: 207303
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Ag+ + 2HS- = Ag(HS)S4-2 + H+
log_k 10.431
delta_h 0 kJ
-gamma 15 0
-no_check
# Id: 207304
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
H+ + SO4-2 = HSO4-
log_k 1.99
delta_h 22 kJ
-gamma 4.5 0
# Id: 3307320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
NH4+ + SO4-2 = NH4SO4-
log_k 1.03
delta_h 0 kJ
-gamma 5 0
# Id: 4907320
# log K source: NIST46.3
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  0.00 25.0
Pb+2 + SO4-2 = PbSO4
log_k 2.69
delta_h 0 kJ
-gamma 0 0
# Id:  6007320
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Pb+2 + 2SO4-2 = Pb(SO4)2-2
log_k 3.47
delta_h 0 kJ
-gamma 0 0
# Id:  6007321
# log K source:  SCD3.02 (1960 RKa)
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Al+3 + SO4-2 = AlSO4+
log_k 3.89
delta_h 28 kJ
-gamma 4.5 0
# Id:  307320
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Al+3 + 2SO4-2 = Al(SO4)2-
log_k 4.92
delta_h 11.9 kJ
-gamma 4.5 0
# Id:  307321
# log K source:  Nord90
# Delta H source:  Nord90
#T and ionic strength:  0.00 25.0
Tl+ + SO4-2 = TlSO4-
log_k 1.37
delta_h -0.8 kJ
-gamma 0 0
# Id:  8707320
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Zn+2 + SO4-2 = ZnSO4
log_k 2.34
delta_h 6.2 kJ
-gamma 0 0
# Id:  9507320
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Zn+2 + 2SO4-2 = Zn(SO4)2-2
log_k 3.28
delta_h 0 kJ
-gamma 0 0
# Id:  9507321
```

```
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cd+2 + SO4-2 = CdSO4
log_k 2.37
delta_h 8.7 kJ
-gamma 0 0
# Id: 1607320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2SO4-2 = Cd(SO4)2-2
log_k 3.5
delta_h 0 kJ
-gamma 0 0
# Id: 1607321
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Hg(OH)2 + 2H+ + SO4-2 = HgSO4 + 2H2O
log_k 8.612
delta_h 0 kJ
-gamma 0 0
# Id: 3617320
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Cu+2 + SO4-2 = CuSO4
log_k 2.36
delta_h 8.7 kJ
-gamma 0 0
# Id: 2317320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ag+ + SO4-2 = AgSO4-
log_k 1.3
delta_h 6.2 kJ
-gamma 0 0
# Id: 207320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ni+2 + SO4-2 = NiSO4
log_k 2.3
delta_h 5.8 kJ
-gamma 0 0
# Id: 5407320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ni+2 + 2SO4-2 = Ni(SO4)2-2
log_k 0.82
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 5407321
# log K source: SCD3.02 (1978 BLa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + SO4-2 = CoSO4
log_k 2.3
delta_h 6.2 kJ
-gamma 0 0
# Id: 2007320
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Fe+2 + SO4-2 = FeSO4
log_k 2.39
delta_h 8 kJ
-gamma 0 0
# Id: 2807320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+3 + SO4-2 = FeSO4+
log_k 4.05
delta_h 25 kJ
-gamma 5 0
# Id: 2817320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Fe+3 + 2SO4-2 = Fe(SO4)2-
log_k 5.38
delta_h 19.2 kJ
-gamma 0 0
# Id: 2817321
# log K source: Nord90
# Delta H source: Nord90
#T and ionic strength: 0.00 25.0
Mn+2 + SO4-2 = MnSO4
log_k 2.25
delta_h 8.7 kJ
-gamma 0 0
# Id: 4707320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + 2H+ + SO4-2 = CrSO4+ + 2H2O
log_k 12.9371
delta_h -98.62 kJ
-gamma 0 0
# Id: 2117320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 50.0
Cr(OH)2+ + H+ + SO4-2 = CrOHSO4 + H2O
```

```
log_k 8.2871
delta_h 0 kJ
-gamma 0 0
# Id: 2117321
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 25.0
2Cr(OH)2+ + SO4-2 + 2H+ = Cr2(OH)2SO4+2 + 2H2O
log_k 16.155
delta_h 0 kJ
-gamma 0 0
# Id: 2117323
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
2Cr(OH)2+ + 2SO4-2 + 2H+ = Cr2(OH)2(SO4)2 + 2H2O
log_k 17.9288
delta_h 0 kJ
-gamma 0 0
# Id: 2117324
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + SO4-2 = USO4+2
log_k 6.6
delta_h 8 kJ
-gamma 0 0
# Id: 8917320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
U+4 + 2SO4-2 = U(SO4)2
log_k 10.5
delta_h 33 kJ
-gamma 0 0
# Id: 8917321
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + SO4-2 = UO2SO4
log_k 3.18
delta_h 20 kJ
-gamma 0 0
# Id: 8937320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + 2SO4-2 = UO2(SO4)2-2
log_k 4.3
delta_h 38 kJ
-gamma 0 0
# Id: 8937321
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
V+3 + SO4-2 = VSO4+
log_k 2.674
delta_h 0 kJ
-gamma 0 0
# Id:  9017320
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  1.00 25.0
VO+2 + SO4-2 = VOSO4
log_k 2.44
delta_h 17 kJ
-gamma 0 0
# Id:  9027320
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
VO2+ + SO4-2 = VO2SO4-
log_k 1.378
delta_h 0 kJ
-gamma 0 0
# Id:  9037320
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  1.00 20.0
Be+2 + SO4-2 = BeSO4
log_k 2.19
delta_h 29 kJ
-gamma 0 0
# Id:  1107321
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Be+2 + 2SO4-2 = Be(SO4)2-2
log_k 2.596
delta_h 0 kJ
-gamma 0 0
# Id:  1107322
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  1.00 25.0
Mg+2 + SO4-2 = MgSO4
log_k 2.26
delta_h 5.8 kJ
-gamma 0 0
# Id:  4607320
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ca+2 + SO4-2 = CaSO4
log_k 2.36
delta_h 7.1 kJ
-gamma 0 0
# Id:  1507320
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Sr+2 + SO4-2 = SrSO4
log_k 2.3
delta_h 8 kJ
-gamma 0 0
# Id: 8007321
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Li+ + SO4-2 = LiSO4-
log_k 0.64
delta_h 0 kJ
-gamma 5 0
# Id: 4407320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Na+ + SO4-2 = NaSO4-
log_k 0.73
delta_h 1 kJ
-gamma 5.4 0
# Id: 5007320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
K+ + SO4-2 = KSO4-
log_k 0.85
delta_h 4.1 kJ
-gamma 5.4 0
# Id: 4107320
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
HSe- + H+ = H2Se
log_k 3.89
delta_h 3.3 kJ
-gamma 0 0
# Id: 3307600
# log K source: NIST46.3
# Delta H source: NIST2.1.1
#T and ionic strength: 0.00 25.0
2Ag+ + HSe- = Ag2Se + H+
log_k 34.911
delta_h 0 kJ
-gamma 0 0
# Id: 207600
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Ag+ + H2O + 2HSe- = AgOH(Se)2-4 + 3H+
log_k -20.509
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 207601
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Mn+2 + HSe- = MnSe + H+
log_k -5.385
delta_h 0 kJ
-gamma 0 0
# Id: 4707600
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
HSeO3- = SeO3-2 + H+
log_k -8.4
delta_h 5.02 kJ
-gamma 0 0
# Id: 3307611
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
HSeO3- + H+ = H2SeO3
log_k 2.63
delta_h 6.2 kJ
-gamma 0 0
# Id: 3307610
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2HSeO3- = Cd(SeO3)2-2 + 2H+
log_k -10.884
delta_h 0 kJ
-gamma 0 0
# Id: 1607610
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Ag+ + HSeO3- = AgSeO3- + H+
log_k -5.592
delta_h 0 kJ
-gamma 0 0
# Id: 207610
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Ag+ + 2HSeO3- = Ag(SeO3)2-3 + 2H+
log_k -13.04
delta_h 0 kJ
-gamma 0 0
# Id: 207611
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Fe+3 + HSeO3- = FeHSeO3+2
```

```
log_k 3.422
delta_h 25 kJ
-gamma 0 0
# Id: 2817610
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 1.00 25.0
SeO4-2 + H+ = HSeO4-
log_k 1.7
delta_h 23 kJ
-gamma 0 0
# Id: 3307620
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Zn+2 + SeO4-2 = ZnSeO4
log_k 2.19
delta_h 0 kJ
-gamma 0 0
# Id: 9507620
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + 2SeO4-2 = Zn(SeO4)2-2
log_k 2.196
delta_h 0 kJ
-gamma 0 0
# Id: 9507621
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Cd+2 + SeO4-2 = CdSeO4
log_k 2.27
delta_h 0 kJ
-gamma 0 0
# Id: 1607620
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ni+2 + SeO4-2 = NiSeO4
log_k 2.67
delta_h 14 kJ
-gamma 0 0
# Id: 5407620
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + SeO4-2 = CoSeO4
log_k 2.7
delta_h 12 kJ
-gamma 0 0
# Id: 2007621
# log K source: NIST46.4
# Delta H source: NIST46.4
```

```
#T and ionic strength:  0.00 25.0
Mn+2 + SeO4-2 = MnSeO4
log_k 2.43
delta_h 14 kJ
-gamma 0 0
# Id:  4707620
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
NH4+ = NH3 + H+
log_k -9.244
delta_h 52 kJ
-gamma 0 0
# Id:  3304900
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Ag+ + NH4+ = AgNH3+ + H+
log_k -5.934
delta_h -72 kJ
-gamma 0 0
# Id:  204901
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Ag+ + 2NH4+ = Ag(NH3)2+ + 2H+
log_k -11.268
delta_h -160 kJ
-gamma 0 0
# Id:  204902
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Hg(OH)2 + H+ + NH4+ = HgNH3+2 + 2H2O
log_k 5.75
delta_h 0 kJ
-gamma 0 0
# Id:  3614900
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  2.00 22.0
Hg(OH)2 + 2NH4+ = Hg(NH3)2+2 + 2H2O
log_k 5.506
delta_h -246.72 kJ
-gamma 0 0
# Id:  3614901
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  1.00 25.0
Hg(OH)2 + 3NH4+ = Hg(NH3)3+2 + 2H2O + H+
log_k -3.138
delta_h -312.72 kJ
-gamma 0 0
# Id:  3614902
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 2.00 25.0
Hg(OH)2 + 4NH4+ = Hg(NH3)4+2 + 2H2O + 2H+
log_k -11.482
delta_h -379.72 kJ
-gamma 0 0
# Id: 3614903
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.10 25.0
Cu+2 + NH4+ = CuNH3+2 + H+
log_k -5.234
delta_h -72 kJ
-gamma 0 0
# Id: 2314901
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ni+2 + NH4+ = NiNH3+2 + H+
log_k -6.514
delta_h -67 kJ
-gamma 0 0
# Id: 5404901
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Ni+2 + 2NH4+ = Ni(NH3)2+2 + 2H+
log_k -13.598
delta_h -111.6 kJ
-gamma 0 0
# Id: 5404902
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + NH4+ = Co(NH3)+2 + H+
log_k -7.164
delta_h -65 kJ
-gamma 0 0
# Id: 2004900
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + 2NH4+ = Co(NH3)2+2 + 2H+
log_k -14.778
delta_h 0 kJ
-gamma 0 0
# Id: 2004901
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 2.00 25.0
Co+2 + 3NH4+ = Co(NH3)3+2 + 3H+
log_k -22.922
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2004902
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 2.00 25.0
Co+2 + 4NH4+ = Co(NH3)4+2 + 4H+
log_k -31.446
delta_h 0 kJ
-gamma 0 0
# Id: 2004903
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 2.00 30.0
Co+2 + 5NH4+ = Co(NH3)5+2 + 5H+
log_k -40.47
delta_h 0 kJ
-gamma 0 0
# Id: 2004904
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 2.00 30.0
Co+3 + 6NH4+ + H2O = Co(NH3)6OH+2 + 7H+
log_k -43.7148
delta_h 0 kJ
-gamma 0 0
# Id: 2014901
# log K source: NIST2.1.1
# Delta H source: MTQ3.11
#T and ionic strength:
Co+3 + 5NH4+ + Cl- = Co(NH3)5Cl+2 + 5H+
log_k -17.9584
delta_h 113.38 kJ
-gamma 0 0
# Id: 2014902
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Co+3 + 6NH4+ + Cl- = Co(NH3)6Cl+2 + 6H+
log_k -33.9179
delta_h 104.34 kJ
-gamma 0 0
# Id: 2014903
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Co+3 + 6NH4+ + Br- = Co(NH3)6Br+2 + 6H+
log_k -33.8884
delta_h 110.57 kJ
-gamma 0 0
# Id: 2014904
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Co+3 + 6NH4+ + I- = Co(NH3)6I+2 + 6H+
```

log_k -33.4808
delta_h 115.44 kJ
-gamma 0 0
Id: 2014905
log K source: NIST2.1.1
Delta H source: NIST2.1.1
#T and ionic strength:
Co+3 + 6NH4+ + SO4-2 = Co(NH3)6SO4+ + 6H+
log_k -28.9926
delta_h 124.5 kJ
-gamma 0 0
Id: 2014906
log K source: NIST2.1.1
Delta H source: NIST2.1.1
#T and ionic strength:
Cr(OH)2+ + 6NH4+ = Cr(NH3)6+3 + 2H2O + 4H+
log_k -32.8952
delta_h 0 kJ
-gamma 0 0
Id: 2114900
log K source: NIST46.3
Delta H source: MTQ3.11
#T and ionic strength: 4.50 25.0
Cr(OH)2+ + 5NH4+ = Cr(NH3)5OH+2 + 4H+ + H2O
log_k -30.2759
delta_h 0 kJ
-gamma 0 0
Id: 2114901
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
Cr(OH)2+ + 6NH4+ + Cl- = Cr(NH3)6Cl+2 + 2H2O + 4H+
log_k -31.7932
delta_h 0 kJ
-gamma 0 0
Id: 2114904
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
Cr(OH)2+ + 6NH4+ + Br- = Cr(NH3)6Br+2 + 4H+ + 2H2O
log_k -31.887
delta_h 0 kJ
-gamma 0 0
Id: 2114905
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
Cr(OH)2+ + 6NH4+ + I- = Cr(NH3)6I+2 + 4H+ + 2H2O
log_k -32.008
delta_h 0 kJ
-gamma 0 0
Id: 2114906
log K source: MTQ3.11
Delta H source: MTQ3.11

```
#T and ionic strength:
#Cr(OH)2+ + 4NH4+ = cis+ + 4H+
# log_k -29.8574
# delta_h 0 kJ
# -gamma 0 0
# # Id: 4902113
# # log K source: MTQ3.11
# # Delta H source: MTQ3.11
# #T and ionic strength:
#Cr(OH)2+ + 4NH4+ = trans+ + 4H+
# log_k -30.5537
# delta_h 0 kJ
# -gamma 0 0
# # Id: 4902114
# # log K source: MTQ3.11
# # Delta H source: MTQ3.11
# #T and ionic strength:
Ca+2 + NH4+ = CaNH3+2 + H+
log_k -9.144
delta_h 0 kJ
-gamma 0 0
# Id: 1504901
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Ca+2 + 2NH4+ = Ca(NH3)2+2 + 2H+
log_k -18.788
delta_h 0 kJ
-gamma 0 0
# Id: 1504902
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Sr+2 + NH4+ = SrNH3+2 + H+
log_k -9.344
delta_h 0 kJ
-gamma 0 0
# Id: 8004901
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Ba+2 + NH4+ = BaNH3+2 + H+
log_k -9.444
delta_h 0 kJ
-gamma 0 0
# Id: 1004901
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Tl+ + NO2- = TlNO2
log_k 0.83
delta_h 0 kJ
-gamma 0 0
# Id: 8704910
```

```
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + NO2- = AgNO2
log_k 2.32
delta_h -29 kJ
-gamma 0 0
# Id: 204911
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ag+ + 2NO2- = Ag(NO2)2-
log_k 2.51
delta_h -46 kJ
-gamma 0 0
# Id: 204910
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cu+2 + NO2- = CuNO2+
log_k 2.02
delta_h 0 kJ
-gamma 0 0
# Id: 2314911
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Cu+2 + 2NO2- = Cu(NO2)2
log_k 3.03
delta_h 0 kJ
-gamma 0 0
# Id: 2314912
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Co+2 + NO2- = CoNO2+
log_k 0.848
delta_h 0 kJ
-gamma 0 0
# Id: 2004911
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Sn(OH)2 + 2H+ + NO3- = SnNO3+ + 2H2O
log_k 7.942
delta_h 0 kJ
-gamma 0 0
# Id: 7904921
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 25.0
Pb+2 + NO3- = PbNO3+
log_k 1.17
delta_h 2 kJ
```

```
-gamma 0 0
# Id: 6004920
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Pb+2 + 2NO3- = Pb(NO3)2
log_k 1.4
delta_h -6.6 kJ
-gamma 0 0
# Id: 6004921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Tl+ + NO3- = TlNO3
log_k 0.33
delta_h -2 kJ
-gamma 0 0
# Id: 8704920
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Tl(OH)3 + NO3- + 3H+ = TlNO3+2 + 3H2O
log_k 7.0073
delta_h 0 kJ
-gamma 0 0
# Id: 8714920
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Cd+2 + NO3- = CdNO3+
log_k 0.5
delta_h -21 kJ
-gamma 0 0
# Id: 1604920
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Cd+2 + 2NO3- = Cd(NO3)2
log_k 0.2
delta_h 0 kJ
-gamma 0 0
# Id: 1604921
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + NO3- = HgNO3+ + 2H2O
log_k 5.7613
delta_h 0 kJ
-gamma 0 0
# Id: 3614920
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Hg(OH)2 + 2H+ + 2NO3- = Hg(NO3)2 + 2H2O
```

```
log_k 5.38
delta_h 0 kJ
-gamma 0 0
# Id: 3614921
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Cu+2 + NO3- = CuNO3+
log_k 0.5
delta_h -4.1 kJ
-gamma 0 0
# Id: 2314921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+2 + 2NO3- = Cu(NO3)2
log_k -0.4
delta_h 0 kJ
-gamma 0 0
# Id: 2314922
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + NO3- = ZnNO3+
log_k 0.4
delta_h -4.6 kJ
-gamma 0 0
# Id: 9504921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Zn+2 + 2NO3- = Zn(NO3)2
log_k -0.3
delta_h 0 kJ
-gamma 0 0
# Id: 9504922
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ag+ + NO3- = AgNO3
log_k -0.1
delta_h 22.6 kJ
-gamma 0 0
# Id: 204920
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ni+2 + NO3- = NiNO3+
log_k 0.4
delta_h 0 kJ
-gamma 0 0
# Id: 5404921
# log K source: NIST46.4
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  0.00 25.0
Co+2 + NO3- = CoNO3+
log_k 0.2
delta_h 0 kJ
-gamma 0 0
# Id:  2004921
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Co+2 + 2NO3- = Co(NO3)2
log_k 0.5085
delta_h 0 kJ
-gamma 0 0
# Id:  2004922
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.50 25.0
Fe+3 + NO3- = FeNO3+2
log_k 1
delta_h -37 kJ
-gamma 0 0
# Id:  2814921
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Mn+2 + NO3- = MnNO3+
log_k 0.2
delta_h 0 kJ
-gamma 0 0
# Id:  4704921
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Mn+2 + 2NO3- = Mn(NO3)2
log_k 0.6
delta_h -1.6569 kJ
-gamma 0 0
# Id:  4704920
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Cr(OH)2+ + NO3- + 2H+ = CrNO3+2 + 2H2O
log_k 8.2094
delta_h -65.4378 kJ
-gamma 0 0
# Id:  2114920
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
UO2+2 + NO3- = UO2NO3+
log_k 0.3
delta_h -12 kJ
-gamma 0 0
# Id:  8934921
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
VO2+ + NO3- = VO2NO3
log_k -0.296
delta_h 0 kJ
-gamma 0 0
# Id: 9034920
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 1.00 20.0
Ca+2 + NO3- = CaNO3+
log_k 0.5
delta_h -5.4 kJ
-gamma 0 0
# Id: 1504921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sr+2 + NO3- = SrNO3+
log_k 0.6
delta_h -10 kJ
-gamma 0 0
# Id: 8004921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + NO3- = BaNO3+
log_k 0.7
delta_h -13 kJ
-gamma 0 0
# Id: 1004921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
H+ + Cyanide- = HCyanide
log_k 9.21
delta_h -43.63 kJ
-gamma 0 0
# Id: 3301431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cd+2 + Cyanide- = CdCyanide+
log_k 6.01
delta_h -30 kJ
-gamma 0 0
# Id: 1601431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cd+2 + 2Cyanide- = Cd(Cyanide)2
log_k 11.12
delta_h -54.3 kJ
```

```
-gamma 0 0
# Id: 1601432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cd+2 + 3Cyanide- = Cd(Cyanide)3-
log_k 15.65
delta_h -90.3 kJ
-gamma 0 0
# Id: 1601433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cd+2 + 4Cyanide- = Cd(Cyanide)4-2
log_k 17.92
delta_h -112 kJ
-gamma 0 0
# Id: 1601434
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + Cyanide- = HgCyanide+ + 2H2O
log_k 23.194
delta_h -136.72 kJ
-gamma 0 0
# Id: 3611431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 2Cyanide- = Hg(Cyanide)2 + 2H2O
log_k 38.944
delta_h 154.28 kJ
-gamma 0 0
# Id: 3611432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 3Cyanide- = Hg(Cyanide)3- + 2H2O
log_k 42.504
delta_h -262.72 kJ
-gamma 0 0
# Id: 3611433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 4Cyanide- = Hg(Cyanide)4-2 + 2H2O
log_k 45.164
delta_h -288.72 kJ
-gamma 0 0
# Id: 3611434
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+ + 2Cyanide- = Cu(Cyanide)2-
```

```
log_k 21.9145
delta_h -121 kJ
-gamma 0 0
# Id: 2301432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Cu+ + 3Cyanide- = Cu(Cyanide)3-2
log_k 27.2145
delta_h -167.4 kJ
-gamma 0 0
# Id: 2301433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+ + 4Cyanide- = Cu(Cyanide)4-3
log_k 28.7145
delta_h -214.2 kJ
-gamma 0 0
# Id: 2301431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ag+ + 2Cyanide- = Ag(Cyanide)2-
log_k 20.48
delta_h -137 kJ
-gamma 0 0
# Id: 201432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ag+ + 3Cyanide- = Ag(Cyanide)3-2
log_k 21.7
delta_h -140 kJ
-gamma 0 0
# Id: 201433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ag+ + H2O + Cyanide- = Ag(Cyanide)OH- + H+
log_k -0.777
delta_h 0 kJ
-gamma 0 0
# Id: 201431
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ni+2 + 4Cyanide- = Ni(Cyanide)4-2
log_k 30.2
delta_h -180 kJ
-gamma 0 0
# Id: 5401431
# log K source: NIST46.4
# Delta H source: NIST46.4
```

```
#T and ionic strength:  0.00 25.0
Ni+2 + 4Cyanide- + H+ = NiH(Cyanide)4-
log_k 36.0289
delta_h 0 kJ
-gamma 0 0
# Id:  5401432
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 25.0
Ni+2 + 4Cyanide- + 2H+ = NiH2Cyanide4
log_k 40.7434
delta_h 0 kJ
-gamma 0 0
# Id:  5401433
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 25.0
Ni+2 + 4Cyanide- + 3H+ = NiH3(Cyanide)4+
log_k 43.3434
delta_h 0 kJ
-gamma 0 0
# Id:  5401434
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 25.0
Co+2 + 3Cyanide- = Co(Cyanide)3-
log_k 14.312
delta_h 0 kJ
-gamma 0 0
# Id:  2001431
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  1.00 25.0
Co+2 + 5Cyanide- = Co(Cyanide)5-3
log_k 23
delta_h -257 kJ
-gamma 0 0
# Id:  2001432
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  1.00 25.0
Fe+2 + 6Cyanide- = Fe(Cyanide)6-4
log_k 35.4
delta_h -358 kJ
-gamma 0 0
# Id:  2801431
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
H+ + Fe+2 + 6Cyanide- = HFe(Cyanide)6-3
log_k 39.71
delta_h -356 kJ
-gamma 0 0
# Id:  2801432
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
2H+ + Fe+2 + 6Cyanide- = H2Fe(Cyanide)6-2
log_k 42.11
delta_h -352 kJ
-gamma 0 0
# Id: 2801433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Fe+3 + 6Cyanide- = Fe(Cyanide)6-3
log_k 43.6
delta_h -293 kJ
-gamma 0 0
# Id: 2811431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
2Fe+3 + 6Cyanide- = Fe2(Cyanide)6
log_k 47.6355
delta_h -218 kJ
-gamma 0 0
# Id: 2811432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Sn(OH)2 + Fe+3 + 6Cyanide- + 2H+ = SnFe(Cyanide)6- + 2H2O
log_k 53.54
delta_h 0 kJ
-gamma 0 0
# Id: 7901431
# log K source: Ba1987
# Delta H source:
#T and ionic strength: 0.00 25.0
NH4+ + Fe+2 + 6Cyanide- = NH4Fe(Cyanide)6-3
log_k 37.7
delta_h -354 kJ
-gamma 0 0
# Id: 4901431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Tl+ + Fe+2 + 6Cyanide- = TlFe(Cyanide)6-3
log_k 38.4
delta_h -365.5 kJ
-gamma 0 0
# Id: 8701432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Mg+2 + Fe+3 + 6Cyanide- = MgFe(Cyanide)6-
log_k 46.39
delta_h -290 kJ
```

```
-gamma 0 0
# Id: 4601431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Mg+2 + Fe+2 + 6Cyanide- = MgFe(Cyanide)6-2
log_k 39.21
delta_h -346 kJ
-gamma 0 0
# Id: 4601432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ca+2 + Fe+3 + 6Cyanide- = CaFe(Cyanide)6-
log_k 46.43
delta_h -291 kJ
-gamma 0 0
# Id: 1501431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ca+2 + Fe+2 + 6Cyanide- = CaFe(Cyanide)6-2
log_k 39.1
delta_h -347 kJ
-gamma 0 0
# Id: 1501432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
2Ca+2 + Fe+2 + 6Cyanide- = Ca2Fe(Cyanide)6
log_k 40.6
delta_h -350.201 kJ
-gamma 0 0
# Id: 1501433
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Sr+2 + Fe+3 + 6Cyanide- = SrFe(Cyanide)6-
log_k 46.45
delta_h -292 kJ
-gamma 0 0
# Id: 8001431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sr+2 + Fe+2 + 6Cyanide- = SrFe(Cyanide)6-2
log_k 39.1
delta_h -350 kJ
-gamma 0 0
# Id: 8001432
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + Fe+2 + 6Cyanide- = BaFe(Cyanide)6-2
```

```
log_k 39.19
delta_h -342 kJ
-gamma 0 0
# Id: 1001430
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + Fe+3 + 6Cyanide- = BaFe(Cyanide)6-
log_k 46.48
delta_h -292 kJ
-gamma 0 0
# Id: 1001431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Na+ + Fe+2 + 6Cyanide- = NaFe(Cyanide)6-3
log_k 37.6
delta_h -354 kJ
-gamma 0 0
# Id: 5001431
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
K+ + Fe+2 + 6Cyanide- = KFe(Cyanide)6-3
log_k 37.75
delta_h -353.9 kJ
-gamma 0 0
# Id: 4101433
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
K+ + Fe+3 + 6Cyanide- = KFe(Cyanide)6-2
log_k 45.04
delta_h -291 kJ
-gamma 0 0
# Id: 4101430
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
H+ + PO4-3 = HPO4-2
log_k 12.375
delta_h -15 kJ
-gamma 5 0
# Id: 3305800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
2H+ + PO4-3 = H2PO4-
log_k 19.573
delta_h -18 kJ
-gamma 5.4 0
# Id: 3305801
# log K source: NIST46.3
# Delta H source: NIST46.3
```

```
#T and ionic strength:  0.00 25.0
3H+ + PO4-3 = H3PO4
log_k 21.721
delta_h -10.1 kJ
-gamma 0 0
# Id:  3305802
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
Co+2 + H+ + PO4-3 = CoHPO4
log_k 15.4128
delta_h 0 kJ
-gamma 0 0
# Id:  2005800
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.10 25.0
Fe+2 + 2H+ + PO4-3 = FeH2PO4+
log_k 22.273
delta_h 0 kJ
-gamma 5.4 0
# Id:  2805800
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Fe+2 + H+ + PO4-3 = FeHPO4
log_k 15.975
delta_h 0 kJ
-gamma 0 0
# Id:  2805801
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Fe+3 + 2H+ + PO4-3 = FeH2PO4+2
log_k 23.8515
delta_h 0 kJ
-gamma 5.4 0
# Id:  2815801
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.50 25.0
Fe+3 + H+ + PO4-3 = FeHPO4+
log_k 22.292
delta_h -30.5432 kJ
-gamma 5.4 0
# Id:  2815800
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.50 25.0
Cr(OH)2+ + 4H+ + PO4-3 = CrH2PO4+2 + 2H2O
log_k 31.9068
delta_h 0 kJ
-gamma 0 0
# Id:  2115800
```

```
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + PO4-3 + H+ = UHPO4+2
log_k 24.443
delta_h 31.38 kJ
-gamma 0 0
# Id: 8915800
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 2PO4-3 + 2H+ = U(HPO4)2
log_k 46.833
delta_h 7.1128 kJ
-gamma 0 0
# Id: 8915801
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 3PO4-3 + 3H+ = U(HPO4)3-2
log_k 67.564
delta_h -32.6352 kJ
-gamma 0 0
# Id: 8915802
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
U+4 + 4PO4-3 + 4H+ = U(HPO4)4-4
log_k 88.483
delta_h -110.876 kJ
-gamma 0 0
# Id: 8915803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + H+ + PO4-3 = UO2HPO4
log_k 19.655
delta_h -8.7864 kJ
-gamma 0 0
# Id: 8935800
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
UO2+2 + 2PO4-3 + 2H+ = UO2(HPO4)2-2
log_k 42.988
delta_h -47.6934 kJ
-gamma 0 0
# Id: 8935801
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + 2H+ + PO4-3 = UO2H2PO4+
log_k 22.833
delta_h -15.4808 kJ
```

```
-gamma 0 0
# Id: 8935802
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
UO2+2 + 2PO4-3 + 4H+ = UO2(H2PO4)2
log_k 44.7
delta_h -69.036 kJ
-gamma 0 0
# Id: 8935803
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + 3PO4-3 + 6H+ = UO2(H2PO4)3-
log_k 66.245
delta_h -119.662 kJ
-gamma 0 0
# Id: 8935804
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
UO2+2 + PO4-3 = UO2PO4-
log_k 13.25
delta_h 0 kJ
-gamma 0 0
# Id: 8935805
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Mg+2 + PO4-3 = MgPO4-
log_k 4.654
delta_h 12.9704 kJ
-gamma 5.4 0
# Id: 4605800
# log K source: SCD3.02 (1993 GMa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.20 25.0
Mg+2 + 2H+ + PO4-3 = MgH2PO4+
log_k 21.2561
delta_h -4.6861 kJ
-gamma 5.4 0
# Id: 4605801
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 37.0
Mg+2 + H+ + PO4-3 = MgHPO4
log_k 15.175
delta_h -3 kJ
-gamma 0 0
# Id: 4605802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ca+2 + H+ + PO4-3 = CaHPO4
```

```
log_k 15.035
delta_h -3 kJ
-gamma 0 0
# Id: 1505800
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ca+2 + PO4-3 = CaPO4-
log_k 6.46
delta_h 12.9704 kJ
-gamma 5.4 0
# Id: 1505801
# log K source: SCD3.02 (1993 GMa)
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Ca+2 + 2H+ + PO4-3 = CaH2PO4+
log_k 20.923
delta_h -6 kJ
-gamma 5.4 0
# Id: 1505802
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Sr+2 + H+ + PO4-3 = SrHPO4
log_k 14.8728
delta_h 0 kJ
-gamma 0 0
# Id: 8005800
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 25.0
Sr+2 + 2H+ + PO4-3 = SrH2PO4+
log_k 20.4019
delta_h 0 kJ
-gamma 0 0
# Id: 8005801
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 20.0
Na+ + H+ + PO4-3 = NaHPO4-
log_k 13.445
delta_h 0 kJ
-gamma 5.4 0
# Id: 5005800
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
K+ + H+ + PO4-3 = KHPO4-
log_k 13.255
delta_h 0 kJ
-gamma 5.4 0
# Id: 4105800
# log K source: NIST46.3
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  0.00 25.0
H3AsO3 = AsO3-3 + 3H+
log_k -34.744
delta_h 84.726 kJ
-gamma 0 0
# Id:  3300602
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
H3AsO3 = HAsO3-2 + 2H+
log_k -21.33
delta_h 59.4086 kJ
-gamma 0 0
# Id:  3300601
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
H3AsO3 = H2AsO3- + H+
log_k -9.29
delta_h 27.41 kJ
-gamma 0 0
# Id:  3300600
# log K source:  NIST46.4
# Delta H source:  NIST2.1.1
#T and ionic strength:  0.00 25.0
H3AsO3 + H+ = H4AsO3+
log_k -0.305
delta_h 0 kJ
-gamma 0 0
# Id:  3300603
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
H3AsO4 = AsO4-3 + 3H+
log_k -20.7
delta_h 12.9 kJ
-gamma 0 0
# Id:  3300613
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
H3AsO4 = HAsO4-2 + 2H+
log_k -9.2
delta_h -4.1 kJ
-gamma 0 0
# Id:  3300612
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
H3AsO4 = H2AsO4- + H+
log_k -2.24
delta_h -7.1 kJ
-gamma 0 0
# Id:  3300611
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sb(OH)3 + H2O = Sb(OH)4- + H+
log_k -12.0429
delta_h 69.8519 kJ
-gamma 0 0
# Id: 7400020
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)3 + H+ = Sb(OH)2+ + H2O
log_k 1.3853
delta_h 0 kJ
-gamma 0 0
# Id: 7403302
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)3 = HSbO2 + H2O
log_k -0.0105
delta_h -0.13 kJ
-gamma 0 0
# Id: 7400021
# log K source: NIST2.1.1
# Delta H source: NIST2.1.1
#T and ionic strength:
Sb(OH)3 = SbO2- + H2O + H+
log_k -11.8011
delta_h 70.1866 kJ
-gamma 0 0
# Id: 7403301
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)3 + H+ = SbO+ + 2H2O
log_k 0.9228
delta_h 8.2425 kJ
-gamma 0 0
# Id: 7403300
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)6- = SbO3- + 3H2O
log_k 2.9319
delta_h 0 kJ
-gamma 0 0
# Id: 7410021
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
Sb(OH)6- + 2H+ = SbO2+ + 4H2O
log_k 2.3895
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 7413300
# log K source: PNL89
# Delta H source: PNL89
#T and ionic strength:
H+ + CO3-2 = HCO3-
log_k 10.329
delta_h -14.6 kJ
-gamma 5.4 0
# Id: 3301400
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
2H+ + CO3-2 = H2CO3
log_k 16.681
delta_h -23.76 kJ
-gamma 0 0
# Id: 3301401
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Pb+2 + 2CO3-2 = Pb(CO3)2-2
log_k 9.938
delta_h 0 kJ
-gamma 0 0
# Id: 6001400
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Pb+2 + CO3-2 = PbCO3
log_k 6.478
delta_h 0 kJ
-gamma 0 0
# Id: 6001401
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Pb+2 + CO3-2 + H+ = PbHCO3+
log_k 13.2
delta_h 0 kJ
-gamma 0 0
# Id: 6001402
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
Zn+2 + CO3-2 = ZnCO3
log_k 4.76
delta_h 0 kJ
-gamma 0 0
# Id: 9501401
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Zn+2 + H+ + CO3-2 = ZnHCO3+
```

```
log_k 11.829
delta_h 0 kJ
-gamma 0 0
# Id: 9501400
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + CO3-2 = HgCO3 + 2H2O
log_k 18.272
delta_h 0 kJ
-gamma 0 0
# Id: 3611401
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Hg(OH)2 + 2H+ + 2CO3-2 = Hg(CO3)2-2 + 2H2O
log_k 21.772
delta_h 0 kJ
-gamma 0 0
# Id: 3611402
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Hg(OH)2 + 3H+ + CO3-2 = HgHCO3+ + 2H2O
log_k 22.542
delta_h 0 kJ
-gamma 0 0
# Id: 3611403
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
Cd+2 + CO3-2 = CdCO3
log_k 4.3578
delta_h 0 kJ
-gamma 0 0
# Id: 1601401
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 25.0
Cd+2 + H+ + CO3-2 = CdHCO3+
log_k 10.6863
delta_h 0 kJ
-gamma 0 0
# Id: 1601400
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Cd+2 + 2CO3-2 = Cd(CO3)2-2
log_k 7.2278
delta_h 0 kJ
-gamma 0 0
# Id: 1601403
# log K source: NIST46.4
# Delta H source: MTQ3.11
```

```
#T and ionic strength:  0.10 20.0
Cu+2 + CO3-2 = CuCO3
log_k 6.77
delta_h 0 kJ
-gamma 0 0
# Id:  2311400
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Cu+2 + H+ + CO3-2 = CuHCO3+
log_k 12.129
delta_h 0 kJ
-gamma 0 0
# Id:  2311402
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Cu+2 + 2CO3-2 = Cu(CO3)2-2
log_k 10.2
delta_h 0 kJ
-gamma 0 0
# Id:  2311401
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Ni+2 + CO3-2 = NiCO3
log_k 4.5718
delta_h 0 kJ
-gamma 0 0
# Id:  5401401
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.70 25.0
Ni+2 + H+ + CO3-2 = NiHCO3+
log_k 12.4199
delta_h 0 kJ
-gamma 0 0
# Id:  5401400
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.70 25.0
Co+2 + CO3-2 = CoCO3
log_k 4.228
delta_h 0 kJ
-gamma 0 0
# Id:  2001400
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.50 25.0
Co+2 + H+ + CO3-2 = CoHCO3+
log_k 12.2199
delta_h 0 kJ
-gamma 0 0
# Id:  2001401
```

```
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.70 25.0
Fe+2 + H+ + CO3-2 = FeHCO3+
log_k 11.429
delta_h 0 kJ
-gamma 6 0
# Id: 2801400
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Mn+2 + H+ + CO3-2 = MnHCO3+
log_k 11.629
delta_h -10.6 kJ
-gamma 5 0
# Id: 4701400
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
UO2+2 + CO3-2 = UO2CO3
log_k 9.6
delta_h 4 kJ
-gamma 0 0
# Id: 8931400
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + 2CO3-2 = UO2(CO3)2-2
log_k 16.9
delta_h 16 kJ
-gamma 0 0
# Id: 8931401
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
UO2+2 + 3CO3-2 = UO2(CO3)3-4
log_k 21.6
delta_h -40 kJ
-gamma 0 0
# Id: 8931402
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Be+2 + CO3-2 = BeCO3
log_k 6.2546
delta_h 0 kJ
-gamma 0 0
# Id: 1101401
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 3.00 25.0
Mg+2 + CO3-2 = MgCO3
log_k 2.92
delta_h 12 kJ
```

```
-gamma 0 0
# Id: 4601400
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Mg+2 + H+ + CO3-2 = MgHCO3+
log_k 11.339
delta_h -10.6 kJ
-gamma 4 0
# Id: 4601401
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Ca+2 + H+ + CO3-2 = CaHCO3+
log_k 11.599
delta_h 5.4 kJ
-gamma 6 0
# Id: 1501400
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
CO3-2 + Ca+2 = CaCO3
log_k 3.2
delta_h 16 kJ
-gamma 0 0
# Id: 1501401
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
Sr+2 + CO3-2 = SrCO3
log_k 2.81
delta_h 20 kJ
-gamma 0 0
# Id: 8001401
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sr+2 + H+ + CO3-2 = SrHCO3+
log_k 11.539
delta_h 10.4 kJ
-gamma 6 0
# Id: 8001400
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + CO3-2 = BaCO3
log_k 2.71
delta_h 16 kJ
-gamma 0 0
# Id: 1001401
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + H+ + CO3-2 = BaHCO3+
```

```
log_k 11.309
delta_h 10.4 kJ
-gamma 6 0
# Id: 1001400
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Na+ + CO3-2 = NaCO3-
log_k 1.27
delta_h -20.35 kJ
-gamma 5.4 0
# Id: 5001400
# log K source: NIST46.3
# Delta H source: NIST2.1.1
#T and ionic strength: 0.00 25.0
Na+ + H+ + CO3-2 = NaHCO3
log_k 10.079
delta_h -28.3301 kJ
-gamma 0 0
# Id: 5001401
# log K source: NIST46.3
# Delta H source: NIST2.1.1
#T and ionic strength: 0.00 25.0
H4SiO4 = H2SiO4-2 + 2H+
log_k -23.04
delta_h 61 kJ
-gamma 5.4 0
# Id: 3307701
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
H4SiO4 = H3SiO4- + H+
log_k -9.84
delta_h 20 kJ
-gamma 4 0
# Id: 3307700
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
UO2+2 + H4SiO4 = UO2H3SiO4+ + H+
log_k -1.9111
delta_h 0 kJ
-gamma 0 0
# Id: 8937700
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 25.0
H3BO3 = H2BO3- + H+
log_k -9.236
delta_h 13 kJ
-gamma 2.5 0
# Id: 3300900
# log K source: NIST46.4
# Delta H source: NIST46.4
```

```
#T and ionic strength:  0.00 25.0
2H3BO3 = H5(BO3)2- + H+
log_k -9.306
delta_h 8.4 kJ
-gamma 2.5 0
# Id:  3300901
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
3H3BO3 = H8(BO3)3- + H+
log_k -7.306
delta_h 29.4 kJ
-gamma 2.5 0
# Id:  3300902
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Ag+ + H3BO3 = AgH2BO3 + H+
log_k -8.036
delta_h 0 kJ
-gamma 2.5 0
# Id:  200901
# log K source:  NIST46.4
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
Mg+2 + H3BO3 = MgH2BO3+ + H+
log_k -7.696
delta_h 13 kJ
-gamma 2.5 0
# Id:  4600901
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Ca+2 + H3BO3 = CaH2BO3+ + H+
log_k -7.476
delta_h 17 kJ
-gamma 2.5 0
# Id:  1500901
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Sr+2 + H3BO3 = SrH2BO3+ + H+
log_k -7.686
delta_h 17 kJ
-gamma 2.5 0
# Id:  8000901
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
Ba+2 + H3BO3 = BaH2BO3+ + H+
log_k -7.746
delta_h 17 kJ
-gamma 2.5 0
# Id:  1000901
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Na+ + H3BO3 = NaH2BO3 + H+
log_k -9.036
delta_h 0 kJ
-gamma 2.5 0
# Id: 5000901
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
CrO4-2 + H+ = HCrO4-
log_k 6.51
delta_h 2 kJ
-gamma 0 0
# Id: 2123300
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
CrO4-2 + 2H+ = H2CrO4
log_k 6.4188
delta_h 39 kJ
-gamma 0 0
# Id: 2123301
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 20.0
2CrO4-2 + 2H+ = Cr2O7-2 + H2O
log_k 14.56
delta_h -15 kJ
-gamma 0 0
# Id: 2123302
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
CrO4-2 + Cl- + 2H+ = CrO3Cl- + H2O
log_k 7.3086
delta_h 0 kJ
-gamma 0 0
# Id: 2121800
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
CrO4-2 + SO4-2 + 2H+ = CrO3SO4-2 + H2O
log_k 8.9937
delta_h 0 kJ
-gamma 0 0
# Id: 2127320
# log K source: MTQ3.11
# Delta H source: MTQ3.11
#T and ionic strength:
CrO4-2 + 4H+ + PO4-3 = CrO3H2PO4- + H2O
log_k 29.3634
delta_h 0 kJ
```

-gamma 0 0
Id: 2125800
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
CrO4-2 + 3H+ + PO4-3 = CrO3HPO4-2 + H2O
log_k 26.6806
delta_h 0 kJ
-gamma 0 0
Id: 2125801
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
CrO4-2 + Na+ = NaCrO4-
log_k 0.6963
delta_h 0 kJ
-gamma 0 0
Id: 5002120
log K source: MTQ3.11
Delta H source: MTQ3.11
#T and ionic strength:
K+ + CrO4-2 = KCrO4-
log_k 0.57
delta_h 0 kJ
-gamma 0 0
Id: 4102120
log K source: NIST46.4
Delta H source: MTQ3.11
#T and ionic strength: 0.00 18.0
MoO4-2 + H+ = HMoO4-
log_k 4.2988
delta_h 20 kJ
-gamma 0 0
Id: 3304801
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.00 20.0
MoO4-2 + 2H+ = H2MoO4
log_k 8.1636
delta_h -26 kJ
-gamma 0 0
Id: 3304802
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.00 20.0
7MoO4-2 + 8H+ = Mo7O24-6 + 4H2O
log_k 52.99
delta_h -228 kJ
-gamma 0 0
Id: 3304803
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
7MoO4-2 + 9H+ = HMo7O24-5 + 4H2O

log_k 59.3768
delta_h -218 kJ
-gamma 0 0
Id: 3304804
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
7MoO4-2 + 10H+ = H2Mo7O24-4 + 4H2O
log_k 64.159
delta_h -215 kJ
-gamma 0 0
Id: 3304805
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
7MoO4-2 + 11H+ = H3Mo7O24-3 + 4H2O
log_k 67.405
delta_h -217 kJ
-gamma 0 0
Id: 3304806
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 1.00 25.0
6MoO4-2 + Al+3 + 6H+ = AlMo6O21-3 + 3H2O
log_k 54.9925
delta_h 0 kJ
-gamma 0 0
Id: 304801
log K source: NIST46.4
Delta H source: MTQ3.11
#T and ionic strength: 0.50 25.0
MoO4-2 + 2Ag+ = Ag2MoO4
log_k -0.4219
delta_h -1.18 kJ
-gamma 0 0
Id: 204801
log K source: Bard85
Delta H source: Bard85
#T and ionic strength:
VO2+ + 2H2O = VO4-3 + 4H+
log_k -30.2
delta_h -25 kJ
-gamma 0 0
Id: 9033303
log K source: NIST46.4
Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
VO2+ + 2H2O = HVO4-2 + 3H+
log_k -15.9
delta_h 0 kJ
-gamma 0 0
Id: 9033302
log K source: NIST46.3
Delta H source: NIST46.3

```
#T and ionic strength:  0.00 25.0
VO2+ + 2H2O = H2VO4- + 2H+
log_k -7.3
delta_h 0 kJ
-gamma 0 0
# Id:  9033301
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
VO2+ + 2H2O = H3VO4 + H+
log_k -3.3
delta_h 44.4759 kJ
-gamma 0 0
# Id:  9033300
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
2VO2+ + 3H2O = V2O7-4 + 6H+
log_k -31.24
delta_h -28 kJ
-gamma 0 0
# Id:  9030020
# log K source:  NIST46.3
# Delta H source:  NIST46.3
#T and ionic strength:  0.00 25.0
2VO2+ + 3H2O = HV2O7-3 + 5H+
log_k -20.67
delta_h 0 kJ
-gamma 0 0
# Id:  9030021
# log K source:  NIST46.3
# Delta H source:  MTQ3.11
#T and ionic strength:  0.00 25.0
2VO2+ + 3H2O = H3V2O7- + 3H+
log_k -3.79
delta_h 0 kJ
-gamma 0 0
# Id:  9030022
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
3VO2+ + 3H2O = V3O9-3 + 6H+
log_k -15.88
delta_h 0 kJ
-gamma 0 0
# Id:  9030023
# log K source:  MTQ3.11
# Delta H source:  MTQ3.11
#T and ionic strength:
4VO2+ + 4H2O = V4O12-4 + 8H+
log_k -20.56
delta_h -87 kJ
-gamma 0 0
# Id:  9030024
```

```
# log K source: NIST46.3
# Delta H source: NIST46.3
#T and ionic strength: 0.00 25.0
10VO2+ + 8H2O = V10O28-6 + 16H+
log_k -24.0943
delta_h 0 kJ
-gamma 0 0
# Id: 9030025
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 20.0
10VO2+ + 8H2O = HV10O28-5 + 15H+
log_k -15.9076
delta_h 90.0397 kJ
-gamma 0 0
# Id: 9030026
# log K source: NIST46.4
# Delta H source: MTQ3.11
#T and ionic strength: 0.10 20.0
10VO2+ + 8H2O = H2V10O28-4 + 14H+
log_k -10.7
delta_h 0 kJ
-gamma 0 0
# Id: 9030027
# log K source: NIST46.3
# Delta H source: MTQ3.11
#T and ionic strength: 0.00 25.0
Benzoate- + H+ = H(Benzoate)
log_k 4.202
delta_h -0.4602 kJ
-gamma 0 0
# Id: 3309171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Pb+2 = Pb(Benzoate)+
log_k 2.4
delta_h 0 kJ
-gamma 0 0
# Id: 6009171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Al+3 = Al(Benzoate)+2
log_k 2.05
delta_h 0 kJ
-gamma 0 0
# Id: 309171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Al+3 + H2O = AlOH(Benzoate)+ + H+
log_k -0.56
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 309172
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Zn+2 = Zn(Benzoate)+
log_k 1.7
delta_h 0 kJ
-gamma 0 0
# Id: 9509171
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Benzoate- + Cd+2 = Cd(Benzoate)+
log_k 1.8
delta_h 0 kJ
-gamma 0 0
# Id: 1609171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2Benzoate- + Cd+2 = Cd(Benzoate)2
log_k 1.82
delta_h 0 kJ
-gamma 0 0
# Id: 1609172
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Benzoate- + Cu+2 = Cu(Benzoate)+
log_k 2.19
delta_h 0 kJ
-gamma 0 0
# Id: 2319171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Ag+ = Ag(Benzoate)
log_k 0.91
delta_h 0 kJ
-gamma 0 0
# Id: 209171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Ni+2 = Ni(Benzoate)+
log_k 1.86
delta_h 0 kJ
-gamma 0 0
# Id: 5409171
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Co+2 + Benzoate- = Co(Benzoate)+
```

```
log_k 1.0537
delta_h 12 kJ
-gamma 0 0
# Id: 2009171
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 30.0
Benzoate- + Mn+2 = Mn(Benzoate)+
log_k 2.06
delta_h 0 kJ
-gamma 0 0
# Id: 4709171
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Benzoate- + Mg+2 = Mg(Benzoate)+
log_k 1.26
delta_h 0 kJ
-gamma 0 0
# Id: 4609171
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Benzoate- + Ca+2 = Ca(Benzoate)+
log_k 1.55
delta_h 0 kJ
-gamma 0 0
# Id: 1509171
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Phenylacetate- + H+ = H(Phenylacetate)
log_k 4.31
delta_h 2.1757 kJ
-gamma 0 0
# Id: 3309181
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Phenylacetate- + Zn+2 = Zn(Phenylacetate)+
log_k 1.57
delta_h 0 kJ
-gamma 0 0
# Id: 9509181
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Phenylacetate- + Cu+2 = Cu(Phenylacetate)+
log_k 1.97
delta_h 0 kJ
-gamma 0 0
# Id: 2319181
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Co+2 + Phenylacetate- = Co(Phenylacetate)+
log_k 0.591
delta_h 0 kJ
-gamma 0 0
# Id: 2009181
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Co+2 + 2Phenylacetate- = Co(Phenylacetate)2
log_k 0.4765
delta_h 0 kJ
-gamma 0 0
# Id: 2009182
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Isophthalate-2 + H+ = H(Isophthalate)-
log_k 4.5
delta_h 1.6736 kJ
-gamma 0 0
# Id: 3309201
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + 2H+ = H2(Isophthalate)
log_k 8
delta_h 1.6736 kJ
-gamma 0 0
# Id: 3309202
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Pb+2 = Pb(Isophthalate)
log_k 2.99
delta_h 0 kJ
-gamma 0 0
# Id: 6009201
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2Isophthalate-2 + Pb+2 = Pb(Isophthalate)2-2
log_k 4.18
delta_h 0 kJ
-gamma 0 0
# Id: 6009202
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Pb+2 + H+ = PbH(Isophthalate)+
log_k 6.69
delta_h 0 kJ
-gamma 0 0
# Id: 6009203
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Cd+2 = Cd(Isophthalate)
log_k 2.15
delta_h 0 kJ
-gamma 0 0
# Id: 1609201
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2Isophthalate-2 + Cd+2 = Cd(Isophthalate)2-2
log_k 2.99
delta_h 0 kJ
-gamma 0 0
# Id: 1609202
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Cd+2 + H+ = CdH(Isophthalate)+
log_k 5.73
delta_h 0 kJ
-gamma 0 0
# Id: 1609203
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Ca+2 = Ca(Isophthalate)
log_k 2
delta_h 0 kJ
-gamma 0 0
# Id: 1509200
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Isophthalate-2 + Ba+2 = Ba(Isophthalate)
log_k 1.55
delta_h 0 kJ
-gamma 0 0
# Id: 1009201
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Diethylamine = H(Diethylamine)+
log_k 10.933
delta_h -53.1368 kJ
-gamma 0 0
# Id: 3309551
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Diethylamine = Zn(Diethylamine)+2
log_k 2.74
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 9509551
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 2Diethylamine = Zn(Diethylamine)2+2
log_k 5.27
delta_h 0 kJ
-gamma 0 0
# Id: 9509552
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 3Diethylamine = Zn(Diethylamine)3+2
log_k 7.71
delta_h 0 kJ
-gamma 0 0
# Id: 9509553
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 4Diethylamine = Zn(Diethylamine)4+2
log_k 9.84
delta_h 0 kJ
-gamma 0 0
# Id: 9509554
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + Diethylamine = Cd(Diethylamine)+2
log_k 2.73
delta_h 0 kJ
-gamma 0 0
# Id: 1609551
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 2Diethylamine = Cd(Diethylamine)2+2
log_k 4.86
delta_h 0 kJ
-gamma 0 0
# Id: 1609552
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 3Diethylamine = Cd(Diethylamine)3+2
log_k 6.37
delta_h 0 kJ
-gamma 0 0
# Id: 1609553
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 4Diethylamine = Cd(Diethylamine)4+2
```

```
log_k 7.32
delta_h 0 kJ
-gamma 0 0
# Id: 1609554
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ag+ + Diethylamine = Ag(Diethylamine)+
log_k 2.98
delta_h 0 kJ
-gamma 0 0
# Id: 209551
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Diethylamine = Ag(Diethylamine)2+
log_k 6.38
delta_h -44.7688 kJ
-gamma 0 0
# Id: 209552
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Diethylamine = Ni(Diethylamine)+2
log_k 2.78
delta_h 0 kJ
-gamma 0 0
# Id: 5409551
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 2Diethylamine = Ni(Diethylamine)2+2
log_k 4.97
delta_h 0 kJ
-gamma 0 0
# Id: 5409552
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 3Diethylamine = Ni(Diethylamine)3+2
log_k 6.72
delta_h 0 kJ
-gamma 0 0
# Id: 5409553
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 4Diethylamine = Ni(Diethylamine)4+2
log_k 7.93
delta_h 0 kJ
-gamma 0 0
# Id: 5409554
# log K source: SCD2.62
# Delta H source: SCD2.62
```

#T and ionic strength:
Ni+2 + 5Diethylamine = Ni(Diethylamine)5+2
log_k 8.87
delta_h 0 kJ
-gamma 0 0
Id: 5409555
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
H+ + Butylamine = H(Butylamine)+
log_k 10.64
delta_h -58.2831 kJ
-gamma 0 0
Id: 3309561
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Butylamine + 2H+ = Hg(Butylamine)+2 + 2H2O
log_k 14.84
delta_h 0 kJ
-gamma 0 0
Id: 3619561
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 2Butylamine + 2H+ = Hg(Butylamine)2+2 + 2H2O
log_k 24.24
delta_h 0 kJ
-gamma 0 0
Id: 3619562
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 3Butylamine + 2H+ = Hg(Butylamine)3+2 + 2H2O
log_k 25.1
delta_h 0 kJ
-gamma 0 0
Id: 3619563
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 4Butylamine + 2H+ = Hg(Butylamine)4+2 + 2H2O
log_k 26.1
delta_h 0 kJ
-gamma 0 0
Id: 3619564
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Butylamine = Ag(Butylamine)+
log_k 3.42
delta_h -16.736 kJ
-gamma 0 0
Id: 209561

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Butylamine = Ag(Butylamine)2+
log_k 7.47
delta_h -52.7184 kJ
-gamma 0 0
# Id: 209562
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Methylamine = H(Methylamine)+
log_k 10.64
delta_h -55.2288 kJ
-gamma 0 0
# Id: 3309581
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Methylamine = Cd(Methylamine)+2
log_k 2.75
delta_h 0 kJ
-gamma 0 0
# Id: 1609581
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Methylamine = Cd(Methylamine)2+2
log_k 4.81
delta_h -29.288 kJ
-gamma 0 0
# Id: 1609582
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 3Methylamine = Cd(Methylamine)3+2
log_k 5.94
delta_h 0 kJ
-gamma 0 0
# Id: 1609583
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 4Methylamine = Cd(Methylamine)4+2
log_k 6.55
delta_h -58.576 kJ
-gamma 0 0
# Id: 1609584
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Methylamine + 2H+ = Hg(Methylamine)+2 + 2H2O
log_k 14.76
delta_h 0 kJ
```

-gamma 0 0
Id: 3619581
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 2Methylamine + 2H+ = Hg(Methylamine)2+2 + 2H2O
log_k 23.96
delta_h 0 kJ
-gamma 0 0
Id: 3619582
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 3Methylamine + 2H+ = Hg(Methylamine)3+2 + 2H2O
log_k 24.3
delta_h 0 kJ
-gamma 0 0
Id: 3619583
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 4Methylamine + 2H+ = Hg(Methylamine)4+2 + 2H2O
log_k 24.6
delta_h 0 kJ
-gamma 0 0
Id: 3619584
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Methylamine = Cu(Methylamine)+2
log_k 4.11
delta_h 0 kJ
-gamma 0 0
Id: 2319581
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Methylamine = Cu(Methylamine)2+2
log_k 7.51
delta_h 0 kJ
-gamma 0 0
Id: 2319582
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 3Methylamine = Cu(Methylamine)3+2
log_k 10.21
delta_h 0 kJ
-gamma 0 0
Id: 2319583
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 4Methylamine = Cu(Methylamine)4+2

```
log_k 12.08
delta_h 0 kJ
-gamma 0 0
# Id: 2319584
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Methylamine = Ag(Methylamine)+
log_k 3.07
delta_h -12.552 kJ
-gamma 0 0
# Id: 209581
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Methylamine = Ag(Methylamine)2+
log_k 6.89
delta_h -48.9528 kJ
-gamma 0 0
# Id: 209582
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Methylamine = Ni(Methylamine)+2
log_k 2.23
delta_h 0 kJ
-gamma 0 0
# Id: 5409581
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Dimethylamine = H(Dimethylamine)+
log_k 10.774
delta_h -50.208 kJ
-gamma 0 0
# Id: 3309591
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Dimethylamine = Ag(Dimethylamine)2+
log_k 5.37
delta_h -40.5848 kJ
-gamma 0 0
# Id: 209591
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Dimethylamine = Ni(Dimethylamine)+2
log_k 1.47
delta_h 0 kJ
-gamma 0 0
# Id: 5409591
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
H+ + Hexylamine = H(Hexylamine)+
log_k 10.63
delta_h -58.576 kJ
-gamma 0 0
# Id: 3309611
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Hexylamine = Ag(Hexylamine)+
log_k 3.54
delta_h -25.104 kJ
-gamma 0 0
# Id: 209611
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Hexylamine = Ag(Hexylamine)2+
log_k 7.55
delta_h -53.1368 kJ
-gamma 0 0
# Id: 209612
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Ethylenediamine = H(Ethylenediamine)+
log_k 9.928
delta_h -49.7896 kJ
-gamma 0 0
# Id: 3309631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Ethylenediamine = H2(Ethylenediamine)+2
log_k 16.776
delta_h -95.3952 kJ
-gamma 0 0
# Id: 3309632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Ethylenediamine = Pb(Ethylenediamine)+2
log_k 5.04
delta_h 0 kJ
-gamma 0 0
# Id: 6009631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + 2Ethylenediamine = Pb(Ethylenediamine)2+2
log_k 8.5
delta_h 0 kJ
-gamma 0 0
# Id: 6009632
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Ethylenediamine = Zn(Ethylenediamine)+2
log_k 5.66
delta_h -29.288 kJ
-gamma 0 0
# Id: 9509631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Ethylenediamine = Zn(Ethylenediamine)2+2
log_k 10.6
delta_h -48.116 kJ
-gamma 0 0
# Id: 9509632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 3Ethylenediamine = Zn(Ethylenediamine)3+2
log_k 13.9
delta_h -71.5464 kJ
-gamma 0 0
# Id: 9509633
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Ethylenediamine = Cd(Ethylenediamine)+2
log_k 5.41
delta_h -28.4512 kJ
-gamma 0 0
# Id: 1609631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Ethylenediamine = Cd(Ethylenediamine)2+2
log_k 9.9
delta_h -55.6472 kJ
-gamma 0 0
# Id: 1609632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 3Ethylenediamine = Cd(Ethylenediamine)3+2
log_k 11.6
delta_h -82.4248 kJ
-gamma 0 0
# Id: 1609633
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Ethylenediamine + 2H+ = Hg(Ethylenediamine)+2 + 2H2O
log_k 20.4
delta_h 0 kJ
```

-gamma 0 0
Id: 3619631
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 2Ethylenediamine + 2H+ = Hg(Ethylenediamine)2+2 + 2H2O
log_k 29.3
delta_h -173.218 kJ
-gamma 0 0
Id: 3619632
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 2Ethylenediamine + 3H+ = HgH(Ethylenediamine)2+3 + 2H2O
log_k 34.7
delta_h 0 kJ
-gamma 0 0
Id: 3619633
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 2Ethylenediamine = Cu(Ethylenediamine)2+
log_k 11.2
delta_h 0 kJ
-gamma 0 0
Id: 2309631
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Ethylenediamine = Cu(Ethylenediamine)+2
log_k 10.5
delta_h -52.7184 kJ
-gamma 0 0
Id: 2319631
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Ethylenediamine = Cu(Ethylenediamine)2+2
log_k 19.6
delta_h -105.437 kJ
-gamma 0 0
Id: 2319632
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Ethylenediamine = Ag(Ethylenediamine)+
log_k 4.6
delta_h -48.9528 kJ
-gamma 0 0
Id: 209631
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Ethylenediamine = Ag(Ethylenediamine)2+

```
log_k 7.5
delta_h -52.3 kJ
-gamma 0 0
# Id: 209632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Ethylenediamine + H+ = AgH(Ethylenediamine)+2
log_k 11.99
delta_h -75.312 kJ
-gamma 0 0
# Id: 209633
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2Ag+ + Ethylenediamine = Ag2(Ethylenediamine)+2
log_k 6.5
delta_h 0 kJ
-gamma 0 0
# Id: 209634
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2Ag+ + 2Ethylenediamine = Ag2(Ethylenediamine)2+2
log_k 12.7
delta_h -97.0688 kJ
-gamma 0 0
# Id: 209635
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Ethylenediamine + 2H+ = Ag(HEthylenediamine)2+3
log_k 24
delta_h -150.206 kJ
-gamma 0 0
# Id: 209636
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Ethylenediamine + H+ = AgH(Ethylenediamine)2+2
log_k 8.4
delta_h -47.6976 kJ
-gamma 0 0
# Id: 209637
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Ethylenediamine = Ni(Ethylenediamine)+2
log_k 7.32
delta_h -37.656 kJ
-gamma 0 0
# Id: 5409631
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Ni+2 + 2Ethylenediamine = Ni(Ethylenediamine)2+2
log_k 13.5
delta_h -76.5672 kJ
-gamma 0 0
# Id: 5409632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 3Ethylenediamine = Ni(Ethylenediamine)3+2
log_k 17.6
delta_h -117.152 kJ
-gamma 0 0
# Id: 5409633
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Ethylenediamine = Co(Ethylenediamine)+2
log_k 5.5
delta_h -28 kJ
-gamma 0 0
# Id: 2009631
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + 2Ethylenediamine = Co(Ethylenediamine)2+2
log_k 10.1
delta_h -58.5 kJ
-gamma 0 0
# Id: 2009632
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + 3Ethylenediamine = Co(Ethylenediamine)3+2
log_k 13.2
delta_h -92.8 kJ
-gamma 0 0
# Id: 2009633
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+3 + 2Ethylenediamine = Co(Ethylenediamine)2+3
log_k 34.7
delta_h 0 kJ
-gamma 0 0
# Id: 2019631
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Co+3 + 3Ethylenediamine = Co(Ethylenediamine)3+3
log_k 48.69
delta_h 0 kJ
-gamma 0 0
# Id: 2019632
```

```
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.50 30.0
Fe+2 + Ethylenediamine = Fe(Ethylenediamine)+2
log_k 4.26
delta_h 0 kJ
-gamma 0 0
# Id: 2809631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + 2Ethylenediamine = Fe(Ethylenediamine)2+2
log_k 7.73
delta_h 0 kJ
-gamma 0 0
# Id: 2809632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + 3Ethylenediamine = Fe(Ethylenediamine)3+2
log_k 10.17
delta_h 0 kJ
-gamma 0 0
# Id: 2809633
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Ethylenediamine = Mn(Ethylenediamine)+2
log_k 2.74
delta_h -11.7152 kJ
-gamma 0 0
# Id: 4709631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + 2Ethylenediamine = Mn(Ethylenediamine)2+2
log_k 4.8
delta_h -25.104 kJ
-gamma 0 0
# Id: 4709632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + 2Ethylenediamine + 2H+ = Cr(Ethylenediamine)2+3 + 2H2O
log_k 22.57
delta_h 0 kJ
-gamma 0 0
# Id: 2119631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + 3Ethylenediamine + 2H+ = Cr(Ethylenediamine)3+3 + 2H2O
log_k 29
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2119632
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Ethylenediamine = Mg(Ethylenediamine)+2
log_k 0.37
delta_h 0 kJ
-gamma 0 0
# Id: 4609631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Ethylenediamine = Ca(Ethylenediamine)+2
log_k 0.11
delta_h 0 kJ
-gamma 0 0
# Id: 1509631
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Propylamine = H(Propylamine)+
log_k 10.566
delta_h -57.53 kJ
-gamma 0 0
# Id: 3309641
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Propylamine = Zn(Propylamine)+2
log_k 2.42
delta_h 0 kJ
-gamma 0 0
# Id: 9509641
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 2Propylamine = Zn(Propylamine)2+2
log_k 4.85
delta_h 0 kJ
-gamma 0 0
# Id: 9509642
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 3Propylamine = Zn(Propylamine)3+2
log_k 7.38
delta_h 0 kJ
-gamma 0 0
# Id: 9509643
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 4Propylamine = Zn(Propylamine)4+2
```

```
log_k 9.49
delta_h 0 kJ
-gamma 0 0
# Id: 9509644
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + Propylamine = Cd(Propylamine)+2
log_k 2.62
delta_h 0 kJ
-gamma 0 0
# Id: 1609641
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 2Propylamine = Cd(Propylamine)2+2
log_k 4.64
delta_h 0 kJ
-gamma 0 0
# Id: 1609642
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 3Propylamine = Cd(Propylamine)3+2
log_k 6.03
delta_h 0 kJ
-gamma 0 0
# Id: 1609643
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ag+ + Propylamine = Ag(Propylamine)+
log_k 3.45
delta_h -12.552 kJ
-gamma 0 0
# Id: 209641
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Propylamine = Ag(Propylamine)2+
log_k 7.44
delta_h -53.1368 kJ
-gamma 0 0
# Id: 209642
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Propylamine = Ni(Propylamine)+2
log_k 2.81
delta_h 0 kJ
-gamma 0 0
# Id: 5409641
# log K source: SCD2.62
# Delta H source: SCD2.62
```

```
#T and ionic strength:
Ni+2 + 2Propylamine = Ni(Propylamine)2+2
log_k 5.02
delta_h 0 kJ
-gamma 0 0
# Id: 5409642
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 3Propylamine = Ni(Propylamine)3+2
log_k 6.79
delta_h 0 kJ
-gamma 0 0
# Id: 5409643
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 4Propylamine = Ni(Propylamine)4+2
log_k 8.31
delta_h 0 kJ
-gamma 0 0
# Id: 5409644
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Isopropylamine = H(Isopropylamine)+
log_k 10.67
delta_h -58.3668 kJ
-gamma 0 0
# Id: 3309651
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Isopropylamine = Zn(Isopropylamine)+2
log_k 2.37
delta_h 0 kJ
-gamma 0 0
# Id: 9509651
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 2Isopropylamine = Zn(Isopropylamine)2+2
log_k 4.67
delta_h 0 kJ
-gamma 0 0
# Id: 9509652
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 3Isopropylamine = Zn(Isopropylamine)3+2
log_k 7.14
delta_h 0 kJ
-gamma 0 0
# Id: 9509653
```

```
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 4Isopropylamine = Zn(Isopropylamine)4+2
log_k 9.44
delta_h 0 kJ
-gamma 0 0
# Id: 9509654
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + Isopropylamine = Cd(Isopropylamine)+2
log_k 2.55
delta_h 0 kJ
-gamma 0 0
# Id: 1609651
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 2Isopropylamine = Cd(Isopropylamine)2+2
log_k 4.57
delta_h 0 kJ
-gamma 0 0
# Id: 1609652
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 3Isopropylamine = Cd(Isopropylamine)3+2
log_k 6.07
delta_h 0 kJ
-gamma 0 0
# Id: 1609653
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 4Isopropylamine = Cd(Isopropylamine)4+2
log_k 6.9
delta_h 0 kJ
-gamma 0 0
# Id: 1609654
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Hg(OH)2 + Isopropylamine + 2H+ = Hg(Isopropylamine)+2 + 2H2O
log_k 14.85
delta_h 0 kJ
-gamma 0 0
# Id: 3619651
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + 2Isopropylamine + 2H+ = Hg(Isopropylamine)2+2 + 2H2O
log_k 24.37
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 3619652
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Isopropylamine = Ag(Isopropylamine)+
log_k 3.67
delta_h -23.8488 kJ
-gamma 0 0
# Id: 209651
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Isopropylamine = Ag(Isopropylamine)2+
log_k 7.77
delta_h -59.8312 kJ
-gamma 0 0
# Id: 209652
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Isopropylamine = Ni(Isopropylamine)+2
log_k 2.71
delta_h 0 kJ
-gamma 0 0
# Id: 5409651
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 2Isopropylamine = Ni(Isopropylamine)2+2
log_k 4.86
delta_h 0 kJ
-gamma 0 0
# Id: 5409652
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 3Isopropylamine = Ni(Isopropylamine)3+2
log_k 6.57
delta_h 0 kJ
-gamma 0 0
# Id: 5409653
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 4Isopropylamine = Ni(Isopropylamine)4+2
log_k 7.83
delta_h 0 kJ
-gamma 0 0
# Id: 5409654
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + 5Isopropylamine = Ni(Isopropylamine)5+2
```

```
log_k 8.43
delta_h 0 kJ
-gamma 0 0
# Id: 5409655
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Trimethylamine = H(Trimethylamine)+
log_k 9.8
delta_h -36.8192 kJ
-gamma 0 0
# Id: 3309661
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Trimethylamine = Ag(Trimethylamine)+
log_k 1.701
delta_h 0 kJ
-gamma 0 0
# Id: 209661
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Citrate-3 = H(Citrate)-2
log_k 6.396
delta_h 3.3472 kJ
-gamma 0 0
# Id: 3309671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Citrate-3 = H2(Citrate)-
log_k 11.157
delta_h 1.297 kJ
-gamma 0 0
# Id: 3309672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
3H+ + Citrate-3 = H3(Citrate)
log_k 14.285
delta_h -2.7614 kJ
-gamma 0 0
# Id: 3309673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Citrate-3 = Pb(Citrate)-
log_k 7.27
delta_h 0 kJ
-gamma 0 0
# Id: 6009671
# log K source: SCD2.62
# Delta H source: SCD2.62
```

```
#T and ionic strength:
Pb+2 + 2Citrate-3 = Pb(Citrate)2-4
log_k 6.53
delta_h 0 kJ
-gamma 0 0
# Id: 6009672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Citrate-3 = Al(Citrate)
log_k 9.97
delta_h 0 kJ
-gamma 0 0
# Id: 309671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + 2Citrate-3 = Al(Citrate)2-3
log_k 14.8
delta_h 0 kJ
-gamma 0 0
# Id: 309672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Citrate-3 + H+ = AlH(Citrate)+
log_k 12.85
delta_h 0 kJ
-gamma 0 0
# Id: 309673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Citrate-3 = Tl(Citrate)-2
log_k 1.48
delta_h 0 kJ
-gamma 0 0
# Id: 8709671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Citrate-3 = Zn(Citrate)-
log_k 6.21
delta_h 8.368 kJ
-gamma 0 0
# Id: 9509671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Citrate-3 = Zn(Citrate)2-4
log_k 7.4
delta_h 25.104 kJ
-gamma 0 0
# Id: 9509672
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Citrate-3 + H+ = ZnH(Citrate)
log_k 10.2
delta_h 3.3472 kJ
-gamma 0 0
# Id: 9509673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Citrate-3 + 2H+ = ZnH2(Citrate)+
log_k 12.84
delta_h 0 kJ
-gamma 0 0
# Id: 9509674
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + Citrate-3 = Cd(Citrate)-
log_k 4.98
delta_h 8.368 kJ
-gamma 0 0
# Id: 1609671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Citrate-3 + H+ = CdH(Citrate)
log_k 9.44
delta_h 3.3472 kJ
-gamma 0 0
# Id: 1609672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Citrate-3 + 2H+ = CdH2(Citrate)+
log_k 12.9
delta_h 0 kJ
-gamma 0 0
# Id: 1609673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Citrate-3 = Cd(Citrate)2-4
log_k 5.9
delta_h 20.92 kJ
-gamma 0 0
# Id: 1609674
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Citrate-3 + 2H+ = Hg(Citrate)- + 2H2O
log_k 18.3
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 3619671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Citrate-3 = Cu(Citrate)-
log_k 7.57
delta_h 0 kJ
-gamma 0 0
# Id: 2319671
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cu+2 + 2Citrate-3 = Cu(Citrate)2-4
log_k 8.9
delta_h 0 kJ
-gamma 0 0
# Id: 2319672
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cu+2 + Citrate-3 + H+ = CuH(Citrate)
log_k 10.87
delta_h 11.7152 kJ
-gamma 0 0
# Id: 2319673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Citrate-3 + 2H+ = CuH2(Citrate)+
log_k 13.23
delta_h 0 kJ
-gamma 0 0
# Id: 2319674
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
2Cu+2 + 2Citrate-3 = Cu2(Citrate)2-2
log_k 16.9
delta_h 41.84 kJ
-gamma 0 0
# Id: 2319675
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Citrate-3 = Ni(Citrate)-
log_k 6.59
delta_h 16.736 kJ
-gamma 0 0
# Id: 5409671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Citrate-3 + H+ = NiH(Citrate)
```

```
log_k 10.5
delta_h 15.8992 kJ
-gamma 0 0
# Id: 5409672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Citrate-3 + 2H+ = NiH2(Citrate)+
log_k 13.3
delta_h 0 kJ
-gamma 0 0
# Id: 5409673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Citrate-3 = Ni(Citrate)2-4
log_k 8.77
delta_h 12.552 kJ
-gamma 0 0
# Id: 5409674
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Citrate-3 + H+ = NiH(Citrate)2-3
log_k 14.9
delta_h 32.6352 kJ
-gamma 0 0
# Id: 5409675
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Citrate-3 = Co(Citrate)-
log_k 6.1867
delta_h 0 kJ
-gamma 0 0
# Id: 2009671
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Co+2 + H+ + Citrate-3 = CoHCitrate
log_k 10.4438
delta_h 0 kJ
-gamma 0 0
# Id: 2009672
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Co+2 + 2H+ + Citrate-3 = CoH2Citrate+
log_k 12.7859
delta_h 0 kJ
-gamma 0 0
# Id: 2009673
# log K source: NIST46.4
# Delta H source: NIST46.2
```

```
#T and ionic strength:  0.10 20.0
Fe+2 + Citrate-3 = Fe(Citrate)-
log_k 6.1
delta_h 0 kJ
-gamma 0 0
# Id:  2809671
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+2 + Citrate-3 + H+ = FeH(Citrate)
log_k 10.2
delta_h 0 kJ
-gamma 0 0
# Id:  2809672
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+3 + Citrate-3 = Fe(Citrate)
log_k 13.1
delta_h 0 kJ
-gamma 0 0
# Id:  2819671
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+3 + Citrate-3 + H+ = FeH(Citrate)+
log_k 14.4
delta_h 0 kJ
-gamma 0 0
# Id:  2819672
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Mn+2 + Citrate-3 = Mn(Citrate)-
log_k 4.28
delta_h 0 kJ
-gamma 0 0
# Id:  4709671
# log K source:  SCD2.62
# Delta H source:  SCD2.62
#T and ionic strength:
Mn+2 + Citrate-3 + H+ = MnH(Citrate)
log_k 9.6
delta_h 0 kJ
-gamma 0 0
# Id:  4709672
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Be+2 + Citrate-3 = Be(Citrate)-
log_k 5.534
delta_h 0 kJ
-gamma 0 0
# Id:  1109671
```

```
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Be+2 + H+ + Citrate-3 = BeH(Citrate)
log_k 9.442
delta_h 0 kJ
-gamma 0 0
# Id: 1109672
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Ca+2 + Citrate-3 = Ca(Citrate)-
log_k 4.87
delta_h -8.368 kJ
-gamma 0 0
# Id: 1509671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Citrate-3 + H+ = CaH(Citrate)
log_k 9.26
delta_h -0.8368 kJ
-gamma 0 0
# Id: 1509672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Citrate-3 + 2H+ = CaH2(Citrate)+
log_k 12.257
delta_h 0 kJ
-gamma 0 0
# Id: 1509673
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Mg+2 + Citrate-3 = Mg(Citrate)-
log_k 4.89
delta_h 8.368 kJ
-gamma 0 0
# Id: 4609671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Citrate-3 + H+ = MgH(Citrate)
log_k 8.91
delta_h 3.3472 kJ
-gamma 0 0
# Id: 4609672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Citrate-3 + 2H+ = MgH2(Citrate)+
log_k 12.2
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 4609673
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Sr+2 + Citrate-3 = Sr(Citrate)-
log_k 4.3367
delta_h 0 kJ
-gamma 0 0
# Id: 8009671
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Sr+2 + H+ + Citrate-3 = SrH(Citrate)
log_k 8.9738
delta_h 0 kJ
-gamma 0 0
# Id: 8009672
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Sr+2 + 2H+ + Citrate-3 = SrH2(Citrate)+
log_k 12.4859
delta_h 0 kJ
-gamma 0 0
# Id: 8009673
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Ba+2 + Citrate-3 = Ba(Citrate)-
log_k 4.1
delta_h 0 kJ
-gamma 0 0
# Id: 1009671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ba+2 + Citrate-3 + H+ = BaH(Citrate)
log_k 8.74
delta_h 0 kJ
-gamma 0 0
# Id: 1009672
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ba+2 + Citrate-3 + 2H+ = BaH2(Citrate)+
log_k 12.3
delta_h 0 kJ
-gamma 0 0
# Id: 1009673
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Na+ + Citrate-3 = Na(Citrate)-2
```

```
log_k 1.03
delta_h -2.8033 kJ
-gamma 0 0
# Id: 5009671
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
2Na+ + Citrate-3 = Na2(Citrate)-
log_k 1.5
delta_h -5.1045 kJ
-gamma 0 0
# Id: 5009672
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Na+ + Citrate-3 + H+ = NaH(Citrate)-
log_k 6.45
delta_h -3.5982 kJ
-gamma 0 0
# Id: 5009673
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
K+ + Citrate-3 = K(Citrate)-2
log_k 1.1
delta_h 5.4392 kJ
-gamma 0 0
# Id: 4109671
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Nta-3 = H(Nta)-2
log_k 10.278
delta_h -18.828 kJ
-gamma 0 0
# Id: 3309681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Nta-3 = H2(Nta)-
log_k 13.22
delta_h -17.9912 kJ
-gamma 0 0
# Id: 3309682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
3H+ + Nta-3 = H3(Nta)
log_k 15.22
delta_h -16.3176 kJ
-gamma 0 0
# Id: 3309683
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
4H+ + Nta-3 = H4(Nta)+
log_k 16.22
delta_h -16.3176 kJ
-gamma 0 0
# Id: 3309684
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Nta-3 = Pb(Nta)-
log_k 12.7
delta_h -15.8992 kJ
-gamma 0 0
# Id: 6009681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Nta-3 + H+ = PbH(Nta)
log_k 15.3
delta_h 0 kJ
-gamma 0 0
# Id: 6009682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Nta-3 = Al(Nta)
log_k 13.3
delta_h 0 kJ
-gamma 0 0
# Id: 309681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Nta-3 + H+ = AlH(Nta)+
log_k 15.2
delta_h 0 kJ
-gamma 0 0
# Id: 309682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Nta-3 + H2O = AlOH(Nta)- + H+
log_k 8
delta_h 0 kJ
-gamma 0 0
# Id: 309683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Nta-3 = Tl(Nta)-2
log_k 5.39
delta_h 0 kJ
-gamma 0 0
# Id: 8709681
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Nta-3 = Zn(Nta)-
log_k 11.95
delta_h -3.7656 kJ
-gamma 0 0
# Id: 9509681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Nta-3 = Zn(Nta)2-4
log_k 14.88
delta_h -15.0624 kJ
-gamma 0 0
# Id: 9509682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Nta-3 + H2O = ZnOH(Nta)-2 + H+
log_k 1.46
delta_h 46.4424 kJ
-gamma 0 0
# Id: 9509683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Nta-3 = Cd(Nta)-
log_k 11.07
delta_h -16.736 kJ
-gamma 0 0
# Id: 1609681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Nta-3 = Cd(Nta)2-4
log_k 15.03
delta_h -38.0744 kJ
-gamma 0 0
# Id: 1609682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Nta-3 + H2O = CdOH(Nta)-2 + H+
log_k -0.61
delta_h 29.288 kJ
-gamma 0 0
# Id: 1609683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Nta-3 + 2H+ = Hg(Nta)- + 2H2O
log_k 21.7
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 3619681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Nta-3 = Cu(Nta)-
log_k 14.4
delta_h -7.9496 kJ
-gamma 0 0
# Id: 2319681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Nta-3 = Cu(Nta)2-4
log_k 18.1
delta_h -37.2376 kJ
-gamma 0 0
# Id: 2319682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Nta-3 + H+ = CuH(Nta)
log_k 16.2
delta_h 0 kJ
-gamma 0 0
# Id: 2319683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Nta-3 + H2O = CuOH(Nta)-2 + H+
log_k 4.8
delta_h 25.5224 kJ
-gamma 0 0
# Id: 2319684
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Nta-3 = Ag(Nta)-2
log_k 6
delta_h -26.3592 kJ
-gamma 0 0
# Id: 209681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Nta-3 = Ni(Nta)-
log_k 12.79
delta_h -10.0416 kJ
-gamma 0 0
# Id: 5409681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Nta-3 = Ni(Nta)2-4
```

```
log_k 16.96
delta_h -32.6352 kJ
-gamma 0 0
# Id: 5409682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Nta-3 + H2O = NiOH(Nta)-2 + H+
log_k 1.5
delta_h 15.0624 kJ
-gamma 0 0
# Id: 5409683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Nta-3 = Co(Nta)-
log_k 11.6667
delta_h -0.4 kJ
-gamma 0 0
# Id: 2009681
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + 2Nta-3 = Co(Nta)2-4
log_k 14.9734
delta_h -20 kJ
-gamma 0 0
# Id: 2009682
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + Nta-3 + H2O = CoOH(Nta)-2 + H+
log_k 0.4378
delta_h 45.6 kJ
-gamma 0 0
# Id: 2009683
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Fe+2 + Nta-3 = Fe(Nta)-
log_k 10.19
delta_h 0 kJ
-gamma 0 0
# Id: 2809681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + 2Nta-3 = Fe(Nta)2-4
log_k 12.62
delta_h 0 kJ
-gamma 0 0
# Id: 2809682
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Fe+2 + Nta-3 + H+ = FeH(Nta)
log_k 12.29
delta_h 0 kJ
-gamma 0 0
# Id: 2809683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + Nta-3 + H2O = FeOH(Nta)-2 + H+
log_k -1.06
delta_h 0 kJ
-gamma 0 0
# Id: 2809684
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Nta-3 = Fe(Nta)
log_k 17.8
delta_h 13.3888 kJ
-gamma 0 0
# Id: 2819681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + 2Nta-3 = Fe(Nta)2-3
log_k 25.9
delta_h 0 kJ
-gamma 0 0
# Id: 2819682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Nta-3 + H2O = FeOH(Nta)- + H+
log_k 13.23
delta_h 0 kJ
-gamma 0 0
# Id: 2819683
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Nta-3 = Mn(Nta)-
log_k 8.573
delta_h 5.8576 kJ
-gamma 0 0
# Id: 4709681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + 2Nta-3 = Mn(Nta)2-4
log_k 11.58
delta_h -17.1544 kJ
-gamma 0 0
# Id: 4709682
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + Nta-3 + 2H+ = Cr(Nta) + 2H2O
log_k 21.2
delta_h 0 kJ
-gamma 0 0
# Id: 2119681
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 2Nta-3 + 2H+ = Cr(Nta)2-3 + 2H2O
log_k 29.5
delta_h 0 kJ
-gamma 0 0
# Id: 2119682
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
MoO4-2 + 2H+ + Nta-3 = MoO3(Nta)-3 + H2O
log_k 19.5434
delta_h -69 kJ
-gamma 0 0
# Id: 4809681
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
MoO4-2 + 3H+ + Nta-3 = MoO3H(Nta)-2 + H2O
log_k 23.3954
delta_h -71 kJ
-gamma 0 0
# Id: 4809682
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 1.00 25.0
MoO4-2 + 4H+ + Nta-3 = MoO3H2(Nta)- + H2O
log_k 25.3534
delta_h -71 kJ
-gamma 0 0
# Id: 4809683
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 1.00 25.0
Be+2 + Nta-3 = Be(Nta)-
log_k 9.0767
delta_h 25 kJ
-gamma 0 0
# Id: 1109681
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Mg+2 + Nta-3 = Mg(Nta)-
log_k 6.5
delta_h 17.9912 kJ
```

```
-gamma 0 0
# Id: 4609681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Nta-3 = Ca(Nta)-
log_k 7.608
delta_h -5.6902 kJ
-gamma 0 0
# Id: 1509681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + 2Nta-3 = Ca(Nta)2-4
log_k 8.81
delta_h -32.6352 kJ
-gamma 0 0
# Id: 1509682
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Nta-3 = Sr(Nta)-
log_k 6.2767
delta_h -2.2 kJ
-gamma 0 0
# Id: 8009681
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Ba+2 + Nta-3 = Ba(Nta)-
log_k 5.875
delta_h -6.025 kJ
-gamma 0 0
# Id: 1009681
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Edta-4 = H(Edta)-3
log_k 10.948
delta_h -23.4304 kJ
-gamma 0 0
# Id: 3309691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Edta-4 = H2(Edta)-2
log_k 17.221
delta_h -41.0032 kJ
-gamma 0 0
# Id: 3309692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
3H+ + Edta-4 = H3(Edta)-
```

```
log_k 20.34
delta_h -35.564 kJ
-gamma 0 0
# Id: 3309693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
4H+ + Edta-4 = H4(Edta)
log_k 22.5
delta_h -34.3088 kJ
-gamma 0 0
# Id: 3309694
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
5H+ + Edta-4 = H5(Edta)+
log_k 24
delta_h -32.2168 kJ
-gamma 0 0
# Id: 3309695
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sn(OH)2 + 2H+ + Edta-4 = Sn(Edta)-2 + 2H2O
log_k 27.026
delta_h 0 kJ
-gamma 0 0
# Id: 7909691
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 20.0
Sn(OH)2 + 3H+ + Edta-4 = SnH(Edta)- + 2H2O
log_k 29.934
delta_h 0 kJ
-gamma 0 0
# Id: 7909692
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 20.0
Sn(OH)2 + 4H+ + Edta-4 = SnH2(Edta) + 2H2O
log_k 31.638
delta_h 0 kJ
-gamma 0 0
# Id: 7909693
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 20.0
Pb+2 + Edta-4 = Pb(Edta)-2
log_k 19.8
delta_h -54.8104 kJ
-gamma 0 0
# Id: 6009691
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Pb+2 + Edta-4 + H+ = PbH(Edta)-
log_k 23
delta_h 0 kJ
-gamma 0 0
# Id: 6009692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Edta-4 + 2H+ = PbH2(Edta)
log_k 24.9
delta_h 0 kJ
-gamma 0 0
# Id: 6009693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Edta-4 = Al(Edta)-
log_k 19.1
delta_h 52.7184 kJ
-gamma 0 0
# Id: 309690
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Edta-4 + H+ = AlH(Edta)
log_k 21.8
delta_h 36.4008 kJ
-gamma 0 0
# Id: 309691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Edta-4 + H2O = AlOH(Edta)-2 + H+
log_k 12.8
delta_h 73.6384 kJ
-gamma 0 0
# Id: 309692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Edta-4 = Tl(Edta)-3
log_k 7.27
delta_h -43.5136 kJ
-gamma 0 0
# Id: 8709691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Edta-4 + H+ = TlH(Edta)-2
log_k 13.68
delta_h 0 kJ
-gamma 0 0
# Id: 8709692
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Edta-4 = Zn(Edta)-2
log_k 18
delta_h -19.2464 kJ
-gamma 0 0
# Id: 9509691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Edta-4 + H+ = ZnH(Edta)-
log_k 21.4
delta_h -28.4512 kJ
-gamma 0 0
# Id: 9509692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Edta-4 + H2O = ZnOH(Edta)-3 + H+
log_k 5.8
delta_h 0 kJ
-gamma 0 0
# Id: 9509693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Edta-4 = Cd(Edta)-2
log_k 18.2
delta_h -38.0744 kJ
-gamma 0 0
# Id: 1609691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Edta-4 + H+ = CdH(Edta)-
log_k 21.5
delta_h -39.748 kJ
-gamma 0 0
# Id: 1609692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Edta-4 + 2H+ = Hg(Edta)-2 + 2H2O
log_k 29.3
delta_h -125.102 kJ
-gamma 0 0
# Id: 3619691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Edta-4 + 3H+ = HgH(Edta)- + 2H2O
log_k 32.9
delta_h -128.449 kJ
```

```
-gamma 0 0
# Id: 3619692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Edta-4 = Cu(Edta)-2
log_k 20.5
delta_h -34.7272 kJ
-gamma 0 0
# Id: 2319691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Edta-4 + H+ = CuH(Edta)-
log_k 24
delta_h -43.0952 kJ
-gamma 0 0
# Id: 2319692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Edta-4 + 2H+ = CuH2(Edta)
log_k 26.2
delta_h 0 kJ
-gamma 0 0
# Id: 2319693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Edta-4 + H2O = CuOH(Edta)-3 + H+
log_k 8.5
delta_h 0 kJ
-gamma 0 0
# Id: 2319694
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Edta-4 = Ag(Edta)-3
log_k 8.08
delta_h -31.38 kJ
-gamma 0 0
# Id: 209691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Edta-4 + H+ = AgH(Edta)-2
log_k 15.21
delta_h 0 kJ
-gamma 0 0
# Id: 209693
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ni+2 + Edta-4 = Ni(Edta)-2
```

```
log_k 20.1
delta_h -30.9616 kJ
-gamma 0 0
# Id: 5409691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Edta-4 + H+ = NiH(Edta)-
log_k 23.6
delta_h -38.4928 kJ
-gamma 0 0
# Id: 5409692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Edta-4 + H2O = NiOH(Edta)-3 + H+
log_k 7.6
delta_h 0 kJ
-gamma 0 0
# Id: 5409693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Edta-4 = Co(Edta)-2
log_k 18.1657
delta_h -15 kJ
-gamma 0 0
# Id: 2009691
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + Edta-4 + H+ = CoH(Edta)-
log_k 21.5946
delta_h -22.9 kJ
-gamma 0 0
# Id: 2009692
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Co+2 + Edta-4 + 2H+ = CoH2(Edta)
log_k 23.4986
delta_h 0 kJ
-gamma 0 0
# Id: 2009693
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Co+3 + Edta-4 = Co(Edta)-
log_k 43.9735
delta_h 0 kJ
-gamma 0 0
# Id: 2019691
# log K source: NIST46.4
# Delta H source: NIST46.2
```

```
#T and ionic strength:  0.10 25.0
Co+3 + Edta-4 + H+ = CoH(Edta)
log_k 47.168
delta_h 0 kJ
-gamma 0 0
# Id:  2019692
# log K source:  NIST46.4
# Delta H source:  NIST46.2
#T and ionic strength:  0.10 20.0
Fe+2 + Edta-4 = Fe(Edta)-2
log_k 16
delta_h -16.736 kJ
-gamma 0 0
# Id:  2809690
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+2 + Edta-4 + H+ = FeH(Edta)-
log_k 19.06
delta_h -27.6144 kJ
-gamma 0 0
# Id:  2809691
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+2 + Edta-4 + H2O = FeOH(Edta)-3 + H+
log_k 6.5
delta_h 0 kJ
-gamma 0 0
# Id:  2809692
# log K source:  SCD2.62
# Delta H source:  SCD2.62
#T and ionic strength:
Fe+2 + Edta-4 + 2H2O = Fe(OH)2(Edta)-4 + 2H+
log_k -4
delta_h 0 kJ
-gamma 0 0
# Id:  2809693
# log K source:  SCD2.62
# Delta H source:  SCD2.62
#T and ionic strength:
Fe+3 + Edta-4 = Fe(Edta)-
log_k 27.7
delta_h -11.2968 kJ
-gamma 0 0
# Id:  2819690
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Fe+3 + Edta-4 + H+ = FeH(Edta)
log_k 29.2
delta_h -11.7152 kJ
-gamma 0 0
# Id:  2819691
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Edta-4 + H2O = FeOH(Edta)-2 + H+
log_k 19.9
delta_h 0 kJ
-gamma 0 0
# Id: 2819692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Edta-4 + 2H2O = Fe(OH)2(Edta)-3 + 2H+
log_k 9.85
delta_h 0 kJ
-gamma 0 0
# Id: 2819693
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Mn+2 + Edta-4 = Mn(Edta)-2
log_k 15.6
delta_h -19.2464 kJ
-gamma 0 0
# Id: 4709691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Edta-4 + H+ = MnH(Edta)-
log_k 19.1
delta_h -24.2672 kJ
-gamma 0 0
# Id: 4709692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr+2 + Edta-4 = Cr(Edta)-2
log_k 15.3
delta_h 0 kJ
-gamma 0 0
# Id: 2109691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr+2 + Edta-4 + H+ = CrH(Edta)-
log_k 19.1
delta_h 0 kJ
-gamma 0 0
# Id: 2109692
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + Edta-4 + 2H+ = Cr(Edta)- + 2H2O
log_k 35.5
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2119691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + Edta-4 + 3H+ = CrH(Edta) + 2H2O
log_k 37.4
delta_h 0 kJ
-gamma 0 0
# Id: 2119692
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + Edta-4 + H+ = CrOH(Edta)-2 + H2O
log_k 27.7
delta_h 0 kJ
-gamma 0 0
# Id: 2119693
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Be+2 + Edta-4 = Be(Edta)-2
log_k 11.4157
delta_h 41 kJ
-gamma 0 0
# Id: 1109691
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Mg+2 + Edta-4 = Mg(Edta)-2
log_k 10.57
delta_h 13.8072 kJ
-gamma 0 0
# Id: 4609690
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Edta-4 + H+ = MgH(Edta)-
log_k 14.97
delta_h 0 kJ
-gamma 0 0
# Id: 4609691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Edta-4 = Ca(Edta)-2
log_k 12.42
delta_h -25.5224 kJ
-gamma 0 0
# Id: 1509690
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Edta-4 + H+ = CaH(Edta)-
```

```
log_k 15.9
delta_h 0 kJ
-gamma 0 0
# Id: 1509691
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Edta-4 = Sr(Edta)-2
log_k 10.4357
delta_h -17 kJ
-gamma 0 0
# Id: 8009691
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Sr+2 + Edta-4 + H+ = SrH(Edta)-
log_k 14.7946
delta_h 0 kJ
-gamma 0 0
# Id: 8009692
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Ba+2 + Edta-4 = Ba(Edta)-2
log_k 7.72
delta_h -20.5016 kJ
-gamma 0 0
# Id: 1009691
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Na+ + Edta-4 = Na(Edta)-3
log_k 2.7
delta_h -5.8576 kJ
-gamma 0 0
# Id: 5009690
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
K+ + Edta-4 = K(Edta)-3
log_k 1.7
delta_h 0 kJ
-gamma 0 0
# Id: 4109690
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Propionate- = H(Propionate)
log_k 4.874
delta_h 0.66 kJ
-gamma 0 0
# Id: 3309711
# log K source: NIST46.4
# Delta H source: NIST46.4
```

```
#T and ionic strength: 0.00 25.0
Pb+2 + Propionate- = Pb(Propionate)+
log_k 2.64
delta_h 0 kJ
-gamma 0 0
# Id: 6009711
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.00 35.0
Pb+2 + 2Propionate- = Pb(Propionate)2
log_k 3.1765
delta_h 0 kJ
-gamma 0 0
# Id: 6009712
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 2.00 25.0
Zn+2 + Propionate- = Zn(Propionate)+
log_k 1.4389
delta_h 0 kJ
-gamma 0 0
# Id: 9509711
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Zn+2 + 2Propionate- = Zn(Propionate)2
log_k 1.842
delta_h 0 kJ
-gamma 0 0
# Id: 9509712
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Cd+2 + Propionate- = Cd(Propionate)+
log_k 1.598
delta_h 0 kJ
-gamma 0 0
# Id: 1609711
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Cd+2 + 2Propionate- = Cd(Propionate)2
log_k 2.472
delta_h 0 kJ
-gamma 0 0
# Id: 1609712
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 25.0
Hg(OH)2 + 2H+ + Propionate- = Hg(Propionate)+ + 2H2O
log_k 10.594
delta_h 0 kJ
-gamma 0 0
# Id: 3619711
```

```
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Cu+2 + Propionate- = Cu(Propionate)+
log_k 2.22
delta_h 4.1 kJ
-gamma 0 0
# Id: 2319711
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+2 + 2Propionate- = Cu(Propionate)2
log_k 3.5
delta_h 0 kJ
-gamma 0 0
# Id: 2319712
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Ni+2 + Propionate- = Ni(Propionate)+
log_k 0.908
delta_h 0 kJ
-gamma 0 0
# Id: 5409711
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 1.00 25.0
Co+2 + Propionate- = Co(Propionate)+
log_k 0.671
delta_h 4.6 kJ
-gamma 0 0
# Id: 2009711
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 2.00 25.0
Co+2 + 2Propionate- = Co(Propionate)2
log_k 0.5565
delta_h 16 kJ
-gamma 0 0
# Id: 2009712
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 2.00 25.0
Fe+3 + Propionate- = Fe(Propionate)+2
log_k 4.012
delta_h 0 kJ
-gamma 0 0
# Id: 2819711
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 20.0
Cr(OH)2+ + 2H+ + Propionate- = Cr(Propionate)+2 + 2H2O
log_k 15.0773
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2119711
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.50 25.0
Cr(OH)2+ + 2H+ + 2Propionate- = Cr(Propionate)2+ + 2H2O
log_k 17.9563
delta_h 0 kJ
-gamma 0 0
# Id: 2119712
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.50 25.0
Cr(OH)2+ + 2H+ + 3Propionate- = Cr(Propionate)3 + 2H2O
log_k 20.8858
delta_h 0 kJ
-gamma 0 0
# Id: 2119713
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.50 25.0
Mg+2 + Propionate- = Mg(Propionate)+
log_k 0.9689
delta_h 4.2677 kJ
-gamma 0 0
# Id: 4609710
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Ca+2 + Propionate- = Ca(Propionate)+
log_k 0.9289
delta_h 3.3472 kJ
-gamma 0 0
# Id: 1509710
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Sr+2 + Propionate- = Sr(Propionate)+
log_k 0.8589
delta_h 0 kJ
-gamma 0 0
# Id: 8009711
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Ba+2 + Propionate- = Ba(Propionate)+
log_k 0.7689
delta_h 0 kJ
-gamma 0 0
# Id: 1009711
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Ba+2 + 2Propionate- = Ba(Propionate)2
```

```
log_k 0.9834
delta_h 0 kJ
-gamma 0 0
# Id: 1009712
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
H+ + Butyrate- = H(Butyrate)
log_k 4.819
delta_h 2.8 kJ
-gamma 0 0
# Id: 3309721
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Pb+2 + Butyrate- = Pb(Butyrate)+
log_k 2.101
delta_h 0 kJ
-gamma 0 0
# Id: 6009721
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 2.00 25.0
Zn+2 + Butyrate- = Zn(Butyrate)+
log_k 1.4289
delta_h 0 kJ
-gamma 0 0
# Id: 9509721
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Hg(OH)2 + 2H+ + Butyrate- = Hg(Butyrate)+ + 2H2O
log_k 10.3529
delta_h 0 kJ
-gamma 0 0
# Id: 3619721
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Cu+2 + Butyrate- = Cu(Butyrate)+
log_k 2.14
delta_h 0 kJ
-gamma 0 0
# Id: 2319721
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Ni+2 + Butyrate- = Ni(Butyrate)+
log_k 0.691
delta_h 0 kJ
-gamma 0 0
# Id: 5409721
# log K source: NIST46.4
# Delta H source: SCD2.62
```

```
#T and ionic strength: 2.00 25.0
Co+2 + Butyrate- = Co(Butyrate)+
log_k 0.591
delta_h 0 kJ
-gamma 0 0
# Id: 2009721
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Co+2 + 2Butyrate- = Co(Butyrate)2
log_k 0.7765
delta_h 0 kJ
-gamma 0 0
# Id: 2009722
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Mg+2 + Butyrate- = Mg(Butyrate)+
log_k 0.9589
delta_h 0 kJ
-gamma 0 0
# Id: 4609720
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Ca+2 + Butyrate- = Ca(Butyrate)+
log_k 0.9389
delta_h 3.3472 kJ
-gamma 0 0
# Id: 1509720
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Sr+2 + Butyrate- = Sr(Butyrate)+
log_k 0.7889
delta_h 0 kJ
-gamma 0 0
# Id: 8009721
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Ba+2 + Butyrate- = Ba(Butyrate)+
log_k 0.7389
delta_h 0 kJ
-gamma 0 0
# Id: 1009721
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 0.10 25.0
Ba+2 + 2Butyrate- = Ba(Butyrate)2
log_k 0.88
delta_h 0 kJ
-gamma 0 0
# Id: 1009722
```

```
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Isobutyrate- = H(Isobutyrate)
log_k 4.849
delta_h 3.2217 kJ
-gamma 0 0
# Id: 3309731
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Isobutyrate- = Zn(Isobutyrate)+
log_k 1.44
delta_h 0 kJ
-gamma 0 0
# Id: 9509731
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Isobutyrate- = Cu(Isobutyrate)+
log_k 2.17
delta_h 0 kJ
-gamma 0 0
# Id: 2319731
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Isobutyrate- = Cu(Isobutyrate)2
log_k 3.3
delta_h 0 kJ
-gamma 0 0
# Id: 2319732
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Isobutyrate- = Fe(Isobutyrate)+2
log_k 4.2
delta_h 0 kJ
-gamma 0 0
# Id: 2819731
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Isobutyrate- = Ca(Isobutyrate)+
log_k 0.51
delta_h 0 kJ
-gamma 0 0
# Id: 1509731
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Two_picoline = H(Two_picoline)+
log_k 5.95
delta_h -25.5224 kJ
```

```
-gamma 0 0
# Id: 3309801
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Two_picoline = Cu(Two_picoline)+2
log_k 1.3
delta_h 0 kJ
-gamma 0 0
# Id: 2319801
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Two_picoline = Cu(Two_picoline)2+2
log_k 2.8
delta_h 0 kJ
-gamma 0 0
# Id: 2319802
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + Two_picoline = Cu(Two_picoline)+
log_k 5.4
delta_h 0 kJ
-gamma 0 0
# Id: 2309801
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 2Two_picoline = Cu(Two_picoline)2+
log_k 7.65
delta_h 0 kJ
-gamma 0 0
# Id: 2309802
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 3Two_picoline = Cu(Two_picoline)3+
log_k 8.5
delta_h 0 kJ
-gamma 0 0
# Id: 2309803
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Two_picoline = Ag(Two_picoline)+
log_k 2.32
delta_h -24.2672 kJ
-gamma 0 0
# Id: 209801
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Two_picoline = Ag(Two_picoline)2+
```

```
log_k 4.68
delta_h -42.6768 kJ
-gamma 0 0
# Id: 209802
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Two_picoline = Ni(Two_picoline)+2
log_k 0.4
delta_h 0 kJ
-gamma 0 0
# Id: 5409801
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Three_picoline = H(Three_picoline)+
log_k 5.7
delta_h -23.8488 kJ
-gamma 0 0
# Id: 3309811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Three_picoline = Zn(Three_picoline)+2
log_k 1
delta_h 0 kJ
-gamma 0 0
# Id: 9509811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Three_picoline = Zn(Three_picoline)2+2
log_k 2.1
delta_h 0 kJ
-gamma 0 0
# Id: 9509812
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 3Three_picoline = Zn(Three_picoline)3+2
log_k 2.6
delta_h 0 kJ
-gamma 0 0
# Id: 9509813
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 4Three_picoline = Zn(Three_picoline)4+2
log_k 3.7
delta_h 0 kJ
-gamma 0 0
# Id: 9509814
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Cd+2 + Three_picoline = Cd(Three_picoline)+2
log_k 1.42
delta_h 0 kJ
-gamma 0 0
# Id: 1609811
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 2Three_picoline = Cd(Three_picoline)2+2
log_k 2.27
delta_h 0 kJ
-gamma 0 0
# Id: 1609812
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 3Three_picoline = Cd(Three_picoline)3+2
log_k 3.6
delta_h 0 kJ
-gamma 0 0
# Id: 1609813
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 4Three_picoline = Cd(Three_picoline)4+2
log_k 4
delta_h 0 kJ
-gamma 0 0
# Id: 1609814
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + Three_picoline = Cu(Three_picoline)+
log_k 5.6
delta_h 0 kJ
-gamma 0 0
# Id: 2309811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 2Three_picoline = Cu(Three_picoline)2+
log_k 7.78
delta_h 0 kJ
-gamma 0 0
# Id: 2309812
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 3Three_picoline = Cu(Three_picoline)3+
log_k 8.6
delta_h 0 kJ
-gamma 0 0
# Id: 2309813
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 4Three_picoline = Cu(Three_picoline)4+
log_k 9
delta_h 0 kJ
-gamma 0 0
# Id: 2309814
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Three_picoline = Cu(Three_picoline)+2
log_k 2.77
delta_h 0 kJ
-gamma 0 0
# Id: 2319811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Three_picoline = Cu(Three_picoline)2+2
log_k 4.8
delta_h 0 kJ
-gamma 0 0
# Id: 2319812
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 3Three_picoline = Cu(Three_picoline)3+2
log_k 6.3
delta_h 0 kJ
-gamma 0 0
# Id: 2319813
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 4Three_picoline = Cu(Three_picoline)4+2
log_k 7.2
delta_h 0 kJ
-gamma 0 0
# Id: 2319814
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Three_picoline = Ag(Three_picoline)+
log_k 2.2
delta_h -21.7568 kJ
-gamma 0 0
# Id: 209811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Three_picoline = Ag(Three_picoline)2+
log_k 4.46
delta_h -49.7896 kJ
```

```
-gamma 0 0
# Id: 209812
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Three_picoline = Ni(Three_picoline)+2
log_k 1.87
delta_h 0 kJ
-gamma 0 0
# Id: 5409811
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Three_picoline = Ni(Three_picoline)2+2
log_k 3.3
delta_h 0 kJ
-gamma 0 0
# Id: 5409812
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 3Three_picoline = Ni(Three_picoline)3+2
log_k 4.1
delta_h 0 kJ
-gamma 0 0
# Id: 5409813
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 4Three_picoline = Ni(Three_picoline)4+2
log_k 4.6
delta_h 0 kJ
-gamma 0 0
# Id: 5409814
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Three_picoline = Co(Three_picoline)+2
log_k 1.4
delta_h 0 kJ
-gamma 0 0
# Id: 2009811
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Co+2 + 2Three_picoline = Co(Three_picoline)2+2
log_k 2.2
delta_h 0 kJ
-gamma 0 0
# Id: 2009812
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Co+2 + 3Three_picoline = Co(Three_picoline)3+2
```

```
log_k 2.5
delta_h 0 kJ
-gamma 0 0
# Id: 2009813
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
H+ + Four_picoline = H(Four_picoline)+
log_k 6.03
delta_h -25.3132 kJ
-gamma 0 0
# Id: 3309821
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Four_picoline = Zn(Four_picoline)+2
log_k 1.4
delta_h 0 kJ
-gamma 0 0
# Id: 9509821
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Four_picoline = Zn(Four_picoline)2+2
log_k 2.11
delta_h 0 kJ
-gamma 0 0
# Id: 9509822
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 3Four_picoline = Zn(Four_picoline)3+2
log_k 2.85
delta_h 0 kJ
-gamma 0 0
# Id: 9509823
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Four_picoline = Cd(Four_picoline)+2
log_k 1.59
delta_h 0 kJ
-gamma 0 0
# Id: 1609821
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 2Four_picoline = Cd(Four_picoline)2+2
log_k 2.4
delta_h 0 kJ
-gamma 0 0
# Id: 1609822
# log K source: SCD2.62
# Delta H source: SCD2.62
```

```
#T and ionic strength:
Cd+2 + 3Four_picoline = Cd(Four_picoline)3+2
log_k 3.18
delta_h 0 kJ
-gamma 0 0
# Id: 1609823
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + 4Four_picoline = Cd(Four_picoline)4+2
log_k 4
delta_h 0 kJ
-gamma 0 0
# Id: 1609824
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + Four_picoline = Cu(Four_picoline)+
log_k 5.65
delta_h 0 kJ
-gamma 0 0
# Id: 2309821
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 2Four_picoline = Cu(Four_picoline)2+
log_k 8.2
delta_h 0 kJ
-gamma 0 0
# Id: 2309822
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 3Four_picoline = Cu(Four_picoline)3+
log_k 8.8
delta_h 0 kJ
-gamma 0 0
# Id: 2309823
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+ + 4Four_picoline = Cu(Four_picoline)4+
log_k 9.2
delta_h 0 kJ
-gamma 0 0
# Id: 2309824
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Four_picoline = Cu(Four_picoline)+2
log_k 2.88
delta_h 0 kJ
-gamma 0 0
# Id: 2319821
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Four_picoline = Cu(Four_picoline)2+2
log_k 5.16
delta_h 0 kJ
-gamma 0 0
# Id: 2319822
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 3Four_picoline = Cu(Four_picoline)3+2
log_k 6.77
delta_h 0 kJ
-gamma 0 0
# Id: 2319823
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 4Four_picoline = Cu(Four_picoline)4+2
log_k 8.08
delta_h 0 kJ
-gamma 0 0
# Id: 2319824
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 5Four_picoline = Cu(Four_picoline)5+2
log_k 8.3
delta_h 0 kJ
-gamma 0 0
# Id: 2319825
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Four_picoline = Ag(Four_picoline)+
log_k 2.03
delta_h -25.5224 kJ
-gamma 0 0
# Id: 209821
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Four_picoline = Ag(Four_picoline)2+
log_k 4.39
delta_h -53.5552 kJ
-gamma 0 0
# Id: 209822
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Four_picoline = Ni(Four_picoline)+2
log_k 2.11
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 5409821
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Four_picoline = Ni(Four_picoline)2+2
log_k 3.59
delta_h 0 kJ
-gamma 0 0
# Id: 5409822
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 3Four_picoline = Ni(Four_picoline)3+2
log_k 4.34
delta_h 0 kJ
-gamma 0 0
# Id: 5409823
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 4Four_picoline = Ni(Four_picoline)4+2
log_k 4.7
delta_h 0 kJ
-gamma 0 0
# Id: 5409824
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Four_picoline = Co(Four_picoline)+2
log_k 1.56
delta_h 0 kJ
-gamma 0 0
# Id: 2009821
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Co+2 + 2Four_picoline = Co(Four_picoline)2+2
log_k 2.51
delta_h 0 kJ
-gamma 0 0
# Id: 2009822
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Co+2 + 3Four_picoline = Co(Four_picoline)3+2
log_k 2.94
delta_h 0 kJ
-gamma 0 0
# Id: 2009823
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Co+2 + 4Four_picoline = Co(Four_picoline)4+2
```

```
log_k 3.17
delta_h 0 kJ
-gamma 0 0
# Id: 2009824
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
H+ + Formate- = H(Formate)
log_k 3.745
delta_h 0.1674 kJ
-gamma 0 0
# Id: 3309831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Formate- = Pb(Formate)+
log_k 2.2
delta_h 0 kJ
-gamma 0 0
# Id: 6009831
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + Formate- = Zn(Formate)+
log_k 1.44
delta_h 0 kJ
-gamma 0 0
# Id: 9509831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Formate- = Cd(Formate)+
log_k 1.7
delta_h 0 kJ
-gamma 0 0
# Id: 1609831
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Hg(OH)2 + Formate- + 2H+ = Hg(Formate)+ + 2H2O
log_k 9.6
delta_h 0 kJ
-gamma 0 0
# Id: 3619831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Formate- = Cu(Formate)+
log_k 2
delta_h 0 kJ
-gamma 0 0
# Id: 2319831
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Ni+2 + Formate- = Ni(Formate)+
log_k 1.22
delta_h 0 kJ
-gamma 0 0
# Id: 5409831
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Co+2 + Formate- = Co(Formate)+
log_k 1.209
delta_h 0 kJ
-gamma 0 0
# Id: 2009831
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 30.0
Co+2 + 2Formate- = Co(Formate)2
log_k 1.1365
delta_h 0 kJ
-gamma 0 0
# Id: 2009832
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Cr+2 + Formate- = Cr(Formate)+
log_k 1.07
delta_h 0 kJ
-gamma 0 0
# Id: 2109831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Formate- = Mg(Formate)+
log_k 1.43
delta_h 0 kJ
-gamma 0 0
# Id: 4609831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Formate- = Ca(Formate)+
log_k 1.43
delta_h 4.184 kJ
-gamma 0 0
# Id: 1509831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Formate- = Sr(Formate)+
log_k 1.39
delta_h 4 kJ
-gamma 0 0
# Id: 8009831
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ba+2 + Formate- = Ba(Formate)+
log_k 1.38
delta_h 0 kJ
-gamma 0 0
# Id: 1009831
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Isovalerate- = H(Isovalerate)
log_k 4.781
delta_h 4.5606 kJ
-gamma 0 0
# Id: 3309841
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Isovalerate- = Zn(Isovalerate)+
log_k 1.39
delta_h 0 kJ
-gamma 0 0
# Id: 9509841
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Isovalerate- = Cu(Isovalerate)+
log_k 2.08
delta_h 0 kJ
-gamma 0 0
# Id: 2319841
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Isovalerate- = Ca(Isovalerate)+
log_k 0.2
delta_h 0 kJ
-gamma 0 0
# Id: 1509841
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Valerate- = H(Valerate)
log_k 4.843
delta_h 2.887 kJ
-gamma 0 0
# Id: 3309851
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Valerate- = Cu(Valerate)+
log_k 2.12
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2319851
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Valerate- = Ca(Valerate)+
log_k 0.3
delta_h 0 kJ
-gamma 0 0
# Id: 1509851
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ba+2 + Valerate- = Ba(Valerate)+
log_k -0.2
delta_h 0 kJ
-gamma 0 0
# Id: 1009851
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Acetate- = H(Acetate)
log_k 4.757
delta_h 0.41 kJ
-gamma 0 0
# Id: 3309921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sn(OH)2 + 2H+ + Acetate- = Sn(Acetate)+ + 2H2O
log_k 10.0213
delta_h 0 kJ
-gamma 0 0
# Id: 7909921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 3.00 25.0
Sn(OH)2 + 2H+ + 2Acetate- = Sn(Acetate)2 + 2H2O
log_k 12.32
delta_h 0 kJ
-gamma 0 0
# Id: 7909922
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 3.00 25.0
Sn(OH)2 + 2H+ + 3Acetate- = Sn(Acetate)3- + 2H2O
log_k 13.55
delta_h 0 kJ
-gamma 0 0
# Id: 7909923
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 3.00 25.0
Pb+2 + Acetate- = Pb(Acetate)+
```

```
log_k 2.68
delta_h -0.4 kJ
-gamma 0 0
# Id: 6009921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Pb+2 + 2Acetate- = Pb(Acetate)2
log_k 4.08
delta_h -0.8 kJ
-gamma 0 0
# Id: 6009922
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Tl+ + Acetate- = Tl(Acetate)
log_k -0.11
delta_h 0 kJ
-gamma 0 0
# Id: 8709921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Zn+2 + Acetate- = Zn(Acetate)+
log_k 1.58
delta_h 8.3 kJ
-gamma 0 0
# Id: 9509921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Zn+2 + 2Acetate- = Zn(Acetate)2
log_k 2.6434
delta_h 22 kJ
-gamma 0 0
# Id: 9509922
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Cd+2 + Acetate- = Cd(Acetate)+
log_k 1.93
delta_h 9.6 kJ
-gamma 0 0
# Id: 1609921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cd+2 + 2Acetate- = Cd(Acetate)2
log_k 2.86
delta_h 15 kJ
-gamma 0 0
# Id: 1609922
# log K source: NIST46.4
# Delta H source: NIST46.4
```

```
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + Acetate- = Hg(Acetate)+ + 2H2O
log_k 10.494
delta_h 0 kJ
-gamma 0 0
# Id: 3619920
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Hg(OH)2 + 2H+ + 2Acetate- = Hg(Acetate)2 + 2H2O
log_k 13.83
delta_h 0 kJ
-gamma 0 0
# Id: 3619921
# log K source: NIST46.4
# Delta H source: SCD2.62
#T and ionic strength: 3.00 25.0
Cu+2 + Acetate- = Cu(Acetate)+
log_k 2.21
delta_h 7.1 kJ
-gamma 0 0
# Id: 2319921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+2 + 2Acetate- = Cu(Acetate)2
log_k 3.4
delta_h 12 kJ
-gamma 0 0
# Id: 2319922
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Cu+2 + 3Acetate- = Cu(Acetate)3-
log_k 3.9434
delta_h 6.2 kJ
-gamma 0 0
# Id: 2319923
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Ag+ + Acetate- = Ag(Acetate)
log_k 0.73
delta_h 3 kJ
-gamma 0 0
# Id: 209921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ag+ + 2Acetate- = Ag(Acetate)2-
log_k 0.64
delta_h 3 kJ
-gamma 0 0
# Id: 209922
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ni+2 + Acetate- = Ni(Acetate)+
log_k 1.37
delta_h 8.7 kJ
-gamma 0 0
# Id: 5409921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Ni+2 + 2Acetate- = Ni(Acetate)2
log_k 2.1
delta_h 10 kJ
-gamma 0 0
# Id: 5409922
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + Acetate- = Co(Acetate)+
log_k 1.38
delta_h 0 kJ
-gamma 0 0
# Id: 2009921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Co+2 + 2Acetate- = Co(Acetate)2
log_k 0.7565
delta_h 0 kJ
-gamma 0 0
# Id: 2009922
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 2.00 25.0
Fe+2 + Acetate- = Fe(Acetate)+
log_k 1.4
delta_h 0 kJ
-gamma 0 0
# Id: 2809920
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Fe+3 + Acetate- = Fe(Acetate)+2
log_k 4.0234
delta_h 0 kJ
-gamma 0 0
# Id: 2819920
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Fe+3 + 2Acetate- = Fe(Acetate)2+
log_k 7.5723
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2819921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Fe+3 + 3Acetate- = Fe(Acetate)3
log_k 9.5867
delta_h 0 kJ
-gamma 0 0
# Id: 2819922
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Mn+2 + Acetate- = Mn(Acetate)+
log_k 1.4
delta_h 0 kJ
-gamma 0 0
# Id: 4709920
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Cr+2 + Acetate- = Cr(Acetate)+
log_k 1.8
delta_h 0 kJ
-gamma 0 0
# Id: 2109921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Cr+2 + 2Acetate- = Cr(Acetate)2
log_k 2.92
delta_h 0 kJ
-gamma 0 0
# Id: 2109922
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Cr(OH)2+ + 2H+ + Acetate- = Cr(Acetate)+2 + 2H2O
log_k 15.0073
delta_h -125.62 kJ
-gamma 0 0
# Id: 2119921
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Cr(OH)2+ + 2H+ + 2Acetate- = Cr(Acetate)2+ + 2H2O
log_k 17.9963
delta_h -117.62 kJ
-gamma 0 0
# Id: 2119922
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Cr(OH)2+ + 2H+ + 3Acetate- = Cr(Acetate)3 + 2H2O
```

```
log_k 20.7858
delta_h -96.62 kJ
-gamma 0 0
# Id: 2119923
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.50 25.0
Be+2 + Acetate- = Be(Acetate)+
log_k 2.0489
delta_h 0 kJ
-gamma 0 0
# Id: 1109921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Be+2 + 2Acetate- = Be(Acetate)2
log_k 3.0034
delta_h 0 kJ
-gamma 0 0
# Id: 1109922
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Mg+2 + Acetate- = Mg(Acetate)+
log_k 1.27
delta_h 0 kJ
-gamma 0 0
# Id: 4609920
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Ca+2 + Acetate- = Ca(Acetate)+
log_k 1.18
delta_h 4 kJ
-gamma 0 0
# Id: 1509920
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Sr+2 + Acetate- = Sr(Acetate)+
log_k 1.14
delta_h 0 kJ
-gamma 0 0
# Id: 8009921
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Ba+2 + Acetate- = Ba(Acetate)+
log_k 1.07
delta_h 0 kJ
-gamma 0 0
# Id: 1009921
# log K source: NIST46.4
# Delta H source: NIST46.2
```

```
#T and ionic strength:  0.00 25.0
Na+ + Acetate- = Na(Acetate)
log_k -0.18
delta_h 12 kJ
-gamma 0 0
# Id:  5009920
# log K source:  NIST46.4
# Delta H source:  NIST46.4
#T and ionic strength:  0.00 25.0
K+ + Acetate- = K(Acetate)
log_k -0.1955
delta_h 4.184 kJ
-gamma 0 0
# Id:  4109921
# log K source:  NIST46.4
# Delta H source:  NIST46.2
#T and ionic strength:  0.10 25.0
H+ + Tartarate-2 = H(Tartarate)-
log_k 4.366
delta_h -0.7531 kJ
-gamma 0 0
# Id:  3309931
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
2H+ + Tartarate-2 = H2(Tartarate)
log_k 7.402
delta_h -3.6819 kJ
-gamma 0 0
# Id:  3309932
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Sn(OH)2 + 2H+ + Tartarate-2 = Sn(Tartarate) + 2H2O
log_k 13.1518
delta_h 0 kJ
-gamma 0 0
# Id:  7909931
# log K source:  NIST46.4
# Delta H source:  NIST46.2
#T and ionic strength:  0.10 20.0
Pb+2 + Tartarate-2 = Pb(Tartarate)
log_k 3.98
delta_h 0 kJ
-gamma 0 0
# Id:  6009931
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Al+3 + 2Tartarate-2 = Al(Tartarate)2-
log_k 9.37
delta_h 0 kJ
-gamma 0 0
# Id:  309931
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Tartarate-2 = Tl(Tartarate)-
log_k 1.4
delta_h 0 kJ
-gamma 0 0
# Id: 8709931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Tl+ + Tartarate-2 + H+ = TlH(Tartarate)
log_k 4.8
delta_h 0 kJ
-gamma 0 0
# Id: 8709932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Tartarate-2 = Zn(Tartarate)
log_k 3.43
delta_h 0 kJ
-gamma 0 0
# Id: 9509931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Tartarate-2 = Zn(Tartarate)2-2
log_k 5.5
delta_h 0 kJ
-gamma 0 0
# Id: 9509932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Tartarate-2 + H+ = ZnH(Tartarate)+
log_k 5.9
delta_h 0 kJ
-gamma 0 0
# Id: 9509933
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Tartarate-2 = Cd(Tartarate)
log_k 2.7
delta_h 0 kJ
-gamma 0 0
# Id: 1609931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Tartarate-2 = Cd(Tartarate)2-2
log_k 4.1
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 1609932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Tartarate-2 + 2H+ = Hg(Tartarate) + 2H2O
log_k 14
delta_h 0 kJ
-gamma 0 0
# Id: 3619931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Tartarate-2 = Cu(Tartarate)
log_k 3.97
delta_h 0 kJ
-gamma 0 0
# Id: 2319931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Tartarate-2 + H+ = CuH(Tartarate)+
log_k 6.7
delta_h 0 kJ
-gamma 0 0
# Id: 2319932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Tartarate-2 = Ni(Tartarate)
log_k 3.46
delta_h 0 kJ
-gamma 0 0
# Id: 5409931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Tartarate-2 + H+ = NiH(Tartarate)+
log_k 5.89
delta_h 0 kJ
-gamma 0 0
# Id: 5409932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Tartarate-2 = Co(Tartarate)
log_k 3.05
delta_h 0 kJ
-gamma 0 0
# Id: 2009931
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Co+2 + 2Tartarate-2 = Co(Tartarate)2-2
```

```
log_k 4
delta_h 0 kJ
-gamma 0 0
# Id: 2009932
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Co+2 + H+ + Tartarate-2 = CoH(Tartarate)+
log_k 5.754
delta_h 0 kJ
-gamma 0 0
# Id: 2009933
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 1.00 20.0
Fe+2 + Tartarate-2 = Fe(Tartarate)
log_k 3.1
delta_h 0 kJ
-gamma 0 0
# Id: 2809931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Tartarate-2 = Fe(Tartarate)+
log_k 7.78
delta_h 0 kJ
-gamma 0 0
# Id: 2819931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Tartarate-2 = Mn(Tartarate)
log_k 3.38
delta_h 0 kJ
-gamma 0 0
# Id: 4709931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Tartarate-2 + H+ = MnH(Tartarate)+
log_k 6
delta_h 0 kJ
-gamma 0 0
# Id: 4709932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Tartarate-2 = Mg(Tartarate)
log_k 2.3
delta_h 0 kJ
-gamma 0 0
# Id: 4609931
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Mg+2 + Tartarate-2 + H+ = MgH(Tartarate)+
log_k 5.75
delta_h 0 kJ
-gamma 0 0
# Id: 4609932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Be+2 + Tartarate-2 = Be(Tartarate)
log_k 2.768
delta_h 0 kJ
-gamma 0 0
# Id: 1109931
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Be+2 + 2Tartarate-2 = Be(Tartarate)2-2
log_k 4.008
delta_h 0 kJ
-gamma 0 0
# Id: 1109932
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Ca+2 + Tartarate-2 = Ca(Tartarate)
log_k 2.8
delta_h -8.368 kJ
-gamma 0 0
# Id: 1509931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Tartarate-2 + H+ = CaH(Tartarate)+
log_k 5.86
delta_h -9.1211 kJ
-gamma 0 0
# Id: 1509932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Tartarate-2 = Sr(Tartarate)
log_k 2.55
delta_h 0 kJ
-gamma 0 0
# Id: 8009931
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 20.0
Sr+2 + H+ + Tartarate-2 = SrH(Tartarate)+
log_k 5.8949
delta_h 0 kJ
-gamma 0 0
# Id: 8009932
```

```
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Ba+2 + Tartarate-2 = Ba(Tartarate)
log_k 2.54
delta_h 0 kJ
-gamma 0 0
# Id: 1009931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ba+2 + Tartarate-2 + H+ = BaH(Tartarate)+
log_k 5.77
delta_h 0 kJ
-gamma 0 0
# Id: 1009932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Na+ + Tartarate-2 = Na(Tartarate)-
log_k 0.9
delta_h -0.8368 kJ
-gamma 0 0
# Id: 5009931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Na+ + Tartarate-2 + H+ = NaH(Tartarate)
log_k 4.58
delta_h -2.8451 kJ
-gamma 0 0
# Id: 5009932
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
K+ + Tartarate-2 = K(Tartarate)-
log_k 0.8
delta_h 0 kJ
-gamma 0 0
# Id: 4109931
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Glycine- = H(Glycine)
log_k 9.778
delta_h -44.3504 kJ
-gamma 0 0
# Id: 3309941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Glycine- = H2(Glycine)+
log_k 12.128
delta_h -48.4507 kJ
```

```
-gamma 0 0
# Id: 3309942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Glycine- = Pb(Glycine)+
log_k 5.47
delta_h 0 kJ
-gamma 0 0
# Id: 6009941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + 2Glycine- = Pb(Glycine)2
log_k 8.86
delta_h 0 kJ
-gamma 0 0
# Id: 6009942
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Tl+ + Glycine- = Tl(Glycine)
log_k 1.72
delta_h 0 kJ
-gamma 0 0
# Id: 8709941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Glycine- = Zn(Glycine)+
log_k 5.38
delta_h -11.7152 kJ
-gamma 0 0
# Id: 9509941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Glycine- = Zn(Glycine)2
log_k 9.81
delta_h -24.2672 kJ
-gamma 0 0
# Id: 9509942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 3Glycine- = Zn(Glycine)3-
log_k 12.3
delta_h -39.748 kJ
-gamma 0 0
# Id: 9509943
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Glycine- = Cd(Glycine)+
```

```
log_k 4.69
delta_h -8.7864 kJ
-gamma 0 0
# Id: 1609941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Glycine- = Cd(Glycine)2
log_k 8.4
delta_h -22.5936 kJ
-gamma 0 0
# Id: 1609942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 3Glycine- = Cd(Glycine)3-
log_k 10.7
delta_h -35.9824 kJ
-gamma 0 0
# Id: 1609943
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Glycine- + 2H+ = Hg(Glycine)+ + 2H2O
log_k 17
delta_h 0 kJ
-gamma 0 0
# Id: 3619941
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Hg(OH)2 + 2Glycine- + 2H+ = Hg(Glycine)2 + 2H2O
log_k 25.8
delta_h 0 kJ
-gamma 0 0
# Id: 3619942
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cu+ + 2Glycine- = Cu(Glycine)2-
log_k 10.3
delta_h 0 kJ
-gamma 0 0
# Id: 2309941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Glycine- = Cu(Glycine)+
log_k 8.57
delta_h -25.104 kJ
-gamma 0 0
# Id: 2319941
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Cu+2 + 2Glycine- = Cu(Glycine)2
log_k 15.7
delta_h -54.8104 kJ
-gamma 0 0
# Id: 2319942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Glycine- = Ag(Glycine)
log_k 3.51
delta_h -19.2464 kJ
-gamma 0 0
# Id: 209941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Glycine- = Ag(Glycine)2-
log_k 6.89
delta_h -48.116 kJ
-gamma 0 0
# Id: 209942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Glycine- = Ni(Glycine)+
log_k 6.15
delta_h -18.828 kJ
-gamma 0 0
# Id: 5409941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Glycine- = Ni(Glycine)2
log_k 11.12
delta_h -38.0744 kJ
-gamma 0 0
# Id: 5409942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 3Glycine- = Ni(Glycine)3-
log_k 14.63
delta_h -62.3416 kJ
-gamma 0 0
# Id: 5409943
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Co+2 + Glycine- = Co(Glycine)+
log_k 5.07
delta_h -12 kJ
-gamma 0 0
# Id: 2009941
```

```
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + 2Glycine- = Co(Glycine)2
log_k 9.07
delta_h -26 kJ
-gamma 0 0
# Id: 2009942
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + 3Glycine- = Co(Glycine)3-
log_k 11.6
delta_h -41 kJ
-gamma 0 0
# Id: 2009943
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + Glycine- + H2O = CoOH(Glycine) + H+
log_k -5.02
delta_h 0 kJ
-gamma 0 0
# Id: 2009944
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Fe+2 + Glycine- = Fe(Glycine)+
log_k 4.31
delta_h -15.0624 kJ
-gamma 0 0
# Id: 2809941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + 2Glycine- = Fe(Glycine)2
log_k 8.29
delta_h 0 kJ
-gamma 0 0
# Id: 2809942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Glycine- = Fe(Glycine)+2
log_k 9.38
delta_h 0 kJ
-gamma 0 0
# Id: 2819941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Glycine- + H+ = FeH(Glycine)+3
log_k 11.55
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2819942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Glycine- = Mn(Glycine)+
log_k 3.19
delta_h -1.2552 kJ
-gamma 0 0
# Id: 4709941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + 2Glycine- = Mn(Glycine)2
log_k 5.4
delta_h 0 kJ
-gamma 0 0
# Id: 4709942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + Glycine- + 2H+ = Cr(Glycine)+2 + 2H2O
log_k 18.7
delta_h 0 kJ
-gamma 0 0
# Id: 2119941
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 2Glycine- + 2H+ = Cr(Glycine)2+ + 2H2O
log_k 25.6
delta_h 0 kJ
-gamma 0 0
# Id: 2119942
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 3Glycine- + 2H+ = Cr(Glycine)3 + 2H2O
log_k 31.6
delta_h 0 kJ
-gamma 0 0
# Id: 2119943
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Mg+2 + Glycine- = Mg(Glycine)+
log_k 2.08
delta_h 4.184 kJ
-gamma 0 0
# Id: 4609941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Glycine- = Ca(Glycine)+
```

```
log_k 1.39
delta_h -4.184 kJ
-gamma 0 0
# Id: 1509941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Glycine- + H+ = CaH(Glycine)+2
log_k 10.1
delta_h -35.9824 kJ
-gamma 0 0
# Id: 1509942
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Glycine- = Sr(Glycine)+
log_k 0.91
delta_h 0 kJ
-gamma 0 0
# Id: 8009941
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.00 25.0
Ba+2 + Glycine- = Ba(Glycine)+
log_k 0.77
delta_h 0 kJ
-gamma 0 0
# Id: 1009941
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Salicylate-2 = H(Salicylate)-
log_k 13.7
delta_h -35.7732 kJ
-gamma 0 0
# Id: 3309951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Salicylate-2 = H2(Salicylate)
log_k 16.8
delta_h -38.7857 kJ
-gamma 0 0
# Id: 3309952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Salicylate-2 = Zn(Salicylate)
log_k 7.71
delta_h 0 kJ
-gamma 0 0
# Id: 9509951
# log K source: SCD2.62
# Delta H source: SCD2.62
```

```
#T and ionic strength:
Zn+2 + Salicylate-2 + H+ = ZnH(Salicylate)+
log_k 15.5
delta_h 0 kJ
-gamma 0 0
# Id: 9509952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Salicylate-2 = Cd(Salicylate)
log_k 6.2
delta_h 0 kJ
-gamma 0 0
# Id: 1609951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Salicylate-2 + H+ = CdH(Salicylate)+
log_k 16
delta_h 0 kJ
-gamma 0 0
# Id: 1609952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Salicylate-2 = Cu(Salicylate)
log_k 11.3
delta_h -17.9912 kJ
-gamma 0 0
# Id: 2319951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Salicylate-2 = Cu(Salicylate)2-2
log_k 19.3
delta_h 0 kJ
-gamma 0 0
# Id: 2319952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Salicylate-2 + H+ = CuH(Salicylate)+
log_k 14.8
delta_h 0 kJ
-gamma 0 0
# Id: 2319953
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Salicylate-2 = Ni(Salicylate)
log_k 8.2
delta_h 0 kJ
-gamma 0 0
# Id: 5409951
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Salicylate-2 = Ni(Salicylate)2-2
log_k 12.64
delta_h 0 kJ
-gamma 0 0
# Id: 5409952
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Co+2 + Salicylate-2 = Co(Salicylate)
log_k 7.4289
delta_h 0 kJ
-gamma 0 0
# Id: 2009951
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Co+2 + 2Salicylate-2 = Co(Salicylate)2-2
log_k 11.8
delta_h 0 kJ
-gamma 0 0
# Id: 2009952
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 20.0
Fe+2 + Salicylate-2 = Fe(Salicylate)
log_k 7.2
delta_h 0 kJ
-gamma 0 0
# Id: 2809951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+2 + 2Salicylate-2 = Fe(Salicylate)2-2
log_k 11.6
delta_h 0 kJ
-gamma 0 0
# Id: 2809952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + Salicylate-2 = Fe(Salicylate)+
log_k 17.6
delta_h 0 kJ
-gamma 0 0
# Id: 2819951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Fe+3 + 2Salicylate-2 = Fe(Salicylate)2-
log_k 29.3
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 2819952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + Salicylate-2 = Mn(Salicylate)
log_k 6.5
delta_h 0 kJ
-gamma 0 0
# Id: 4709951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mn+2 + 2Salicylate-2 = Mn(Salicylate)2-2
log_k 10.1
delta_h 0 kJ
-gamma 0 0
# Id: 4709952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Be+2 + Salicylate-2 = Be(Salicylate)
log_k 13.3889
delta_h -31.7732 kJ
-gamma 0 0
# Id: 1109951
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.10 25.0
Be+2 + 2Salicylate-2 = Be(Salicylate)2-2
log_k 23.25
delta_h 0 kJ
-gamma 0 0
# Id: 1109952
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Mg+2 + Salicylate-2 = Mg(Salicylate)
log_k 5.76
delta_h 0 kJ
-gamma 0 0
# Id: 4609951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Mg+2 + Salicylate-2 + H+ = MgH(Salicylate)+
log_k 15.3
delta_h 0 kJ
-gamma 0 0
# Id: 4609952
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Ca+2 + Salicylate-2 = Ca(Salicylate)
```

```
log_k 4.05
delta_h 0 kJ
-gamma 0 0
# Id: 1509951
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Salicylate-2 + H+ = CaH(Salicylate)+
log_k 14.3
delta_h 0 kJ
-gamma 0 0
# Id: 1509952
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ba+2 + Salicylate-2 + H+ = BaH(Salicylate)+
log_k 13.9
delta_h 0 kJ
-gamma 0 0
# Id: 1009951
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
H+ + Glutamate-2 = H(Glutamate)-
log_k 9.96
delta_h -41.0032 kJ
-gamma 0 0
# Id: 3309961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Glutamate-2 = H2(Glutamate)
log_k 14.26
delta_h -43.5136 kJ
-gamma 0 0
# Id: 3309962
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
3H+ + Glutamate-2 = H3(Glutamate)+
log_k 16.42
delta_h -46.8608 kJ
-gamma 0 0
# Id: 3309963
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Glutamate-2 = Pb(Glutamate)
log_k 6.43
delta_h 0 kJ
-gamma 0 0
# Id: 6009961
# log K source: SCD2.62
# Delta H source: SCD2.62
```

#T and ionic strength:
Pb+2 + 2Glutamate-2 = Pb(Glutamate)2-2
log_k 8.61
delta_h 0 kJ
-gamma 0 0
Id: 6009962
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
Pb+2 + Glutamate-2 + H+ = PbH(Glutamate)+
log_k 14.08
delta_h 0 kJ
-gamma 0 0
Id: 6009963
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
Al+3 + Glutamate-2 + H+ = AlH(Glutamate)+2
log_k 13.07
delta_h 0 kJ
-gamma 0 0
Id: 309961
log K source: NIST46.2
Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Glutamate-2 = Zn(Glutamate)
log_k 6.2
delta_h 0 kJ
-gamma 0 0
Id: 9509961
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 2Glutamate-2 = Zn(Glutamate)2-2
log_k 9.13
delta_h 0 kJ
-gamma 0 0
Id: 9509962
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
Zn+2 + 3Glutamate-2 = Zn(Glutamate)3-4
log_k 9.8
delta_h 0 kJ
-gamma 0 0
Id: 9509963
log K source: SCD2.62
Delta H source: SCD2.62
#T and ionic strength:
Cd+2 + Glutamate-2 = Cd(Glutamate)
log_k 4.7
delta_h 0 kJ
-gamma 0 0
Id: 1609961

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Glutamate-2 = Cd(Glutamate)2-2
log_k 7.59
delta_h 0 kJ
-gamma 0 0
# Id: 1609962
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Hg(OH)2 + Glutamate-2 + 2H+ = Hg(Glutamate) + 2H2O
log_k 19.8
delta_h 0 kJ
-gamma 0 0
# Id: 3619961
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Hg(OH)2 + 2Glutamate-2 + 2H+ = Hg(Glutamate)2-2 + 2H2O
log_k 26.2
delta_h 0 kJ
-gamma 0 0
# Id: 3619962
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cu+2 + Glutamate-2 = Cu(Glutamate)
log_k 9.17
delta_h -20.92 kJ
-gamma 0 0
# Id: 2319961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Glutamate-2 = Cu(Glutamate)2-2
log_k 15.78
delta_h -48.116 kJ
-gamma 0 0
# Id: 2319962
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Glutamate-2 + H+ = CuH(Glutamate)+
log_k 13.3
delta_h -28.0328 kJ
-gamma 0 0
# Id: 2319963
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + Glutamate-2 = Ag(Glutamate)-
log_k 4.22
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 209961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ag+ + 2Glutamate-2 = Ag(Glutamate)2-3
log_k 7.36
delta_h 0 kJ
-gamma 0 0
# Id: 209962
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
2Ag+ + Glutamate-2 = Ag2(Glutamate)
log_k 3.4
delta_h 0 kJ
-gamma 0 0
# Id: 209963
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Glutamate-2 = Ni(Glutamate)
log_k 6.47
delta_h 0 kJ
-gamma 0 0
# Id: 5409961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + 2Glutamate-2 = Ni(Glutamate)2-2
log_k 10.7
delta_h -30.9616 kJ
-gamma 0 0
# Id: 5409962
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Glutamate-2 = Co(Glutamate)
log_k 5.4178
delta_h 0 kJ
-gamma 0 0
# Id: 2009961
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Co+2 + 2Glutamate-2 = Co(Glutamate)2-2
log_k 8.7178
delta_h 0 kJ
-gamma 0 0
# Id: 2009962
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Mn+2 + Glutamate-2 = Mn(Glutamate)
```

```
log_k 4.95
delta_h 0 kJ
-gamma 0 0
# Id: 4709961
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Mn+2 + 2Glutamate-2 = Mn(Glutamate)2-2
log_k 8.48
delta_h 0 kJ
-gamma 0 0
# Id: 4709962
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + Glutamate-2 + 2H+ = Cr(Glutamate)+ + 2H2O
log_k 22.6
delta_h 0 kJ
-gamma 0 0
# Id: 2119961
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 2Glutamate-2 + 2H+ = Cr(Glutamate)2- + 2H2O
log_k 30.7
delta_h 0 kJ
-gamma 0 0
# Id: 2119962
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + Glutamate-2 + 3H+ = CrH(Glutamate)+2 + 2H2O
log_k 25.2
delta_h 0 kJ
-gamma 0 0
# Id: 2119963
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Mg+2 + Glutamate-2 = Mg(Glutamate)
log_k 2.8
delta_h 0 kJ
-gamma 0 0
# Id: 4609961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ca+2 + Glutamate-2 = Ca(Glutamate)
log_k 2.06
delta_h 0 kJ
-gamma 0 0
# Id: 1509961
# log K source: NIST46.2
# Delta H source: NIST46.2
```

```
#T and ionic strength:
Ca+2 + Glutamate-2 + H+ = CaH(Glutamate)+
log_k 11.13
delta_h 0 kJ
-gamma 0 0
# Id: 1509962
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Sr+2 + Glutamate-2 = Sr(Glutamate)
log_k 2.2278
delta_h 0 kJ
-gamma 0 0
# Id: 8009961
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.10 25.0
Ba+2 + Glutamate-2 = Ba(Glutamate)
log_k 2.14
delta_h 0 kJ
-gamma 0 0
# Id: 1009961
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
H+ + Phthalate-2 = H(Phthalate)-
log_k 5.408
delta_h 2.1757 kJ
-gamma 0 0
# Id: 3309971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
2H+ + Phthalate-2 = H2(Phthalate)
log_k 8.358
delta_h 4.8534 kJ
-gamma 0 0
# Id: 3309972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Phthalate-2 = Pb(Phthalate)
log_k 4.26
delta_h 0 kJ
-gamma 0 0
# Id: 6009971
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Pb+2 + 2Phthalate-2 = Pb(Phthalate)2-2
log_k 4.83
delta_h 0 kJ
-gamma 0 0
# Id: 6009972
```

```
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Pb+2 + Phthalate-2 + H+ = PbH(Phthalate)+
log_k 6.98
delta_h 0 kJ
-gamma 0 0
# Id: 6009973
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + Phthalate-2 = Al(Phthalate)+
log_k 4.56
delta_h 0 kJ
-gamma 0 0
# Id: 309971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Al+3 + 2Phthalate-2 = Al(Phthalate)2-
log_k 7.2
delta_h 0 kJ
-gamma 0 0
# Id: 309972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + Phthalate-2 = Zn(Phthalate)
log_k 2.91
delta_h 13.3888 kJ
-gamma 0 0
# Id: 9509971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Zn+2 + 2Phthalate-2 = Zn(Phthalate)2-2
log_k 4.2
delta_h 0 kJ
-gamma 0 0
# Id: 9509972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Phthalate-2 = Cd(Phthalate)
log_k 3.43
delta_h 0 kJ
-gamma 0 0
# Id: 1609971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + Phthalate-2 + H+ = CdH(Phthalate)+
log_k 6.3
delta_h 0 kJ
```

```
-gamma 0 0
# Id: 1609973
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cd+2 + 2Phthalate-2 = Cd(Phthalate)2-2
log_k 3.7
delta_h 0 kJ
-gamma 0 0
# Id: 1609972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Phthalate-2 = Cu(Phthalate)
log_k 4.02
delta_h 8.368 kJ
-gamma 0 0
# Id: 2319971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + Phthalate-2 + H+ = CuH(Phthalate)+
log_k 7.1
delta_h 3.8493 kJ
-gamma 0 0
# Id: 2319970
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cu+2 + 2Phthalate-2 = Cu(Phthalate)2-2
log_k 5.3
delta_h 15.8992 kJ
-gamma 0 0
# Id: 2319972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Phthalate-2 = Ni(Phthalate)
log_k 2.95
delta_h 7.5312 kJ
-gamma 0 0
# Id: 5409971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Ni+2 + Phthalate-2 + H+ = NiH(Phthalate)+
log_k 6.6
delta_h 0 kJ
-gamma 0 0
# Id: 5409972
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Co+2 + Phthalate-2 = Co(Phthalate)
```

```
log_k 2.83
delta_h 7.9 kJ
-gamma 0 0
# Id: 2009971
# log K source: NIST46.4
# Delta H source: NIST46.4
#T and ionic strength: 0.00 25.0
Co+2 + H+ + Phthalate-2 = CoH(Phthalate)+
log_k 7.227
delta_h 0 kJ
-gamma 0 0
# Id: 2009972
# log K source: NIST46.4
# Delta H source: NIST46.2
#T and ionic strength: 0.50 25.0
Mn+2 + Phthalate-2 = Mn(Phthalate)
log_k 2.74
delta_h 10.0416 kJ
-gamma 0 0
# Id: 4709971
# log K source: NIST46.2
# Delta H source: NIST46.2
#T and ionic strength:
Cr(OH)2+ + Phthalate-2 + 2H+ = Cr(Phthalate)+ + 2H2O
log_k 16.3
delta_h 0 kJ
-gamma 0 0
# Id: 2119971
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 2Phthalate-2 + 2H+ = Cr(Phthalate)2- + 2H2O
log_k 21.2
delta_h 0 kJ
-gamma 0 0
# Id: 2119972
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Cr(OH)2+ + 3Phthalate-2 + 2H+ = Cr(Phthalate)3-3 + 2H2O
log_k 23.3
delta_h 0 kJ
-gamma 0 0
# Id: 2119973
# log K source: SCD2.62
# Delta H source: SCD2.62
#T and ionic strength:
Be+2 + Phthalate-2 = Be(Phthalate)
log_k 4.8278
delta_h 0 kJ
-gamma 0 0
# Id: 1109971
# log K source: NIST46.4
# Delta H source: NIST46.2
```

```
#T and ionic strength:  0.10 25.0
Be+2 + 2Phthalate-2 = Be(Phthalate)2-2
log_k 6.5478
delta_h 0 kJ
-gamma 0 0
# Id:  1109972
# log K source:  NIST46.4
# Delta H source:  NIST46.2
#T and ionic strength:  0.10 25.0
Mg+2 + Phthalate-2 = Mg(Phthalate)
log_k 2.49
delta_h 0 kJ
-gamma 0 0
# Id:  4609971
# log K source:  SCD2.62
# Delta H source:  SCD2.62
#T and ionic strength:
Ca+2 + Phthalate-2 = Ca(Phthalate)
log_k 2.45
delta_h 0 kJ
-gamma 0 0
# Id:  1509970
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Ca+2 + Phthalate-2 + H+ = CaH(Phthalate)+
log_k 6.43
delta_h 0 kJ
-gamma 0 0
# Id:  1509971
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Ba+2 + Phthalate-2 = Ba(Phthalate)
log_k 2.33
delta_h 0 kJ
-gamma 0 0
# Id:  1009971
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
Na+ + Phthalate-2 = Na(Phthalate)-
log_k 0.8
delta_h 4.184 kJ
-gamma 0 0
# Id:  5009970
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
K+ + Phthalate-2 = K(Phthalate)-
log_k 0.7
delta_h 3.7656 kJ
-gamma 0 0
# Id:  4109971
```

```
# log K source:  NIST46.2
# Delta H source:  NIST46.2
#T and ionic strength:
PHASES
Sulfur
S + H+ + 2e- = HS-
log_k -2.1449
delta_h -16.3 kJ
Semetal(hex
Se + H+ + 2e- = HSe-
log_k -7.7084
delta_h 15.9 kJ
Semetal(am)
Se + H+ + 2e- = HSe-
log_k -7.1099
delta_h 10.8784 kJ
Sbmetal
Sb + 3H2O = Sb(OH)3 + 3H+ + 3e-
log_k -11.6889
delta_h 83.89 kJ
Snmetal(wht)
Sn + 2H2O = Sn(OH)2 + 2H+ + 2e-
log_k -2.3266
delta_h -0 kJ
Pbmetal
Pb = Pb+2 + 2e-
log_k 4.2462
delta_h 0.92 kJ
Tlmetal
Tl = Tl+ + e-
log_k 5.6762
delta_h 5.36 kJ
Znmetal
Zn = Zn+2 + 2e-
log_k 25.7886
delta_h -153.39 kJ
Cdmetal(alpha)
Cd = Cd+2 + 2e-
log_k 13.5147
delta_h -75.33 kJ
Cdmetal(gamma)
Cd = Cd+2 + 2e-
log_k 13.618
delta_h -75.92 kJ
Hgmetal(l)
Hg = 0.5Hg2+2 + e-
log_k -13.4517
delta_h 83.435 kJ
Cumetal
Cu = Cu+ + e-
log_k -8.756
delta_h 71.67 kJ
Agmetal
Ag = Ag+ + e-
```

log_k -13.5065
delta_h 105.79 kJ
Crmetal
Cr = Cr+2 + 2e-
log_k 30.4831
delta_h -172 kJ
Vmetal
V = V+3 + 3e-
log_k 44.0253
delta_h -259 kJ
Stibnite
Sb2S3 + 6H2O = 2Sb(OH)3 + 3H+ + 3HS-
log_k -50.46
delta_h 293.78 kJ
Orpiment
As2S3 + 6H2O = 2H3AsO3 + 3HS- + 3H+
log_k -61.0663
delta_h 350.68 kJ
Realgar
AsS + 3H2O = H3AsO3 + HS- + 2H+ + e-
log_k -19.747
delta_h 127.8 kJ
SnS
SnS + 2H2O = Sn(OH)2 + H+ + HS-
log_k -19.114
delta_h -0 kJ
SnS2
SnS2 + 6H2O = Sn(OH)6-2 + 4H+ + 2HS-
log_k -57.4538
delta_h -0 kJ
Galena
PbS + H+ = Pb+2 + HS-
log_k -13.97
delta_h 80 kJ
Tl2S
Tl2S + H+ = 2Tl+ + HS-
log_k -7.19
delta_h 91.52 kJ
ZnS(am)
ZnS + H+ = Zn+2 + HS-
log_k -9.052
delta_h 15.3553 kJ
Sphalerite
ZnS + H+ = Zn+2 + HS-
log_k -11.45
delta_h 30 kJ
Wurtzite
ZnS + H+ = Zn+2 + HS-
log_k -8.95
delta_h 21.171 kJ
Greenockite
CdS + H+ = Cd+2 + HS-
log_k -14.36
delta_h 55 kJ

Hg2S
Hg2S + H+ = Hg2+2 + HS-
log_k -11.6765
delta_h 69.7473 kJ
Cinnabar
HgS + 2H2O = Hg(OH)2 + H+ + HS-
log_k -45.694
delta_h 253.76 kJ
Metacinnabar
HgS + 2H2O = Hg(OH)2 + H+ + HS-
log_k -45.094
delta_h 253.72 kJ
Chalcocite
Cu2S + H+ = 2Cu+ + HS-
log_k -34.92
delta_h 168 kJ
Djurleite
Cu0.066Cu1.868S + H+ = 0.066Cu+2 + 1.868Cu+ + HS-
log_k -33.92
delta_h 200.334 kJ
Anilite
Cu0.25Cu1.5S + H+ = 0.25Cu+2 + 1.5Cu+ + HS-
log_k -31.878
delta_h 182.15 kJ
BlaubleiII
Cu0.6Cu0.8S + H+ = 0.6Cu+2 + 0.8Cu+ + HS-
log_k -27.279
delta_h -0 kJ
BlaubleiI
Cu0.9Cu0.2S + H+ = 0.9Cu+2 + 0.2Cu+ + HS-
log_k -24.162
delta_h -0 kJ
Covellite
CuS + H+ = Cu+2 + HS-
log_k -22.3
delta_h 97 kJ
Chalcopyrite
CuFeS2 + 2H+ = Cu+2 + Fe+2 + 2HS-
log_k -35.27
delta_h 148.448 kJ
Acanthite
Ag2S + H+ = 2Ag+ + HS-
log_k -36.22
delta_h 227 kJ
NiS(alpha)
NiS + H+ = Ni+2 + HS-
log_k -5.6
delta_h -0 kJ
NiS(beta)
NiS + H+ = Ni+2 + HS-
log_k -11.1
delta_h -0 kJ
NiS(gamma)
NiS + H+ = Ni+2 + HS-

log_k -12.8
delta_h -0 kJ
CoS(alpha)
CoS + H+ = Co+2 + HS-
log_k -7.44
delta_h -0 kJ
CoS(beta)
CoS + H+ = Co+2 + HS-
log_k -11.07
delta_h -0 kJ
FeS(ppt)
FeS + H+ = Fe+2 + HS-
log_k -2.95
delta_h -11 kJ
Greigite
Fe3S4 + 4H+ = 2Fe+3 + Fe+2 + 4HS-
log_k -45.035
delta_h -0 kJ
Mackinawite
FeS + H+ = Fe+2 + HS-
log_k -3.6
delta_h -0 kJ
Pyrite
FeS2 + 2H+ + 2e- = Fe+2 + 2HS-
log_k -18.5082
delta_h 49.844 kJ
MnS(grn)
MnS + H+ = Mn+2 + HS-
log_k 0.17
delta_h -32 kJ
MnS(pnk)
MnS + H+ = Mn+2 + HS-
log_k 3.34
delta_h -0 kJ
MoS2
MoS2 + 4H2O = MoO4-2 + 6H+ + 2HS- + 2e-
log_k -70.2596
delta_h 389.02 kJ
BeS
BeS + H+ = Be+2 + HS-
log_k 19.38
delta_h -0 kJ
BaS
BaS + H+ = Ba+2 + HS-
log_k 16.18
delta_h -0 kJ
Hg2(Cyanide)2
Hg2(Cyanide)2 = Hg2+2 + 2Cyanide-
log_k -39.3
delta_h -0 kJ
CuCyanide
CuCyanide = Cu+ + Cyanide-
log_k -19.5
delta_h -19 kJ

AgCyanide
AgCyanide = Ag+ + Cyanide-
log_k -15.74
delta_h 110.395 kJ
Ag2(Cyanide)2
Ag2(Cyanide)2 = 2Ag+ + 2Cyanide-
log_k -11.3289
delta_h -0 kJ
NaCyanide(cubic)
NaCyanide = Cyanide- + Na+
log_k 1.6012
delta_h 0.969 kJ
KCyanide(cubic)
KCyanide = Cyanide- + K+
log_k 1.4188
delta_h 11.93 kJ
Pb2Fe(Cyanide)6
Pb2Fe(Cyanide)6 = 2Pb+2 + Fe+2 + 6Cyanide-
log_k -53.42
delta_h -0 kJ
Zn2Fe(Cyanide)6
Zn2Fe(Cyanide)6 = 2Zn+2 + Fe+2 + 6Cyanide-
log_k -51.08
delta_h -0 kJ
Cd2Fe(Cyanide)6
Cd2Fe(Cyanide)6 = 2Cd+2 + Fe+2 + 6Cyanide-
log_k -52.78
delta_h -0 kJ
Ag4Fe(Cyanide)6
Ag4Fe(Cyanide)6 = 4Ag+ + Fe+2 + 6Cyanide-
log_k -79.47
delta_h -0 kJ
Ag3Fe(Cyanide)6
Ag3Fe(Cyanide)6 = 3Ag+ + Fe+3 + 6Cyanide-
log_k -72.7867
delta_h -0 kJ
Mn3(Fe(Cyanide)6)2
Mn3(Fe(Cyanide)6)2 = 3Mn+2 + 2Fe+3 + 12Cyanide-
log_k -105.4
delta_h -0 kJ
Sb2Se3
Sb2Se3 + 6H2O = 2Sb(OH)3 + 3HSe- + 3H+
log_k -67.7571
delta_h 343.046 kJ
SnSe
SnSe + 2H2O = Sn(OH)2 + H+ + HSe-
log_k -30.494
delta_h -0 kJ
SnSe2
SnSe2 + 6H2O = Sn(OH)6-2 + 4H+ + 2HSe-
log_k -65.1189
delta_h -0 kJ
Clausthalite
PbSe + H+ = Pb+2 + HSe-

log_k -27.1
delta_h 119.72 kJ
Tl2Se
Tl2Se + H+ = 2Tl+ + HSe-
log_k -18.1
delta_h 85.62 kJ
ZnSe
ZnSe + H+ = Zn+2 + HSe-
log_k -14.4
delta_h 25.51 kJ
CdSe
CdSe + H+ = Cd+2 + HSe-
log_k -20.2
delta_h 75.9814 kJ
HgSe
HgSe + 2H2O = Hg(OH)2 + H+ + HSe-
log_k -55.694
delta_h -0 kJ
Cu2Se(alpha)
Cu2Se + H+ = 2Cu+ + HSe-
log_k -45.8
delta_h 214.263 kJ
Cu3Se2
Cu3Se2 + 2H+ = 2HSe- + 2Cu+ + Cu+2
log_k -63.4911
delta_h 340.327 kJ
CuSe
CuSe + H+ = Cu+2 + HSe-
log_k -33.1
delta_h 121.127 kJ
CuSe2
CuSe2 + 2H+ + 2e- = 2HSe- + Cu+2
log_k -33.3655
delta_h 140.582 kJ
Ag2Se
Ag2Se + H+ = 2Ag+ + HSe-
log_k -48.7
delta_h 265.48 kJ
NiSe
NiSe + H+ = Ni+2 + HSe-
log_k -17.7
delta_h -0 kJ
CoSe
CoSe + H+ = Co+2 + HSe-
log_k -16.2
delta_h -0 kJ
FeSe
FeSe + H+ = Fe+2 + HSe-
log_k -11
delta_h 2.092 kJ
Ferroselite
FeSe2 + 2H+ + 2e- = 2HSe- + Fe+2
log_k -18.5959
delta_h 47.2792 kJ

MnSe
MnSe + H+ = Mn+2 + HSe-
log_k 3.5
delta_h -98.15 kJ
AlSb
AlSb + 3H2O = Sb(OH)3 + 6e- + Al+3 + 3H+
log_k 65.6241
delta_h -0 kJ
ZnSb
ZnSb + 3H2O = Sb(OH)3 + 5e- + Zn+2 + 3H+
log_k 11.0138
delta_h -54.8773 kJ
CdSb
CdSb + 3H2O = Sb(OH)3 + 5e- + 3H+ + Cd+2
log_k -0.3501
delta_h 22.36 kJ
Cu2Sb:3H2O
Cu2Sb:3H2O = Sb(OH)3 + 6e- + 3H+ + Cu+ + Cu+2
log_k -34.8827
delta_h 233.237 kJ
Cu3Sb
Cu3Sb + 3H2O = Sb(OH)3 + 6e- + 3H+ + 3Cu+
log_k -42.5937
delta_h 308.131 kJ
#Ag4Sb
Ag4Sb + 3H2O = Sb(OH)3 + 6e- + 3Ag+ + 3H+
log_k -56.1818
delta_h -0 kJ
Breithauptite
NiSb + 3H2O = Sb(OH)3 + 5e- + 3H+ + Ni+2
log_k -18.5225
delta_h 96.0019 kJ
MnSb
MnSb + 3H2O = Mn+3 + Sb(OH)3 + 6e- + 3H+
log_k -2.9099
delta_h 21.1083 kJ
Mn2Sb
Mn2Sb + 3H2O = 2Mn+2 + Sb(OH)3 + 7e- + 3H+
log_k 61.0796
delta_h -0 kJ
USb2
USb2 + 8H2O = UO2+2 + 2Sb(OH)3 + 12e- + 10H+
log_k 29.5771
delta_h -103.56 kJ
U3Sb4
U3Sb4 + 12H2O = 3U+4 + 4Sb(OH)3 + 24e- + 12H+
log_k 152.383
delta_h -986.04 kJ
Mg2Sb3
Mg2Sb3 + 9H2O = 2Mg+2 + 3Sb(OH)3 + 9H+ + 13e-
log_k 74.6838
delta_h -0 kJ
Ca3Sb2
Ca3Sb2 + 6H2O = 3Ca+2 + 2Sb(OH)3 + 6H+ + 12e-

log_k 142.974
delta_h -732.744 kJ
NaSb
NaSb + 3H2O = Na+ + Sb(OH)3 + 3H+ + 4e-
log_k 23.1658
delta_h -93.45 kJ
Na3Sb
Na3Sb + 3H2O = 3Na+ + Sb(OH)3 + 3H+ + 6e-
log_k 94.4517
delta_h -432.13 kJ
SeO2
SeO2 + H2O = HSeO3- + H+
log_k 0.1246
delta_h 1.4016 kJ
SeO3
SeO3 + H2O = SeO4-2 + 2H+
log_k 21.044
delta_h -146.377 kJ
Sb2O5
Sb2O5 + 7H2O = 2Sb(OH)6- + 2H+
log_k -9.6674
delta_h -0 kJ
SbO2
SbO2 + 4H2O = Sb(OH)6- + e- + 2H+
log_k -27.8241
delta_h -0 kJ
Sb2O4
Sb2O4 + 2H2O + 2H+ + 2e- = 2Sb(OH)3
log_k 3.4021
delta_h -68.04 kJ
Sb4O6(cubic)
Sb4O6 + 6H2O = 4Sb(OH)3
log_k -18.2612
delta_h 61.1801 kJ
Sb4O6(orth)
Sb4O6 + 6H2O = 4Sb(OH)3
log_k -17.9012
delta_h 37.6801 kJ
Sb(OH)3
Sb(OH)3 = Sb(OH)3
log_k -7.1099
delta_h 30.1248 kJ
Senarmontite
Sb2O3 + 3H2O = 2Sb(OH)3
log_k -12.3654
delta_h 30.6478 kJ
Valentinite
Sb2O3 + 3H2O = 2Sb(OH)3
log_k -8.4806
delta_h 19.0163 kJ
Chalcedony
SiO2 + 2H2O = H4SiO4
log_k -3.55
delta_h 19.7 kJ

Cristobalite
SiO2 + 2H2O = H4SiO4
log_k -3.35
delta_h 20.006 kJ
Quartz
SiO2 + 2H2O = H4SiO4
log_k -4
delta_h 22.36 kJ
SiO2(am-gel)
SiO2 + 2H2O = H4SiO4
log_k -2.71
delta_h 14 kJ
SiO2(am-ppt)
SiO2 + 2H2O = H4SiO4
log_k -2.74
delta_h 15.15 kJ
SnO
SnO + H2O = Sn(OH)2
log_k -4.9141
delta_h -0 kJ
SnO2
SnO2 + 4H2O = Sn(OH)6-2 + 2H+
log_k -28.9749
delta_h -0 kJ
Sn(OH)2
Sn(OH)2 = Sn(OH)2
log_k -5.4309
delta_h -0 kJ
Sn(OH)4
Sn(OH)4 + 2H2O = Sn(OH)6-2 + 2H+
log_k -22.2808
delta_h -0 kJ
H2Sn(OH)6
H2Sn(OH)6 = Sn(OH)6-2 + 2H+
log_k -23.5281
delta_h -0 kJ
Massicot
PbO + 2H+ = Pb+2 + H2O
log_k 12.894
delta_h -66.848 kJ
Litharge
PbO + 2H+ = Pb+2 + H2O
log_k 12.694
delta_h -65.501 kJ
PbO:0.3H2O
PbO:0.33H2O + 2H+ = Pb+2 + 1.33H2O
log_k 12.98
delta_h -0 kJ
Plattnerite
PbO2 + 4H+ + 2e- = Pb+2 + 2H2O
log_k 49.6001
delta_h -296.27 kJ
Pb(OH)2
Pb(OH)2 + 2H+ = Pb+2 + 2H2O

log_k 8.15
delta_h -58.5342 kJ
Pb2O(OH)2
Pb2O(OH)2 + 4H+ = 2Pb+2 + 3H2O
log_k 26.188
delta_h -0 kJ
Al(OH)3(am)
Al(OH)3 + 3H+ = Al+3 + 3H2O
log_k 10.8
delta_h -111 kJ
Boehmite
AlOOH + 3H+ = Al+3 + 2H2O
log_k 8.578
delta_h -117.696 kJ
Diaspore
AlOOH + 3H+ = Al+3 + 2H2O
log_k 6.873
delta_h -103.052 kJ
Gibbsite
Al(OH)3 + 3H+ = Al+3 + 3H2O
log_k 8.291
delta_h -95.3952 kJ
Tl2O
Tl2O + 2H+ = 2Tl+ + H2O
log_k 27.0915
delta_h -96.41 kJ
TlOH
TlOH + H+ = Tl+ + H2O
log_k 12.9186
delta_h -41.57 kJ
Avicennite
Tl2O3 + 3H2O = 2Tl(OH)3
log_k -13
delta_h -0 kJ
Tl(OH)3
Tl(OH)3 = Tl(OH)3
log_k -5.441
delta_h -0 kJ
Zn(OH)2(am)
Zn(OH)2 + 2H+ = Zn+2 + 2H2O
log_k 12.474
delta_h -80.62 kJ
Zn(OH)2
Zn(OH)2 + 2H+ = Zn+2 + 2H2O
log_k 12.2
delta_h -0 kJ
Zn(OH)2(beta)
Zn(OH)2 + 2H+ = Zn+2 + 2H2O
log_k 11.754
delta_h -83.14 kJ
Zn(OH)2(gamma)
Zn(OH)2 + 2H+ = Zn+2 + 2H2O
log_k 11.734
delta_h -0 kJ

Zn(OH)2(epsilon)
Zn(OH)2 + 2H+ = Zn+2 + 2H2O
log_k 11.534
delta_h -81.8 kJ
ZnO(active)
ZnO + 2H+ = Zn+2 + H2O
log_k 11.1884
delta_h -88.76 kJ
Zincite
ZnO + 2H+ = Zn+2 + H2O
log_k 11.334
delta_h -89.62 kJ
Cd(OH)2(am)
Cd(OH)2 + 2H+ = Cd+2 + 2H2O
log_k 13.73
delta_h -86.9017 kJ
Cd(OH)2
Cd(OH)2 + 2H+ = Cd+2 + 2H2O
log_k 13.644
delta_h -94.62 kJ
Monteponite
CdO + 2H+ = Cd+2 + H2O
log_k 15.1034
delta_h -103.4 kJ
Hg2(OH)2
Hg2(OH)2 + 2H+ = Hg2+2 + 2H2O
log_k 5.2603
delta_h -0 kJ
Montroydite
HgO + H2O = Hg(OH)2
log_k -3.64
delta_h -38.9 kJ
Hg(OH)2
Hg(OH)2 = Hg(OH)2
log_k -3.4963
delta_h -0 kJ
Cuprite
Cu2O + 2H+ = 2Cu+ + H2O
log_k -1.406
delta_h -124.02 kJ
Cu(OH)2
Cu(OH)2 + 2H+ = Cu+2 + 2H2O
log_k 8.674
delta_h -56.42 kJ
Tenorite
CuO + 2H+ = Cu+2 + H2O
log_k 7.644
delta_h -64.867 kJ
Ag2O
Ag2O + 2H+ = 2Ag+ + H2O
log_k 12.574
delta_h -45.62 kJ
Ni(OH)2
Ni(OH)2 + 2H+ = Ni+2 + 2H2O

log_k 12.794
delta_h -95.96 kJ
Bunsenite
NiO + 2H+ = Ni+2 + H2O
log_k 12.4456
delta_h -100.13 kJ
CoO
CoO + 2H+ = Co+2 + H2O
log_k 13.5864
delta_h -106.295 kJ
Co(OH)2
Co(OH)2 + 2H+ = Co+2 + 2H2O
log_k 13.094
delta_h -0 kJ
Co(OH)3
Co(OH)3 + 3H+ = Co+3 + 3H2O
log_k -2.309
delta_h -92.43 kJ
#Wustite-0.11
WUSTITE-0.11 + 2H+ = 0.947Fe+2 + H2O
log_k 11.6879
delta_h -103.938 kJ
Fe(OH)2
Fe(OH)2 + 2H+ = Fe+2 + 2H2O
log_k 13.564
delta_h -0 kJ
Ferrihydrite
Fe(OH)3 + 3H+ = Fe+3 + 3H2O
log_k 3.191
delta_h -73.374 kJ
Fe3(OH)8
Fe3(OH)8 + 8H+ = 2Fe+3 + Fe+2 + 8H2O
log_k 20.222
delta_h -0 kJ
Goethite
FeOOH + 3H+ = Fe+3 + 2H2O
log_k 0.491
delta_h -60.5843 kJ
Pyrolusite
MnO2 + 4H+ + 2e- = Mn+2 + 2H2O
log_k 41.38
delta_h -272 kJ
Birnessite
MnO2 + 4H+ + e- = Mn+3 + 2H2O
log_k 18.091
delta_h -0 kJ
Nsutite
MnO2 + 4H+ + e- = Mn+3 + 2H2O
log_k 17.504
delta_h -0 kJ
Pyrochroite
Mn(OH)2 + 2H+ = Mn+2 + 2H2O
log_k 15.194
delta_h -97.0099 kJ

Manganite
MnOOH + 3H+ + e- = Mn+2 + 2H2O
log_k 25.34
delta_h -0 kJ
Cr(OH)2
Cr(OH)2 + 2H+ = Cr+2 + 2H2O
log_k 10.8189
delta_h -35.6058 kJ
Cr(OH)3(am)
Cr(OH)3 + H+ = Cr(OH)2+ + H2O
log_k -0.75
delta_h -0 kJ
Cr(OH)3
Cr(OH)3 + H+ = Cr(OH)2+ + H2O
log_k 1.3355
delta_h -29.7692 kJ
CrO3
CrO3 + H2O = CrO4-2 + 2H+
log_k -3.2105
delta_h -5.2091 kJ
MoO3
MoO3 + H2O = MoO4-2 + 2H+
log_k -8
delta_h -0 kJ
VO
VO + 2H+ = V+3 + H2O + e-
log_k 14.7563
delta_h -113.041 kJ
V(OH)3
V(OH)3 + 3H+ = V+3 + 3H2O
log_k 7.591
delta_h -0 kJ
VO(OH)2
VO(OH)2 + 2H+ = VO+2 + 2H2O
log_k 5.1506
delta_h -0 kJ
Uraninite
UO2 + 4H+ = U+4 + 2H2O
log_k -4.6693
delta_h -77.86 kJ
UO2(am)
UO2 + 4H+ = U+4 + 2H2O
log_k 0.934
delta_h -109.746 kJ
UO3
UO3 + 2H+ = UO2+2 + H2O
log_k 7.7
delta_h -81.0299 kJ
Gummite
UO3 + 2H+ = UO2+2 + H2O
log_k 7.6718
delta_h -81.0299 kJ
UO2(OH)2(beta)
UO2(OH)2 + 2H+ = UO2+2 + 2H2O

log_k 5.6116
delta_h -56.7599 kJ
Schoepite
UO2(OH)2:H2O + 2H+ = UO2+2 + 3H2O
log_k 5.994
delta_h -49.79 kJ
Be(OH)2(am)
Be(OH)2 + 2H+ = Be+2 + 2H2O
log_k 7.194
delta_h -0 kJ
Be(OH)2(alpha)
Be(OH)2 + 2H+ = Be+2 + 2H2O
log_k 6.894
delta_h -0 kJ
Be(OH)2(beta)
Be(OH)2 + 2H+ = Be+2 + 2H2O
log_k 6.494
delta_h -0 kJ
Brucite
Mg(OH)2 + 2H+ = Mg+2 + 2H2O
log_k 16.844
delta_h -113.996 kJ
Periclase
MgO + 2H+ = Mg+2 + H2O
log_k 21.5841
delta_h -151.23 kJ
Mg(OH)2(active)
Mg(OH)2 + 2H+ = Mg+2 + 2H2O
log_k 18.794
delta_h -0 kJ
Lime
CaO + 2H+ = Ca+2 + H2O
log_k 32.6993
delta_h -193.91 kJ
Portlandite
Ca(OH)2 + 2H+ = Ca+2 + 2H2O
log_k 22.804
delta_h -128.62 kJ
Ba(OH)2:8H2O
Ba(OH)2:8H2O + 2H+ = Ba+2 + 10H2O
log_k 24.394
delta_h -54.32 kJ
Cu(SbO3)2
Cu(SbO3)2 + 6H+ + 4e- = 2Sb(OH)3 + Cu+2
log_k 45.2105
delta_h -0 kJ
Arsenolite
As4O6 + 6H2O = 4H3AsO3
log_k -2.76
delta_h 59.9567 kJ
Claudetite
As4O6 + 6H2O = 4H3AsO3
log_k -3.065
delta_h 55.6054 kJ

As2O5
As2O5 + 3H2O = 2H3AsO4
log_k 6.7061
delta_h -22.64 kJ
Pb2O3
Pb2O3 + 6H+ + 2e- = 2Pb+2 + 3H2O
log_k 61.04
delta_h -0 kJ
Minium
Pb3O4 + 8H+ + 2e- = 3Pb+2 + 4H2O
log_k 73.5219
delta_h -421.874 kJ
Al2O3
Al2O3 + 6H+ = 2Al+3 + 3H2O
log_k 19.6524
delta_h -258.59 kJ
Co3O4
Co3O4 + 8H+ = Co+2 + 2Co+3 + 4H2O
log_k -10.4956
delta_h -107.5 kJ
CoFe2O4
CoFe2O4 + 8H+ = Co+2 + 2Fe+3 + 4H2O
log_k -3.5281
delta_h -158.82 kJ
Magnetite
Fe3O4 + 8H+ = 2Fe+3 + Fe+2 + 4H2O
log_k 3.4028
delta_h -208.526 kJ
Hercynite
FeAl2O4 + 8H+ = Fe+2 + 2Al+3 + 4H2O
log_k 22.893
delta_h -313.92 kJ
Hematite
Fe2O3 + 6H+ = 2Fe+3 + 3H2O
log_k -1.418
delta_h -128.987 kJ
Maghemite
Fe2O3 + 6H+ = 2Fe+3 + 3H2O
log_k 6.386
delta_h -0 kJ
Lepidocrocite
FeOOH + 3H+ = Fe+3 + 2H2O
log_k 1.371
delta_h -0 kJ
Hausmannite
Mn3O4 + 8H+ + 2e- = 3Mn+2 + 4H2O
log_k 61.03
delta_h -421 kJ
Bixbyite
Mn2O3 + 6H+ = 2Mn+3 + 3H2O
log_k -0.6445
delta_h -124.49 kJ
Cr2O3
Cr2O3 + H2O + 2H+ = 2Cr(OH)2+

log_k -2.3576
delta_h -50.731 kJ
#V2O3
V2O3 + 3H+ = V+3 + 1.5H2O
log_k 4.9
delta_h -82.5085 kJ
V3O5
V3O5 + 4H+ = 3VO+2 + 2H2O + 2e-
log_k 1.8361
delta_h -98.46 kJ
#V2O4
V2O4 + 2H+ = VO+2 + H2O
log_k 4.27
delta_h -58.8689 kJ
V4O7
V4O7 + 6H+ = 4VO+2 + 3H2O + 2e-
log_k 7.1865
delta_h -163.89 kJ
V6O13
V6O13 + 2H+ = 6VO2+ + H2O + 4e-
log_k -60.86
delta_h 271.5 kJ
V2O5
V2O5 + 2H+ = 2VO2+ + H2O
log_k -1.36
delta_h 34 kJ
U4O9
U4O9 + 18H+ + 2e- = 4U+4 + 9H2O
log_k -3.0198
delta_h -426.87 kJ
U3O8
U3O8 + 16H+ + 4e- = 3U+4 + 8H2O
log_k 21.0834
delta_h -485.44 kJ
Spinel
MgAl2O4 + 8H+ = Mg+2 + 2Al+3 + 4H2O
log_k 36.8476
delta_h -388.012 kJ
Magnesioferrite
Fe2MgO4 + 8H+ = Mg+2 + 2Fe+3 + 4H2O
log_k 16.8597
delta_h -278.92 kJ
Natron
Na2CO3:10H2O = 2Na+ + CO3-2 + 10H2O
log_k -1.311
delta_h 65.8771 kJ
Cuprousferrite
CuFeO2 + 4H+ = Cu+ + Fe+3 + 2H2O
log_k -8.9171
delta_h -15.89 kJ
Cupricferrite
CuFe2O4 + 8H+ = Cu+2 + 2Fe+3 + 4H2O
log_k 5.9882
delta_h -210.21 kJ

FeCr2O4
FeCr2O4 + 4H+ = 2Cr(OH)2+ + Fe+2
log_k 7.2003
delta_h -140.4 kJ
MgCr2O4
MgCr2O4 + 4H+ = 2Cr(OH)2+ + Mg+2
log_k 16.2007
delta_h -179.4 kJ
SbF3
SbF3 + 3H2O = Sb(OH)3 + 3H+ + 3F-
log_k -10.2251
delta_h -6.7279 kJ
PbF2
PbF2 = Pb+2 + 2F-
log_k -7.44
delta_h 20 kJ
ZnF2
ZnF2 = Zn+2 + 2F-
log_k -0.5343
delta_h -59.69 kJ
CdF2
CdF2 = Cd+2 + 2F-
log_k -1.2124
delta_h -46.22 kJ
Hg2F2
Hg2F2 = Hg2+2 + 2F-
log_k -10.3623
delta_h -18.486 kJ
CuF
CuF = Cu+ + F-
log_k -4.9056
delta_h 16.648 kJ
CuF2
CuF2 = Cu+2 + 2F-
log_k 1.115
delta_h -66.901 kJ
CuF2:2H2O
CuF2:2H2O = Cu+2 + 2F- + 2H2O
log_k -4.55
delta_h -15.2716 kJ
AgF:4H2O
AgF:4H2O = Ag+ + F- + 4H2O
log_k 1.0491
delta_h 15.4202 kJ
CoF2
CoF2 = Co+2 + 2F-
log_k -1.5969
delta_h -57.368 kJ
CoF3
CoF3 = Co+3 + 3F-
log_k -1.4581
delta_h -123.692 kJ
CrF3
CrF3 + 2H2O = Cr(OH)2+ + 3F- + 2H+

log_k -11.3367
delta_h -23.3901 kJ
VF4
VF4 + H2O = VO+2 + 4F- + 2H+
log_k 14.93
delta_h -199.117 kJ
UF4
UF4 = U+4 + 4F-
log_k -29.5371
delta_h -79.0776 kJ
UF4:2.5H2O
UF4:2.5H2O = U+4 + 4F- + 2.5H2O
log_k -32.7179
delta_h 24.325 kJ
MgF2
MgF2 = Mg+2 + 2F-
log_k -8.13
delta_h -8 kJ
Fluorite
CaF2 = Ca+2 + 2F-
log_k -10.5
delta_h 8 kJ
SrF2
SrF2 = Sr+2 + 2F-
log_k -8.58
delta_h 4 kJ
BaF2
BaF2 = Ba+2 + 2F-
log_k -5.82
delta_h 4 kJ
Cryolite
Na3AlF6 = 3Na+ + Al+3 + 6F-
log_k -33.84
delta_h 38 kJ
SbCl3
SbCl3 + 3H2O = Sb(OH)3 + 3Cl- + 3H+
log_k 0.5719
delta_h -35.18 kJ
SnCl2
SnCl2 + 2H2O = Sn(OH)2 + 2H+ + 2Cl-
log_k -9.2752
delta_h -0 kJ
Cotunnite
PbCl2 = Pb+2 + 2Cl-
log_k -4.78
delta_h 26.166 kJ
Matlockite
PbClF = Pb+2 + Cl- + F-
log_k -8.9733
delta_h 33.19 kJ
Phosgenite
PbCl2:PbCO3 = 2Pb+2 + 2Cl- + CO3-2
log_k -19.81
delta_h -0 kJ

Laurionite
PbOHCl + H+ = Pb+2 + Cl- + H2O
log_k 0.623
delta_h -0 kJ
Pb2(OH)3Cl
Pb2(OH)3Cl + 3H+ = 2Pb+2 + 3H2O + Cl-
log_k 8.793
delta_h -0 kJ
TlCl
TlCl = Tl+ + Cl-
log_k -3.74
delta_h 41 kJ
ZnCl2
ZnCl2 = Zn+2 + 2Cl-
log_k 7.05
delta_h -72.5 kJ
Zn2(OH)3Cl
Zn2(OH)3Cl + 3H+ = 2Zn+2 + 3H2O + Cl-
log_k 15.191
delta_h -0 kJ
Zn5(OH)8Cl2
Zn5(OH)8Cl2 + 8H+ = 5Zn+2 + 8H2O + 2Cl-
log_k 38.5
delta_h -0 kJ
CdCl2
CdCl2 = Cd+2 + 2Cl-
log_k -0.6588
delta_h -18.58 kJ
CdCl2:1H2O
CdCl2:1H2O = Cd+2 + 2Cl- + H2O
log_k -1.6932
delta_h -7.47 kJ
CdCl2:2.5H2O
CdCl2:2.5H2O = Cd+2 + 2Cl- + 2.5H2O
log_k -1.913
delta_h 7.2849 kJ
CdOHCl
CdOHCl + H+ = Cd+2 + H2O + Cl-
log_k 3.5373
delta_h -30.93 kJ
Calomel
Hg2Cl2 = Hg2+2 + 2Cl-
log_k -17.91
delta_h 92 kJ
HgCl2
HgCl2 + 2H2O = Hg(OH)2 + 2Cl- + 2H+
log_k -21.2621
delta_h 107.82 kJ
Nantokite
CuCl = Cu+ + Cl-
log_k -6.73
delta_h 42.662 kJ
Melanothallite
CuCl2 = Cu+2 + 2Cl-

log_k 6.2572
delta_h -63.407 kJ
Atacamite
Cu2(OH)3Cl + 3H+ = 2Cu+2 + 3H2O + Cl-
log_k 7.391
delta_h -93.43 kJ
Cerargyrite
AgCl = Ag+ + Cl-
log_k -9.75
delta_h 65.2 kJ
CoCl2
CoCl2 = Co+2 + 2Cl-
log_k 8.2672
delta_h -79.815 kJ
CoCl2:6H2O
CoCl2:6H2O = Co+2 + 2Cl- + 6H2O
log_k 2.5365
delta_h 8.0598 kJ
(Co(NH3)6)Cl3
(Co(NH3)6)Cl3 + 6H+ = Co+3 + 6NH4+ + 3Cl-
log_k 20.0317
delta_h -33.1 kJ
(Co(NH3)5OH2)Cl3
(Co(NH3)5OH2)Cl3 + 5H+ = Co+3 + 5NH4+ + 3Cl- + H2O
log_k 11.7351
delta_h -25.37 kJ
(Co(NH3)5Cl)Cl2
(Co(NH3)5Cl)Cl2 + 5H+ = Co+3 + 5NH4+ + 3Cl-
log_k 4.5102
delta_h -10.74 kJ
Fe(OH)2.7Cl.3
Fe(OH)2.7Cl.3 + 2.7H+ = Fe+3 + 2.7H2O + 0.3Cl-
log_k -3.04
delta_h -0 kJ
MnCl2:4H2O
MnCl2:4H2O = Mn+2 + 2Cl- + 4H2O
log_k 2.7151
delta_h -10.83 kJ
CrCl2
CrCl2 = Cr+2 + 2Cl-
log_k 14.0917
delta_h -110.76 kJ
CrCl3
CrCl3 + 2H2O = Cr(OH)2+ + 3Cl- + 2H+
log_k 15.1145
delta_h -121.08 kJ
VCl2
VCl2 = V+3 + 2Cl- + e-
log_k 18.8744
delta_h -141.16 kJ
VCl3
VCl3 = V+3 + 3Cl-
log_k 23.4326
delta_h -179.54 kJ

VOCl
VOCl + 2H+ = V+3 + Cl- + H2O
log_k 11.1524
delta_h -104.91 kJ
VOCl2
VOCl2 = VO+2 + 2Cl-
log_k 12.7603
delta_h -117.76 kJ
VO2Cl
VO2Cl = VO2+ + Cl-
log_k 2.8413
delta_h -40.28 kJ
Halite
NaCl = Na+ + Cl-
log_k 1.6025
delta_h 3.7 kJ
SbBr3
SbBr3 + 3H2O = Sb(OH)3 + 3Br- + 3H+
log_k 0.9689
delta_h -20.94 kJ
SnBr2
SnBr2 + 2H2O = Sn(OH)2 + 2H+ + 2Br-
log_k -9.5443
delta_h -0 kJ
SnBr4
SnBr4 + 6H2O = Sn(OH)6-2 + 6H+ + 4Br-
log_k -28.8468
delta_h -0 kJ
PbBr2
PbBr2 = Pb+2 + 2Br-
log_k -5.3
delta_h 35.499 kJ
PbBrF
PbBrF = Pb+2 + Br- + F-
log_k -8.49
delta_h -0 kJ
TlBr
TlBr = Tl+ + Br-
log_k -5.44
delta_h 54 kJ
ZnBr2:2H2O
ZnBr2:2H2O = Zn+2 + 2Br- + 2H2O
log_k 5.2005
delta_h -30.67 kJ
CdBr2:4H2O
CdBr2:4H2O = Cd+2 + 2Br- + 4H2O
log_k -2.425
delta_h 30.5001 kJ
Hg2Br2
Hg2Br2 = Hg2+2 + 2Br-
log_k -22.25
delta_h 133 kJ
HgBr2
HgBr2 + 2H2O = Hg(OH)2 + 2Br- + 2H+

log_k -25.2734
delta_h 138.492 kJ
CuBr
CuBr = Cu+ + Br-
log_k -8.3
delta_h 54.86 kJ
Cu2(OH)3Br
Cu2(OH)3Br + 3H+ = 2Cu+2 + 3H2O + Br-
log_k 7.9085
delta_h -93.43 kJ
Bromyrite
AgBr = Ag+ + Br-
log_k -12.3
delta_h 84.5 kJ
(Co(NH3)6)Br3
(Co(NH3)6)Br3 + 6H+ = Co+3 + 6NH4+ + 3Br-
log_k 18.3142
delta_h -21.1899 kJ
(Co(NH3)5Cl)Br2
(Co(NH3)5Cl)Br2 + 5H+ = Co+3 + 5NH4+ + Cl- + 2Br-
log_k 5.0295
delta_h -6.4 kJ
CrBr3
CrBr3 + 2H2O = Cr(OH)2+ + 3Br- + 2H+
log_k 19.9086
delta_h -141.323 kJ
AsI3
AsI3 + 3H2O = H3AsO3 + 3I- + 3H+
log_k 4.2307
delta_h 3.15 kJ
SbI3
SbI3 + 3H2O = Sb(OH)3 + 3H+ + 3I-
log_k -0.538
delta_h 13.5896 kJ
PbI2
PbI2 = Pb+2 + 2I-
log_k -8.1
delta_h 62 kJ
TlI
TlI = Tl+ + I-
log_k -7.23
delta_h 75 kJ
ZnI2
ZnI2 = Zn+2 + 2I-
log_k 7.3055
delta_h -58.92 kJ
CdI2
CdI2 = Cd+2 + 2I-
log_k -3.5389
delta_h 13.82 kJ
Hg2I2
Hg2I2 = Hg2+2 + 2I-
log_k -28.34
delta_h 163 kJ

Coccinite
HgI2 + 2H2O = Hg(OH)2 + 2H+ + 2I-
log_k -34.9525
delta_h 210.72 kJ
HgI2:2NH3
HgI2:2NH3 + 2H2O = Hg(OH)2 + 2I- + 2NH4+
log_k -16.2293
delta_h 132.18 kJ
HgI2:6NH3
HgI2:6NH3 + 2H2O + 4H+ = Hg(OH)2 + 2I- + 6NH4+
log_k 33.7335
delta_h -90.3599 kJ
CuI
CuI = Cu+ + I-
log_k -12
delta_h 82.69 kJ
Iodyrite
AgI = Ag+ + I-
log_k -16.08
delta_h 110 kJ
(Co(NH3)6)I3
(Co(NH3)6)I3 + 6H+ = Co+3 + 6NH4+ + 3I-
log_k 16.5831
delta_h -9.6999 kJ
(Co(NH3)5Cl)I2
(Co(NH3)5Cl)I2 + 5H+ = Co+3 + 5NH4+ + Cl- + 2I-
log_k 5.5981
delta_h 0.66 kJ
CrI3
CrI3 + 2H2O = Cr(OH)2+ + 3I- + 2H+
log_k 20.4767
delta_h -134.419 kJ
Cerussite
PbCO3 = Pb+2 + CO3-2
log_k -13.13
delta_h 24.79 kJ
Pb2OCO3
Pb2OCO3 + 2H+ = 2Pb+2 + H2O + CO3-2
log_k -0.5578
delta_h -40.8199 kJ
Pb3O2CO3
Pb3O2CO3 + 4H+ = 3Pb+2 + CO3-2 + 2H2O
log_k 11.02
delta_h -110.583 kJ
Hydrocerussite
Pb3(OH)2(CO3)2 + 2H+ = 3Pb+2 + 2H2O + 2CO3-2
log_k -18.7705
delta_h -0 kJ
Pb10(OH)6O(CO3)6
Pb10(OH)6O(CO3)6 + 8H+ = 10Pb+2 + 6CO3-2 + 7H2O
log_k -8.76
delta_h -0 kJ
Tl2CO3
Tl2CO3 = 2Tl+ + CO3-2

log_k -3.8367
delta_h 35.49 kJ
Smithsonite
ZnCO3 = Zn+2 + CO3-2
log_k -10
delta_h -15.84 kJ
ZnCO3:1H2O
ZnCO3:1H2O = Zn+2 + CO3-2 + H2O
log_k -10.26
delta_h -0 kJ
Otavite
CdCO3 = Cd+2 + CO3-2
log_k -12
delta_h -0.55 kJ
Hg2CO3
Hg2CO3 = Hg2+2 + CO3-2
log_k -16.05
delta_h 45.14 kJ
Hg3O2CO3
Hg3O2CO3 + 4H2O = 3Hg(OH)2 + 2H+ + CO3-2
log_k -29.682
delta_h -0 kJ
CuCO3
CuCO3 = Cu+2 + CO3-2
log_k -11.5
delta_h -0 kJ
Malachite
Cu2(OH)2CO3 + 2H+ = 2Cu+2 + 2H2O + CO3-2
log_k -5.306
delta_h 76.38 kJ
Azurite
Cu3(OH)2(CO3)2 + 2H+ = 3Cu+2 + 2H2O + 2CO3-2
log_k -16.906
delta_h -95.22 kJ
Ag2CO3
Ag2CO3 = 2Ag+ + CO3-2
log_k -11.09
delta_h 42.15 kJ
NiCO3
NiCO3 = Ni+2 + CO3-2
log_k -6.87
delta_h -41.589 kJ
CoCO3
CoCO3 = Co+2 + CO3-2
log_k -9.98
delta_h -12.7612 kJ
Siderite
FeCO3 = Fe+2 + CO3-2
log_k -10.24
delta_h -16 kJ
Rhodochrosite
MnCO3 = Mn+2 + CO3-2
log_k -10.58
delta_h -1.88 kJ

Rutherfordine
UO2CO3 = UO2+2 + CO3-2
log_k -14.5
delta_h -3.03 kJ
Artinite
MgCO3:Mg(OH)2:3H2O + 2H+ = 2Mg+2 + CO3-2 + 5H2O
log_k 9.6
delta_h -120.257 kJ
Hydromagnesite
Mg5(CO3)4(OH)2:4H2O + 2H+ = 5Mg+2 + 4CO3-2 + 6H2O
log_k -8.766
delta_h -218.447 kJ
Magnesite
MgCO3 = Mg+2 + CO3-2
log_k -7.46
delta_h 20 kJ
Nesquehonite
MgCO3:3H2O = Mg+2 + CO3-2 + 3H2O
log_k -4.67
delta_h -24.2212 kJ
Aragonite
CaCO3 = Ca+2 + CO3-2
log_k -8.3
delta_h -12 kJ
Calcite
CaCO3 = Ca+2 + CO3-2
log_k -8.48
delta_h -8 kJ
Dolomite(ordered)
CaMg(CO3)2 = Ca+2 + Mg+2 + 2CO3-2
log_k -17.09
delta_h -39.5 kJ
Dolomite(disordered)
CaMg(CO3)2 = Ca+2 + Mg+2 + 2CO3-2
log_k -16.54
delta_h -46.4 kJ
Huntite
CaMg3(CO3)4 = 3Mg+2 + Ca+2 + 4CO3-2
log_k -29.968
delta_h -107.78 kJ
Strontianite
SrCO3 = Sr+2 + CO3-2
log_k -9.27
delta_h -0 kJ
Witherite
BaCO3 = Ba+2 + CO3-2
log_k -8.57
delta_h 4 kJ
Thermonatrite
Na2CO3:H2O = 2Na+ + CO3-2 + H2O
log_k 0.637
delta_h -10.4799 kJ
TlNO3
TlNO3 = Tl+ + NO3-

log_k -1.6127
delta_h 42.44 kJ
Zn(NO3)2:6H2O
Zn(NO3)2:6H2O = Zn+2 + 2NO3- + 6H2O
log_k 3.3153
delta_h 24.5698 kJ
Cu2(OH)3NO3
Cu2(OH)3NO3 + 3H+ = 2Cu+2 + 3H2O + NO3-
log_k 9.251
delta_h -72.5924 kJ
(Co(NH3)6)(NO3)3
(Co(NH3)6)(NO3)3 + 6H+ = Co+3 + 6NH4+ + 3NO3-
log_k 17.9343
delta_h 1.59 kJ
(Co(NH3)5Cl)(NO3)2
(Co(NH3)5Cl)(NO3)2 + 5H+ = Co+3 + 5NH4+ + Cl- + 2NO3-
log_k 6.2887
delta_h 6.4199 kJ
UO2(NO3)2
UO2(NO3)2 = UO2+2 + 2NO3-
log_k 12.1476
delta_h -83.3999 kJ
UO2(NO3)2:2H2O
UO2(NO3)2:2H2O = UO2+2 + 2NO3- + 2H2O
log_k 4.851
delta_h -25.355 kJ
UO2(NO3)2:3H2O
UO2(NO3)2:3H2O = UO2+2 + 2NO3- + 3H2O
log_k 3.39
delta_h -9.1599 kJ
UO2(NO3)2:6H2O
UO2(NO3)2:6H2O = UO2+2 + 2NO3- + 6H2O
log_k 2.0464
delta_h 20.8201 kJ
Pb(BO2)2
Pb(BO2)2 + 2H2O + 2H+ = Pb+2 + 2H3BO3
log_k 6.5192
delta_h -15.6119 kJ
Zn(BO2)2
Zn(BO2)2 + 2H2O + 2H+ = Zn+2 + 2H3BO3
log_k 8.29
delta_h -0 kJ
Cd(BO2)2
Cd(BO2)2 + 2H2O + 2H+ = Cd+2 + 2H3BO3
log_k 9.84
delta_h -0 kJ
Co(BO2)2
Co(BO2)2 + 2H2O + 2H+ = Co+2 + 2H3BO3
log_k 27.0703
delta_h -0 kJ
SnSO4
SnSO4 + 2H2O = Sn(OH)2 + 2H+ + SO4-2
log_k -56.9747
delta_h -0 kJ

Sn(SO4)2
Sn(SO4)2 + 6H2O = Sn(OH)6-2 + 6H+ + 2SO4-2
log_k -15.2123
delta_h -0 kJ
Larnakite
PbO:PbSO4 + 2H+ = 2Pb+2 + SO4-2 + H2O
log_k -0.4344
delta_h -21.83 kJ
Pb3O2SO4
Pb3O2SO4 + 4H+ = 3Pb+2 + SO4-2 + 2H2O
log_k 10.6864
delta_h -79.14 kJ
Pb4O3SO4
Pb4O3SO4 + 6H+ = 4Pb+2 + SO4-2 + 3H2O
log_k 21.8772
delta_h -136.45 kJ
Anglesite
PbSO4 = Pb+2 + SO4-2
log_k -7.79
delta_h 12 kJ
Pb4(OH)6SO4
Pb4(OH)6SO4 + 6H+ = 4Pb+2 + SO4-2 + 6H2O
log_k 21.1
delta_h -0 kJ
AlOHSO4
AlOHSO4 + H+ = Al+3 + SO4-2 + H2O
log_k -3.23
delta_h -0 kJ
Al4(OH)10SO4
Al4(OH)10SO4 + 10H+ = 4Al+3 + SO4-2 + 10H2O
log_k 22.7
delta_h -0 kJ
Tl2SO4
Tl2SO4 = 2Tl+ + SO4-2
log_k -3.7868
delta_h 33.1799 kJ
Zn2(OH)2SO4
Zn2(OH)2SO4 + 2H+ = 2Zn+2 + 2H2O + SO4-2
log_k 7.5
delta_h -0 kJ
Zn4(OH)6SO4
Zn4(OH)6SO4 + 6H+ = 4Zn+2 + 6H2O + SO4-2
log_k 28.4
delta_h -0 kJ
Zn3O(SO4)2
Zn3O(SO4)2 + 2H+ = 3Zn+2 + 2SO4-2 + H2O
log_k 18.9135
delta_h -258.08 kJ
Zincosite
ZnSO4 = Zn+2 + SO4-2
log_k 3.9297
delta_h -82.586 kJ
ZnSO4:1H2O
ZnSO4:1H2O = Zn+2 + SO4-2 + H2O

log_k -0.638
delta_h -44.0699 kJ
Bianchite
ZnSO4:6H2O = Zn+2 + SO4-2 + 6H2O
log_k -1.765
delta_h -0.6694 kJ
Goslarite
ZnSO4:7H2O = Zn+2 + SO4-2 + 7H2O
log_k -2.0112
delta_h 14.21 kJ
Cd3(OH)4SO4
Cd3(OH)4SO4 + 4H+ = 3Cd+2 + 4H2O + SO4-2
log_k 22.56
delta_h -0 kJ
Cd3(OH)2(SO4)2
Cd3(OH)2(SO4)2 + 2H+ = 3Cd+2 + 2H2O + 2SO4-2
log_k 6.71
delta_h -0 kJ
Cd4(OH)6SO4
Cd4(OH)6SO4 + 6H+ = 4Cd+2 + 6H2O + SO4-2
log_k 28.4
delta_h -0 kJ
CdSO4
CdSO4 = Cd+2 + SO4-2
log_k -0.1722
delta_h -51.98 kJ
CdSO4:1H2O
CdSO4:1H2O = Cd+2 + SO4-2 + H2O
log_k -1.7261
delta_h -31.5399 kJ
CdSO4:2.67H2O
CdSO4:2.67H2O = Cd+2 + SO4-2 + 2.67H2O
log_k -1.873
delta_h -17.9912 kJ
Hg2SO4
Hg2SO4 = Hg2+2 + SO4-2
log_k -6.13
delta_h 5.4 kJ
HgSO4
HgSO4 + 2H2O = Hg(OH)2 + SO4-2 + 2H+
log_k -9.4189
delta_h 14.6858 kJ
Cu2SO4
Cu2SO4 = 2Cu+ + SO4-2
log_k -1.95
delta_h -19.079 kJ
Antlerite
Cu3(OH)4SO4 + 4H+ = 3Cu+2 + 4H2O + SO4-2
log_k 8.788
delta_h -0 kJ
Brochantite
Cu4(OH)6SO4 + 6H+ = 4Cu+2 + 6H2O + SO4-2
log_k 15.222
delta_h -202.86 kJ

Langite
Cu4(OH)6SO4:H2O + 6H+ = 4Cu+2 + 7H2O + SO4-2
log_k 17.4886
delta_h -165.55 kJ
CuOCuSO4
CuOCuSO4 + 2H+ = 2Cu+2 + H2O + SO4-2
log_k 10.3032
delta_h -137.777 kJ
CuSO4
CuSO4 = Cu+2 + SO4-2
log_k 2.9395
delta_h -73.04 kJ
Chalcanthite
CuSO4:5H2O = Cu+2 + SO4-2 + 5H2O
log_k -2.64
delta_h 6.025 kJ
Ag2SO4
Ag2SO4 = 2Ag+ + SO4-2
log_k -4.82
delta_h 17 kJ
Ni4(OH)6SO4
Ni4(OH)6SO4 + 6H+ = 4Ni+2 + SO4-2 + 6H2O
log_k 32
delta_h -0 kJ
Retgersite
NiSO4:6H2O = Ni+2 + SO4-2 + 6H2O
log_k -2.04
delta_h 4.6024 kJ
Morenosite
NiSO4:7H2O = Ni+2 + SO4-2 + 7H2O
log_k -2.1449
delta_h 12.1802 kJ
CoSO4
CoSO4 = Co+2 + SO4-2
log_k 2.8024
delta_h -79.277 kJ
CoSO4:6H2O
CoSO4:6H2O = Co+2 + SO4-2 + 6H2O
log_k -2.4726
delta_h 1.0801 kJ
Melanterite
FeSO4:7H2O = Fe+2 + SO4-2 + 7H2O
log_k -2.209
delta_h 20.5 kJ
Fe2(SO4)3
Fe2(SO4)3 = 2Fe+3 + 3SO4-2
log_k -3.7343
delta_h -242.028 kJ
H-Jarosite
(H3O)Fe3(SO4)2(OH)6 + 5H+ = 3Fe+3 + 2SO4-2 + 7H2O
log_k -12.1
delta_h -230.748 kJ
Na-Jarosite
NaFe3(SO4)2(OH)6 + 6H+ = Na+ + 3Fe+3 + 2SO4-2 + 6H2O

log_k -11.2
delta_h -151.377 kJ
K-Jarosite
KFe3(SO4)2(OH)6 + 6H+ = K+ + 3Fe+3 + 2SO4-2 + 6H2O
log_k -14.8
delta_h -130.875 kJ
MnSO4
MnSO4 = Mn+2 + SO4-2
log_k 2.5831
delta_h -64.8401 kJ
Mn2(SO4)3
Mn2(SO4)3 = 2Mn+3 + 3SO4-2
log_k -5.711
delta_h -163.427 kJ
VOSO4
VOSO4 = VO+2 + SO4-2
log_k 3.6097
delta_h -86.7401 kJ
Epsomite
MgSO4:7H2O = Mg+2 + SO4-2 + 7H2O
log_k -2.1265
delta_h 11.5601 kJ
Anhydrite
CaSO4 = Ca+2 + SO4-2
log_k -4.36
delta_h -7.2 kJ
Gypsum
CaSO4:2H2O = Ca+2 + SO4-2 + 2H2O
log_k -4.61
delta_h 1 kJ
Celestite
SrSO4 = Sr+2 + SO4-2
log_k -6.62
delta_h 2 kJ
Barite
BaSO4 = Ba+2 + SO4-2
log_k -9.98
delta_h 23 kJ
Mirabilite
Na2SO4:10H2O = 2Na+ + SO4-2 + 10H2O
log_k -1.114
delta_h 79.4416 kJ
Thenardite
Na2SO4 = 2Na+ + SO4-2
log_k 0.3217
delta_h -9.121 kJ
K-Alum
KAl(SO4)2:12H2O = K+ + Al+3 + 2SO4-2 + 12H2O
log_k -5.17
delta_h 30.2085 kJ
Alunite
KAl3(SO4)2(OH)6 + 6H+ = K+ + 3Al+3 + 2SO4-2 + 6H2O
log_k -1.4
delta_h -210 kJ

(NH4)2CrO4
(NH4)2CrO4 = CrO4-2 + 2NH4+
log_k 0.4046
delta_h 9.163 kJ
PbCrO4
PbCrO4 = Pb+2 + CrO4-2
log_k -12.6
delta_h 44.18 kJ
Tl2CrO4
Tl2CrO4 = 2Tl+ + CrO4-2
log_k -12.01
delta_h 74.27 kJ
Hg2CrO4
Hg2CrO4 = Hg2+2 + CrO4-2
log_k -8.7
delta_h -0 kJ
CuCrO4
CuCrO4 = Cu+2 + CrO4-2
log_k -5.44
delta_h -0 kJ
Ag2CrO4
Ag2CrO4 = 2Ag+ + CrO4-2
log_k -11.59
delta_h 62 kJ
MgCrO4
MgCrO4 = CrO4-2 + Mg+2
log_k 5.3801
delta_h -88.9518 kJ
CaCrO4
CaCrO4 = Ca+2 + CrO4-2
log_k -2.2657
delta_h -26.945 kJ
SrCrO4
SrCrO4 = Sr+2 + CrO4-2
log_k -4.65
delta_h -10.1253 kJ
BaCrO4
BaCrO4 = Ba+2 + CrO4-2
log_k -9.67
delta_h 33 kJ
Li2CrO4
Li2CrO4 = CrO4-2 + 2Li+
log_k 4.8568
delta_h -45.2792 kJ
Na2CrO4
Na2CrO4 = CrO4-2 + 2Na+
log_k 2.9302
delta_h -19.6301 kJ
Na2Cr2O7
Na2Cr2O7 + H2O = 2CrO4-2 + 2Na+ + 2H+
log_k -9.8953
delta_h 22.1961 kJ
K2CrO4
K2CrO4 = CrO4-2 + 2K+

log_k -0.5134
delta_h 18.2699 kJ
K2Cr2O7
K2Cr2O7 + H2O = 2CrO4-2 + 2K+ + 2H+
log_k -17.2424
delta_h 80.7499 kJ
Hg2SeO3
Hg2SeO3 + H+ = Hg2+2 + HSeO3-
log_k -4.657
delta_h -0 kJ
HgSeO3
HgSeO3 + 2H2O = Hg(OH)2 + H+ + HSeO3-
log_k -12.43
delta_h -0 kJ
Ag2SeO3
Ag2SeO3 + H+ = 2Ag+ + HSeO3-
log_k -7.15
delta_h 39.68 kJ
CuSeO3:2H2O
CuSeO3:2H2O + H+ = Cu+2 + HSeO3- + 2H2O
log_k 0.5116
delta_h -36.861 kJ
NiSeO3:2H2O
NiSeO3:2H2O + H+ = HSeO3- + Ni+2 + 2H2O
log_k 2.8147
delta_h -31.0034 kJ
CoSeO3
CoSeO3 + H+ = Co+2 + HSeO3-
log_k 1.32
delta_h -0 kJ
Fe2(SeO3)3:2H2O
Fe2(SeO3)3:2H2O + 3H+ = 3HSeO3- + 2Fe+3 + 2H2O
log_k -20.6262
delta_h -0 kJ
Fe2(OH)4SeO3
Fe2(OH)4SeO3 + 5H+ = HSeO3- + 2Fe+3 + 4H2O
log_k 1.5539
delta_h -0 kJ
MnSeO3
MnSeO3 + H+ = Mn+2 + HSeO3-
log_k 1.13
delta_h -0 kJ
MnSeO3:2H2O
MnSeO3:2H2O + H+ = HSeO3- + Mn+2 + 2H2O
log_k 0.9822
delta_h 8.4935 kJ
MgSeO3:6H2O
MgSeO3:6H2O + H+ = Mg+2 + HSeO3- + 6H2O
log_k 3.0554
delta_h 5.23 kJ
CaSeO3:2H2O
CaSeO3:2H2O + H+ = HSeO3- + Ca+2 + 2H2O
log_k 2.8139
delta_h -19.4556 kJ

SrSeO3
SrSeO3 + H+ = Sr+2 + HSeO3-
log_k 2.3
delta_h -0 kJ
BaSeO3
BaSeO3 + H+ = Ba+2 + HSeO3-
log_k 1.83
delta_h 11.98 kJ
Na2SeO3:5H2O
Na2SeO3:5H2O + H+ = 2Na+ + HSeO3- + 5H2O
log_k 10.3
delta_h -0 kJ
PbSeO4
PbSeO4 = Pb+2 + SeO4-2
log_k -6.84
delta_h 15 kJ
Tl2SeO4
Tl2SeO4 = 2Tl+ + SeO4-2
log_k -4.1
delta_h 43 kJ
ZnSeO4:6H2O
ZnSeO4:6H2O = Zn+2 + SeO4-2 + 6H2O
log_k -1.52
delta_h -0 kJ
CdSeO4:2H2O
CdSeO4:2H2O = Cd+2 + SeO4-2 + 2H2O
log_k -1.85
delta_h -0 kJ
Ag2SeO4
Ag2SeO4 = 2Ag+ + SeO4-2
log_k -8.91
delta_h -43.5 kJ
CuSeO4:5H2O
CuSeO4:5H2O = Cu+2 + SeO4-2 + 5H2O
log_k -2.44
delta_h -0 kJ
NiSeO4:6H2O
NiSeO4:6H2O = Ni+2 + SeO4-2 + 6H2O
log_k -1.52
delta_h -0 kJ
CoSeO4:6H2O
CoSeO4:6H2O = Co+2 + SeO4-2 + 6H2O
log_k -1.53
delta_h -0 kJ
MnSeO4:5H2O
MnSeO4:5H2O = Mn+2 + SeO4-2 + 5H2O
log_k -2.05
delta_h -0 kJ
UO2SeO4:4H2O
UO2SeO4:4H2O = UO2+2 + SeO4-2 + 4H2O
log_k -2.25
delta_h -0 kJ
MgSeO4:6H2O
MgSeO4:6H2O = Mg+2 + SeO4-2 + 6H2O

log_k -1.2
delta_h -0 kJ
CaSeO4:2H2O
CaSeO4:2H2O = Ca+2 + SeO4-2 + 2H2O
log_k -3.02
delta_h -8.3 kJ
SrSeO4
SrSeO4 = Sr+2 + SeO4-2
log_k -4.4
delta_h 0.4 kJ
BaSeO4
BaSeO4 = Ba+2 + SeO4-2
log_k -7.46
delta_h 22 kJ
BeSeO4:4H2O
BeSeO4:4H2O = Be+2 + SeO4-2 + 4H2O
log_k -2.94
delta_h -0 kJ
Na2SeO4
Na2SeO4 = 2Na+ + SeO4-2
log_k 1.28
delta_h -0 kJ
K2SeO4
K2SeO4 = 2K+ + SeO4-2
log_k -0.73
delta_h -0 kJ
(NH4)2SeO4
(NH4)2SeO4 = 2NH4+ + SeO4-2
log_k 0.45
delta_h -0 kJ
H2MoO4
H2MoO4 = MoO4-2 + 2H+
log_k -12.8765
delta_h 49 kJ
PbMoO4
PbMoO4 = Pb+2 + MoO4-2
log_k -15.62
delta_h 53.93 kJ
Al2(MoO4)3
Al2(MoO4)3 = 3MoO4-2 + 2Al+3
log_k 2.3675
delta_h -260.8 kJ
Tl2MoO4
Tl2MoO4 = MoO4-2 + 2Tl+
log_k -7.9887
delta_h -0 kJ
ZnMoO4
ZnMoO4 = MoO4-2 + Zn+2
log_k -10.1254
delta_h -10.6901 kJ
CdMoO4
CdMoO4 = MoO4-2 + Cd+2
log_k -14.1497
delta_h 19.48 kJ

CuMoO4
CuMoO4 = MoO4-2 + Cu+2
log_k -13.0762
delta_h 12.2 kJ
Ag2MoO4
Ag2MoO4 = 2Ag+ + MoO4-2
log_k -11.55
delta_h 52.7 kJ
NiMoO4
NiMoO4 = MoO4-2 + Ni+2
log_k -11.1421
delta_h 1.3 kJ
CoMoO4
CoMoO4 = MoO4-2 + Co+2
log_k -7.7609
delta_h -23.3999 kJ
FeMoO4
FeMoO4 = MoO4-2 + Fe+2
log_k -10.091
delta_h -11.1 kJ
BeMoO4
BeMoO4 = MoO4-2 + Be+2
log_k -1.7817
delta_h -56.4 kJ
MgMoO4
MgMoO4 = Mg+2 + MoO4-2
log_k -1.85
delta_h -0 kJ
CaMoO4
CaMoO4 = Ca+2 + MoO4-2
log_k -7.95
delta_h -2 kJ
BaMoO4
BaMoO4 = MoO4-2 + Ba+2
log_k -6.9603
delta_h 10.96 kJ
Li2MoO4
Li2MoO4 = MoO4-2 + 2Li+
log_k 2.4416
delta_h -33.9399 kJ
Na2MoO4
Na2MoO4 = MoO4-2 + 2Na+
log_k 1.4901
delta_h -9.98 kJ
Na2MoO4:2H2O
Na2MoO4:2H2O = MoO4-2 + 2Na+ + 2H2O
log_k 1.224
delta_h -0 kJ
Na2Mo2O7
Na2Mo2O7 + H2O = 2MoO4-2 + 2Na+ + 2H+
log_k -16.5966
delta_h 56.2502 kJ
K2MoO4
K2MoO4 = MoO4-2 + 2K+

log_k 3.2619
delta_h -3.38 kJ
PbHPO4
PbHPO4 = Pb+2 + H+ + PO4-3
log_k -23.805
delta_h -0 kJ
Pb3(PO4)2
Pb3(PO4)2 = 3Pb+2 + 2PO4-3
log_k -43.53
delta_h -0 kJ
Pyromorphite
Pb5(PO4)3Cl = 5Pb+2 + 3PO4-3 + Cl-
log_k -84.43
delta_h -0 kJ
Hydroxylpyromorphite
Pb5(PO4)3OH + H+ = 5Pb+2 + 3PO4-3 + H2O
log_k -62.79
delta_h -0 kJ
Plumbgummite
PbAl3(PO4)2(OH)5:H2O + 5H+ = Pb+2 + 3Al+3 + 2PO4-3 + 6H2O
log_k -32.79
delta_h -0 kJ
Hinsdalite
PbAl3PO4SO4(OH)6 + 6H+ = Pb+2 + 3Al+3 + PO4-3 + SO4-2 + 6H2O
log_k -2.5
delta_h -0 kJ
Tsumebite
Pb2CuPO4(OH)3:3H2O + 3H+ = 2Pb+2 + Cu+2 + PO4-3 + 6H2O
log_k -9.79
delta_h -0 kJ
Zn3(PO4)2:4H2O
Zn3(PO4)2:4H2O = 3Zn+2 + 2PO4-3 + 4H2O
log_k -35.42
delta_h -0 kJ
Cd3(PO4)2
Cd3(PO4)2 = 3Cd+2 + 2PO4-3
log_k -32.6
delta_h -0 kJ
Hg2HPO4
Hg2HPO4 = Hg2+2 + H+ + PO4-3
log_k -24.775
delta_h -0 kJ
Cu3(PO4)2
Cu3(PO4)2 = 3Cu+2 + 2PO4-3
log_k -36.85
delta_h -0 kJ
Cu3(PO4)2:3H2O
Cu3(PO4)2:3H2O = 3Cu+2 + 2PO4-3 + 3H2O
log_k -35.12
delta_h -0 kJ
Ag3PO4
Ag3PO4 = 3Ag+ + PO4-3
log_k -17.59
delta_h -0 kJ

Ni3(PO4)2
Ni3(PO4)2 = 3Ni+2 + 2PO4-3
log_k -31.3
delta_h -0 kJ
CoHPO4
CoHPO4 = Co+2 + PO4-3 + H+
log_k -19.0607
delta_h -0 kJ
Co3(PO4)2
Co3(PO4)2 = 3Co+2 + 2PO4-3
log_k -34.6877
delta_h -0 kJ
Vivianite
Fe3(PO4)2:8H2O = 3Fe+2 + 2PO4-3 + 8H2O
log_k -36
delta_h -0 kJ
Strengite
FePO4:2H2O = Fe+3 + PO4-3 + 2H2O
log_k -26.4
delta_h -9.3601 kJ
Mn3(PO4)2
Mn3(PO4)2 = 3Mn+2 + 2PO4-3
log_k -23.827
delta_h 8.8701 kJ
MnHPO4
MnHPO4 = Mn+2 + PO4-3 + H+
log_k -25.4
delta_h -0 kJ
(VO)3(PO4)2
(VO)3(PO4)2 = 3VO+2 + 2PO4-3
log_k -25.1
delta_h -0 kJ
Mg3(PO4)2
Mg3(PO4)2 = 3Mg+2 + 2PO4-3
log_k -23.28
delta_h -0 kJ
MgHPO4:3H2O
MgHPO4:3H2O = Mg+2 + H+ + PO4-3 + 3H2O
log_k -18.175
delta_h -0 kJ
FCO3Apatite
Ca9.316Na0.36Mg0.144(PO4)4.8(CO3)1.2F2.48 = 9.316Ca+2 + 0.36Na+ + 0.144Mg+2 + 4.8PO4-3 + 1.2CO3-2 + 2.48F-
log_k -114.4
delta_h 164.808 kJ
Hydroxylapatite
Ca5(PO4)3OH + H+ = 5Ca+2 + 3PO4-3 + H2O
log_k -44.333
delta_h -0 kJ
CaHPO4:2H2O
CaHPO4:2H2O = Ca+2 + H+ + PO4-3 + 2H2O
log_k -18.995
delta_h 23 kJ
CaHPO4

CaHPO4 = Ca+2 + H+ + PO4-3
log_k -19.275
delta_h 31 kJ
Ca3(PO4)2(beta)
Ca3(PO4)2 = 3Ca+2 + 2PO4-3
log_k -28.92
delta_h 54 kJ
Ca4H(PO4)3:3H2O
Ca4H(PO4)3:3H2O = 4Ca+2 + H+ + 3PO4-3 + 3H2O
log_k -47.08
delta_h -0 kJ
SrHPO4
SrHPO4 = Sr+2 + H+ + PO4-3
log_k -19.295
delta_h -0 kJ
BaHPO4
BaHPO4 = Ba+2 + H+ + PO4-3
log_k -19.775
delta_h -0 kJ
U(HPO4)2:4H2O
U(HPO4)2:4H2O = U+4 + 2PO4-3 + 2H+ + 4H2O
log_k -51.584
delta_h 16.0666 kJ
(UO2)3(PO4)2
(UO2)3(PO4)2 = 3UO2+2 + 2PO4-3
log_k -49.4
delta_h 397.062 kJ
UO2HPO4
UO2HPO4 = UO2+2 + H+ + PO4-3
log_k -24.225
delta_h -0 kJ
Uramphite
(NH4)2(UO2)2(PO4)2 = 2UO2+2 + 2NH4+ + 2PO4-3
log_k -51.749
delta_h 40.5848 kJ
Przhevalskite
Pb(UO2)2(PO4)2 = 2UO2+2 + Pb+2 + 2PO4-3
log_k -44.365
delta_h -46.024 kJ
Torbernite
Cu(UO2)2(PO4)2 = 2UO2+2 + Cu+2 + 2PO4-3
log_k -45.279
delta_h -66.5256 kJ
Bassetite
Fe(UO2)2(PO4)2 = 2UO2+2 + Fe+2 + 2PO4-3
log_k -44.485
delta_h -83.2616 kJ
Saleeite
Mg(UO2)2(PO4)2 = 2UO2+2 + Mg+2 + 2PO4-3
log_k -43.646
delta_h -84.4331 kJ
Ningyoite
CaU(PO4)2:2H2O = U+4 + Ca+2 + 2PO4-3 + 2H2O
log_k -53.906

delta_h -9.4977 kJ
H-Autunite
H2(UO2)2(PO4)2 = 2UO2+2 + 2H+ + 2PO4-3
log_k -47.931
delta_h -15.0624 kJ
Autunite
Ca(UO2)2(PO4)2 = 2UO2+2 + Ca+2 + 2PO4-3
log_k -43.927
delta_h -59.9986 kJ
Sr-Autunite
Sr(UO2)2(PO4)2 = 2UO2+2 + Sr+2 + 2PO4-3
log_k -44.457
delta_h -54.6012 kJ
Na-Autunite
Na2(UO2)2(PO4)2 = 2UO2+2 + 2Na+ + 2PO4-3
log_k -47.409
delta_h -1.9246 kJ
K-Autunite
K2(UO2)2(PO4)2 = 2UO2+2 + 2K+ + 2PO4-3
log_k -48.244
delta_h 24.5182 kJ
Uranocircite
Ba(UO2)2(PO4)2 = 2UO2+2 + Ba+2 + 2PO4-3
log_k -44.631
delta_h -42.2584 kJ
Pb3(AsO4)2
Pb3(AsO4)2 + 6H+ = 3Pb+2 + 2H3AsO4
log_k 5.8
delta_h -0 kJ
AlAsO4:2H2O
AlAsO4:2H2O + 3H+ = Al+3 + H3AsO4 + 2H2O
log_k 4.8
delta_h -0 kJ
Zn3(AsO4)2:2.5H2O
Zn3(AsO4)2:2.5H2O + 6H+ = 3Zn+2 + 2H3AsO4 + 2.5H2O
log_k 13.65
delta_h -0 kJ
Cu3(AsO4)2:2H2O
Cu3(AsO4)2:2H2O + 6H+ = 3Cu+2 + 2H3AsO4 + 2H2O
log_k 6.1
delta_h -0 kJ
Ag3AsO3
Ag3AsO3 + 3H+ = 3Ag+ + H3AsO3
log_k 2.1573
delta_h -0 kJ
Ag3AsO4
Ag3AsO4 + 3H+ = 3Ag+ + H3AsO4
log_k -2.7867
delta_h -0 kJ
Ni3(AsO4)2:8H2O
Ni3(AsO4)2:8H2O + 6H+ = 3Ni+2 + 2H3AsO4 + 8H2O
log_k 15.7
delta_h -0 kJ
Co3(AsO4)2

Co3(AsO4)2 + 6H+ = 3Co+2 + 2H3AsO4
log_k 13.0341
delta_h -0 kJ
FeAsO4:2H2O
FeAsO4:2H2O + 3H+ = Fe+3 + H3AsO4 + 2H2O
log_k 0.4
delta_h -0 kJ
Mn3(AsO4)2:8H2O
Mn3(AsO4)2:8H2O + 6H+ = 3Mn+2 + 2H3AsO4 + 8H2O
log_k 12.5
delta_h -0 kJ
Ca3(AsO4)2:4H2O
Ca3(AsO4)2:4H2O + 6H+ = 3Ca+2 + 2H3AsO4 + 4H2O
log_k 22.3
delta_h -0 kJ
Ba3(AsO4)2
Ba3(AsO4)2 + 6H+ = 3Ba+2 + 2H3AsO4
log_k -8.91
delta_h 11.0458 kJ
#NH4VO3
NH4VO3 + 2H+ = 2VO2+ + H2O
log_k 3.8
delta_h 30 kJ
Pb3(VO4)2
Pb3(VO4)2 + 8H+ = 3Pb+2 + 2VO2+ + 4H2O
log_k 6.14
delta_h -72.6342 kJ
Pb2V2O7
Pb2V2O7 + 6H+ = 2Pb+2 + 2VO2+ + 3H2O
log_k -1.9
delta_h -26.945 kJ
AgVO3
AgVO3 + 2H+ = Ag+ + VO2+ + H2O
log_k 0.77
delta_h -0 kJ
Ag2HVO4
Ag2HVO4 + 3H+ = 2Ag+ + VO2+ + 2H2O
log_k 1.48
delta_h -0 kJ
Ag3H2VO5
Ag3H2VO5 + 4H+ = 3Ag+ + VO2+ + 3H2O
log_k 5.18
delta_h -0 kJ
Fe(VO3)2
Fe(VO3)2 + 4H+ = Fe+2 + 2VO2+ + 2H2O
log_k -3.72
delta_h -61.6722 kJ
Mn(VO3)2
Mn(VO3)2 + 4H+ = Mn+2 + 2VO2+ + 2H2O
log_k 4.9
delta_h -92.4664 kJ
Mg(VO3)2
Mg(VO3)2 + 4H+ = Mg+2 + 2VO2+ + 2H2O
log_k 11.28

delta_h -136.649 kJ
Mg2V2O7
Mg2V2O7 + 6H+ = 2Mg+2 + 2VO2+ + 3H2O
log_k 26.36
delta_h -255.224 kJ
Carnotite
KUO2VO4 + 4H+ = K+ + UO2+2 + VO2+ + 2H2O
log_k 0.23
delta_h -36.4008 kJ
Tyuyamunite
Ca(UO2)2(VO4)2 + 8H+ = Ca+2 + 2UO2+2 + 2VO2+ + 4H2O
log_k 4.08
delta_h -153.134 kJ
Ca(VO3)2
Ca(VO3)2 + 4H+ = Ca+2 + 2VO2+ + 2H2O
log_k 5.66
delta_h -84.7678 kJ
Ca3(VO4)2
Ca3(VO4)2 + 8H+ = 3Ca+2 + 2VO2+ + 4H2O
log_k 38.96
delta_h -293.466 kJ
Ca2V2O7
Ca2V2O7 + 6H+ = 2Ca+2 + 2VO2+ + 3H2O
log_k 17.5
delta_h -159.494 kJ
Ca3(VO4)2:4H2O
Ca3(VO4)2:4H2O + 8H+ = 3Ca+2 + 2VO2+ + 8H2O
log_k 39.86
delta_h -0 kJ
Ca2V2O7:2H2O
Ca2V2O7:2H2O + 6H+ = 2Ca+2 + 2VO2+ + 5H2O
log_k 21.552
delta_h -0 kJ
Ba3(VO4)2:4H2O
Ba3(VO4)2:4H2O + 8H+ = 3Ba+2 + 2VO2+ + 8H2O
log_k 32.94
delta_h -0 kJ
Ba2V2O7:2H2O
Ba2V2O7:2H2O + 6H+ = 2Ba+2 + 2VO2+ + 5H2O
log_k 15.872
delta_h -0 kJ
NaVO3
NaVO3 + 2H+ = Na+ + VO2+ + H2O
log_k 3.8582
delta_h -30.1799 kJ
Na3VO4
Na3VO4 + 4H+ = 3Na+ + VO2+ + 2H2O
log_k 36.6812
delta_h -184.61 kJ
Na4V2O7
Na4V2O7 + 6H+ = 4Na+ + 2VO2+ + 3H2O
log_k 37.4
delta_h -201.083 kJ
Halloysite

Al2Si2O5(OH)4 + 6H+ = 2Al+3 + 2H4SiO4 + H2O
log_k 9.5749
delta_h -181.43 kJ
Kaolinite
Al2Si2O5(OH)4 + 6H+ = 2Al+3 + 2H4SiO4 + H2O
log_k 7.435
delta_h -148 kJ
Greenalite
Fe3Si2O5(OH)4 + 6H+ = 3Fe+2 + 2H4SiO4 + H2O
log_k 20.81
delta_h -0 kJ
Chrysotile
Mg3Si2O5(OH)4 + 6H+ = 3Mg+2 + 2H4SiO4 + H2O
log_k 32.2
delta_h -196 kJ
Sepiolite
Mg2Si3O7.5OH:3H2O + 4H+ + 0.5H2O = 2Mg+2 + 3H4SiO4
log_k 15.76
delta_h -114.089 kJ
Sepiolite(A)
Mg2Si3O7.5OH:3H2O + 0.5H2O + 4H+ = 2Mg+2 + 3H4SiO4
log_k 18.78
delta_h -0 kJ
PHASES
O2(g)
O2 + 4H+ + 4e- = 2H2O
log_k 83.0894
delta_h -571.66 kJ
CH4(g)
CH4 + 3H2O = CO3-2 + 8e- + 10H+
log_k -41.0452
delta_h 257.133 kJ
CO2(g)
CO2 + H2O = 2H+ + CO3-2
log_k -18.147
delta_h 4.06 kJ
H2S(g)
H2S = H+ + HS-
log_k -8.01
delta_h -0 kJ
H2Se(g)
H2Se = HSe- + H+
log_k -4.96
delta_h -15.3 kJ
Hg(g)
Hg = 0.5Hg2+2 + e-
log_k -7.8733
delta_h 22.055 kJ
Hg2(g)
Hg2 = Hg2+2 + 2e-
log_k -14.9554
delta_h 58.07 kJ
Hg(CH3)2(g)
Hg(CH3)2 + 8H2O = Hg(OH)2 + 2CO3-2 + 16e- + 20H+

```
log_k -73.7066
delta_h 481.99 kJ
HgF(g)
HgF = 0.5Hg2+2 + F-
log_k 32.6756
delta_h -254.844 kJ
HgF2(g)
HgF2 + 2H2O = Hg(OH)2 + 2F- + 2H+
log_k 12.5652
delta_h -165.186 kJ
HgCl(g)
HgCl = 0.5Hg2+2 + Cl-
log_k 19.4966
delta_h -162.095 kJ
HgBr(g)
HgBr = 0.5Hg2+2 + Br-
log_k 16.7566
delta_h -142.157 kJ
HgBr2(g)
HgBr2 + 2H2O = Hg(OH)2 + 2Br- + 2H+
log_k -18.3881
delta_h 54.494 kJ
HgI(g)
HgI = 0.5Hg2+2 + I-
log_k 11.3322
delta_h -106.815 kJ
HgI2(g)
HgI2 + 2H2O = Hg(OH)2 + 2I- + 2H+
log_k -27.2259
delta_h 114.429 kJ
SURFACE_MASTER_SPECIES
Hfo_s Hfo_sOH
Hfo_w Hfo_wOH
Hao_ Hao_OH #hydrous aluminum oxides - gibbsite
SURFACE_SPECIES
Hfo_wOH = Hfo_wOH
log_k 0.0
Hfo_sOH = Hfo_sOH
log_k 0.0
Hao_OH = Hao_OH
log_k 0.0

Hfo_sOH + H+ = Hfo_sOH2+
log_k 7.29
delta_h 0 kJ
# Id: 8113302
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH = Hfo_sO- + H+
log_k -8.93
delta_h 0 kJ
# Id: 8113301
# log K source:
```

```
# Delta H source:
#T and ionic strength:
Hfo_wOH + H+ = Hfo_wOH2+
log_k 7.29
delta_h 0 kJ
# Id: 8123302
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH = Hfo_wO- + H+
log_k -8.93
delta_h 0 kJ
# Id: 8123301
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Ba+2 = Hfo_sOHBa+2
log_k 5.46
delta_h 0 kJ
# Id: 8111000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Ba+2 = Hfo_wOBa+ + H+
log_k -7.2
delta_h 0 kJ
# Id: 8121000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Ca+2 = Hfo_sOHCa+2
log_k 4.97
delta_h 0 kJ
# Id: 8111500
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Ca+2 = Hfo_wOCa+ + H+
log_k -5.85
delta_h 0 kJ
# Id: 8121500
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Mg+2 = Hfo_wOMg+ + H+
log_k -4.6
delta_h 0 kJ
# Id: 8124600
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Ag+ = Hfo_sOAg + H+
log_k -1.72
delta_h 0 kJ
```

```
# Id: 8110200
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Ag+ = Hfo_wOAg + H+
log_k -5.3
delta_h 0 kJ
# Id: 8120200
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Ni+2 = Hfo_sONi+ + H+
log_k 0.37
delta_h 0 kJ
# Id: 8115400
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Ni+2 = Hfo_wONi+ + H+
log_k -2.5
delta_h 0 kJ
# Id: 8125400
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Cd+2 = Hfo_sOCd+ + H+
log_k 0.47
delta_h 0 kJ
# Id: 8111600
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Cd+2 = Hfo_wOCd+ + H+
log_k -2.9
delta_h 0 kJ
# Id: 8121600
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Co+2 = Hfo_sOCo+ + H+
log_k -0.46
delta_h 0 kJ
# Id: 8112000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Co+2 = Hfo_wOCo+ + H+
log_k -3.01
delta_h 0 kJ
# Id: 8122000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Zn+2 = Hfo_sOZn+ + H+
```

```
log_k 0.99
delta_h 0 kJ
# Id: 8119500
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Zn+2 = Hfo_wOZn+ + H+
log_k -1.99
delta_h 0 kJ
# Id: 8129500
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Cu+2 = Hfo_sOCu+ + H+
log_k 2.89
delta_h 0 kJ
# Id: 8112310
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Cu+2 = Hfo_wOCu+ + H+
log_k 0.6
delta_h 0 kJ
# Id: 8123100
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Pb+2 = Hfo_sOPb+ + H+
log_k 4.65
delta_h 0 kJ
# Id: 8116000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Pb+2 = Hfo_wOPb+ + H+
log_k 0.3
delta_h 0 kJ
# Id: 8126000
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Be+2 = Hfo_sOBe+ + H+
log_k 5.7
delta_h 0 kJ
# Id: 8111100
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Be+2 = Hfo_wOBe+ + H+
log_k 3.3
delta_h 0 kJ
# Id: 8121100
# log K source:
# Delta H source:
```

#T and ionic strength:
Hfo_sOH + Hg(OH)2 + H+ = Hfo_sOHg+ + 2H2O
log_k 13.95
delta_h 0 kJ
Id: 8113610
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + Hg(OH)2 + H+ = Hfo_wOHg+ + 2H2O
log_k 12.64
delta_h 0 kJ
Id: 8123610
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + Sn(OH)2 + H+ = Hfo_sOSn+ + 2H2O
log_k 15.1
delta_h 0 kJ
Id: 8117900
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + Sn(OH)2 + H+ = Hfo_wOSn+ + 2H2O
log_k 13
delta_h 0 kJ
Id: 8127900
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + Cr(OH)2+ = Hfo_sOCrOH+ + H2O
log_k 11.63
delta_h 0 kJ
Id: 8112110
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + H3AsO3 = Hfo_sH2AsO3 + H2O
log_k 5.41
delta_h 0 kJ
Id: 8110600
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + H3AsO3 = Hfo_wH2AsO3 + H2O
log_k 5.41
delta_h 0 kJ
Id: 8120600
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + H3BO3 = Hfo_sH2BO3 + H2O
log_k 0.62
delta_h 0 kJ
Id: 8110900

```
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + H3BO3 = Hfo_wH2BO3 + H2O
log_k 0.62
delta_h 0 kJ
# Id: 8120900
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + PO4-3 + 3H+ = Hfo_sH2PO4 + H2O
log_k 31.29
delta_h 0 kJ
# Id: 8115800
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + PO4-3 + 3H+ = Hfo_wH2PO4 + H2O
log_k 31.29
delta_h 0 kJ
# Id: 8125800
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + PO4-3 + 2H+ = Hfo_sHPO4- + H2O
log_k 25.39
delta_h 0 kJ
# Id: 8115801
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + PO4-3 + 2H+ = Hfo_wHPO4- + H2O
log_k 25.39
delta_h 0 kJ
# Id: 8125801
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + PO4-3 + H+ = Hfo_sPO4-2 + H2O
log_k 17.72
delta_h 0 kJ
# Id: 8115802
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + PO4-3 + H+ = Hfo_wPO4-2 + H2O
log_k 17.72
delta_h 0 kJ
# Id: 8125802
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + H3AsO4 = Hfo_sH2AsO4 + H2O
log_k 8.61
```

```
delta_h 0 kJ
# Id: 8110610
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + H3AsO4 = Hfo_wH2AsO4 + H2O
log_k 8.61
delta_h 0 kJ
# Id: 8120610
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + H3AsO4 = Hfo_sHAsO4- + H2O + H+
log_k 2.81
delta_h 0 kJ
# Id: 8110611
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + H3AsO4 = Hfo_wHAsO4- + H2O + H+
log_k 2.81
delta_h 0 kJ
# Id: 8120611
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + H3AsO4 = Hfo_sOHAsO4-3 + 3H+
log_k -10.12
delta_h 0 kJ
# Id: 8110613
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + H3AsO4 = Hfo_wOHAsO4-3 + 3H+
log_k -10.12
delta_h 0 kJ
# Id: 8120613
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + VO2+ + 2H2O = Hfo_sOHVO4-3 + 4H+
log_k -16.63
delta_h 0 kJ
# Id: 8119031
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + VO2+ + 2H2O = Hfo_wOHVO4-3 + 4H+
log_k -16.63
delta_h 0 kJ
# Id: 8129031
# log K source:
# Delta H source:
#T and ionic strength:
```

Hfo_sOH + SO4-2 + H+ = Hfo_sSO4- + H2O
log_k 7.78
delta_h 0 kJ
Id: 8117320
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + SO4-2 + H+ = Hfo_wSO4- + H2O
log_k 7.78
delta_h 0 kJ
Id: 8127320
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + SO4-2 = Hfo_sOHSO4-2
log_k 0.79
delta_h 0 kJ
Id: 8117321
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + SO4-2 = Hfo_wOHSO4-2
log_k 0.79
delta_h 0 kJ
Id: 8127321
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + HSeO3- = Hfo_sSeO3- + H2O
log_k 4.29
delta_h 0 kJ
Id: 8117610
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + HSeO3- = Hfo_wSeO3- + H2O
log_k 4.29
delta_h 0 kJ
Id: 8127610
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + HSeO3- = Hfo_sOHSeO3-2 + H+
log_k -3.23
delta_h 0 kJ
Id: 8117611
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + HSeO3- = Hfo_wOHSeO3-2 + H+
log_k -3.23
delta_h 0 kJ
Id: 8127611
log K source:

```
# Delta H source:
#T and ionic strength:
Hfo_sOH + SeO4-2 + H+ = Hfo_sSeO4- + H2O
log_k 7.73
delta_h 0 kJ
# Id: 8117620
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + SeO4-2 + H+ = Hfo_wSeO4- + H2O
log_k 7.73
delta_h 0 kJ
# Id: 8127620
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + SeO4-2 = Hfo_sOHSeO4-2
log_k 0.8
delta_h 0 kJ
# Id: 8117621
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + SeO4-2 = Hfo_wOHSeO4-2
log_k 0.8
delta_h 0 kJ
# Id: 8127621
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + CrO4-2 + H+ = Hfo_sCrO4- + H2O
log_k 10.85
delta_h 0 kJ
# Id: 8112120
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + CrO4-2 + H+ = Hfo_wCrO4- + H2O
log_k 10.85
delta_h 0 kJ
# Id: 8122120
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + CrO4-2 = Hfo_sOHCrO4-2
log_k 3.9
delta_h 0 kJ
# Id: 8112121
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + CrO4-2 = Hfo_wOHCrO4-2
log_k 3.9
delta_h 0 kJ
```

Id: 8122121
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + MoO4-2 + H+ = Hfo_sMoO4- + H2O
log_k 9.5
delta_h 0 kJ
Id: 8114800
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + MoO4-2 + H+ = Hfo_wMoO4- + H2O
log_k 9.5
delta_h 0 kJ
Id: 8124800
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + MoO4-2 = Hfo_sOHMoO4-2
log_k 2.4
delta_h 0 kJ
Id: 8114801
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + MoO4-2 = Hfo_wOHMoO4-2
log_k 2.4
delta_h 0 kJ
Id: 8124801
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + Sb(OH)6- + H+ = Hfo_sSbO(OH)4 + 2H2O
log_k 8.4
delta_h 0 kJ
Id: 8117410
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + Sb(OH)6- + H+ = Hfo_wSbO(OH)4 + 2H2O
log_k 8.4
delta_h 0 kJ
Id: 8127410
log K source:
Delta H source:
#T and ionic strength:
Hfo_sOH + Sb(OH)6- = Hfo_sOHSbO(OH)4- + H2O
log_k 1.3
delta_h 0 kJ
Id: 8117411
log K source:
Delta H source:
#T and ionic strength:
Hfo_wOH + Sb(OH)6- = Hfo_wOHSbO(OH)4- + H2O

```
log_k 1.3
delta_h 0 kJ
# Id: 8127411
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Cyanide- + H+ = Hfo_sCyanide + H2O
log_k 13
delta_h 0 kJ
# Id: 8111430
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Cyanide- + H+ = Hfo_wCyanide + H2O
log_k 13
delta_h 0 kJ
# Id: 8121430
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_sOH + Cyanide- = Hfo_sOHCyanide-
log_k 5.7
delta_h 0 kJ
# Id: 8111431
# log K source:
# Delta H source:
#T and ionic strength:
Hfo_wOH + Cyanide- = Hfo_wOHCyanide-
log_k 5.7
delta_h 0 kJ
# Id: 8121431
# log K source:
# Delta H source:
#T and ionic strength:
#Additions from GWB Minteq
Hfo_wOH + H4SiO4 = Hfo_wOSi(OH)3 + H2O
log_k 4.28
delta_h 0 kJ
Hfo_wOH + H4SiO4 = Hfo_wOSiO(OH)2- + H+ + H2O
log_k -3.22
delta_h 0 kJ
Hfo_sOH + H4SiO4 = Hfo_sOSi(OH)3 + H2O
log_k 4.28
delta_h 0
Hfo_sOH + H4SiO4 = Hfo_sOSiO(OH)2- + H+ + H2O
log_k -3.22
delta_h 0
Hfo_wOH + CO3-2 + H+ = Hfo_wCO3- + H2O
log_k 12.56
delta_h 0
Hfo_wOH + CO3-2 + 2H+= Hfo_wHCO3 + H2O
log_k 20.62
delta_h 0
Hfo_sOH + CO3-2 + H+ = Hfo_sCO3- + H2O
```

```
log_k 12.56
delta_h 0
Hfo_sOH + CO3-2 + 2H+= Hfo_sHCO3 + H2O
log_k 20.62
delta_h 0

#Karamalidis and Dzombak sorption to gibbsite (hao) as compiled in Cravotta 2021 (https://doi.org/10.1016/j.apgeochem.2020.104845) Table S4 unless otherwise noted
Hao_OH + Cu+2 = Hao_OCu+ + H+
log_k 0.25
Hao_OH + Pb+2 = Hao_OPb+ + H+
log_k 0.37
Hao_OH + Co+2 = Hao_OCo+ + H+
log_k -2.52
Hao_OH + Cd+2 = Hao_OCd+ + H+
log_k -2.73
Hao_OH + Mn+2 = Hao_OMn+ + H+
log_k -5.49
Hao_OH + Fe+2 = Hao_OFe+ + H+
log_k -3.77
Hao_OH + Ca+2 = Hao_OCa+ + H+
log_k -10.49
Hao_OH + Mg+2 = Hao_OMg+ + H+
log_k -5.93
Hao_OH + Ba+2 = Hao_OBa+ + H+
log_k -8.5
Hao_OH + Sr+2 = Hao_OSr+ + H+
log_k -8.26
Hao_OH + Zn+2 = Hao_OZn+ + H+
log_k -0.96
Hao_OH + PO4-3 + 3 H+ = Hao_H2PO4 + H2O
log_k 26.89
Hao_OH + PO4-3 + 2H+ = Hao_HPO4- + H2O
log_k 19.37
Hao_OH + PO4-3 + H+ = Hao_PO4-2 + H2O
log_k 13.57
#Hao_OH + SO4-2 + H+ = Hao_SO4- + H2O
# log_k -0.45
#Hao_OH + SO4-2 = Hao_OHSO4-2
# log_k 1.19
Hao_OH + F- + H+ = Hao_F + H2O
log_k 8.78
Hao_OH + F- = Hao_OHF-
log_k 2.88
Hao_OH + 2 F- + H+ = Hao_F2- + H2O
log_k 11.94
Hao_OH + H4SiO4 = Hao_OH4SiO4- + H+
log_k -4.16

#Modified value from Goldberg and Glaubig (1985)
Hao_OH + H3BO3 = Hao_H2BO3 + H2O
Log_k 4.83
Hao_OH + H3BO3 = Hao_H3BO4- + H+
Log_k -7.40

#Modified value from Kitadai et al. (2018)
```

```
Hao_OH + SO4-2 + H+ = Hao_SO4- + H2O
log_k 2.4
#Modified value from Kitadai et al. (2018)
Hao_OH + SO4-2 = Hao_OHSO4-2
log_k 7.5

END
```

ATTACHMENT C
Details of Geochemical Model Parameterization

Attachment C. Details of Geochemical Model Parameterization

Introduction

This appendix to the Groundwater Polishing Report for the Coffeen Gypsum Management Facility Gypsum Stack Pond (GSP) provides detailed information regarding geochemical model parameterization. The information provided includes sources of thermodynamic data, sources of data used in model parameterization, summarized values, and calculation methods. All solid-phase data is fully documented in the Nature and Extent Report.[1] All aqueous data have been posted to the facility's operating record in accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.800(d)(15).

Solid Phase Inputs

The solid phase inputs to the model included iron (hydr)oxides and aluminum (hydr)oxides. These phases tend to have relatively rapid precipitation kinetics and form an outer layer on the surfaces of aquifer solids, creating surface area for sorption and attenuation of boron. Input concentrations for iron and aluminum (hydr)oxides are ideally derived using sequential extraction procedure (SEP) data. SEP methods employ chemical extractants to dissolve metals from specific solid-associated phases. SEP methods use progressively stronger reagents to solubilize metals from increasingly recalcitrant phases. Although these procedures do not identify the discrete solid phases in a soil/aquifer matrix, they provide a means to evaluate and characterize the metal binding mechanisms and relative stability of metals in each phase, and to estimate the available mass of the respective attenuating phase(s) (i.e., aluminum and iron [hydr]oxide). However, SEP analyses were not completed on Coffeen GSP samples. The dataset constraints necessitated alternative means of deriving oxide inputs.

Because SEP analyses were not completed on any Coffeen GSP samples during the time associated with the model input conditions, model input concentrations for ferrihydrite and gibbsite were derived using site-specific total metals and the proportion of total metals as crystalline metal oxides (applicable to crystalline iron oxides) or amorphous metal oxides (iron and aluminum) compiled from SEP datasets consisting of samples collected from similar geologic systems at various power generating facilities across Illinois. Much of the Coffeen GSP uppermost aquifer (UA) consists of the Hagarstown Member, so the analogous dataset for the UA is comprised of samples collected from various power generating facilities across Illinois specifically within the Hagarstown Member. The geologic similarity (regional geology, similar lithologies and depositional environments, similar

[1] The Nature and Extent Report was previously submitted to IEPA in April, 2024, and provided with relevant updates as Appendix D of the CAAA to which this report is attached.

mineral assemblages) between the samples comprising this dataset and the Coffeen GSP subsurface make this dataset appropriate for estimating the amount and distribution of sorbing solid phases in the absence of a complete site-specific dataset. SEP data for iron and aluminum is available for 3 Hagarstown Member solid phase samples collected from a different power generating station.

Total solid-phase iron was measured in two GSP UA solids samples, one of which was collected adjacent to the well of interest in this evaluation, G215. Both of these samples contained total iron concentrations of 16,000 milligrams per kilogram (mg/kg). These samples were also analyzed for mineralogy via X-ray diffraction analysis (XRD). XRD identified multiple minerals containing iron in their crystal structures, but no iron oxide minerals were detected. The UA in the vicinity of the GSP was therefore determined to not contain crystalline iron oxide material.

The amorphous ferrihydrite components for the UA was based on the 25th percentile of amorphous ferrihydrite distribution in the analogous compiled SEP dataset.

The gibbsite component of the models was determined using the average mass of aluminum associated with the oxide fraction from the compiled SEP dataset described above.

In thermodynamic modeling, the amount of sorbing phase present is typically the dominant control on the concentration of constituents sorbed under a given pH. Therefore, different amounts of metal oxides were used to test the sensitivity of the model to the amount of sorbing phase present. The amount of metal oxides used were derived from the 25th percentile, median (*i.e.*, 50th percentile), and 75th percentile of the SEP results for the relevant iron and aluminum phases.

Sorption of inorganic constituents to iron (hydr)oxides in the MINTEQ v4 database[2] is represented by the hydrous ferric oxide (HFO) thermodynamic dataset presented in Dzombak and Morel (1990). Sorption of inorganic constituents to aluminum (hydr)oxides is represented by the hydrous aluminum oxide (HAO) thermodynamic data presented in Karamalidis and Dzombak (2010), Goldberg and Glaubig (1985) (boron), and Kitadai et al. (2018) (sulfate). These sorption data are based on gibbsite, a nearly ubiquitous crystalline aluminum hydroxide mineral (Karamalidis and Dzombak 2010).

The quantities of HFO and HAO in the model are represented by ferrihydrite ($Fe(OH)_3$) and gibbsite ($Al(OH)_3$), respectively. Ferrihydrite is the most similar naturally occurring iron oxide to HFO (Dzombak and Morel, 1990), and sorption data for HAO was determined using gibbsite (Karamalidis and Dzombak 2010). Metal concentrations are presented in milligrams per kilogram of dry weight (mg/kg dw), whereas ferrihydrite and gibbsite inputs to the model represent moles of solid phase associated with one liter (L) of aqueous phase. The concentrations of iron and aluminum were converted to moles of ferrihydrite and gibbsite (respectively) according to the following:

The mass in kilograms (kg) of solid in the model (i.e., per 1 L of water) was calculated by:

[2] The default MINTEQ v4 database for PHREEQC does not include sorption data for carbonate and silicate to HFO. Thermodynamic constants for sorption of carbonate and silicate to HFO were added from the MINTEQ database associated with the Geochemist's Workbench software program.

$$Solid\ Mass\ In\ Model\ (kg) = \frac{(1-\phi)}{\phi} \times \frac{1000\ cm^3\ water}{L\ water} \times 1\ L\ water\ \times \rho\ \times \frac{1\ kg\ solid}{1000\ g\ solid}$$

Where:

ϕ = porosity (water volume in cubic centimeters [cm^3] / total volume in cm^3)

ρ = density of the solid (grams [g]/cm^3)

Porosity and density represent the median of measurements each hydrostratigraphic unit as reported in the Hydrogeologic Characterization Report (Ramboll 2021).

Moles of ferrihydrite and gibbsite were determined using metal concentrations as described above, the molar mass of iron or aluminum, and the mass of solid phase in the model:

$$Moles\ of\ Metal\ Oxide = \frac{mg\ Fe\ or\ Al}{kg\ solid} \times \frac{g}{1000\ mg} \times \frac{moles\ Fe\ or\ Al}{g\ Fe\ or\ Al} \times kg\ Solid\ Mass\ in\ Model$$

The moles of ferrihydrite and gibbsite are represented by moles of Fe or Al (respectively) in a 1:1 ratio mased on the mineral formula. Ferrihydrite and gibbsite were allowed to precipitate or dissolve in the reaction phase of the model to evaluate the impact of source control on sorbing phase availability.

Calcite and dolomite were included as mineral phases in the model because carbonate mineral formation and dissolution are often major controls on groundwater pH. Calcite and dolomite are common carbonate minerals and were detected at levels of greater than 1% by weight in X-ray diffraction analysis and are therefore considered to be present in excess within the aquifer. Therefore, the mass fractions reported in the X-ray diffraction are used as model inputs for the GSP UA. Both calcite and dolomite were allowed to precipitate in the reaction phase of the model.

Barite and gypsum are common sulfate minerals that have the potential to form under ambient environmental conditions. Neither mineral was detected in X-ray diffraction results at well locations containing exceedances of GWPSs. Therefore, barite and gypsum did not have initial concentrations in the model but were allowed to precipitate or dissolve in the reaction phase of the model.

Aqueous Inputs

In addition to the constituent of concern boron, the following parameters are included in the model and are anticipated to capture the expected attenuation and mobilization mechanisms for reasons detailed below:

- Temperature, pH and pe: pH and pe (a measure of redox potential) are major controls on chemical attenuation and mobility.
- Chloride, potassium, and sodium: Major ions in groundwater typically required for the model to reach charge balance.

- Carbonate ion, calcium, and magnesium: Major ions in groundwater that may also form common minerals, including carbonates. Carbonate mineral formation and dissolution is often a major control on groundwater pH. Bicarbonate and carbonate ions, a major component of groundwater alkalinity, may also compete with sulfate/boron for sorbing sites.
- Silicon and phosphate: Silicate and phosphate are oxyanions that compete with sulfate/boron for sorbing sites.
- Aluminum, iron, and manganese: As discussed above, iron and aluminum form reactive metal (hydr)oxide minerals which have high capacities for sorbing other ions on their surfaces. Although sorption to manganese oxides was not considered in this model, manganese behaves similarly to iron and is included for completeness.
- Remaining constituents regulated under 35 IAC § 845.600[3]: Although these parameters are not subject to corrective action at Coffeen GSP, they are included in the model for completeness.

Values for pe and carbonate ion concentrations were derived from values previously reported in the analytical data according to the following methods.

pe is a non-dimension scale of redox potential and is calculated from oxidation reduction potential (ORP). First, the field-measured ORP was converted to Eh (i.e., the redox potential normalized to the standard hydrogen electrode). The following equation provided in the Horiba water quality meter instruction manual[4] was used:

$$Eh = ORP + 206 - 0.7*(T - 25)$$

Where both Eh and ORP are in volts (V) and T is temperature in degrees Celsius. Eh is then converted to pe:

$$pe = (Eh * F) / (2.303 * R * T)$$

Where:

F = Faraday constant (96,500 Joules (J) / V-equivalent)

R = Molar gas constant (8.31 J / Kelvin (K)-mole)

T = temperature in Kelvin

Data reported for groundwater at the site include carbonate and bicarbonate alkalinity in units of mg of calcium carbonate per liter (mg $CaCO_3$/L). For use in modeling, it is convenient to convert these values to a single carbonate (CO_3^{2-}) ion concentration. Because carbonate and bicarbonate alkalinity are reported in the same units (i.e., standardized to mg $CaCO_3$) and represent different protonation states of the same inorganic carbon oxyanion, they were summed to represent total

[3] Mercury, thallium, total dissolved solids, and radium were not included in the model. Mercury reactions within the environment are highly complex and would require a separate modeling effort. Thallium forms a non-reactive monovalent cation and is rarely detected in the groundwater and is therefore not expected to contribute to model outcomes. Total dissolved solids are not a chemical parameter, but rather the result of other chemical abundances taken together. Radium is not included in most thermodynamic databases.

[4] https://static.horiba.com/fileadmin/Horiba/Products/Process_and_Environmental/Water_Pollution/Instruction_Manuals/U-50/U-50_Manual.pdf

alkalinity due to carbonate. This summed alkalinity was converted to concentration of carbonate ion according to the following equation:

$$\frac{mg\ CO_3^{2-}}{L} = \frac{mg\ CaCO_3}{L} \times \frac{mole\ CaCO_3}{100.1\ mg\ CaCO_3} \times \frac{1\ mole\ CO_3^{2-}}{1\ mole\ CaCO_3} \times \frac{60\ mg\ CO_3^{2-}}{mole\ CO_3^{2-}}$$

The full suite of geochemical parameters for this model was measured in Quarter 2 and Quarter 3, 2023. The medians of these results were used in the model to represent average groundwater interacting with the solid phase. For compliance well G215, the median for each parameter was calculated individually. For background wells, a single median for each parameter was calculated using data from all three background locations measured in Quarter 2 and Quarter 3, 2023.

The model was run without charge balancing and with charge balancing on chloride. The results during the reaction modeling did not substantially differ with and without charge balancing on chloride. The results presented in the Groundwater Polishing Report therefore represent the model results using charge balancing on chloride.

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ATTACHMENT D
Complete Geochemical Modeling Outputs

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	pH	pe	charge	pct_err	S(6)
G215	C - UA	Initial Soln	TRUE	25p	6.99	4.33	1.72e-16	4.99e-13	0.00532
G215	C - UA	Speciation Model	TRUE	25p	6.99	4.33	1.67e-16	4.86e-13	0.00532
G215	C - UA	First Reaction	TRUE	25p	7.25	0.390	-6.90e-05	-2.64e-01	0.00175
G215	C - UA	Second Reaction	TRUE	25p	7.27	0.300	-9.61e-07	-3.71e-03	0.00170
G215	C - UA	Initial Soln	TRUE	75p	6.99	4.33	1.72e-16	4.99e-13	0.00532
G215	C - UA	Speciation Model	TRUE	75p	6.99	4.33	1.67e-16	4.86e-13	0.00532
G215	C - UA	First Reaction	TRUE	75p	7.24	0.443	-6.43e-05	-2.43e-01	0.00177
G215	C - UA	Second Reaction	TRUE	75p	7.26	0.343	-1.73e-06	-6.65e-03	0.00170
G215	C - UA	Initial Soln	TRUE	median	6.99	4.33	1.72e-16	4.99e-13	0.00532
G215	C - UA	Speciation Model	TRUE	median	6.99	4.33	1.67e-16	4.86e-13	0.00532
G215	C - UA	First Reaction	TRUE	median	7.25	0.414	-7.18e-05	-2.74e-01	0.00176
G215	C - UA	Second Reaction	TRUE	median	7.27	0.321	-1.40e-06	-5.38e-03	0.00170
G215	C - UA	Initial Soln	FALSE	25p	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	Speciation Model	FALSE	25p	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	First Reaction	FALSE	25p	7.25	0.387	-6.20e-05	-2.37e-01	0.00175
G215	C - UA	Second Reaction	FALSE	25p	7.27	0.299	-8.94e-07	-3.45e-03	0.00170
G215	C - UA	Initial Soln	FALSE	75p	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	Speciation Model	FALSE	75p	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	First Reaction	FALSE	75p	7.24	0.441	-5.67e-05	-2.15e-01	0.00177
G215	C - UA	Second Reaction	FALSE	75p	7.26	0.341	-1.64e-06	-6.29e-03	0.00170
G215	C - UA	Initial Soln	FALSE	median	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	Speciation Model	FALSE	median	6.99	4.33	0.00312	10.0	0.00532
G215	C - UA	First Reaction	FALSE	median	7.25	0.412	-6.42e-05	-2.45e-01	0.00176
G215	C - UA	Second Reaction	FALSE	median	7.27	0.320	-1.31e-06	-5.06e-03	0.00170

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	B	Li	As	C(4)	Cl
G215	C - UA	Initial Soln	TRUE	25p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	Speciation Model	TRUE	25p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	First Reaction	TRUE	25p	6.00e-05	1.12e-06	1.14e-07	0.00388	0.00708
G215	C - UA	Second Reaction	TRUE	25p	5.61e-05	1.12e-06	1.26e-07	0.00376	0.00708
G215	C - UA	Initial Soln	TRUE	75p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	Speciation Model	TRUE	75p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	First Reaction	TRUE	75p	6.02e-05	1.12e-06	1.09e-07	0.00400	0.00708
G215	C - UA	Second Reaction	TRUE	75p	5.73e-05	1.12e-06	1.09e-07	0.00382	0.00708
G215	C - UA	Initial Soln	TRUE	median	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	Speciation Model	TRUE	median	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00675
G215	C - UA	First Reaction	TRUE	median	6.03e-05	1.12e-06	1.10e-07	0.00393	0.00708
G215	C - UA	Second Reaction	TRUE	median	5.70e-05	1.12e-06	1.16e-07	0.00378	0.00708
G215	C - UA	Initial Soln	FALSE	25p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	Speciation Model	FALSE	25p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	First Reaction	FALSE	25p	5.95e-05	1.12e-06	1.16e-07	0.00387	0.00708
G215	C - UA	Second Reaction	FALSE	25p	5.57e-05	1.12e-06	1.29e-07	0.00375	0.00708
G215	C - UA	Initial Soln	FALSE	75p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	Speciation Model	FALSE	75p	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	First Reaction	FALSE	75p	5.98e-05	1.12e-06	1.11e-07	0.00399	0.00708
G215	C - UA	Second Reaction	FALSE	75p	5.69e-05	1.12e-06	1.11e-07	0.00382	0.00708
G215	C - UA	Initial Soln	FALSE	median	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	Speciation Model	FALSE	median	7.19e-05	1.28e-06	1.03e-07	0.00337	0.00363
G215	C - UA	First Reaction	FALSE	median	5.98e-05	1.12e-06	1.13e-07	0.00392	0.00708
G215	C - UA	Second Reaction	FALSE	median	5.66e-05	1.12e-06	1.19e-07	0.00378	0.00708

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	F	Ca	Mg	Na	K
G215	C - UA	Initial Soln	TRUE	25p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	TRUE	25p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	TRUE	25p	1.08e-05	0.00284	0.00223	0.00383	3.51e-05
G215	C - UA	Second Reaction	TRUE	25p	1.07e-05	0.00280	0.00221	0.00383	3.51e-05
G215	C - UA	Initial Soln	TRUE	75p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	TRUE	75p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	TRUE	75p	1.08e-05	0.00288	0.00227	0.00383	3.51e-05
G215	C - UA	Second Reaction	TRUE	75p	1.07e-05	0.00282	0.00222	0.00383	3.51e-05
G215	C - UA	Initial Soln	TRUE	median	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	TRUE	median	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	TRUE	median	1.08e-05	0.00286	0.00225	0.00383	3.51e-05
G215	C - UA	Second Reaction	TRUE	median	1.07e-05	0.00281	0.00221	0.00383	3.51e-05
G215	C - UA	Initial Soln	FALSE	25p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	FALSE	25p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	FALSE	25p	1.08e-05	0.00284	0.00223	0.00383	3.51e-05
G215	C - UA	Second Reaction	FALSE	25p	1.07e-05	0.00280	0.00221	0.00383	3.51e-05
G215	C - UA	Initial Soln	FALSE	75p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	FALSE	75p	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	FALSE	75p	1.08e-05	0.00288	0.00227	0.00383	3.51e-05
G215	C - UA	Second Reaction	FALSE	75p	1.07e-05	0.00282	0.00222	0.00383	3.51e-05
G215	C - UA	Initial Soln	FALSE	median	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	Speciation Model	FALSE	median	1.42e-05	0.00438	0.00359	0.00409	0.000111
G215	C - UA	First Reaction	FALSE	median	1.08e-05	0.00286	0.00225	0.00383	3.51e-05
G215	C - UA	Second Reaction	FALSE	median	1.07e-05	0.00281	0.00221	0.00383	3.51e-05

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	Ba	Si	P	Mn	Fe
G215	C - UA	Initial Soln	TRUE	25p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	TRUE	25p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	TRUE	25p	2.17e-07	9.44e-05	2.41e-07	4.35e-06	3.94e-06
G215	C - UA	Second Reaction	TRUE	25p	2.22e-07	0.000102	2.87e-07	3.58e-06	4.33e-06
G215	C - UA	Initial Soln	TRUE	75p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	TRUE	75p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	TRUE	75p	2.16e-07	9.12e-05	2.17e-07	4.57e-06	3.91e-06
G215	C - UA	Second Reaction	TRUE	75p	2.22e-07	9.10e-05	2.33e-07	3.73e-06	4.17e-06
G215	C - UA	Initial Soln	TRUE	median	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	TRUE	median	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	TRUE	median	2.17e-07	9.21e-05	2.27e-07	4.47e-06	3.91e-06
G215	C - UA	Second Reaction	TRUE	median	2.22e-07	9.59e-05	2.57e-07	3.66e-06	4.23e-06
G215	C - UA	Initial Soln	FALSE	25p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	FALSE	25p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	FALSE	25p	2.17e-07	9.43e-05	2.42e-07	4.39e-06	3.96e-06
G215	C - UA	Second Reaction	FALSE	25p	2.22e-07	0.000102	2.89e-07	3.60e-06	4.34e-06
G215	C - UA	Initial Soln	FALSE	75p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	FALSE	75p	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	FALSE	75p	2.16e-07	9.10e-05	2.18e-07	4.61e-06	3.93e-06
G215	C - UA	Second Reaction	FALSE	75p	2.22e-07	9.09e-05	2.34e-07	3.75e-06	4.19e-06
G215	C - UA	Initial Soln	FALSE	median	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	Speciation Model	FALSE	median	3.11e-07	0.000109	1.45e-07	1.03e-05	1.44e-05
G215	C - UA	First Reaction	FALSE	median	2.17e-07	9.19e-05	2.28e-07	4.51e-06	3.92e-06
G215	C - UA	Second Reaction	FALSE	median	2.22e-07	9.58e-05	2.58e-07	3.69e-06	4.24e-06

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	Al	Sb	Be	Cd	Cr
G215	C - UA	Initial Soln	TRUE	25p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	TRUE	25p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	TRUE	25p	6.70e-08	5.40e-09	1.31e-08	1.31e-09	9.01e-09
G215	C - UA	Second Reaction	TRUE	25p	6.91e-08	5.40e-09	1.26e-08	1.27e-09	8.79e-09
G215	C - UA	Initial Soln	TRUE	75p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	TRUE	75p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	TRUE	75p	6.49e-08	5.40e-09	1.37e-08	1.33e-09	9.32e-09
G215	C - UA	Second Reaction	TRUE	75p	6.79e-08	5.40e-09	1.29e-08	1.28e-09	8.83e-09
G215	C - UA	Initial Soln	TRUE	median	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	TRUE	median	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	TRUE	median	6.61e-08	5.40e-09	1.34e-08	1.32e-09	9.13e-09
G215	C - UA	Second Reaction	TRUE	median	6.86e-08	5.40e-09	1.27e-08	1.28e-09	8.78e-09
G215	C - UA	Initial Soln	FALSE	25p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	FALSE	25p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	FALSE	25p	6.70e-08	5.40e-09	1.31e-08	1.46e-09	9.05e-09
G215	C - UA	Second Reaction	FALSE	25p	6.91e-08	5.40e-09	1.26e-08	1.42e-09	8.84e-09
G215	C - UA	Initial Soln	FALSE	75p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	FALSE	75p	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	FALSE	75p	6.49e-08	5.40e-09	1.37e-08	1.49e-09	9.36e-09
G215	C - UA	Second Reaction	FALSE	75p	6.79e-08	5.40e-09	1.29e-08	1.44e-09	8.87e-09
G215	C - UA	Initial Soln	FALSE	median	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	Speciation Model	FALSE	median	1.90e-07	2.12e-09	2.19e-08	2.09e-09	1.68e-08
G215	C - UA	First Reaction	FALSE	median	6.61e-08	5.40e-09	1.34e-08	1.47e-09	9.17e-09
G215	C - UA	Second Reaction	FALSE	median	6.86e-08	5.40e-09	1.27e-08	1.43e-09	8.82e-09

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	Co	Pb	Mo	Se	Hfo_s
G215	C - UA	Initial Soln	TRUE	25p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	TRUE	25p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	4.00e-05
G215	C - UA	First Reaction	TRUE	25p	7.15e-09	1.39e-09	8.60e-09	7.79e-09	4.00e-05
G215	C - UA	Second Reaction	TRUE	25p	6.98e-09	1.35e-09	6.26e-09	1.16e-08	4.00e-05
G215	C - UA	Initial Soln	TRUE	75p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	TRUE	75p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	9.50e-05
G215	C - UA	First Reaction	TRUE	75p	7.30e-09	1.41e-09	1.15e-08	6.17e-09	9.50e-05
G215	C - UA	Second Reaction	TRUE	75p	7.05e-09	1.36e-09	6.93e-09	7.76e-09	9.50e-05
G215	C - UA	Initial Soln	TRUE	median	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	TRUE	median	1.16e-08	1.26e-09	2.33e-08	4.25e-09	6.00e-05
G215	C - UA	First Reaction	TRUE	median	7.21e-09	1.40e-09	9.72e-09	6.86e-09	6.00e-05
G215	C - UA	Second Reaction	TRUE	median	7.01e-09	1.35e-09	6.47e-09	9.42e-09	6.00e-05
G215	C - UA	Initial Soln	FALSE	25p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	FALSE	25p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	4.00e-05
G215	C - UA	First Reaction	FALSE	25p	7.26e-09	1.40e-09	8.64e-09	7.85e-09	4.00e-05
G215	C - UA	Second Reaction	FALSE	25p	7.10e-09	1.36e-09	6.26e-09	1.16e-08	4.00e-05
G215	C - UA	Initial Soln	FALSE	75p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	FALSE	75p	1.16e-08	1.26e-09	2.33e-08	4.25e-09	9.50e-05
G215	C - UA	First Reaction	FALSE	75p	7.42e-09	1.42e-09	1.16e-08	6.22e-09	9.50e-05
G215	C - UA	Second Reaction	FALSE	75p	7.17e-09	1.37e-09	6.94e-09	7.83e-09	9.50e-05
G215	C - UA	Initial Soln	FALSE	median	1.16e-08	1.26e-09	2.33e-08	4.25e-09	0
G215	C - UA	Speciation Model	FALSE	median	1.16e-08	1.26e-09	2.33e-08	4.25e-09	6.00e-05
G215	C - UA	First Reaction	FALSE	median	7.33e-09	1.41e-09	9.77e-09	6.91e-09	6.00e-05
G215	C - UA	Second Reaction	FALSE	median	7.13e-09	1.37e-09	6.47e-09	9.51e-09	6.00e-05

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	Hfo_w	Hao_	m_Hfo_wOH	m_Hfo_wOH2+	m_Hfo_wOHSO4-2
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	0.00160	0.00287	0.000110	9.09e-05	8.46e-06
G215	C - UA	First Reaction	TRUE	25p	0.00160	0.00287	0.000125	8.11e-05	1.67e-06
G215	C - UA	Second Reaction	TRUE	25p	0.00160	0.00287	0.000124	8.17e-05	1.47e-06
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	0.00380	0.00363	0.000262	0.000216	2.01e-05
G215	C - UA	First Reaction	TRUE	75p	0.00380	0.00363	0.000294	0.000191	4.24e-06
G215	C - UA	Second Reaction	TRUE	75p	0.00380	0.00363	0.000303	0.000193	3.96e-06
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	0.00240	0.00330	0.000165	0.000136	1.27e-05
G215	C - UA	First Reaction	TRUE	median	0.00240	0.00330	0.000187	0.000121	2.60e-06
G215	C - UA	Second Reaction	TRUE	median	0.00240	0.00330	0.000190	0.000122	2.36e-06
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	0.00160	0.00287	0.000110	9.07e-05	8.50e-06
G215	C - UA	First Reaction	FALSE	25p	0.00160	0.00287	0.000125	8.14e-05	1.66e-06
G215	C - UA	Second Reaction	FALSE	25p	0.00160	0.00287	0.000124	8.19e-05	1.46e-06
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	0.00380	0.00363	0.000261	0.000215	2.02e-05
G215	C - UA	First Reaction	FALSE	75p	0.00380	0.00363	0.000294	0.000191	4.21e-06
G215	C - UA	Second Reaction	FALSE	75p	0.00380	0.00363	0.000303	0.000194	3.94e-06
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	0.00240	0.00330	0.000165	0.000136	1.27e-05
G215	C - UA	First Reaction	FALSE	median	0.00240	0.00330	0.000187	0.000122	2.58e-06
G215	C - UA	Second Reaction	FALSE	median	0.00240	0.00330	0.000190	0.000123	2.34e-06

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	m_Hfo_wSO4-	m_Hfo_wOSi(OH)3	m_Hfo_wOSiO(OH)2-	m_Hfo_wHCO3	m_Hfo_wCO3-
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	3.50e-06	0.000230	0.000172	0.000446	9.19e-05
G215	C - UA	First Reaction	TRUE	25p	5.43e-07	0.000225	0.000214	0.000380	9.94e-05
G215	C - UA	Second Reaction	TRUE	25p	4.85e-07	0.000242	0.000227	0.000355	9.17e-05
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	8.30e-06	0.000547	0.000409	0.00106	0.000218
G215	C - UA	First Reaction	TRUE	75p	1.38e-06	0.000511	0.000485	0.000950	0.000248
G215	C - UA	Second Reaction	TRUE	75p	1.27e-06	0.000527	0.000509	0.000896	0.000239
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	5.24e-06	0.000345	0.000258	0.000669	0.000138
G215	C - UA	First Reaction	TRUE	median	8.45e-07	0.000329	0.000314	0.000584	0.000153
G215	C - UA	Second Reaction	TRUE	median	7.64e-07	0.000347	0.000331	0.000548	0.000144
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	3.51e-06	0.000230	0.000172	0.000446	9.19e-05
G215	C - UA	First Reaction	FALSE	25p	5.40e-07	0.000225	0.000213	0.000379	9.90e-05
G215	C - UA	Second Reaction	FALSE	25p	4.83e-07	0.000242	0.000226	0.000354	9.13e-05
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	8.35e-06	0.000545	0.000407	0.00106	0.000218
G215	C - UA	First Reaction	FALSE	75p	1.38e-06	0.000510	0.000483	0.000950	0.000247
G215	C - UA	Second Reaction	FALSE	75p	1.26e-06	0.000526	0.000507	0.000896	0.000238
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	5.27e-06	0.000344	0.000257	0.000669	0.000138
G215	C - UA	First Reaction	FALSE	median	8.41e-07	0.000329	0.000312	0.000584	0.000153
G215	C - UA	Second Reaction	FALSE	median	7.61e-07	0.000347	0.000330	0.000548	0.000144

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	m_Hfo_wPO4-2	m_Hfo_wHPO4-	m_Hfo_wH2PO4	m_Hfo_sCO3-	m_Hfo_sHCO3
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	3.21e-06	6.36e-06	2.14e-07	1.26e-08	6.13e-08
G215	C - UA	First Reaction	TRUE	25p	4.20e-06	6.53e-06	1.73e-07	1.27e-08	4.85e-08
G215	C - UA	Second Reaction	TRUE	25p	4.57e-06	7.21e-06	1.93e-07	1.15e-08	4.45e-08
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	7.63e-06	1.51e-05	5.07e-07	3.00e-08	1.45e-07
G215	C - UA	First Reaction	TRUE	75p	9.37e-06	1.46e-05	3.87e-07	3.21e-08	1.23e-07
G215	C - UA	Second Reaction	TRUE	75p	9.93e-06	1.52e-05	3.94e-07	3.04e-08	1.14e-07
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	4.82e-06	9.54e-06	3.20e-07	1.89e-08	9.19e-08
G215	C - UA	First Reaction	TRUE	median	6.10e-06	9.46e-06	2.50e-07	1.97e-08	7.51e-08
G215	C - UA	Second Reaction	TRUE	median	6.53e-06	1.01e-05	2.66e-07	1.83e-08	6.94e-08
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	3.21e-06	6.35e-06	2.14e-07	1.25e-08	6.09e-08
G215	C - UA	First Reaction	FALSE	25p	4.19e-06	6.54e-06	1.73e-07	1.26e-08	4.81e-08
G215	C - UA	Second Reaction	FALSE	25p	4.56e-06	7.21e-06	1.94e-07	1.14e-08	4.42e-08
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	7.63e-06	1.51e-05	5.07e-07	2.98e-08	1.45e-07
G215	C - UA	First Reaction	FALSE	75p	9.35e-06	1.46e-05	3.88e-07	3.18e-08	1.22e-07
G215	C - UA	Second Reaction	FALSE	75p	9.90e-06	1.52e-05	3.96e-07	3.01e-08	1.14e-07
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	4.82e-06	9.53e-06	3.20e-07	1.88e-08	9.14e-08
G215	C - UA	First Reaction	FALSE	median	6.08e-06	9.47e-06	2.50e-07	1.95e-08	7.45e-08
G215	C - UA	Second Reaction	FALSE	median	6.51e-06	1.01e-05	2.67e-07	1.81e-08	6.89e-08

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	m_Hfo_sHPO4-	m_Hfo_sH2BO3	m_Hfo_sH2PO4	m_Hfo_sOSi(OH)3	m_Hfo_sOSiO(OH)2-
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	8.73e-10	4.54e-12	2.93e-11	3.16e-08	2.36e-08
G215	C - UA	First Reaction	TRUE	25p	8.34e-10	3.96e-12	2.20e-11	2.87e-08	2.73e-08
G215	C - UA	Second Reaction	TRUE	25p	9.05e-10	3.62e-12	2.42e-11	3.04e-08	2.85e-08
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	2.07e-09	1.08e-11	6.96e-11	7.51e-08	5.61e-08
G215	C - UA	First Reaction	TRUE	75p	1.89e-09	9.45e-12	5.01e-11	6.61e-08	6.27e-08
G215	C - UA	Second Reaction	TRUE	75p	1.94e-09	9.17e-12	5.03e-11	6.72e-08	6.50e-08
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	1.31e-09	6.80e-12	4.40e-11	4.74e-08	3.55e-08
G215	C - UA	First Reaction	TRUE	median	1.22e-09	5.99e-12	3.20e-11	4.23e-08	4.03e-08
G215	C - UA	Second Reaction	TRUE	median	1.28e-09	5.65e-12	3.37e-11	4.39e-08	4.19e-08
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	8.68e-10	4.50e-12	2.92e-11	3.13e-08	2.34e-08
G215	C - UA	First Reaction	FALSE	25p	8.29e-10	3.90e-12	2.20e-11	2.85e-08	2.70e-08
G215	C - UA	Second Reaction	FALSE	25p	9.00e-10	3.57e-12	2.42e-11	3.02e-08	2.82e-08
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	2.06e-09	1.07e-11	6.92e-11	7.44e-08	5.56e-08
G215	C - UA	First Reaction	FALSE	75p	1.88e-09	9.33e-12	4.99e-11	6.55e-08	6.20e-08
G215	C - UA	Second Reaction	FALSE	75p	1.93e-09	9.04e-12	5.02e-11	6.67e-08	6.43e-08
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	1.30e-09	6.75e-12	4.37e-11	4.70e-08	3.51e-08
G215	C - UA	First Reaction	FALSE	median	1.21e-09	5.91e-12	3.19e-11	4.20e-08	3.99e-08
G215	C - UA	Second Reaction	FALSE	median	1.27e-09	5.57e-12	3.36e-11	4.36e-08	4.15e-08

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	m_Hfo_sOHSO4-2	m_Hfo_sSO4-	m_Hao_SO4-	m_Hao_OHSO4-2	m_Hao_H2BO3
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	1.16e-09	4.80e-10	7.82e-14	0.000601	0.00111
G215	C - UA	First Reaction	TRUE	25p	2.13e-10	6.93e-11	2.70e-14	0.000580	0.00105
G215	C - UA	Second Reaction	TRUE	25p	1.85e-10	6.09e-11	2.62e-14	0.000596	0.000998
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	2.76e-09	1.14e-09	9.89e-14	0.000760	0.00141
G215	C - UA	First Reaction	TRUE	75p	5.49e-10	1.79e-10	3.55e-14	0.000728	0.00135
G215	C - UA	Second Reaction	TRUE	75p	5.05e-10	1.62e-10	3.36e-14	0.000745	0.00129
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	1.74e-09	7.20e-10	8.99e-14	0.000691	0.00128
G215	C - UA	First Reaction	TRUE	median	3.34e-10	1.08e-10	3.15e-14	0.000664	0.00122
G215	C - UA	Second Reaction	TRUE	median	2.99e-10	9.67e-11	3.03e-14	0.000680	0.00116
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	1.16e-09	4.80e-10	7.83e-14	0.000601	0.00111
G215	C - UA	First Reaction	FALSE	25p	2.10e-10	6.85e-11	2.70e-14	0.000582	0.00105
G215	C - UA	Second Reaction	FALSE	25p	1.82e-10	6.03e-11	2.63e-14	0.000598	0.000992
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	2.76e-09	1.14e-09	9.90e-14	0.000760	0.00140
G215	C - UA	First Reaction	FALSE	75p	5.41e-10	1.77e-10	3.56e-14	0.000730	0.00134
G215	C - UA	Second Reaction	FALSE	75p	4.99e-10	1.60e-10	3.37e-14	0.000747	0.00128
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	1.74e-09	7.20e-10	9.00e-14	0.000691	0.00127
G215	C - UA	First Reaction	FALSE	median	3.30e-10	1.07e-10	3.16e-14	0.000666	0.00121
G215	C - UA	Second Reaction	FALSE	median	2.95e-10	9.57e-11	3.03e-14	0.000682	0.00116

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	m_Hao_H3BO4-	Ferrihydrite	d_Ferrihydrite	Gibbsite	d_Gibbsite
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	4.00e-11	0.00800	0	0.0870	0
G215	C - UA	First Reaction	TRUE	25p	1.06e-10	0.00800	4.03e-06	0.0870	6.56e-07
G215	C - UA	Second Reaction	TRUE	25p	1.06e-10	0.00801	3.99e-06	0.0870	6.54e-07
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	5.06e-11	0.0190	0	0.110	0
G215	C - UA	First Reaction	TRUE	75p	1.29e-10	0.0190	4.12e-06	0.110	6.58e-07
G215	C - UA	Second Reaction	TRUE	75p	1.34e-10	0.0190	4.01e-06	0.110	6.55e-07
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	4.60e-11	0.0120	0	0.100	0
G215	C - UA	First Reaction	TRUE	median	1.20e-10	0.0120	4.06e-06	0.100	6.57e-07
G215	C - UA	Second Reaction	TRUE	median	1.22e-10	0.0120	4.00e-06	0.100	6.55e-07
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	3.97e-11	0.00800	0	0.0870	0
G215	C - UA	First Reaction	FALSE	25p	1.06e-10	0.00800	4.04e-06	0.0870	6.56e-07
G215	C - UA	Second Reaction	FALSE	25p	1.06e-10	0.00801	4.00e-06	0.0870	6.54e-07
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	5.02e-11	0.0190	0	0.110	0
G215	C - UA	First Reaction	FALSE	75p	1.29e-10	0.0190	4.13e-06	0.110	6.58e-07
G215	C - UA	Second Reaction	FALSE	75p	1.33e-10	0.0190	4.01e-06	0.110	6.55e-07
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	4.57e-11	0.0120	0	0.100	0
G215	C - UA	First Reaction	FALSE	median	1.20e-10	0.0120	4.07e-06	0.100	6.57e-07
G215	C - UA	Second Reaction	FALSE	median	1.22e-10	0.0120	4.00e-06	0.100	6.55e-07

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	Barite	d_Barite	Calcite	d_Calcite	Dolomite (ordered)
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	25p	0	0	2.00	0	5.00
G215	C - UA	First Reaction	TRUE	25p	6.13e-07	6.13e-07	2.00	0.000275	5.00
G215	C - UA	Second Reaction	TRUE	25p	1.22e-06	6.09e-07	2.00	0.000253	5.00
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	75p	0	0	2.00	0	5.00
G215	C - UA	First Reaction	TRUE	75p	6.15e-07	6.15e-07	2.00	0.000288	5.00
G215	C - UA	Second Reaction	TRUE	75p	1.22e-06	6.08e-07	2.00	0.000258	5.00
G215	C - UA	Initial Soln	TRUE	median	0	0	0	0	0
G215	C - UA	Speciation Model	TRUE	median	0	0	2.00	0	5.00
G215	C - UA	First Reaction	TRUE	median	6.14e-07	6.14e-07	2.00	0.000281	5.00
G215	C - UA	Second Reaction	TRUE	median	1.22e-06	6.09e-07	2.00	0.000255	5.00
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	25p	0	0	2.00	0	5.00
G215	C - UA	First Reaction	FALSE	25p	6.13e-07	6.13e-07	2.00	0.000271	5.00
G215	C - UA	Second Reaction	FALSE	25p	1.22e-06	6.09e-07	2.00	0.000253	5.00
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	75p	0	0	2.00	0	5.00
G215	C - UA	First Reaction	FALSE	75p	6.14e-07	6.14e-07	2.00	0.000283	5.00
G215	C - UA	Second Reaction	FALSE	75p	1.22e-06	6.08e-07	2.00	0.000258	5.00
G215	C - UA	Initial Soln	FALSE	median	0	0	0	0	0
G215	C - UA	Speciation Model	FALSE	median	0	0	2.00	0	5.00
G215	C - UA	First Reaction	FALSE	median	6.14e-07	6.14e-07	2.00	0.000276	5.00
G215	C - UA	Second Reaction	FALSE	median	1.22e-06	6.09e-07	2.00	0.000255	5.00

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	d_Dolomite (ordered)	Gypsum	d_Gypsum	si_Ferrihydrite	si_Gibbsite
G215	C - UA	Initial Soln	TRUE	25p	0	0	0	2.93	0.740
G215	C - UA	Speciation Model	TRUE	25p	0	0	0	2.93	0.740
G215	C - UA	First Reaction	TRUE	25p	-2.46e-04	0	0	0	0
G215	C - UA	Second Reaction	TRUE	25p	-1.87e-04	0	0	0	0
G215	C - UA	Initial Soln	TRUE	75p	0	0	0	2.93	0.740
G215	C - UA	Speciation Model	TRUE	75p	0	0	0	2.93	0.740
G215	C - UA	First Reaction	TRUE	75p	-3.03e-04	0	0	0	0
G215	C - UA	Second Reaction	TRUE	75p	-2.08e-04	0	0	0	0
G215	C - UA	Initial Soln	TRUE	median	0	0	0	2.93	0.740
G215	C - UA	Speciation Model	TRUE	median	0	0	0	2.93	0.740
G215	C - UA	First Reaction	TRUE	median	-2.69e-04	0	0	0	0
G215	C - UA	Second Reaction	TRUE	median	-1.95e-04	0	0	0	0
G215	C - UA	Initial Soln	FALSE	25p	0	0	0	2.94	0.741
G215	C - UA	Speciation Model	FALSE	25p	0	0	0	2.94	0.741
G215	C - UA	First Reaction	FALSE	25p	-2.42e-04	0	0	0	0
G215	C - UA	Second Reaction	FALSE	25p	-1.86e-04	0	0	0	0
G215	C - UA	Initial Soln	FALSE	75p	0	0	0	2.94	0.741
G215	C - UA	Speciation Model	FALSE	75p	0	0	0	2.94	0.741
G215	C - UA	First Reaction	FALSE	75p	-2.97e-04	0	0	0	0
G215	C - UA	Second Reaction	FALSE	75p	-2.07e-04	0	0	0	0
G215	C - UA	Initial Soln	FALSE	median	0	0	0	2.94	0.741
G215	C - UA	Speciation Model	FALSE	median	0	0	0	2.94	0.741
G215	C - UA	First Reaction	FALSE	median	-2.64e-04	0	0	0	0
G215	C - UA	Second Reaction	FALSE	median	-1.95e-04	0	0	0	0

Attachment D. PHREEQC modeling output
Groundwater Polishing Report
GMF Gypsum Stack Pond
Coffeen Power Plant
Coffeen, IL

Location	Location Description	Model	Charge Balance	Solids Summary	si_Barite	si_Calcite	si_Dolomite (ordered)	si_Gypsum
G215	C - UA	Initial Soln	TRUE	25p	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	Speciation Model	TRUE	25p	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	First Reaction	TRUE	25p	0	0	0	-1.34e+00
G215	C - UA	Second Reaction	TRUE	25p	0	0	0	-1.35e+00
G215	C - UA	Initial Soln	TRUE	75p	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	Speciation Model	TRUE	75p	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	First Reaction	TRUE	75p	0	0	0	-1.33e+00
G215	C - UA	Second Reaction	TRUE	75p	0	0	0	-1.35e+00
G215	C - UA	Initial Soln	TRUE	median	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	Speciation Model	TRUE	median	0.608	-3.25e-01	-6.83e-01	-7.98e-01
G215	C - UA	First Reaction	TRUE	median	0	0	0	-1.33e+00
G215	C - UA	Second Reaction	TRUE	median	0	0	0	-1.35e+00
G215	C - UA	Initial Soln	FALSE	25p	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	Speciation Model	FALSE	25p	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	First Reaction	FALSE	25p	0	0	0	-1.34e+00
G215	C - UA	Second Reaction	FALSE	25p	0	0	0	-1.35e+00
G215	C - UA	Initial Soln	FALSE	75p	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	Speciation Model	FALSE	75p	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	First Reaction	FALSE	75p	0	0	0	-1.33e+00
G215	C - UA	Second Reaction	FALSE	75p	0	0	0	-1.35e+00
G215	C - UA	Initial Soln	FALSE	median	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	Speciation Model	FALSE	median	0.618	-3.19e-01	-6.71e-01	-7.90e-01
G215	C - UA	First Reaction	FALSE	median	0	0	0	-1.33e+00
G215	C - UA	Second Reaction	FALSE	median	0	0	0	-1.35e+00

NOTES:
All model results are in units of moles with the exceptions of:

pH and pe (standard units)
charge (equivalents)
Results beginning with 'd_' (change from prior model step)
Results beginning with 'si_' (saturation index)

APPENDIX B
CORRECTIVE ACTION GROUNDWATER MONITORING PLAN

Intended for
Illinois Power Generating Company
134 CIPS Lane
Coffeen, IL 62017

Date
June 10, 2025

Project No.
1940110241-001

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN

COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO W1350150004-03

RAMBOLL Bright ideas. Sustainable change.

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN COFFEEN POWER PLANT, GMF GYPSUM STACK POND, IEPA ID NO W1350150004-03

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940110241-001**
Recipient	**Illinois Power Generating Company**
Document type	**Corrective Action Groundwater Monitoring Plan**
Revision	**FINAL**
Date	**June 10, 2025**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Sung-Woo Lee, PhD**
Approved by	**Brian G. Hennings, PG**
Description	**Corrective Action Groundwater Monitoring Plan**

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CONTENTS

1.	**Introduction**	**4**
1.1	Overview	4
1.2	Site Location and Background	5
1.3	Conceptual Site Model	5
1.4	Groundwater Quality	6
1.5	Nature and Extent Investigation	7
2.	**Corrective Action Groundwater Monitoring Plan**	**8**
2.1	Corrective Action Groundwater Monitoring Program and Parameters	8
2.1.1	35 I.A.C. § 845 Corrective Action Groundwater Monitoring	8
2.2	Sampling Schedule	8
2.3	Groundwater Sample Collection	9
2.4	Laboratory Analysis	9
2.5	Quality Assurance Program	9
2.6	Groundwater Monitoring Well Maintenance Plan	10
2.7	Statistical Analysis	10
2.8	Data Reporting	10
2.9	Compliance with Applicable Groundwater Protection Standards	10
3.	**Effectiveness of the Corrective Action Remedy**	**12**
3.1	Remedy Progress Evaluation	12
3.1.1	Comparison to Groundwater Protection Standard	13
3.1.2	Agreement with Groundwater Model	13
3.1.3	Trend Analysis	14
3.1.4	Adaptive Management Actions	14
3.2	Stability Evaluation	15
3.3	Attainment Evaluation and Conclusion of Corrective Action Monitoring	16
4.	**References**	**17**

TABLES (ATTACHED)

Table 1-1 35 I.A.C. § 845 Requirements Checklist
Table 2-1 Summary of Monitoring Well Locations and Purpose
Table 2-2 Monitoring Well Locations and Construction Details
Table 2-3 Sampling and Analysis Summary
Table 3-1 Adaptive Site Management Metrics and Trigger Criteria

FIGURES (ATTACHED)

Figure 1-1 Corrective Action Monitoring Outline
Figure 1-2 Site Location Map
Figure 1-3 Site Map
Figure 1-4 Potentiometric Surface Map, October 28 and 29, 2024
Figure 2-1 Proposed 35 I.A.C. § 845 Corrective Action Monitoring Well Location Map
Figure 3-1 Corrective Action Monitoring Timeline
Figure 3-2 Adaptive Site Management Decision-Making Flow Chart

APPENDICES

Appendix A Boring Logs and Well Construction Forms
Appendix B 35 I.A.C. § 845 Multi-Site Statistical Analysis Plan

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
AP1	Ash Pond No. 1
AP2	Ash Pond No. 2
ASD	Alternative Source Demonstration
CAAA	Corrective Action Alternatives Analysis
CCR	coal combustion residuals
COC	constituent of concern
CPP	Coffeen Power Plant
CSM	conceptual site model
DA	deep aquifer
DCU	deep confining unit
E001	Event 1
GMF GSP	Gypsum Management Facility Gypsum Stack Pond
GMF RP	Gypsum Management Facility Recycle Pond
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HCR	Hydrogeologic Site Characterization Report
ID	identification
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
IPGC	Illinois Power Generating Company
LCU	lower confining unit
LF	Landfill
NID	National Inventory of Dams
No.	Number
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RL	reporting limit
SI	surface impoundment
StAP	Statistical Analysis Plan
TDS	total dissolved solids
UA	uppermost aquifer
UCU	upper confining unit
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

1.1 Overview

In accordance with requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments, Ramboll Americas Engineering Solutions, Inc. (Ramboll) has prepared this Corrective Action Groundwater Monitoring Plan (GMP) on behalf of Coffee Power Plant (CPP), operated by Illinois Power Generating Company (IPGC). This GMP will apply specifically to the coal combustion residuals (CCR) Unit referred to as Gypsum Management Facility Gypsum Stack Pond (GMF GSP), CCR identification (ID) No. 103, Illinois Environmental Protection Agency (IEPA) ID No. W1350150004-03, and National Inventory of Dams (NID) No. IL50579. The GMF GSP is a 37-acre, lined SI put into operation in 2010 and used to manage blowdown from the air emission scrubbers at the CPP. The GMF GSP was built in accordance with Water Pollution Control Permit 2008-EA-4661. IPGC ceased receipt of waste to the GMF GSP prior to April 11, 2021. This Corrective Action GMP includes content requirements specific to 35 I.A.C. § 845.630 (*Groundwater Monitoring System*), 35 I.A.C. § 845.640 (*Groundwater Sampling and Analysis*), 35 I.A.C. § 845.650 (Groundwater Monitoring Program), and 35 I.A.C. § 845.680 (*Implementation of the Corrective Action Plan*) for the GMF GSP at the CPP.

A checklist in **Table 1-1** provides references to sections, tables, and figures within this document that meet the specific requirements of 35 I.A.C. § 845.630, 35 I.A.C. § 845.640, 35 I.A.C. § 845.650, and 35 I.A.C. § 845.680.

This Corrective Action GMP is included as Appendix B2 to the Corrective Action Plan for the CPP GMF GSP. The Corrective Action Plan proposes source control (*i.e.,* closure of the GMF GSP) followed by groundwater polishing as the remedy for the GMF GSP. As described in the Corrective Action Plan, the proposed remedy meets the performance standards of 35 I.A.C. § 845.670(d) and addresses all current and potential future releases from the GMF GSP. Likewise, this Corrective Action GMP establishes how data will be collected, documented, and evaluated to assess remedy effectiveness for all currently documented and potential future releases from the GMF GSP [1] per the process outlined in **Figure 1-1**.

Adaptive site management strategies are an integral part of corrective action groundwater monitoring. The adaptive site management approach consistent with National Research Council, Interstate Technology & Regulatory Council and United States Environmental Protection Agency (USEPA) methodologies will allow timely incorporation of new site information throughout corrective action to ensure the achievement of the groundwater protection standard (GWPS). The adaptive site management approach expedites progress toward meeting the GWPS while acknowledging uncertainties, such as the persistence of current groundwater flow directions and potential related changes in geochemical conditions. The structured decision-making process proposed in this Corrective Action GMP includes specific metrics used to evaluate remedy progress, criteria which would trigger adaptive management evaluation, and options for those management actions.

[1] The presence of exceedances at the waste boundary will continue to be evaluated under the Operating permit GMP previously submitted to IEPA [3].

1.2 Site Location and Background

The CPP is located in Montgomery County, in central Illinois, within Section 11 Township 7 North and Range 7 East. The CPP is approximately two miles south of the city of Coffeen and about eight miles southeast of the city of Hillsboro, Illinois (**Figure 1-2**). The CPP operated as a coal-fired power plant with five CCR units present, including the GMF GSP, Ash Pond No. 1 (AP1), Ash Pond No. 2 (AP2), the Gypsum Management Facility Recycle Pond (GMF RP), and Landfill (LF). Operations began in 1964 and CCR was disposed of in AP1. AP2 was also utilized in the early 1970's and AP1 was reconstructed in 1978. Both of these units were used until the mid-1980's, beginning in 2010 CCR material was placed in the LF and GMF Units. The GMF GSP is located between the two lobes of Coffeen Lake (identified as "Coffeen Lake" and "Unnamed Tributary" on **Figure 1-2**). To the east is the Unnamed Tributary, the LF to the west, the GMF RP to the south, and agricultural land to the north (**Figure 1-3**). Beyond the lake and other CCR units is agricultural land.

The GMF GSP is a 37-acre, lined SI put into operation in 2010 and used to manage blowdown from the air emission scrubbers at the CPP. The GMF GSP was built in accordance with Water Pollution Control Permit 2008-EA-4661 and features a composite 60-millimeter high density polyethylene liner with 3 feet of recompacted soil with a hydraulic conductivity of 1×10^{-7} centimeters per second, with internal piping and drains to collect contact water. Construction of the unit required excavation to approximately 603 feet and installation of a groundwater underdrain system to eliminate inward pressure on the liner prior to placement of CCR. The GMF GSP underdrain was actively pumped during construction, but is not actively pumped. IPGC ceased receipt of waste to the GMF GSP prior to April 11, 2021. This Corrective Action GMP includes content requirements specific to 35 I.A.C. § 845.630 (Groundwater Monitoring System), 35 I.A.C. § 845.640 (Groundwater Sampling and Analysis), 35 I.A.C. § 845.650 (Groundwater Monitoring Program), and 35 I.A.C. § 845.680 (Implementation of the Corrective Action Plan) for the GMF GSP at the CPP.

1.3 Conceptual Site Model

Significant site investigation has been completed at the CPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the GMF GSP has been well characterized as detailed in the Hydrogeologic Site Characterization Report (HCR) [1] included in the Operating Permit Application[2] and in the Nature and Extent Report [2].[3] A conceptual site model (CSM) has been developed and is discussed below.

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

- **Upper Confining Unit (UCU):** Consists of the Loess Unit and the upper clayey portion of the Hagarstown Member which has generally lower vertical permeability and generally greater than 60 percent fine. The UCU was encountered across most of the CPP, with the exception

[2] The HCR was previously included as Attachment H of the Coffeen GMF GSP Operating Permit Application, submitted to IEPA on October 25, 2021.
[3] The Nature and Extent Report was previously submitted to IEPA [2] and is provided with updates as Appendix D of the Corrective Action Alternatives Analysis (CAAA). The CAAA serves as Appendix A to the Corrective Action Plan to which this report is attached.

of the eastern edges of the SIs near the Unnamed Tributary where the unit was eroded following deposition or locations where it has been excavated for construction.

- **Uppermost Aquifer (UA):** Consists primarily of sand and sandy silts and clays at the base of the Hagarstown Member and, in some locations, the uppermost weathered sandy clay portion of the Vandalia Member. The UA is absent in several locations due to weathering and in others due to excavation during construction of the CCR Unit. The hydraulic characteristics of the Hagarstown Member indicate the UA has a moderate hydraulic conductivity.
- **Lower Confining Unit (LCU):** Is composed of the sandy clay till of the Vandalia Member, the silt of the Mulberry Grove Formation, and the compacted clay till of the Smithboro Member. The LCU underlies the UA and was encountered in all boring locations on the CPP. Results from laboratory tests completed for vertical hydraulic conductivity indicate the Vandalia Member has a very low vertical hydraulic conductivity.
- **Deep Aquifer (DA):** Consists primarily of sandy silt and sands of the Yarmouth Soil, which are thin (less than 5 feet) and discontinuous across the CPP.
- **Deep Confining Unit (DCU):** Underlies the DA and is composed of the Banner Formation, of which the thick Lierle Clay is the first encountered unit. No boring penetrated the full thickness of the DCU.

Overall groundwater flow within the UA is divided towards the two lobes of Coffeen Lake. The groundwater divide runs approximately through the center of the CPP, with groundwater east of the divide flowing east to southeast towards the Unnamed Tributary or the eastern lobe of Coffeen Lake and groundwater west of the divide flowing west to southwest towards the western lobe of Coffeen Lake. Groundwater flows primarily east to southeast across the GMF GSP toward the Unnamed Tributary. Although elevations vary seasonally, the groundwater flow direction in the UA is consistent and likely controlled by the proximity and hydraulic connection to Coffeen Lake. Groundwater elevations and contours for the October 2024 groundwater monitoring event are presented in **Figure 1-4**.

1.4 Groundwater Quality

Groundwater monitoring in accordance with the proposed Operating GMP and sampling methodologies provided in the operating permit application for groundwater compliance at the GMF GSP began in the second quarter of 2023 [3]. The proposed compliance monitoring wells yield groundwater samples that represent the quality of downgradient groundwater at the CCR boundary (as required in 35 I.A.C. § 845.630(a)(2)).

The Event 1 (E001) quarterly groundwater monitoring event was completed on June 9, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C) and the statistical analysis plan submitted with the operating permit application (Appendix A of the GMP), constituent concentrations observed at compliance wells were evaluated for compliance with the GWPSs summarized in 35 I.A.C. § 845.600 to determine exceedances[4] of the GWPS. The following GWPS exceedance at a compliance groundwater monitoring well was identified [4]:

[4] Throughout this document, "exceedance" or "exceedances" is intended to refer only to potential exceedances of proposed applicable background statistics or GWPSs as described in the proposed groundwater monitoring program which was submitted to the IEPA on October 25, 2021 as part of IPGC's operating permit application for the CPP GMF GSP. That operating permit application, including the proposed groundwater monitoring program, remains under review by the IEPA and, therefore, IPGC has not identified any actual exceedances.

- Sulfate at well G215

An Alternative Source Demonstration (ASD) was not completed for the GWPS exceedance listed above. Subsequent compliance sampling events (following E001) were evaluated for exceedances of the GWPS as described in 35 I.A.C. § 845.600 [5, 6, 7, 8, 9, 10]. Exceedances identified during the subsequent events were consistent with that listed above. In addition to the exceedance listed above, the following exceedances were identified:

- Arsenic at well G206D
- Sulfate at well G217
- Total Dissolved Solids (TDS) at well G215

Pursuant to 35 I.A.C. § 845.650(e), an Alternative Source Demonstration (ASD) presented evidence demonstrating that sources other than the GMF GSP were the cause of the arsenic GWPS exceedance at G206D [11], and the ASD was subsequently approved by the IEPA [12].

In accordance with 35 I.A.C. § 845.660, a Corrective Measures Assessment was developed to address current and potential future GWPS exceedances originating from the GMF GSP and was submitted to IEPA on June 12, 2024 [13]. The selected remedy will meet the performance standards of 35 I.A.C. § 845.670(d) and once implemented and completed, the selected remedy presented in the Corrective Action Plan will attain the GWPSs.

1.5 Nature and Extent Investigation

A limited investigation was conducted in 2024 to further assess the nature, degree, and extent of sulfate, and TDS groundwater impacts downgradient of the GMF GSP in accordance with 35 I.A.C. § 845.650. Two borings, G219 and G220, were advanced and converted to monitoring wells downgradient of G215.

Soil lithology was logged continuously and soil samples were collected from each boring for laboratory analysis from within the screened interval of each well and from the soil just above the screened interval. Soil samples were analyzed for total metals for 7-step sequential extraction, bulk mineralogy by Reitveld x-ray diffraction analysis, bulk elemental composition by x-ray fluorescence, sulfur content, total organic carbon and loss on ignition, and cation exchange capacity. An evaluation of the data is provided in the Nature and Extent Report.[5]

[5] The Nature and Extent Report was previously submitted to IEPA [2] and is provided with updates as Appendix D of the CAAA. The CAAA serves as Appendix A to the Corrective Action Plan to which this report is attached.

2. CORRECTIVE ACTION GROUNDWATER MONITORING PLAN

This Corrective Action GMP is being provided to propose a groundwater monitoring program specific to the GMF GSP that will comply with 35 I.A.C. § 845.680. The Corrective Action GMP will monitor and evaluate groundwater quality specifically to document the effectiveness of the corrective action remedy. The groundwater monitoring program will include sampling and analysis procedures that are consistent and that provide an accurate representation of groundwater quality.

2.1 Corrective Action Groundwater Monitoring Program and Parameters

2.1.1 35 I.A.C. § 845 Corrective Action Groundwater Monitoring

The proposed 35 I.A.C. § 845 corrective action monitoring well network will consist of five wells to document the effectiveness of the corrective action remedy and ultimately demonstrate compliance with GWPSs (**Figure 2-1**). The wells included in the corrective action monitoring well network include select compliance monitoring wells from the Operating GMP network (*e.g.*, those with previously reported exceedances of the GWPS) (**Section 1.4**)

As appropriate to meet the corrective action monitoring objectives and evaluate the effectiveness of the corrective action remedy (as described in **Section 3**), the corrective action monitoring program involves assigning each well to a monitoring category or purpose (**Table 2-1**). These monitoring categories include:

- **Inside Plume**: monitoring wells installed at the CCR boundary with GWPS exceedances.
- **Plume Definition**: wells located along the lateral or vertical boundary of the plume.

A summary of the well locations and associated purpose as it relates to the above category is presented in **Table 2-1** and **Figure 2-1**. Monitoring well depths and construction details are listed in **Table 2-2**, and boring logs and monitoring well construction forms are provided in **Appendix A**. Groundwater samples will be collected and analyzed for the laboratory and field parameters in **Table 2-3**. Laboratory parameters include major ions for evaluating groundwater chemistry and constituents of concern (COCs) (*i.e.*, reported exceedances in accordance with the Operating GMP) the Corrective Action is intended to address. Sampling to evaluate corrective action effectiveness will begin the quarter after the corrective action remedy is implemented and commissioned.

2.2 Sampling Schedule

All wells in the 35 I.A.C. § 845 corrective action GMP network, as presented in **Table 2-1**, will be sampled quarterly to provide a complete picture of corrective action effectiveness. Groundwater elevations will be determined at the time of sample collection from each well. Sampling will end in accordance with 35 I.A.C. § 845.680(c), when compliance with the GWPS has been demonstrated "at all points within the plume of contamination that lies beyond the waste boundary […] for a period of three consecutive years" (details in **Section 3.3**).

Consistent with 35 I.A.C. § 845.650(b)(4), quarterly sampling may be reduced to a semiannual frequency with IEPA approval after completion of five years of monitoring. A request for reduced sampling frequency will include a demonstration that corrective action monitoring effectiveness

will not be compromised; sufficient data has been collected to evaluate ongoing remedy effectiveness; and existing data show trends consistent with anticipated remedy performance (details in **Section 3.1**).

2.3 Groundwater Sample Collection

Groundwater sampling procedures have been developed and the collection of groundwater samples is being implemented to meet the requirements of 35 I.A.C. § 845.640. In addition to groundwater well samples, quality assurance samples will be collected as described in **Section 2.5** (**Table 2-3**). Groundwater samples will be collected and analyzed in accordance with the Multi-Site Sampling and Analysis Plan [14][6].

2.4 Laboratory Analysis

Laboratory analysis will be performed consistent with the requirements of 35 I.A.C. § 845.640(j) by a state-certified laboratory using methods approved by IEPA and USEPA. Laboratory methods may be modified based on laboratory equipment availability or procedures, but the Reporting Limit (RL) for all parameters analyzed, regardless of method, will be lower than the applicable groundwater quality standard [15]. Concentrations lower than the RL will be reported as less than the RL.

2.5 Quality Assurance Program

Consistent with the requirements of 35 I.A.C. § 845.640(a)(5), the sampling and analysis program includes procedures and techniques for quality assurance/quality control (QA/QC). Additional quality assurance samples to be collected will include the following[6]:

- Field duplicates will be collected at a frequency of one per group of ten or fewer investigative water samples.
- One equipment blank sample will be collected and analyzed for each day of sampling. If dedicated sampling equipment is used, then equipment blank samples will not be collected.
- The duplicate and equipment blank quality assurance samples will be supplemented by the laboratory QA/QC program, which typically includes:
  - Regular generation of instrument calibration curves to assure instrument reliability
  - Laboratory control samples and/or quality control check standards that have been spiked, and analyses to monitor the performance of the analytical method
  - Matrix spike/matrix spike duplicate analyses to determine percent recoveries and relative percent differences for each of the parameters detected
  - Analysis of replicate samples to check the precision of the instrumentation and/or methodology employed for all analytical methods
  - Analysis of method blanks to assure that the system is free of contamination

Water quality meters used to measure pH and turbidity will be calibrated according to manufacturer's specifications. At a minimum, it is recommended that calibration of pH occur daily prior to sampling and checked for accuracy at the end of each day. Unusual or suspect pH

[6] The Multi-Site Sampling and Analysis Plan and Multi-Site Quality Assurance Project plan are living documents which are subject to routine evaluation and updates in accordance with USEPA recommended best practices [21, 22].

measurements during sampling events will be flagged, evaluated, and additional calibration may be performed throughout the sampling events. Turbidity meters will be checked daily, prior to and following sampling. Unusual measurements or erratic meter performance will be flagged and evaluated for overall effects on the data prior to reporting.

2.6 Groundwater Monitoring Well Maintenance Plan

Consistent with the requirements of 35 I.A.C. § 845.630(e)(2), maintenance will be performed according to the Multi-Site Sampling and Analysis Plan [14] as needed to assure that the monitoring wells provide representative groundwater samples. Monitoring wells will be inspected during each groundwater sampling event; inspections will consist of the following:

- Visual inspection, clearing of vegetation, replacement of markers, and painting of protective casings as needed to assure that monitoring wells are clearly marked and accessible
- Visual inspection and repair or replacement of well aprons as needed to assure that they are intact, drain water away from the well, and have not heaved
- Visual inspection and repair or replacement of protective casings as needed to assure that they are undamaged, and that locks are present and functional
- Checks to assure that well caps are intact and vented, unless in flood-prone areas, in which case caps will not be vented
- Routine measurement of monitoring well depths to determine the degree of siltation within the wells. Wells will be redeveloped as needed to remove siltation from the screened interval if it impedes flow of water into the well
- Checks to assure that wells are clear of internal obstructions, and flow freely

If wells are damaged or become otherwise inoperable, they will be replaced by wells screened at the same elevation and as close to the original well as possible (ideally within 10 feet) and notification will be provided to IEPA. If a replacement well cannot be installed within approximately 10 feet of the original well location, notification will be sent to IEPA and a monitoring well will be installed as close as possible to the original monitoring well and given a new well identification number. Any well replacement activities will also be documented in the Annual Groundwater Monitoring and Corrective Action Report.

2.7 Statistical Analysis

A Multi-Site Statistical Analysis Plan (StAP) (**Appendix B**) has been developed to summarize the statistical procedures that will be used to evaluate the groundwater results.

2.8 Data Reporting

Groundwater monitoring and analysis completed in accordance with 35 I.A.C. § 845 under an approved monitoring program will be reported to IEPA annually by January 31 as required by I.A.C. § 845.550, for data collected the preceding year. The Annual Groundwater Monitoring and Corrective Action Report will include the status of the groundwater monitoring and Corrective Action Plan for the GMF GSP in addition to other requirements detailed in 35 I.A.C. § 845.610(e).

2.9 Compliance with Applicable Groundwater Protection Standards

As provided in 35 I.A.C. § 845.680(c)(2), corrective action is considered complete when compliance with the GWPS has been achieved by demonstrating that concentration of

constituents listed in 35 I.A.C. § 845.600 have not exceeded the GWPSs for a period of three consecutive years, using the statistical procedures and performance standards in 35 I.A.C. § 845.640(f) and (g).

Attainment of GWPSs and conclusion of corrective action monitoring is discussed below in **Section 3.3**.

If a new exceedance is determined during monitoring under the Operating GMP, the Corrective Action groundwater monitoring program will be evaluated for monitoring of additional locations and/or constituents using the adaptive site management methods presented herein.

3. EFFECTIVENESS OF THE CORRECTIVE ACTION REMEDY

The methods for evaluating the effectiveness of the corrective action remedy described in this section are based on the following guidance documents:

- "Methods for Evaluating the Attainment of Cleanup Standards Volume 2: Ground Water," USEPA, Office of Policy, Planning, and Evaluation, 1992. [16]
- "Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind," USEPA, Office of Solid Waste and Emergency Response, 2014. [17]
- "Adaptive Site Management – A Framework for Implementing Adaptive Management at Contaminated Sediment Superfund Sites," USEPA, Office of Superfund Remediation and Technology Innovation, 2022. [18]
- "Environmental Cleanup Best Management Practices: Effective Use of the Project Life Cycle Conceptual Site Model," USEPA, Office of Solid Waste and Emergency Response, 2011. [19]

Evaluation of corrective action remedy effectiveness will occur in three phases (**Figure 3-1**): remedy progress evaluation, stability evaluation, and attainment evaluation [16].

1. Remedy progress evaluation occurs after implementation of corrective actions to assess if the remedy is functioning as anticipated.
2. The stability evaluation, which assesses if a new post-treatment steady state in the groundwater has been reached.
3. Attainment evaluation occurs after a new steady state has been achieved and assesses if COC concentrations are below the GWPS.

COCs are parameters with exceedances of the GWPS to be addressed by the Corrective Action Plan. Corrective action monitoring at the COF GMF GSP includes the following COC parameters:

- Sulfate and TDS

The effectiveness of the remedy at each phase is evaluated using performance metrics designed to assess the goals of that phase. Performance metrics answer questions designed to evaluate multiple aspects of remedy effectiveness with the ultimate goal of holistically guiding management decisions [17]. These metrics may be evaluated using qualitative (subject to expert judgement) or quantitative (numerical outcomes) methods.

This section details the goals and performance metrics of each phase of remedy evaluation. Within each phase, the well groups described in **Section 2.1** have distinct applicable metrics and/or potential management actions consistent with the role of that well group within the corrective action monitoring framework. The remedy evaluation metrics documented here are specific to wells within the Corrective Action monitoring program.

3.1 Remedy Progress Evaluation

The goal of remedy process evaluation is to determine if a groundwater remedy is on track to achieve cleanup standards within the proposed time frame and to inform adaptive management decisions if performance metrics are not achieved. Evaluation of remedy progress includes evaluating the response of COCs in individual monitoring wells and in the plume as a whole. Remedy progress is evaluated using performance metrics as described below. **Table 3-1** details

the questions used to assess remedy progress and metrics which would trigger additional evaluation of adaptive site management options. **Figure 3-2** presents an outline of the decision-making process regarding adaptive management actions (the first step of which is assessing remedy progress per **Table 3-1**).

Documentation of remedy progress metrics will be provided in the Annual Groundwater Monitoring and Corrective Action Report (**Section 2.8**) beginning after the second year of data collection: a minimum of eight data points is required to complete meaningful statistical analysis required for evaluation of the remedy progress metrics, which will be available after two years of quarterly sampling. Per USEPA guidance [17], a thorough review of corrective action progress and remedy effectiveness will be conducted every five years. A Five-Year Annual Groundwater Monitoring and Corrective Action Report will evaluate the comprehensive data set and, if triggered by the results of the remedy progress evaluation metrics (**Table 3-1**), evaluate whether adaptive management actions are needed (**Figure 3-2**). The five-year time frame allows adaptive management decisions to be based on robust data sufficient to complete meaningful statistical analysis while remaining responsive to changing site conditions [17]. The remedy progress evaluation metrics and triggers for additional evaluation are described below.

3.1.1 Comparison to Groundwater Protection Standard

The Inside Plume wells in this monitoring plan were defined based on exceedances of the GWPS. The question posed to evaluate whether exceedances of the GWPS occur, and associated method of evaluation is (**Table 3-1**):

- Are COC concentrations greater than the GWPS? – Compare data points or summary statistics to site-specific GWPS values.

COC concentrations below the GWPS in Inside Plume wells may indicate that remedial actions are approaching completion and that moving to the next phase of remedy effectiveness evaluation may be warranted (see **Section 3.2**). Persistence of COC concentrations above the GWPS in Plume Definition wells may indicate that the plume is no longer properly delineated. Therefore, the trigger criterion for further evaluation is a central tendency measure of the last eight data points exceeding the GWPS.

3.1.2 Agreement with Groundwater Model

A groundwater flow and transport model[7] was used to compare the anticipated time to reach the GWPS for the different corrective actions considered at the GMF GSP.

The question posed to evaluate agreement of corrective action remedy progress with the groundwater model results is provided in **Table 3-1** and summarized below:

- Are concentrations of COCs at individual wells consistent with modeling expectations? – Evaluate if the observed results track with the predicted results in general direction and magnitude using expert professional judgement.

Only Inside Plume and Plume Definition wells included in the flow and transport model are evaluated according to this metric. Trigger criteria for additional adaptive site management evaluation include monitoring results failing to follow the general magnitude and direction of groundwater model results at one or more locations. It is acceptable to conclude that no further

[7] The Groundwater Modeling Report is referenced in the CAAA presented as part of the Corrective Action Plan.

adaptive site management evaluation is triggered if future observations do not precisely match modeled results on an individual well basis if the direction of remedy progress is adequate.

3.1.3 Trend Analysis

Evaluation of COC trends in wells both within and outside of the plume is a major component of remedy progress evaluations [16, 17]. Decreasing COC concentrations within the groundwater plume provides critical support for remedy effectiveness evaluations. Changing concentrations in wells defining the plume may indicate unanticipated plume migration or a need for better plume definition. Both short-term and long-term trends are important to evaluate remedy performance [16]. All trend analyses are performed in accordance with the Multi-Site StAP (**Appendix B**) and the USEPA Unified Guidance for groundwater statistics [20].

The questions posed to evaluate if COC concentrations are decreasing in Inside Plume wells and the associated methods for evaluation are provided in **Table 3-1** and summarized as follows:

- Are the average plume COC concentrations decreasing? – Evaluate trend based on quarterly average of COC concentrations of Inside Plume wells, both for the last eight sampling events and since corrective action was initiated.

The questions posed to evaluate if COC concentrations are changing in Inside Plume wells and Plume Definition wells and the associated methods for evaluation are provided in **Table 3-1** and summarized below:

- Are concentrations of COCs at individual wells changing? – Evaluate trend of COC concentrations, both for the last eight sampling events and since corrective action was initiated.

The goal of the corrective action is to reduce COC concentrations in the groundwater. Therefore, trigger criteria have been established for the two types of corrective action monitoring wells as follows:

- Inside Plume well triggers for adaptive site management evaluation are based on no decreasing trend in COC concentrations (short-term or long-term).
- Plume Definition well triggers are based on increasing COC concentrations, which may indicate improper delineation of the plume. Therefore, the trigger criterion for adaptive site management evaluation at Plume Definition wells is increasing short- or long-term trend.

3.1.4 Adaptive Management Actions

The goal of adaptive management actions is to understand why performance metrics are not met and, if the remedy is found to be unsuccessful in meeting remediation goals, drive supplemental corrective actions or, in extreme cases, re-evaluation of remedy selection. This section describes in greater detail the steps in the flow chart presented in **Figure 3-2** (adapted from Figure 2 in [17]).

As the remedy progress evaluation metrics are evaluated annually, failure to meet the metrics (as described in **Table 3-1**) leads to further action. If the data available at the time of the Five-Year Review are anticipated to be inadequate for determining the need for adaptive site management actions, additional data may be collected before the Five-Year Review including collecting samples from additional wells or measuring additional parameters.

If the remedy progress is not found to be adequate during the Five-Year Review, the most critical question is whether or not the remedy is likely to achieve the GWPS in a reasonable time frame. This may be evaluated using methods such as regression analysis or analysis of groundwater flow. If the remedy progress is not judged to be adequate but the remedy is likely to achieve the GWPS in a reasonable time frame, the CSM or the groundwater model may require updating to reflect evolving field conditions[8]. Additional data collected may also suggest ways to optimize the monitoring network or performance metrics [17].

If the remedy does not appear likely to achieve the GWPS in a reasonable time frame, it may be due to changing hydrogeochemical dynamics within the plume or an additional source of COCs not accounted for in the CSM. If available data suggests either occurrence, the Five-Year Review will describe additional activities planned to investigate if the existing remedy is still a viable option for attaining the GWPS. If the remedy is still viable, an update to the CSM and groundwater model is likely required [17, 19] and will be conducted after additional investigation is completed.

If the remedy does not appear likely to achieve the GWPS in a reasonable time frame, there is no alternative source of COCs not accounted for in the CSM, and the plume is appropriately delineated; or if the investigation into the hydrogeochemical changes or alternative source of COCs determines that the remedial action is no longer solely viable as a corrective action, an evaluation of additional remedial actions will be initiated.

If the remedy progress evaluation metrics indicate that concentrations across the monitoring network are below the GWPS the remedy progress phase may be considered complete, and the monitoring program may move to the Stability Evaluation phase (see **Section 3.2**).

3.2 Stability Evaluation

Evaluation of groundwater stability reflects the idea that implementation of a remedy will, by necessity, cause changes to the physical and chemical environment of the groundwater. Before assessing if compliance with the GWPS has been attained (**Section 3.3**), any transient effects of treatment on the groundwater (e.g., rebounding concentrations) should be allowed to dissipate [16]. Stability is evaluated to assess if a new stable equilibrium has been reached after final closure has been implemented. Stability is achieved when groundwater elevations are stable (accounting for seasonal variability), average COC concentrations are stable across all wells, and COC concentrations are stable at each well.

Trends in groundwater elevation and COC concentrations at each plume well will be evaluated using the most recent eight data points (*i.e.*, two years of data when sampling quarterly) according to methods presented in the Multi-Site StAP (**Appendix B**). This metric is met for a plume well when there is no statistically significant trend in groundwater elevation or COC concentrations.

Plume COC concentrations will be evaluated for trend using the most recent eight data points, with the average concentration across plume wells per sampling event considered as one data

[8] As stated in Section 1.4.1 of the Corrective Action Plan, "Estimated times to reach GWPS will be periodically reviewed and updated based on observed corrective action performance via an adaptive site management strategy."

point, according to methods presented in the Multi-Site StAP (**Appendix B**). This metric is met when there is no statistically significant trend in average COC concentrations.

3.3 Attainment Evaluation and Conclusion of Corrective Action Monitoring

The ultimate goal of groundwater corrective action is to attain compliance with the GWPS for each COC in Inside Plume wells. After stability has been achieved per the metrics discussed in **Section 3.2**, attainment evaluation will begin. Per 35 I.A.C. § 845.680(c), corrective action is considered complete when compliance with the GWPS has been demonstrated "at all points within the plume of contamination that lies beyond the waste boundary […] for a period of three consecutive years". Attainment of the GWPS will be evaluated in accordance with the Multi-Site StAP (**Appendix B**). Corrective action monitoring is considered complete for the site when COCs in the corrective action monitoring well network do not exceed the GWPS for three years.

4. REFERENCES

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[4] Ramboll Americas Engineering Solutions, Inc., "35 I.A.C. § 845.610(B)(3)(D) Groundwater Monitoring Data and Detected Exceedances, Quarter 2, 2023: GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois," October 16, 2023.

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[17] United States Environmental Protection Agency, "Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind," Office of Solid Waste and Emergency Response, 2014.

[18] United States Environmental Protection Agency, "Adaptive Site Management - A Framework for Implementing Adaptive Management at Contaminated Sediment Superfund Sites," Office of Superfund Remediation and Technology Innovation, 2022.

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TABLES

Table 1-1. 35 I.A.C. § 845 Requirements Checklist

Corrective Action Groundwater Monitoring Plan
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

35 I.A.C. § 845 Reference	35 I.A.C. § 845 Components	Location of Information in Corrective Action GMP
845.630	**Groundwater Monitoring Systems**	
845.630(a)(2)	Potential contaminant pathways must be monitored.	NA
845.630(a) 845.630(b) 845.630(c)	At least two upgradient wells and four downgradient wells (min. 1 and 3, but requires additional documentation)	Section 2.1 Figure 1-4
845.630(a) 845.630(b) 845.630(c)	Downgradient Well Density	Figure 1-4
845.630(a)(2)	Downgradient wells at waste boundary	Figure 1-4
845.640	**Groundwater Sampling and Analysis Requirements**	
845.640(a)	Consistent sampling and analysis procedures	Section 2 Tables 2-3 and 2-4
845.640(b)	Methods are appropriate	Section 2 Tables 2-3 and 2-4
845.640(c)	Groundwater elevations must be measured in each well prior to purging, each time groundwater is sampled.	Section 2.2
845.640 (d)(e)(f)(g)(h)	Establishment of background and application of statistical methods	Section 2.7 Appendix B
845.640(i)	Analyze total recoverable metals	Table 2-3
845.640(j)	Analyze groundwater samples using a certified laboratory	Section 2.4

Table 1-1. 35 I.A.C. § 845 Requirements Checklist
Corrective Action Groundwater Monitoring Plan
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

35 I.A.C. § 845 Reference	35 I.A.C. § 845 Components	Location of Information in Corrective Action GMP
845.650	**Groundwater Monitoring Program**	
845.650(a)	Must include monitoring for all constituents with a groundwater protection standard in Section 845.600(a), calcium, and turbidity	Section 2.1 Table 2-3
845.650(b)(c)	Groundwater Monitoring Frequency	Section 2.2
845.650(d)(e)	Exceedances of the groundwater protection standard	Sections 2.9 and 3.1.1
845.650(b)(2) and (3)	Staff gauge/ piezometer to monitor head in impoundment	Figure 1-4 (NE Riser)
NA	Staff gauge/ piezometer to monitor head of neighboring surface water body	NA
845.680	**Implementation of the Corrective Action Plan**	
845.680(a)(1)(a)	Establish and implement a corrective action groundwater monitoring program that meets requirements of 845.650	Sections 2.1 and 3 Tables 2-1 and 3-1 Figure 2-1
845.680(a)(1)(b)	Document the effectiveness of the corrective action remedy	Section 3
845.680(a)(1)(c)	Demonstrate compliance with the groundwater protection standard under Subsection [845.680] (c)	Sections 2.9 and 3

Table 1-1. 35 I.A.C. § 845 Requirements Checklist

Corrective Action Groundwater Monitoring Plan

Coffeen Power Plant

GMF Gypsum Stack Pond

Coffeen, IL

35 I.A.C. § 845 Reference	35 I.A.C. § 845 Components	Location of Information in Corrective Action GMP
845.680(c)(1)	Demonstrate compliance with the groundwater protection standards established by 845.600 has been achieved at all points within the plume of contamination that lies beyond the waste boundary	Section 3.3
845.680(c)(2)	Demonstrate that concentrations of constituents listed in 845.600 have not exceeded the groundwater protection standards for a period of three consecutive years using statistical procedures and performance standards in 845.640(f) and (g)	Sections 3.3 and 3.4

[O: CJC 10/23/2024; C: LDC 11/7/2024][U: KLT 2/10/25, C: CJC 04/02/2025]

Notes:

GMP = Groundwater Monitoring Plan

NA = Not Applicable

Table 2-1. Summary of Monitoring Well Locations and Purpose

Corrective Action Groundwater Monitoring Plan

Coffeen Power Plant

GMF Gypsum Stack Pond

Coffeen, IL

Well ID	Monitored Unit	Corrective Action Monitoring Well System	
		Inside Plume	Plume Definition
G213	UA		X
G215	UA	X	
G217	UA	X	
G218	UA		X
G219	UA		X

[O: KLT 2/10/2024, C: CJC 4/07/2025]

Notes:

UA = uppermost aquifer

Table 2-2. Monitoring Well Locations and Construction Details
Corrective Action Groundwater Monitoring Plan
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Location	HSU	Date Constructed	Top of PVC Elevation (ft NAVD88)	Measuring Point Elevation (ft NAVD88)	Measuring Point Description	Ground Elevation (ft NAVD88)	Screen Top Depth (ft bgs)	Screen Bottom Depth (ft bgs)	Screen Top Elevation (ft NAVD88)	Screen Bottom Elevation (ft NAVD88)	Well Depth (ft bgs)	Bottom of Boring Elevation (ft NAVD88)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
G213	UA	10/12/2010	632.7	632.9	Top of Casing	630.9	16.8	21.3	614.2	609.6	23.8	607.1	4.5	2	39.068592	-89.394827
G215	UA	10/13/2010	633.0	633.2	Top of Casing	631.1	19.4	23.8	611.7	607.3	26.4	604.7	4.4	2	39.069316	-89.393945
G217	UA	10/12/2010	633.0	633.2	Top of Casing	631.3	20.5	24.9	610.8	606.4	27.3	603.9	4.4	2	39.070347	-89.393963
G218	UA	10/12/2010	632.9	633.1	Top of Casing	631.4	20.3	24.8	611.0	606.6	27.0	604.3	4.4	2	39.070883	-89.393960
G219	UA	3/18/2024	620.1	620.1	Top of Casing	617.1	5.0	15.0	612.1	602.1	18.0	599.1	10	2	39.070875	-89.392145

[O: CJC 10/23/2024; C: AOC 10/30/2024][U: KLT 2/10/25, C: CJC 4/07/2025]

Notes:
All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
-- = data not available
bgs = below ground surface
ft = foot or feet
HSU = Hydrostratigraphic Unit
NAVD88 = North American Vertical Datum of 1988
PVC = polyvinyl chloride
UA = uppermost aquifer

Table 2-3. Sampling and Analysis Summary
Corrective Action Groundwater Monitoring Plan
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

Parameter	Analytical Method [1]	Number of Samples	Field Duplicates [2]	Field Blanks [3]	Equipment Blanks [3]	MS/MSD [4]	Total	Container Type	Minimum Volume [5]	Preservation (Cool to 6 °C for all samples)	Sample Hold Time from Collection Date
Corrective Action Parameter(s) [6]											
Sulfate	9036 or EPA 300	5	1	0	0	1	7	plastic	50 mL	Cool to 6 °C	28 days
Total Dissolved Solids	SM 2540 C	5	1	0	0	1	7	plastic	200 mL	Cool to 6 °C	7 days
Inorganic Parameters											
Alkalinity, bicarbonate	SM 2320 B	5	1	0	0	1	7	plastic	500 mL	Cool to 6 °C	14 days
Alkalinity, carbonate	SM 2320 B	5	1	0	0	1	7	plastic	500 mL	Cool to 6 °C	14 days
Calcium	6020 [7]	5	1	0	0	1	7	plastic	600 mL	HNO_3 to pH<2	6 months
Chloride	9251 or EPA 300	5	1	0	0	1	7	plastic	100 mL	Cool to 6 °C	28 days
Fluoride	9214 or EPA 300	5	1	0	0	1	7	plastic	300 mL	Cool to 6 °C	28 days
Magnesium	6020 [7]	5	1	0	0	1	7	plastic	600 mL	HNO_3 to pH<2	6 months
Sodium	6020 [7]	5	1	0	0	1	7	plastic	600 mL	HNO_3 to pH<2	6 months
Potassium	6020 [7]	5	1	0	0	1	7	plastic	600 mL	HNO_3 to pH<2	6 months
Field Parameters											
pH	SM 4500-H+ B	5	NA	NA	NA	NA	5	flow-through cell	NA	none	immediately
Dissolved Oxygen [8]	SM 4500-O/405.1	5	NA	NA	NA	NA	5	flow-through cell	NA	none	immediately
Temperature [8]	SM 2550	5	NA	NA	NA	NA	5	flow-through cell	NA	none	immediately
Oxidation/Reduction Potential [8]	SM 2580 B	5	NA	NA	NA	NA	5	flow-through cell	NA	none	immediately
Specific Conductance [8]	SM 2510 B	5	NA	NA	NA	NA	5	flow-through cell	NA	none	immediately
Turbidity [9]	SM 2130 B	5	NA	NA	NA	NA	5	flow-through cell or hand-held turbidity meter	NA	none	immediately

[O: CJC 10/23/2024, C: AOC 10/30/2024][U: KLT 2/10/25, C: CJC 04/02/2025]

Notes:
[1] Analytical method numbers are from SW-846 unless otherwise indicated. Analytical methods may be updated with more recent versions as appropriate.
[2] Field duplicates will be collected at a frequency of one per group of 10 or fewer investigative water samples. Field duplicates will not be collected for radium analysis.
[3] Field blanks will be collected at the discretion of the project manager; Equipment blanks will be collected at a rate of 1 per sampling event if non-dedicated equipment is used.
[4] Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a frequency of one per group of 20 or fewer investigative water samples per CCR unit/multi-unit. Additional volume to be determined by laboratory.
[5] Sample volume is estimated and will be determined by the laboratory.
[6] Determined by reported exceedances under the Operating Groundwater Monitoring Plan
[7] Metals may be analyzed via USEPA methods 6010 or 6020 depending on laboratory instrument availability.
[8] Parameter collected for quality assurance and quality control for field sampling purposes only; not required to be collected or reported under 35 I.A.C. § 845; collection of parameter may be discontinued without notification.
[9] If turbidity exceeds 10 NTU, a duplicate sample filtered through a 0.45 micron filter may be collected for metals analysis in addition to the unfiltered sample. Both samples would be submitted for analysis.
< = less than
°C = degrees Celsius
HNO_3 = nitric acid
mL = milliliter
NA = not applicable
NTU = nephelometric turbidity unit

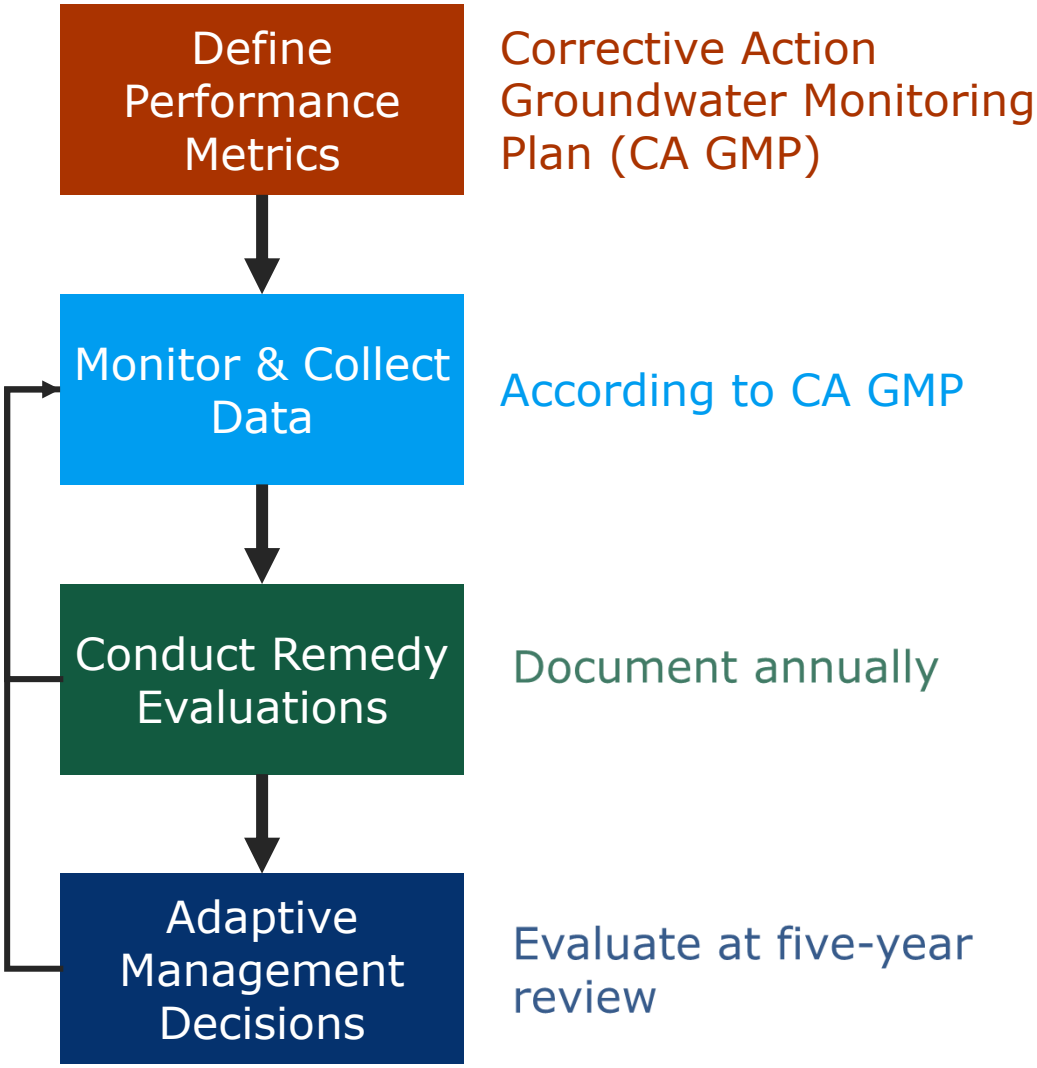
Table 3-1. Adaptive Site Management Metrics and Trigger Criteria
Corrective Action Groundwater Monitoring Plan
Coffeen Power Plant
GMF Gypsum Stack Pond
Coffeen, IL

QUESTION	**Are COC concentrations greater than the GWPS?**		**Are concentrations of COCs at individual wells consistent with modeling expectations?** [1]		**Are the average COC concentrations decreasing?**	**Are concentrations of COCs at individual wells changing?**	**Adaptive Site Management Outcome**
EVALUATION [2]	Compare data points or summary statistics to site-specific GWPS		Do the observed results track with the predicted results in general direction and magnitude? (Professional judgement)		Evaluate trend on quarterly average of well concentrations, both for last 8 data points and since corrective action initiated or closure completed	Evaluate trend of COCs at each well, both for last 8 data points and since corrective action initiated	
Inside Plume	Central tendency concentration of last eight data points above the GWPS	**AND**	Results inconsistent with model	**AND MORE THAN ONE OF**	Neither trend decreasing	Neither trend decreasing	**Additional Evaluation Triggered (See Figure 3-2)**
Lateral/Vertical Plume Definition	Central tendency concentration of last eight data points above the GWPS		Results inconsistent with model		--	Either trend increasing	

[O: CJC 10/23/2024; C: AOC 10/30/2024]

Notes:
1. Only applies to wells included in the flow and transport model
2. To be documented in Annual Monitoring and Corrective Action Reports
-- = No relevant trigger criteria
COC = constituent of concern
GWPS = groundwater protection standard

FIGURES



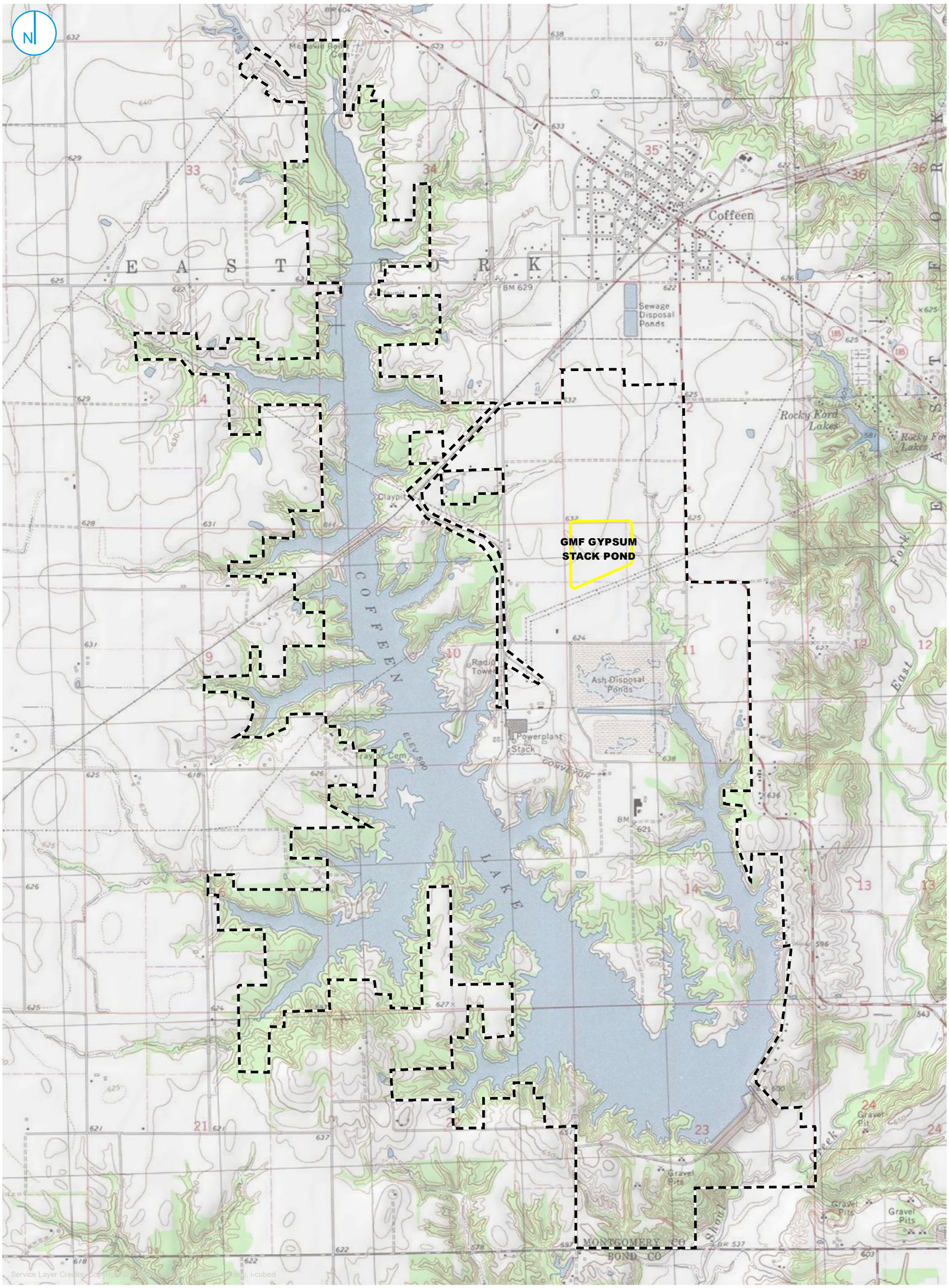
RAMBOLL

DRAFTED BY: AO | 2/7/2025

CORRECTIVE ACTION MONITORING OUTLINE

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Figure 1-1



REGULATED UNIT (SUBJECT UNIT)
PROPERTY BOUNDARY

0 1,000 2,000 Feet

SITE LOCATION MAP

FIGURE 1-2

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

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

0 325 650 Feet

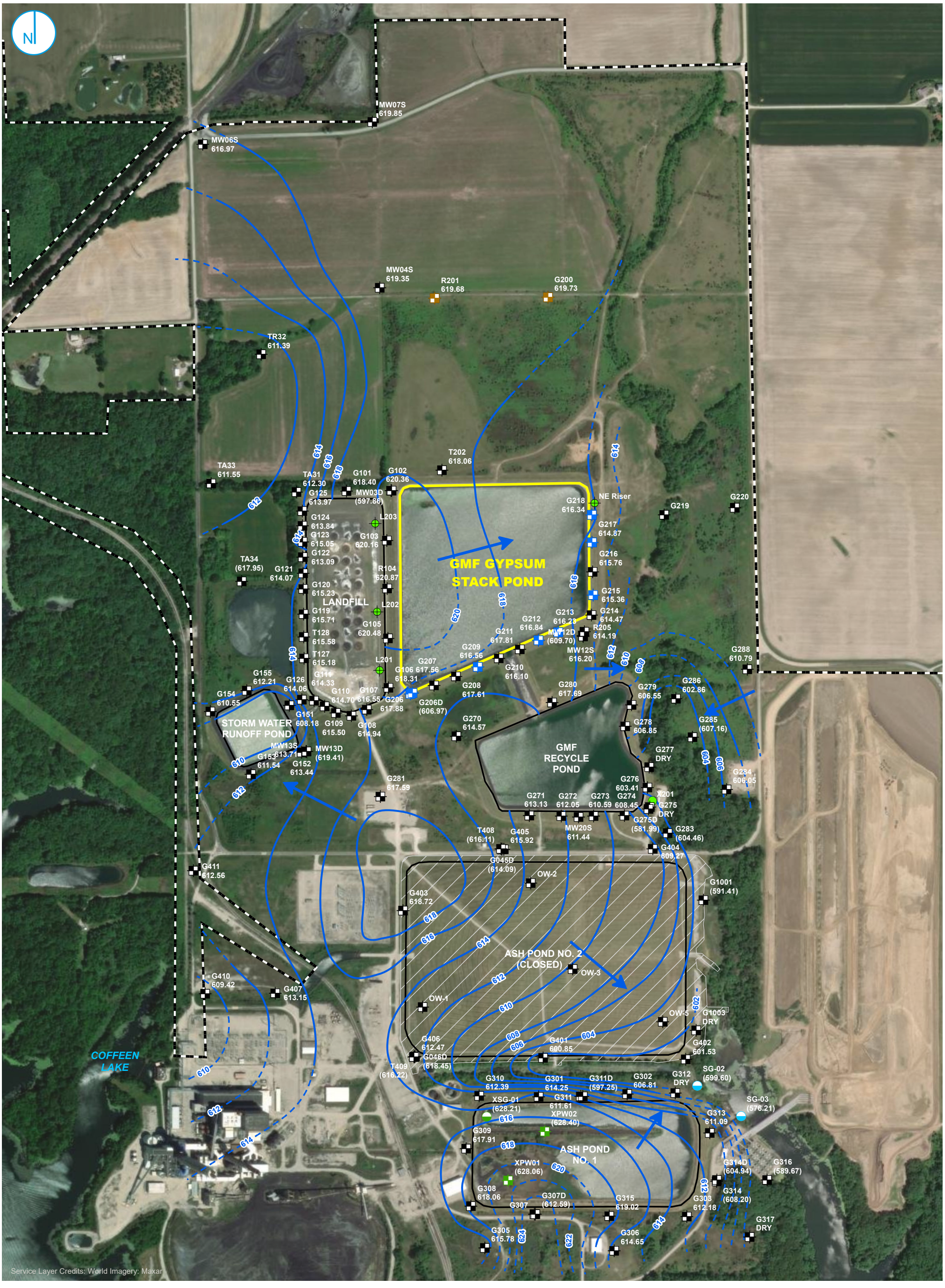
SITE MAP

FIGURE 1-3

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL



- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- MONITORING WELL
- PORE WATER WELL
- LEACHATE WELL
- STAFF GAGE, RIVER
- STAFF GAGE, CCR UNIT
- CCR SOURCE WATER SAMPLE
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

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).

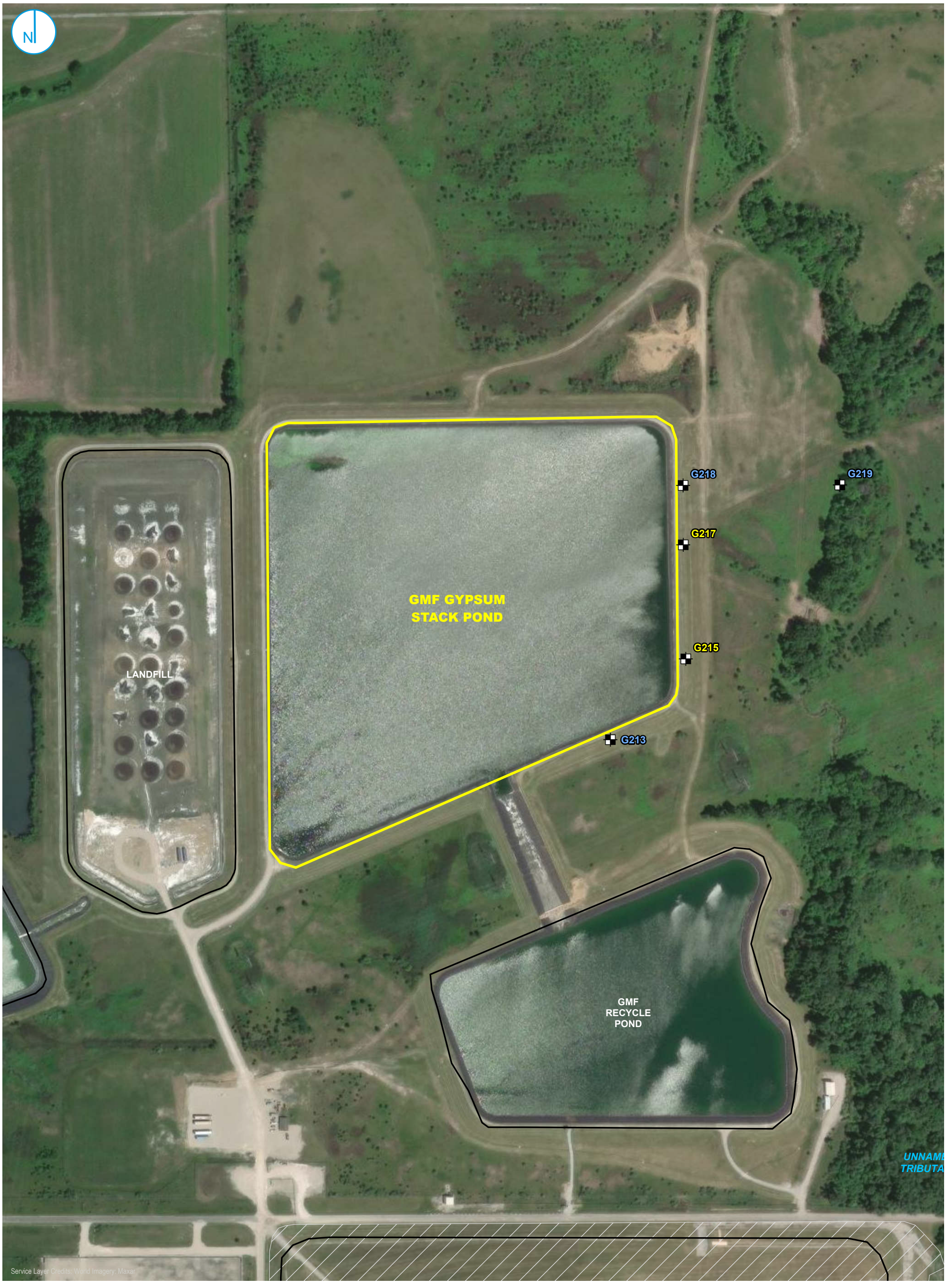
POTENTIOMETRIC SURFACE MAP
OCTOBER 28 AND 29, 2024

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 1-4

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL



MONITORING WELL
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

XXX INSIDE PLUME MONITORING WELL
XXX PLUME DEFINITION MONITORING WELL

0 150 300 Feet

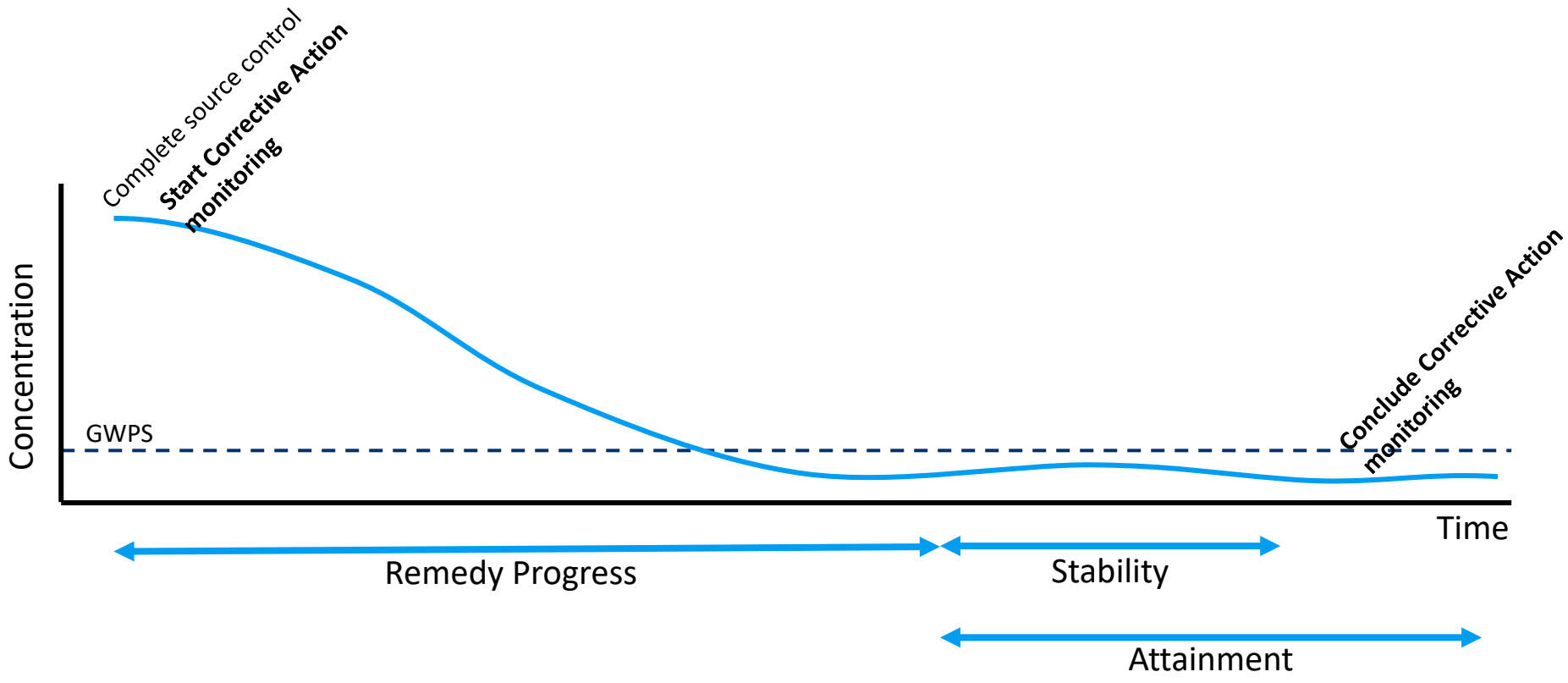
PROPOSED 35 I.A.C. § 845 CORRECTIVE ACTION MONITORING WELL LOCATION MAP

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL



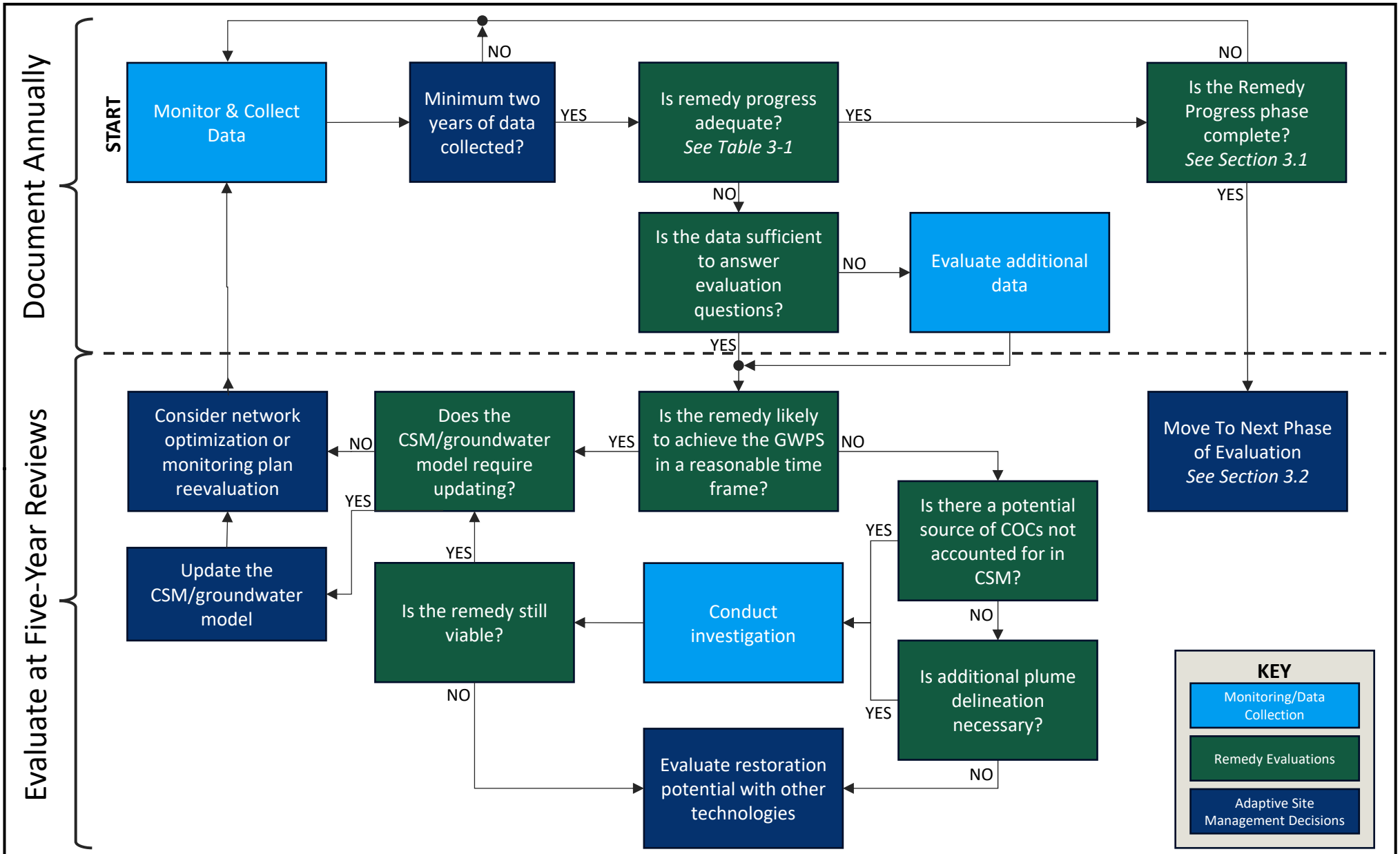
RAMBOLL

DRAFTED BY: AO | 2/7/2025

CORRECTIVE ACTION MONITORING TIMELINE

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Figure 3-1



Adapted from Figure 2 in USEPA (2014) *"Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind,"* Office of Solid Waste and Emergency Response. 9200.2-144. May. https://semspub.epa.gov/work/HQ/100000021.pdf

RAMBOLL

DRAFTED BY: AO | 2/7/2025

ADAPTIVE SITE MANAGEMENT DECISION-MAKING FLOW CHART

CORRECTIVE ACTION GROUNDWATER MONITORING PLAN
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Figure 3-2

APPENDICES

APPENDIX A
BORING LOGS AND WELL CONSTRUCTION FORMS

BORING LOGS

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, mild (mid-50's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers

FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G213
Well ID: G213
Surface Elev: 630.34 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,544.37N
2,515,723.51E

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

WATER LEVEL INFORMATION:
▼ = 20.00 - While drilling
▼ = 19.92 - Upon completion
▽ =

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	Elevation ft. MSL	Remarks
1A	23/24 *96%*	ss	*4-3* *4-5* N=7	15				FILL - Brown (10YR4/3) with 10% dark gray (10YR4/1) and 5% dark yellowish brown (10YR4/6) mottles, moist, silty CLAY with trace sand and gravel.	630	
2A	22/24 *92%*	ss	*2-4* *6-8* N=10	21			2		628	
3A	22/24 *92%*	ss	*2-4* *7-8* N=11	17			4		626	
4A	22/24 *92%*	ss	*2-4* *4-8* N=8	16			6		624	
5A	20/24 *83%*	ss	*1-3* *6-6* N=9	12			8		622	
6A	20/24 *83%*	ss	*2-2* *5-7* N=7	24			10	Dark gray (10YR4/1) with 25% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, trace roots.	620	
								Gray (10YR5/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT, trace roots.		
7A	20/24 *83%*	ss	*2-3* *3-5* N=6	19			12	Dark gray (10YR4/1) with 3% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	618	
8A	22/24 *92%*	ss	*1-2* *2-3* N=4	24			14	Dark gray (10YR4/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.	616	
9A	24/24 *100%*	ss	*woh-1* *2-2* N=3	24			16	Gray (10YR5/1) with 25% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.	614	
							18	Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, soft, very fine- to fine-grained sandy CLAY with trace gravel.	612	
10A	18/24 *75%*	ss	*woh-woh* *1-2*	24				Dark yellowish brown (10YR4/6), very moist, soft, sandy CLAY with trace gravel.		
							▼ 20			

NOTE(S): G213 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, mild (mid-50's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G213
Well ID: G213
Surface Elev: 630.34 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,544.37N
2,515,723.51E

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

WATER LEVEL INFORMATION:
▼ = 20.00 - While drilling
▼ = 19.92 - Upon completion
▽ =

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
11A	18/24 *75%*	ss	*1-1* *1-2* N=2	18				Dark yellowish brown (10YR4/6), moist, soft, clayey, very fine- to coarse-grained SAND with trace gravel.		610	
								Dark yellowish brown (10YR4/6), moist, firm, very silty CLAY with sand and gravel.			
							22			608	
12A	22/24 *92%*	ss	*10-13* *18-22* N=31	11				Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.			
							24				

End of Boring = 24.0 ft. BGS

NOTE(S): G213 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

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

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

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
1A	23/24 *96%*	ss	*5-3 3-5* N=6	18		
2A	19/24 *79%*	ss	*3-3 5-6* N=8	17		
3A	20/24 *83%*	ss	*2-3 7-7* N=10	13		
4A	23/24 *96%*	ss	*3-6 6-7* N=12	16		
4B				27		
5A	20/24 *83%*	ss	*3-3 3-5* N=6	20		
6A	13/24 *54%*	ss	*2-2 3-5* N=5	24		
7A	19/24 *79%*	ss	*2-3 4-6* N=7	17		
8A	20/24 *83%*	ss	*2-3 4-5* N=7	19		
9A	22/24 *92%*	ss	*1-3 3-4* N=6	19		
10A	24/24 *100%*	ss	*woh-1 2-2* N=3	17		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
2	FILL - Brown (10YR4/3) with 30% dark gray (10YR4/1) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	630	
4		628	
6		626	
8	FILL - Dark grayish brown (10YR4/2), moist, firm, silty CLAY with trace sand and gravel.	624	
10	FILL - Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.	622	
12	Very dark gray (10YR3/1), moist, firm, silty CLAY with trace sand, trace roots.	620	
14	Dark gray (10YR4/1) with 30% dark yellowish brown (10YR4/6) moist, firm, silty CLAY with trace sand.	618	
16	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.	616	
18	Dark gray (10YR4/1), moist, firm, clayey SILT with trace sand.	614	
20	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	612	
	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, soft, sandy CLAY with trace gravel.		

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

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

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

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
11A	20/24 *83%*	SS	*2-4 4-4* N=8	17				Dark yellowish brown (10YR4/6), moist, medium dense, clayey SILT with sand and trace gravel.		610	
								Yellowish brown (10YR5/6), moist, medium dense, silty, very fine- to fine-grained SAND.			
							22 ▽	Dark yellowish brown (10YR4/6) with 30% dark gray (10YR4/1) mottles, moist, firm, sandy CLAY with trace gravel.			
12A	24/24 *100%*	SS	*7-11 17-19* N=28	11				Grayish brown (10YR5/2), slightly moist, very firm, very silty CLAY with sand and gravel.		608	
12B	0/4 *0%*	BD		9			24	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.			

End of Boring = 24.3 ft. BGS

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/12/2010
Finish: 10/12/2010
WEATHER: Sunny, warm (lo-80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G217
Well ID: G217
Surface Elev: 630.67 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,185.57N
2,515,963.02E

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

WATER LEVEL INFORMATION:
▼ = 23.00 - While drilling
▼ = 24.82 - Upon completion
▽ = 23.98 - 10/13/10

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
1A	20/24 *83%*	ss	*5-2 3-4* N=5	21		
2A	19/24 *79%*	ss	*2-3 5-6* N=8	28		
3A	19/24 *79%*	ss	*2-3 6-7* N=9	14		
4A	23/24 *96%*	ss	*5-6 7-8* N=13	15		
5A	20/24 *83%*	ss	*3-5 7-6* N=12	13		
6A	19/24 *79%*	ss	*3-3 4-5* N=7	27		
7A	18/24 *75%*	ss	*3-4 6-8* N=10	28		
8A	20/24 *83%*	ss	*2-4 6-8* N=10	16		
9A	19/24 *79%*	ss	*2-3 4-5* N=7	26		
10A	19/24 *79%*	ss	*1-2 2-3* N=4	18		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	FILL - Brown (10YR4/3) with 10% dark gray (10YR4/1) and 5% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	630	
2		628	
4	FILL - Dark gray (10YR4/1) with 25% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	626	
6	FILL - Brown (10YR4/3) with 10% dark gray (10YR4/1) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	624	
8	FILL - Dark grayish brown (10YR4/2) with 5% dark yellowish brown (10YR4/6) slightly moist, firm, clayey SILT with trace sand and gravel.	622	
10	FILL - Very dark gray (10YR3/1), moist, firm, silty CLAY with trace sand and gravel.		
	Dark gray (10YR4/1), moist, firm, silty CLAY with trace sand and gravel.	620	
	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, trace roots.		
12	Dark grayish brown (10YR4/2) with 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY trace sand, trace roots.	618	
14	Dark gray (10YR4/1), moist, firm, silty CLAY with trace sand and gravel.	616	
16	Dark gray (10YR4/1) with 10% yellowish brown (10YR5/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	614	
18	Gray (10YR5/1) with 5% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with sand and trace gravel.	612	
20			

NOTE(S): G217 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/12/2010
Finish: 10/12/2010
WEATHER: Sunny, warm (lo-80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G217
Well ID: G217
Surface Elev: 630.67 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,185.57N
2,515,963.02E

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

WATER LEVEL INFORMATION:
▼ = 23.00 - While drilling
▼ = 24.82 - Upon completion
▽ = 23.98 - 10/13/10

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	Elevation ft. MSL	Remarks
								Gray (10YR5/1) with 5% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with sand and trace gravel. *[Continued from previous page]*	610	
11A	22/24 *92%*	ss	*woh-woh* *1-2*	18				Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with sand and trace gravel.		
							22			
12A	10/24 *42%*	ss	*4-6* *7-10* N=13	13			▼	Yellowish brown (10 YR5/4), wet, medium dense, silty, very fine- to coarse-grained SAND with trace gravel.	608	
							▽ 24			
13A	22/24 *92%*	ss	*8-18* *17-17* N=35	12			▼	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.	606	
							26			

End of Boring = 26.0 ft. BGS

NOTE(S): G217 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, warm (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G218
Well ID: G218
Surface Elev: 630.64 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,380.92N
2,515,962.16E

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

WATER LEVEL INFORMATION:
▼ = 24.00 - While drilling
▼ = 24.76 - Upon completion
▽ =

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
1A	18/24 75%	ss	4-1 2-1 N=3	20		
2A	22/24 92%	ss	2-2 3-5 N=5	20		
3A	19/24 79%	ss	2-3 4-8 N=7	17		
4A	22/24 92%	ss	2-5 6-8 N=11	14		
5A	20/24 83%	ss	3-4 8-7 N=12	17		
6A	19/24 79%	ss	2-2 3-5 N=5	19		
6B				25		
7A	22/24 92%	ss	2-3 5-7 N=8	22		
8A	18/24 75%	ss	2-3 4-5 N=7	19		
9A	24/24 100%	ss	2-2 2-4 N=4	19		
10A	24/24 100%	ss	1-2 2-3 N=4	18		

Depth ft. BGS	Lithologic Description	Elevation ft. MSL
	FILL - Brown (10YR4/3) with 15% dark gray (10YR4/1) and 5% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.	630
2		
	FILL - Dark gray (10YR4/1) with 30% brown (10YR4/3) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	628
4		626
6		624
	FILL - Brown (10YR5/3) with 10% dark gray (10YR4/1) mottles, slightly moist, firm, clayey SILT with trace sand and gravel.	
8		622
	Dark grayish brown (10YR4/2) with 5% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.	
10		620
	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, slight trace roots.	
12		618
	Dark gray (10YR4/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.	
14		616
16		614
	Gray (10YR5/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.	
18		612
20		

Borehole Detail

Remarks

NOTE(S): G218 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: Start: 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, warm (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: Driller: D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G218
Well ID: G218
Surface Elev: 630.64 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,380.92N
2,515,962.16E

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

WATER LEVEL INFORMATION:
▼ = 24.00 - While drilling
▼ = 24.76 - Upon completion
▽ =

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	Elevation ft. MSL	Remarks
11A	22/24 92%	ss	woh-woh woh-woh	16				Gray (10YR5/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, very soft, clayey, very fine- to coarse-grained SAND with trace gravel.	610	
							22			
12A	24/24 100%	ss	1-1 1-3 N=2	10				Yellowish brown, wet, loose, silty, very fine- to coarse-grained SAND with trace gravel.	608	
12B				16				Dark gray (10YR4/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		
							▼ 24			
13A	24/24 100%	ss	1-5 9-13 N=14	20			▼	Gray (10YR5/1), wet, loose, silty, very fine- to coarse-grained SAND with trace gravel.	606	
13B				17				Dark gray (10YR4/1), slightly moist, very firm, very silty CLAY with sand and gravel.		
							26			

End of Boring = 26.0 ft. BGS

NOTE(S): G218 installed in borehole.

RAMBOLL

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Coffeen 2024 Nature & Extent Investigation		G219

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Ethan Orange Cascade Drilling LP	3/18/2024	3/18/2024	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
G219	Feet (NAVD88)	617.04 Feet (NAVD88)	6.0 inches

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

State Plane 876,384.36 N, 2,516,476.36 E E/W

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

Lat 39° 4' 15.1464"

Long -89° 23' 31.722"

Local Grid Location

Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Montgomery	Illinois	Coffeen

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	120 92		1 2 3 4 5 6 7 8 9 10 11 12	0 - 8' **SILTY CLAY:** CL/ML, dark yellowish brown (10YR 3/4), sand (0-5%), very stiff, plastic, moist.	CL/ML									
				5' - 7' reddish gray (5YR 5/2) lenses (10%), reddish gray (5YR 5/2) orange oxidation (10%).										
				7' - 8' orange oxidation (10%).										
				8 - 9' **SILTY CLAY WITH SAND:** (CL/ML)S, grayish brown (2.5Y 5/2), orange oxidation (10%), fine sand, sbangular to subrounded sand, fine gravel (0-5%), very stiff, medium plasticity, moist.	(CL/ML)S									
				9 - 10.5' **SANDY SILT:** s(ML), light olive brown (2.5Y 5/6), medium plasticity, soft, wet.	s(ML)									
2 CS	120 120			10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist.	(CL/ML)S									Soil sample collected from 9.5-10 feet below ground surface (ft bgs).

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

Signature

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

Boring Number G219

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				10.5 - 20' **SILTY CLAY WITH SAND:** (CL/ML)S, very dark grayish brown (10YR 3/2), fine to coarse sand, stiff, medium to low plasticity, moist. *(continued)*										
			13											
			14											
			15											
			16		(CL/ML)S									Soil sample collected from 11-20 ft bgs.
			17											
			18											
			19											
			20	20' End of Boring.										

WELL CONSTRUCTION FORMS

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G213

Site Name: AEG Coffeen Power Station CCB Management Facility Borehole #: G213

State Plane Coordinate: X 2,515,723.5 Y 875,544.4 (or) Latitude: 39 ° 4 ' 6.9 " Longitude: -89 ° 23 ' 41.4 "

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

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

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna L. Simpson Date Started: 10/12/2010 Date Finished: 10/12/2010

Report Form Completed By: Suzanna L. Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

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

Installation Method: Gravity

Setting Time: 10 min

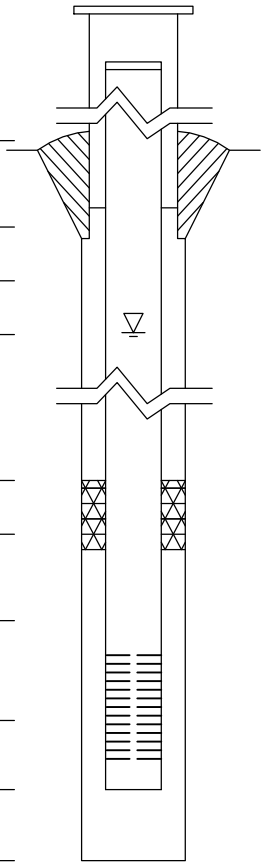
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

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

Installation Method: n/a



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
633.08	-2.74	Top of Protective Casing
632.81	-2.47	Top of Riser Pipe
630.34	0.00	Ground Surface
627.64	2.70	Top of Annular Sealant
615.01	15.33	Static Water Level (After Completion) 11/15/2010
616.54	13.80	Top of Seal
615.34	15.00	Top of Sand Pack
613.59	16.75	Top of Screen
609.05	21.29	Bottom of Screen
608.52	21.82	Bottom of Well
606.34	24.00	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)	19.22
Bottom of Screen to End Cap	(feet)	0.53
Screen Length (1st slot to last slot)	(feet)	4.54
Total Length of Casing	(feet)	24.29
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G215

Site Name: CCB Management Facility Borehole #: G215

State Plane Coordinate: X 2,515,971.6 Y 875,810.2 (or) Latitude: 39° 4' 9.500" Longitude: -89° 23' 38.200"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

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

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/13/2010 Date Finished: 10/13/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

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

Installation Method: Gravity

Setting Time: 20 min

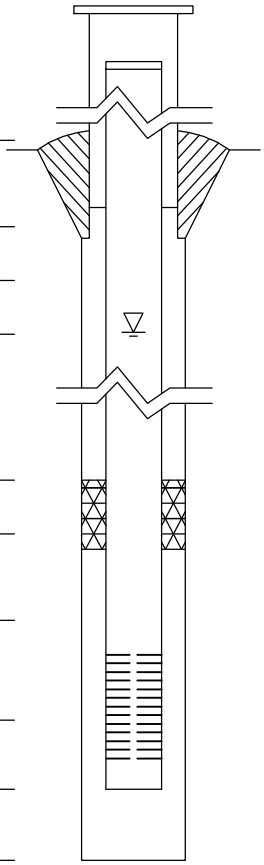
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

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

Installation Method: n/a



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
633.30	-2.82	Top of Protective Casing
633.06	-2.58	Top of Riser Pipe
630.48	0.00	Ground Surface
627.58	2.90	Top of Annular Sealant
607.64	22.84	Static Water Level (After Completion) 11/15/2010
614.08	16.40	Top of Seal
612.98	17.50	Top of Sand Pack
611.07	19.41	Top of Screen
606.68	23.80	Bottom of Screen
606.17	24.31	Bottom of Well
606.17	24.31	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:
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)	21.99
Bottom of Screen to End Cap	(feet)	0.51
Screen Length (1st slot to last slot)	(feet)	4.39
Total Length of Casing	(feet)	26.89
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G217

Site Name: AEG Coffeen Power Station CCB Management Facility Borehole #: G217

State Plane Coordinate: X 2,515,963.0 Y 876,185.6 (or) Latitude: 39 ° 4 ' 13.2 " Longitude: -89 ° 23 ' 38.3 "

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

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

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna L. Simpson Date Started: 10/12/2010 Date Finished: 10/12/2010

Report Form Completed By: Suzanna L. Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

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

Installation Method: Gravity

Setting Time: 11 min

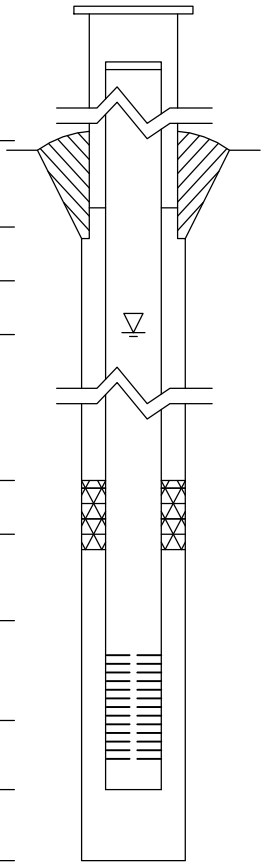
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

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

Installation Method: n/a



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
633.34	-2.67	Top of Protective Casing
633.10	-2.43	Top of Riser Pipe
630.67	0.00	Ground Surface
628.27	2.40	Top of Annular Sealant
609.28	21.39	Static Water Level (After Completion) 11/15/2010
612.82	17.85	Top of Seal
611.82	18.85	Top of Sand Pack
610.18	20.49	Top of Screen
605.79	24.88	Bottom of Screen
605.29	25.38	Bottom of Well
604.67	26.00	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)	22.92
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.39
Total Length of Casing	(feet)	27.81
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G218

Site Name: CCB Management Facility Borehole #: G218

State Plane Coordinate: X 2,515,962.2 Y 876,380.9 (or) Latitude: 39° 4' 15.200" Longitude: -89° 23' 38.200"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

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

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/12/2010 Date Finished: 10/12/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

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

Installation Method: Gravity

Setting Time: 17 min

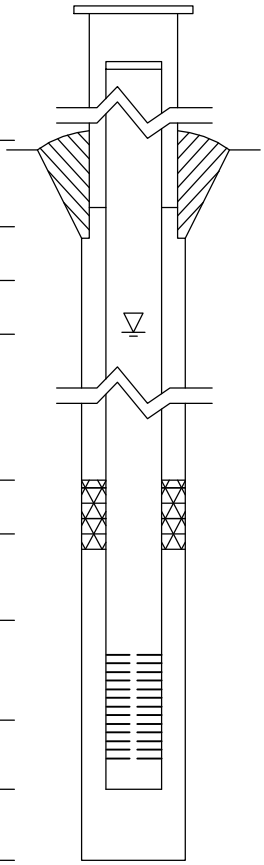
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

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

Installation Method: n/a



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
633.34	-2.70	Top of Protective Casing
633.11	-2.47	Top of Riser Pipe
630.64	0.00	Ground Surface
627.14	3.50	Top of Annular Sealant
609.89	20.75	Static Water Level (After Completion) 11/15/2010
613.14	17.50	Top of Seal
612.14	18.50	Top of Sand Pack
610.31	20.33	Top of Screen
605.87	24.77	Bottom of Screen
605.37	25.27	Bottom of Well
604.64	26.00	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:
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)	22.80
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.44
Total Length of Casing	(feet)	27.74
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

RAMBOLL

MONITORING WELL CONSTRUCTION

Facility/Project Name Coffeen 2024 Nature & Extent Investigation	Local Grid Location of Well _____ft. ☐ N. ☐ S. _____ft. ☐ E. ☐ W.	Well Name G219
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 39° 4' 15.1" Long. -89° 23' 31.7" or	
Facility ID	St. Plane 876,384 ft. N, 2,516,476 ft. E. S / C / N	Date Well Installed 03/18/2024
Type of Well Well Code 11/mw	Section Location of Waste/Source _____1/4 of _____ 1/4 of Sec. _____, T. _____ N, R. _____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Ethan Orange
Distance from Waste/ Source ft. / State Illinois	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known Gov. Lot Number _____	Cascade Drilling LP

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

B. Well casing, top elevation 620.51 ft. (NAVD88)

C. Land surface elevation 617.0 ft. (NAVD88)

D. Surface seal, bottom 616.0 ft. (NAVD88) or 1.0 ft.

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

13. Sieve analysis attached? ☐ Yes ☒ No

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

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

16. Drilling additives used? ☒ Yes ☐

Describe N

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

E. Bentonite seal, top 616.0 ft. (NAVD88) or 1.0 ft.

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

G. Filter pack, top 613.0 ft. (NAVD88) or 4.0 ft.

H. Screen joint, top 612.0 ft. (NAVD88) or 5.0 ft.

I. Well bottom _____ ft. (NAVD88) or _____ ft.

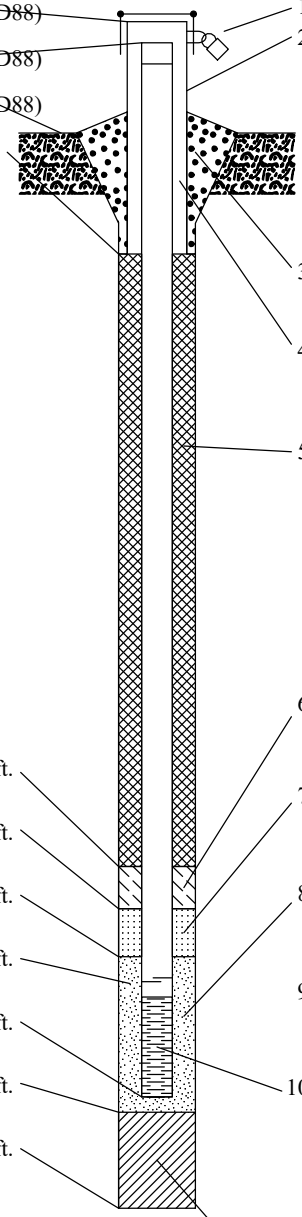
J. Filter pack, bottom 601.0 ft. (NAVD88) or 16.0 ft.

K. Borehole, bottom 597.0 ft. (NAVD88) or 20.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: 5.0 ft.
c. Material: Steel ☒
_____ Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 4 - 3.5"x5' steel bollards
3. Surface seal: Bentonite ☐
Concrete ☒
_____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ☒
Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☒
b. _____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. _____Lbs/gal mud weight . . . Bentonite slurry ☐
d. _____% Bentonite . . . Bentonite-cement grout ☐
e. 0.52 Ft^3 volume added for any of the above
f. How installed: Tremie ☐
Tremie pumped ☐
Gravity ☒
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. PW Gillibrand Co., Inc. 16/30
b. Volume added 2.1 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
_____ Other ☐
10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒
Continuous slot ☐
_____ Other ☐
b. Manufacturer Johnson
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐
3/8" bentonite Other ☒

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

Date Modified: 3/24/2025

Signature

Firm Ramboll Americas Engineering Solutions, Inc.
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APPENDIX B
35 I.A.C. 845 Multi-Site Statistical Analysis Plan

Date
April 1, 2025

Project No.
1940110241

35 I.A.C § 845 MULTI-SITE STATISTICAL ANALYSIS PLAN

RAMBOLL Bright ideas. Sustainable change.

35 I.A.C § 845 MULTI-SITE STATISTICAL ANALYSIS PLAN

Project no.	**1940110241**
Recipient	**Vistra Corp**
Document type	**Statistical Analysis Plan**
Revision	**FINAL**
Date	**April 1, 2025**
Prepared by	**Rachel Banoff and Alison O'Connor**
Checked by	**Eric J. Tlachac, PE**
Approved by	**Brian G. Hennings, PG**

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LICENSED PROFESSIONAL CERTIFICATIONS

This certification is based on the description of the statistical methods selected to evaluate groundwater as presented in the following 35 I.A.C. § 845 Multi-Site Statistical Analysis Plan. The procedures described in the plan will be used to establish background conditions and implement compliance and corrective action monitoring as necessary and required by 35 I.A.C. § 845.640, § 845.650, and § 845.680. The 35 I.A.C. § 845 Multi-Site Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640(f), with reference to the acceptable statistical procedures provided in the United States Environmental Protection Agency (USEPA)'s *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (*Unified Guidance,* USEPA 2009), and is intended to provide a logical process and framework for conducting the statistical analysis of the data obtained during groundwater monitoring. In accordance with 35 I.A.C. § 845.640(f)(1), the statistical method chosen for analysis of background groundwater quality is the tolerance interval procedure for each constituent listed in 35 I.A.C. § 845.600(a)(1) at this CCR unit per 35 I.A.C. § 845.640(f)(1)(C). Groundwater Protection Standards (GWPS) will be established in accordance with 35 I.A.C. § 845.600(a) (greater of the background concentration or numerical limit specified in 35 I.A.C. § 845.600(a)(1)). The GWPS will be compared to the appropriate confidence interval for the observed concentrations for each constituent in each compliance well. Consistent with the *Unified Guidance*, the same general statistical method of confidence interval testing against a fixed GWPS is recommended in compliance and corrective action programs. Confidence intervals provide a flexible and statistically accurate method to test how a parameter estimated from a single sample compares to a fixed numerical limit. Confidence intervals explicitly account for variation and uncertainty in the sample data used to construct them.

Description of the statistical methods chosen for analysis of groundwater monitoring data and application of these methods for determining exceedances of the GWPS identified in 35 I.A.C. § 845.600(a) is provided in this 35 I.A.C. § 845 Multi-Site Statistical Analysis Plan.

35 I.A.C. § 845.640 Statistical Analysis (PE)

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the statistical methods summarized above and described in this document (35 I.A.C. § 845 Multi-Site Statistical Analysis Plan) are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Date: April 1, 2025

35 I.A.C. § 845.640 Statistical Analysis (PG)

I, Brian G. Hennings, a qualified professional geologist in good standing in the State of Illinois, certify that the statistical methods described in this document (35 I.A.C. § 845 Multi-Site Statistical Analysis Plan) are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.

Brian G. Hennings
Professional Geologist
196.001482
Illinois
Date: April 1, 2025

35 I.A.C. § 845.640 Statistical Analysis

I, Rachel A. Banoff, a qualified professional, certify that the statistical methods described in this document (35 I.A.C. § 845 Multi-Site Statistical Analysis Plan), are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.

Rachel A. Banoff, EIT
Project Statistician
Date: April 1, 2025

DOCUMENT REVISION RECORD

Issue No.	Date	Details of Revisions
Revision 0	April 1, 2025	• Original Document

DOCUMENT APPLICABILITY BY FACILITY OWNER

Table A. Document Applicability by Facility Owner

Facility & Owner	Unit ID	Unit Name
Baldwin Power Plant Dynegy Midwest Generation, LLC	601	Bottom Ash Pond
	605	Fly Ash Pond System
Coffeen Power Plant Illinois Power Generating Company	101	Ash Pond No. 1
	102	Ash Pond No. 2
	103	GMF Gypsum Stack Pond
	104	GMF Recycle Pond
Duck Creek Power Plant Illinois Power Resources Generating, LLC	201/202	Ash Pond No. 1 Ash Pond No. 2
	203	GMF Pond
	205	Bottom Ash Basin
Edwards Power Plant Illinois Power Resources Generating, LLC	301	Ash Pond
Hennepin Power Plant Dynegy Midwest Generation, LLC	802	Ash Pond No. 2
	803	East Ash Pond
	804	Old West Ash Pond
	802/805	Ash Pond No. 2 Ash Pond No. 4
Joppa Power Plant Electric Energy, Inc.	401	East Ash Pond
	403	West Ash Pond
Kincaid Power Plant Kincaid Generation, LLC	141	Ash Pond
Newton Power Plant Illinois Power Generating Company	501	Primary Ash Pond
Vermilion Power Plant Dynegy Midwest Generation, LLC	910	North Ash Pond
	911/912	Old East Ash Pond New East Ash Pond

CONTENTS

Licensed Professional Certifications		**1**
1.	**Introduction**	**7**
1.1	Statistical Analysis Objectives	7
1.2	Statistical Analysis Plan Approach	7
2.	**Groundwater Data Evaluation And Statistical Assumptions**	**9**
2.1	Sample Independence	9
2.2	Non-Detect Data Processing	9
2.3	Testing for Normality	9
2.4	Outlier Evaluation and Management	10
2.5	Trend Analysis	10
2.6	Spatial Variation	11
2.7	Temporal Variation	11
2.8	Updating Background	11
3.	**Compliance Monitoring Program**	**12**
3.1	Monitoring Program Outline	12
3.1.1	Establish Background and GWPS	12
3.1.2	Evaluate Background and GWPS Exceedances	12
3.2	Upper Tolerance Limit	13
3.3	Confidence Intervals	15
3.3.1	Confidence Intervals Around Trending Data	15
3.3.2	Parametric Confidence Intervals around a Mean	17
3.3.3	Non-Parametric Confidence Intervals around a Median	18
4.	**Corrective Action Monitoring Program**	**19**
4.1	Remedy Progress Evaluation	19
4.1.1	Central Tendency	19
4.1.2	Trend of Average Concentration in Individual Wells and in a Plume	20
4.2	Stability Evaluation	20
4.3	Attainment Evaluation	20
5.	**References**	**22**

FIGURES (IN TEXT)

Figure 1 Flow chart illustrating the statistical methods used for calculating background under Compliance Monitoring

Figure 2 Flow chart illustrating the statistical methods used for calculating confidence intervals in Compliance Monitoring

ACRONYMS AND ABBREVIATIONS

%	percent
35 I.A.C.	Title 35 of the Illinois Administrative Code
CCR	coal combustion residuals
CI	confidence interval
DQR	Double Quantification Rule
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
IEPA	Illinois Environmental Protection Agency
LCL	lower confidence limit
LTL	lower tolerance limit
MDL	method detection limit
PQL	practical quantitation limit
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
SAP	Sampling and Analysis Plan
SI	surface impoundment
UCL	upper confidence limit
Unified Guidance	Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance (USEPA, 2009)
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit

1. INTRODUCTION

In April 2021, the Illinois Environmental Protection Agency (IEPA) issued a final rule for the regulation and management of coal combustion residuals (CCR) in surface impoundments (SIs) under the Standards for the Disposal of CCR in Surface Impoundments: Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845. Facilities regulated under 35 I.A.C. § 845 are required to develop and sample a groundwater monitoring well system to evaluate whether impounded CCR materials are impacting groundwater quality. The groundwater quality evaluation must include certification from a qualified professional engineer that the selected statistical method is appropriate for evaluating groundwater monitoring data for the CCR surface impoundment. The procedures described in the evaluation will be used to establish background conditions and implement Compliance and Corrective Action Monitoring as necessary and required by 35 I.A.C. § 845.640, § 845.650, § 845.680, and § 845.780. This Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640(f), with reference to the acceptable statistical procedures provided in United States Environmental Protection Agency's (USEPA's) Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (Unified Guidance) (USEPA, 2009).[1]

1.1 Statistical Analysis Objectives

This Multi-Site Statistical Analysis Plan provides a framework for conducting the statistical analyses of groundwater data collected during operation, post-closure care, and corrective action monitoring (if required). This Multi-Site Statistical Analysis Plan does not include procedures for groundwater sample collection and analysis conducted in accordance with the Multi-Site Sampling and Analysis Plan (SAP; Ramboll, 2022) or data quality evaluation conducted in accordance with the Multi-Site Quality Assurance Project Plan (QAPP; Ramboll, 2022).[2]

1.2 Statistical Analysis Plan Approach

The analyses described in this document are intended to support monitoring programs described in detail in the CCR unit-specific Operating Permit Groundwater Monitoring Plans (GMPs), Closure Construction Permit GMPs, and Corrective Action GMPs. When necessary and contingent upon equivalent statistical power, an alternative test consistent with the performance standards in 35 I.A.C. § 845.640(g), not included in this Statistical Analysis Plan, may be chosen due to site-specific data requirements.

35 I.A.C. § 845 outlines three phases of groundwater monitoring:

- Baseline Monitoring in accordance with 35 I.A.C. § 845.650(b)(1)
- Compliance Monitoring in accordance with 35 I.A.C. § 845.650 and 35 I.A.C. § 845.780(b)
- Corrective Action Monitoring in accordance with 35 I.A.C. § 845.680(a)

Each phase of the groundwater monitoring program requires specific statistical procedures to accomplish the intended purpose. During the first phase, background groundwater quality will be established, utilizing upgradient and background wells. Compliance Monitoring, which

[1] Despite being currently archived on USEPA's website, the Unified Guidance remains a valid reference for developing a statistical analysis plan (personal communication with Alison O'Connor, February 11, 2025).

[2] The Multi-Site Sampling and Analysis Plan and Multi-Site Quality Assurance Project plan are living documents which are subject to routine evaluation and updates in accordance with USEPA recommended best practices (USEPA 2020; USEPA 2023).

encompasses data collection and statistical evaluation conducted during unit operation and the post-closure care period, will then evaluate whether exceedances occur for 20 required constituents (per 35 I.A.C. § 845.600(a)(1)) relative to the groundwater protection standard (GWPS) established by 35 I.A.C. § 845.600. Corrective Action Monitoring evaluates remedy progress and completion and will be initiated upon implementation of the Corrective Action GMP.

2. GROUNDWATER DATA EVALUATION AND STATISTICAL ASSUMPTIONS

The following subsections outline the statistical tests and procedures utilized to evaluate data collected for consistency with statistical assumptions and evaluate data distribution. These methods may be used in any phase of groundwater monitoring.

2.1 Sample Independence

Independence of sample results is a major assumption for most statistical analyses. To ensure physical independence of groundwater sampling results, the minimum time between sampling events must be longer than the time required for groundwater to move through the monitoring well. Therefore, the minimum time interval between sampling events is a function of the groundwater velocity and well bore volume (diameter of the well and surrounding filter pack). The sampling schedules for Baseline Monitoring, Compliance Monitoring, and Corrective Action Monitoring are specified in 35 I.A.C. § 845 and may conflict with the statistical assumption of independence of sample results.

2.2 Non-Detect Data Processing

Groundwater sample analysis results below the reporting limit (RL), also referred to as the practical quantitation limit (PQL), will not be used in statistical calculations due to the inherent uncertainty in results that are estimated between the method detection limit (MDL) and RL/PQL, and error assumptions inherent to the statistical calculations. Results below the RL/PQL will be considered non-detect data. For statistical characterization evaluations (*e.g.*, distribution testing, and trend analysis), non-detects were replaced with the half of the RL for the analysis. For statistical test procedures that involve the calculation of a mean and standard deviation (as described in **Section 3**):

- If the frequency of non-detect data are less than or equal to 15 percent (%), half of the RL will be substituted for these data.
- If the non-detect frequency is greater than 15% and less than or equal to 50% and the data are normally or log-normally distributed (**Section 2.3**), the Kaplan-Meier method will be used to estimate the mean and standard deviation adjusted for the presence of left-censored values.
- If the non-detect frequency is greater than 50% or data are not normally or log-normally distributed (**Section 2.3**), a non-parametric test or calculation will be used.

2.3 Testing for Normality

In accordance with 35 I.A.C. § 845.640(g)(1), "the statistical method used to evaluate groundwater monitoring data must be appropriate for the distribution of constituents". The Unified Guidance document recommends the Shapiro-Wilk normality test for sample sizes of 50 or less, and the Shapiro-Francia normality test for sample sizes greater than 50. Log-transformation of datasets to achieve normal distributions is preferred to using non-parametric methods. However, if data normality cannot be achieved through log transformation, a non-parametric method is used.

2.4 Outlier Evaluation and Management

Groundwater analytical data may be screened for the existence of outliers using methods described by the Unified Guidance. Outliers are extreme data points that may represent an anomaly or erroneous data point. To test for outliers, one or more of the following outlier tests will be utilized:

- Dixon's test, for well-constituent pairs with less than 25 samples, assumes normally distributed data.
- Rosner's test, for well-constituent pairs with more than 20 samples, assumes normally distributed data.
- Grubb's test for well-constituent pairs with seven or more samples, assumes normally distributed data.

In addition, time series, box-whisker plots, and probability plots will be used to provide visual tools to identify potential outliers, and evaluation of seasonal, spatial, or temporal variability for both normally and non-normally distributed data.

When necessary, a confirmatory sample will be collected to allow the facility to distinguish between an outlier and a true release from the facility (35 I.A.C. § 845.650(d)). If re-sampling is necessary, this sample will be collected within 60 days following outlier identification. Rigorous data validation and review is preferred to formal outlier testing and exclusion to ensure that all data used in statistical evaluations is representative of field conditions. Quality control/quality assurance data are collected and data verification is completed in accordance with the QAPP. Project staff familiar with the site and historical data will review the data generated each quarter and facilitate additional validation as needed. Data quality control, groundwater geochemistry, and sampling procedures will be evaluated as potential sources of error leading to an outlier result. Exclusion of potential outliers without an identified source of error may be considered only for data that could cause extremely elevated background concentrations.

2.5 Trend Analysis

Statistical analyses confirming the lack of trend are a fundamental step to confirm the assumption that groundwater quality values (*i.e.,* constituent means) are stationary or constant over time. These analyses allow for evaluation of variation in the background and compliance data for each constituent over time. A statistically significant increasing trend in the background data could indicate an existing release from the CCR unit or alternative source, requiring further investigation. In addition, statistically significant trending background data can result in increased standard deviation and, therefore, greater prediction or tolerance limits. Consequently, the increased prediction or tolerance limit will have less statistical power or ability to identify a release from a CCR unit.

A linear regression, coupled with a t-test for slope significance at a 95% confidence level (or 0.05 significance level), may be used on datasets for each constituent with few non-detects and a normally distributed variance of the mean to evaluate time trends. The Theil-Sen trend line, coupled with the Mann-Kendall test for slope significance at a 95% confidence level (or 0.05 significance level), may be used for datasets with frequent non-detects or non-normal variance. Similarly, trend analyses could also be used on compliance data to evaluate a possible release from the CCR unit.

2.6 Spatial Variation

Spatial trends and/or variation between background wells could indicate an existing release from a CCR unit. If the spatial variability is not due to an existing release, intrawell comparisons in compliance wells may be used to account for spatial variability and monitor for a future release. However, the CCR units being monitored have been placed into service prior to the start of groundwater monitoring and it is unknown whether a previous release has occurred. Accordingly, intrawell comparisons in compliance wells cannot be used to determine the occurrence of a future release, and interwell comparisons between compliance wells and background wells will be used.

2.7 Temporal Variation

Time series plots can be used to identify temporal dependence. Potentially significant temporal components of variability can be identified by graphing single constituent data from multiple wells together on a time series plot. With temporal dependence, the time series plot has a pattern of parallel traces, in which the individual wells will tend to rise and fall together across the sequence of sampling dates. Time series plots can be helpful by plotting multiple constituents over time for the same well, or averaging values for each constituent across wells on each sampling event and then plotting the averages over time. In either case, the plots can signify whether the general concentration pattern over time is simultaneously observed for different constituents. If so, it may indicate that a group of constituents is highly correlated in groundwater or that the same artifacts of sampling and/or lab analysis impacted the results of several monitoring parameters.

2.8 Updating Background

Updating the background dataset periodically by adding recent results to an existing background dataset can improve the statistical power and accuracy of the statistical analysis, especially for non-parametric prediction intervals. The Unified Guidance recommends updating statistical limits (background) when at least four to eight new measurements (every 2 to 4 years under a semiannual monitoring program or 1 to 2 years under a quarterly monitoring program) are available for comparison to historical data. Methods discussed in **Section 2.4** and professional judgement will be used to evaluate whether any individual data points appear to drive an anomalously high background level. A t-test for equal means (if normal data distribution) or a Mann-Whitney or Wilcoxon test for equal medians (if non-normal data distribution) will be conducted to verify that the two groups of background sample populations are statistically different prior to updating any background datasets. A 0.05 significance level will be utilized when evaluating the two populations, with the null hypothesis that the two populations have equal means or medians. In addition, time series graphs or other trend evaluation statistics (such as a Mann-Kendall test) will be conducted on the new background dataset to verify the absence of a release or changing groundwater quality. If the tests indicate that there are no statistical differences between the two background populations, the new data will be combined with the existing dataset. If the two populations are found to be different, the data will be reviewed to evaluate the cause of the difference. If the differences appear to be caused by a release (*i.e.,* if the new data are significantly higher, or lower for pH), then the previous background dataset may continue to be used. Furthermore, verified outliers will not be added to an existing background dataset. Spatial variability among background wells will also be assessed when background datasets are updated to determine whether pooling data is appropriate.

3. COMPLIANCE MONITORING PROGRAM

Compliance Monitoring encompasses data collection and statistical evaluation conducted during unit operation (35 I.A.C. § 845.640 and 845.650) and the post-closure care period (35 I.A.C. § 845.780). Compliance Monitoring is designed to evaluate whether concentrations of constituents listed in 35 I.A.C. § 845.600(a)(1) in compliance wells exceed GWPS or background in a statistically significant manner.

3.1 Monitoring Program Outline

3.1.1 Establish Background and GWPS

A site-specific GWPS will be established for constituents listed in 35 I.A.C. § 845.600(a)(1) for each CCR unit. The GWPS will be the concentration specified in 35 I.A.C. § 845.600(a)(1), unless the background concentration is greater. For this exception, background concentrations will be used to define the GWPS. Background concentrations will be calculated using a parametric or non-parametric upper tolerance limit (UTL), depending on the data distribution, consistent with 35 I.A.C. § 845.640(f)(1)(C). The procedure for calculating a UTL is outlined in **Figure 1** and described in **Section 3.2**. If only one background result is detected, that value will be used as the UTL.

3.1.2 Evaluate Background and GWPS Exceedances

Per 35 I.A.C. § 845.610(b)(3), groundwater monitoring data from compliance monitoring wells will be evaluated for statistically significant exceedances over background and the site-specific GWPS. In accordance with recommendation in the Unified Guidance for compliance monitoring, exceedances are evaluated by comparing a confidence interval (CI) to a fixed standard. The null hypothesis of this comparison is that compliance well groundwater concentrations do not exceed the standard unless the statistical test indicates otherwise.

GWPS exceedances will be determined by comparing the lower confidence limit (LCL) of the compliance well concentrations to the GWPS, except for pH where the LCL will be compared to the upper end of the GWPS range, and the upper confidence limit (UCL) compared to the low end of the GWPS range. A GWPS exceedance is determined if the LCL is greater than the GWPS, and, for pH, either the LCL is greater than the upper end of the GWPS range or the UCL is less than the low end of the GWPS range. The method of calculating the CI (outlined in **Figure 2** and described in **Section 3.3**) will be determined by sample size, trends in the data, and data normality. The significance level (alpha) for this calculation will be fixed at 0.01 (99% confidence) as recommended by Unified Guidance. If there are too few data points to calculate an LCL (a minimum of four data points is typically required), the most recent data point will be compared to the GWPS.

In the event that statistical analyses identify an exceedance of the GWPS for one or more parameters, the exceedance parameters and wells of concern may be immediately re-sampled. Compliance Monitoring statistics will be updated using the verification resample. If the Compliance Monitoring statistics using the compliance verification resample data result in an exceedance of the GWPS, the exceedance is confirmed.

Comparison of groundwater monitoring data to background is required by 35 I.A.C. § 845.610(3)(B), but these background "exceedances" do not carry any compliance implications.

Background exceedances will be determined by comparing the LCL of the compliance well concentrations to the background UTL, with the exception of pH where the UCL of the compliance well concentrations will also be compared to the background lower tolerance limit (LTL). A background exceedance is determined if the LCL is greater than the background UTL, or, for pH, either the LCL is greater than the UTL or the UCL is less than the LTL. If there are too few data points to calculate an LCL (a minimum of four data points is required), the most recent data point will be compared to the background UTL (and LTL for pH).

Additionally, an exceedance of either background or GWPS will be identified if the constituent monitored was not detected in all previous samples at a compliance well and the two most recent samples have both detections and exceed the GPWS (or are less than the low end of the GWPS range for pH) or background UTL (or are less than the LTL for pH).

3.2 Upper Tolerance Limit

The method for calculating a UTL depends primarily on the proportion of non-detects and the data distribution (**Figure 1**). A parametric UTL will be used to calculate the GWPS when the background data are normally distributed and have a non-detect frequency of 50% or less. The Unified Guidance recommends 95% confidence level and 95% coverage (95/95 tolerance interval). When the non-detect frequency is 15% or less, half the RL will be substituted for non-detects (simple substitution), and the normal mean and standard deviation will be calculated. The Kaplan-Meier method will be used when the detection frequency is between 15% and 50%. The Kaplan-Meier method assesses the linearity of a censored probability plot to determine whether the background sample can be approximately normalized. If so, then the Kaplan-Meier method will be used to compute estimates of the mean and standard deviation adjusted for the presence of left-censored values. The Kaplan-Meier estimate of the mean and standard deviation will be substituted for the sample mean and standard deviation.

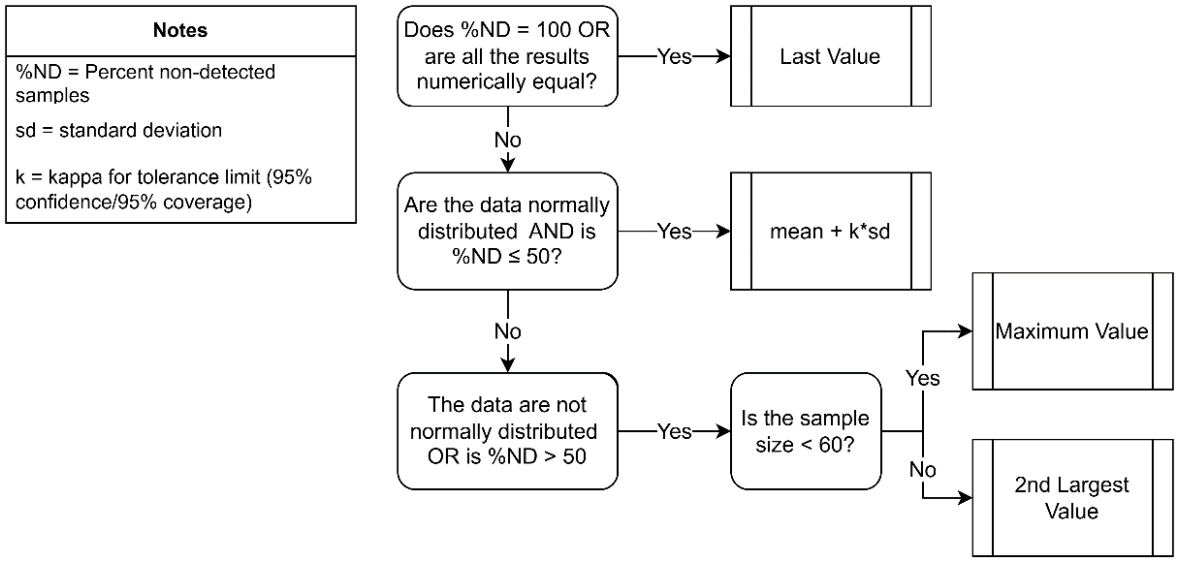

Figure 1. Flow chart illustrating the statistical methods used for calculating background under Compliance Monitoring.

The parametric UTL on a future mean will be calculated from the background dataset as follows:

$$UTL = \overline{x} + \kappa\,(n, \gamma, \alpha - 1) \cdot s$$

$\overline{x}$ = background sample mean

s = background sample standard deviation

$\kappa\,(n, \gamma, \alpha - 1)$ = one-sided normal tolerance factor based on the chosen coverage (γ) and confidence level (α -1) and the size of the background dataset (n). Values may be calculated per Millard (2013) or looked up in Table 17-3 in Appendix D of the Unified Guidance.

If the UTL is constructed on the logarithms of original observations to achieve normality, where $\overline{y}$ and s_y are the log-mean and log-standard deviation, the limit will be exponentiated for back-transformation to the concentration scale as follows:

$$TL = \exp\left[\overline{y} + \kappa\,(n, \gamma, \alpha - 1) \cdot s_y\right]$$

$\overline{y}$ = background sample log-mean

s_y = background sample log-standard deviation

If the background data set is non-parametric or has a non-detect frequency greater than 50%, a non-parametric UTL is used. The maximum concentration is used as the non-parametric UTL for sample sizes less than 60 and the second largest concentration is used as the non-parametric UTL for sample sizes greater than or equal to 60. As described in the Unified Guidance, the advantages include the resulting UTL reflecting actual concentration magnitudes, and the UTL more likely representing a detected concentration (unless all the data were non-detect).

3.3 Confidence Intervals

The method for calculating a CI depends on whether or not there is a trend in the data, the proportion of non-detects, and the data distribution (**Figure 2**). The following sections describe the procedure for calculating the CI in each case.

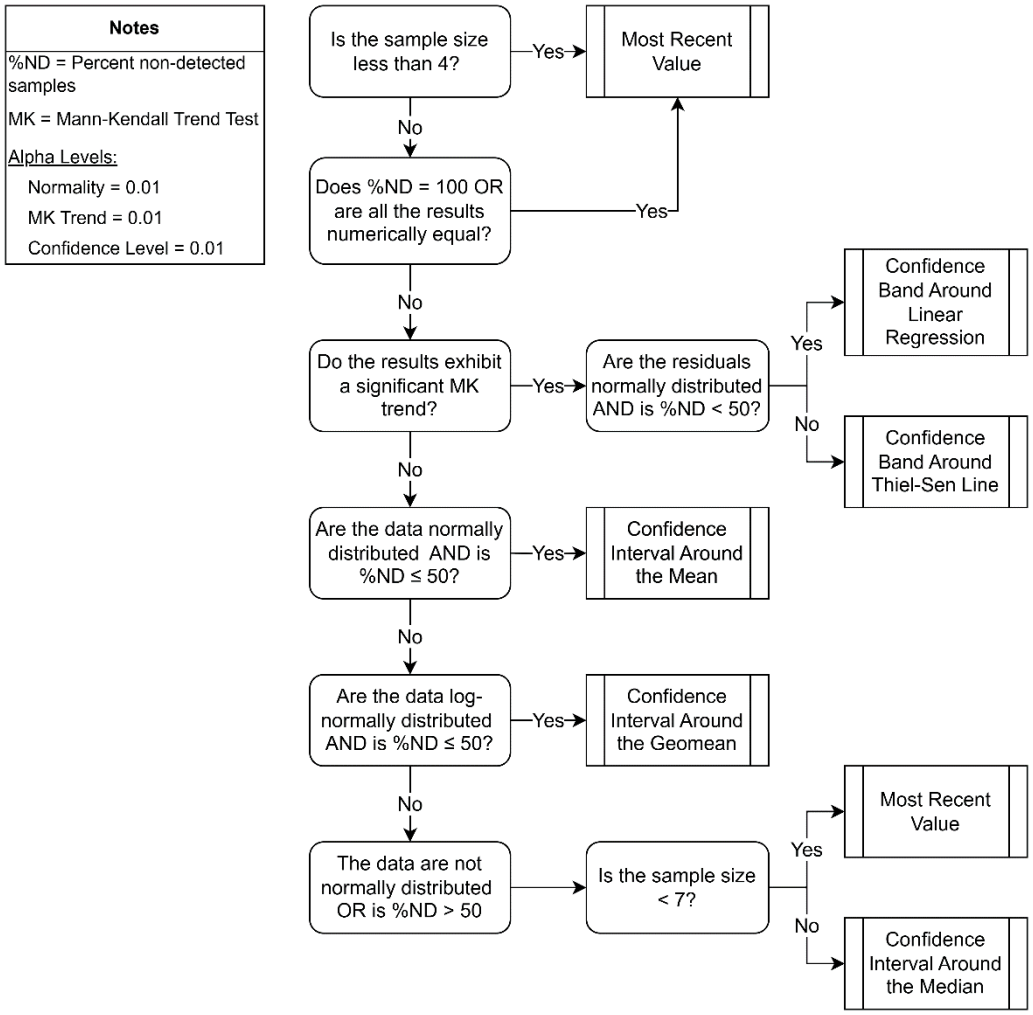

Figure 2. Flow chart illustrating the statistical methods used for calculating confidence intervals in Compliance Monitoring.

3.3.1 Confidence Intervals Around Trending Data

If compliance data exhibit a statistically significant trend based on results from a Mann-Kendall trend test and consists of a sufficient sample size (see below), CIs accounting for trends will be constructed to account for the trend-induced variation. If this is not accounted for, a wider CI will inevitably be calculated for a given confidence level and sample size (*n*). A wider CI will result in less statistical power, or ability to demonstrate an exceedance or return to compliance. When a linear trend line has been estimated, a series of CIs is estimated at each point along the trend. This creates a simultaneous confidence band that follows the trend line. As the underlying population mean increases or decreases, the confidence band also increases to reflect this change at that point in time.

Linear regression will be used when the compliance data set consists of at least eight samples, the frequency of non-detects is below 50%, and residuals around the trend line are normally distributed. The linear regression of concentration against sampling date (time) will be computed as follows:

$$\hat{b} = \sum_{i=1}^{n} (t_i - \bar{t}) \cdot x_i / (n-1) \cdot s_t^2$$

x_i = i^{th} concentration value and

t_i = i^{th} sampling date

$\bar{t}$ = sampling mean date

s_t^2 = variance of the sampling dates

This estimate leads to the following regression equation:

$$\hat{x} = \bar{x} + \hat{b} \cdot (\mathrm{t} - \bar{t})$$

$\bar{x}$ = mean concentration level

$\hat{x}$ = estimated mean concentration at time t

The regression residuals will also be computed at each sampling event to ensure uniformity and lack of significant skewness. Regression residuals will be computed at each sampling event as follows:

$$r_i = x_i - \hat{x}_i$$

The estimated variance around the regression line, or mean squared error, will be computed as follows:

$$s_e^2 = \frac{1}{n-2} \sum_{i=1}^{n} r_i^2$$

The CI around a linear regression trend line given confidence level (1-α) and a point in time (t_0), will be computed as follows:

$$LCL_{1-\alpha} = \hat{x}_0 - \sqrt{2 s_e^2 \cdot F_{1-2\alpha,2,\mathrm{n}-1} \cdot \left[\frac{1}{n} + \frac{(t_0 - \bar{t})^2}{(n-1) \cdot s_t^2}\right]}$$

$$UCL_{1-\alpha} = \hat{x}_0 - \sqrt{2 s_e^2 \cdot F_{1-2\alpha,2,\mathrm{n}-2} \cdot \left[\frac{1}{n} + \frac{(t_0 - \bar{t})^2}{(n-1) \cdot s_t^2}\right]}$$

$\hat{x}_0$ = estimated mean concentration from the regression equation at time t_0

$F_{1-2\alpha,2,\mathrm{n}-2}$ = upper (1-2α)th percentage point from an F-distribution with 2 and (n-2) degrees of freedom

If the compliance data set consists of at least seven samples but has a non-detect frequency greater than 50% or the residuals are not normally distributed, the Thiel-Sen trend line will be used as a non-parametric alternative to linear regression for calculation of the CI. The Thiel-Sen trend line estimates the median concentration over time by combining the median pairwise slope with the median concentration value and the median sample date. To compute the Thiel-Sen line,

the data will first be ordered by sampling event x_1, x_2, x_n. All possible distinct pairs of measurements (x_i, x_j) for $j > i$ will be considered and the simple pairwise slope estimate will be computed for each pair as follows:

$$m_{ij} = (x_j - x_i)/(j - i)$$

With a sample size of n, there will be a total of $N = n(n\text{-}1)/2$ pairwise estimates m_{ij}. If a given observation is a non-detect, half the RL will be substituted. The N pairwise slope estimates (m_{ij}) will be ordered from least to greatest (renamed $m_{(1)}$, $m_{(2)}$,..$m_{(N)}$). The Thiel-Sen estimate of slope (Q) will be calculated as the median value of the list depending on whether N is even or odd as follows:

$$Q = \begin{cases} m_{([N+1]/2)} \; if \; N \; is \; odd \\ (m_{(N/2)} + m_{([N+2]/2)})/2 \; if \; N \; is \; even \end{cases}$$

The sample concentration magnitude will be ordered from least to greatest, $x_{(1)}$, $x_{(2)}$, to $x_{(n)}$ and the median concentration will be calculated as follows:

$$\tilde{x} = \begin{cases} x_{([n+1]/2)} \; if \; n \; is \; odd \\ (x_{(n/2)} + x_{([n+2]/2)})/2 \; if \; n \; is \; even \end{cases}$$

The median sampling date ($\tilde{t}$) with ordered times ($t_{(1)}$, $t_{(2)}$, to $t_{(n)}$) will also be determined in this way. The Thiel-Sen trend line will then be computed for an estimate at any time (t) of the expected median concentration (x) as follows:

$$x = \tilde{x} + Q \cdot (\mathrm{t} - \tilde{t}) = (\tilde{x} - Q \cdot \tilde{t}) + Q \cdot \mathrm{t}$$

To construct a confidence band around the Thiel-Sen line, sample pairs (t_i, x_i) will be formed with a sample date (t_i) and the concentration measurement from that date (x_i). Bootstrap samples (B) will be formed by repeatedly sampling n pairs at random with replacement from the original sample pairs. This will be repeated 500 times. For each bootstrap sample, a Thiel-Sen trend line will be constructed using the equation above. A series of equally spaced t_j values will be identified along the range of sampling dates represented in the original sample, j=1 to m. The Thiel-Sen trend line associated with each bootstrap replicate will be used to compute an estimated concentration ($\hat{x}_j^B$). A CI will be constructed for the lower αth percentile $\hat{x}_j^{[\alpha]}$from the distribution of estimated concentrations at each time point (t_j). For a UCL, compute the upper (1-α)th percentile, $\hat{x}_j^{[1-\alpha]}$ at each t_j; for an LCL, compute the lower αth percentile, $\hat{x}_j^{[\alpha]}$ at each t_j.

3.3.2 Parametric Confidence Intervals around a Mean

If compliance data do not show a trend and are normal or log-normal, one-sided parametric CIs around a sample mean will be constructed for each constituent and well pair. The LCL will be calculated as:

$$LCL_{1-\alpha} = \overline{x} - t_{1-\alpha,n-1} \cdot \frac{s}{\sqrt{n}}$$

The UCL will be calculated as:

$$UCL_{1-\alpha} = \overline{x} + t_{1-\alpha,n-1} \cdot \frac{s}{\sqrt{n}}$$

$\overline{x}$ = compliance sample mean

s = compliance sample standard deviation

n = compliance sample size

$t_{1-\alpha,n-1}$ = obtained from a Student's t-table with (n–1) degrees of freedom at the chosen alpha level (0.01) (Table 16-1 in Appendix D of the Unified Guidance)

If compliance data are distributed lognormally, the LCL will be computed around the lognormal geometric mean as:

$$LCL_{1-\alpha} = \exp\left(\overline{y} - t_{1-\alpha,n-1} \cdot \frac{s_y}{\sqrt{n}}\right)$$

The UCL will be computed around the lognormal geometric mean as:

$$UCL_{1-\alpha} = \exp\left(\overline{y} + t_{1-\alpha,n-1} \cdot \frac{s_y}{\sqrt{n}}\right)$$

$\overline{y}$ = compliance sample log-mean

s_y = compliance sample log-standard deviation

3.3.3 Non-Parametric Confidence Intervals around a Median

Non-parametric confidence intervals around the median will be computed if the compliance data do not show a trend and contain greater than 50% non-detects or are non-normally distributed. The mathematical algorithm used to construct non-parametric CIs is based on the probability p that any randomly-selected measurement in a sample of n concentration measurements will be less than an unknown p x 100th percentile of interest (where P is between 0 and 1). Then the probability that the measurement will exceed the p x 100th percentile is (1–p). The number of sample values falling below the p x 100th percentile out of a set of n should follow a binomial distribution with parameters n and success probability p, where 'success' is defined as the event that a sample measurement is below the p x 100th percentile. The probability that the interval formed by a given pair of order statistics will contain the percentile of interest will then be determined by a cumulative binomial distribution *Bin(x;n,p)*, representing the probability of x or fewer successes occurring in n trials with success probability p. P will be set to 0.50 for an interval around the median. In accordance with the Unified Guidance, a confidence interval around the median will only be calculated if at least seven data points are available.

The sample size n will be ordered from least to greatest. Given p = 0.50, candidate interval endpoints will be chosen by ordered data values with ranks rounded upward to the next higher integers. The ranks of the endpoint will be denoted L^* and U* and are calculated using the following equations (Conover, 1999, p. 144):

$$L^* = np - Z_{1-\alpha}\sqrt{np(1-p)}$$

$$U^* = np + Z_{1-\alpha}\sqrt{np(1-p)}$$

4. CORRECTIVE ACTION MONITORING PROGRAM

Corrective Action Monitoring is performed after a corrective action remedy has been selected and implemented. 35 I.A.C. § 845.680(a)(1) specifies that the corrective action groundwater monitoring program must meet the requirements listed in 35 I.A.C. § 845.650 (*i.e.*, Compliance Monitoring), document the effectiveness of the selected remedy, and demonstrate compliance with the GWPS. Post-Closure Care monitoring as described in **Section 3** will operate concurrently with Corrective Action Monitoring, fulfilling the requirements of 35 I.A.C. § 845.650. This document describes the statistical methods used to document the progress of the selected remedy and demonstrate compliance with the GWPS.

Evaluation of corrective action remedy effectiveness will occur in three phases: remedy progress evaluation, stability evaluation, and attainment evaluation (USEPA, 1992).

1. Remedy progress evaluation occurs after implementation of corrective actions to assess if the remedy is functioning as anticipated.
2. The stability evaluation, which occurs after treatment has been concluded and a re-equilibration period has elapsed, assesses if a new post-treatment steady state in the groundwater has been reached.
3. Attainment evaluation occurs after a new steady state has been achieved and assesses if COC concentrations are below the GWPS.

In accordance with the Unified Guidance, these evaluations only apply to constituents which have previous exceedances of the GWPS. Constituents without previous GWPS exceedances continue to be evaluated according to Compliance Monitoring (per **Section 3**). The Corrective Action GMP for each unit describes the detailed approach to remedy effectiveness evaluation and reporting. Statistical evaluations used in each of these three phases are described below.

4.1 Remedy Progress Evaluation

The goal of remedy progress evaluation is to determine if a groundwater remedy is on track to achieve cleanup standards within the proposed time frame and to inform adaptive management decisions if performance metrics are not achieved. Evaluations of remedy effectiveness include:

- Comparison of the central tendency (*i.e.*, mean or median) of data from corrective action monitoring wells to the GWPS
- Trend analysis of average concentrations in individual wells and in a plume

Unlike Compliance Monitoring, remedy progress evaluation does not result in the determination of exceedances. Instead, the results from these analyses are used to evaluate performance metrics described in the site-specific Corrective Action GMP.

4.1.1 Central Tendency

The two most common central tendency measures of a data set are the sample mean and sample median. The sample mean best represents the central tendency of normally-distributed data; therefore, the mean will be used to represent the tendency if the data are approximately normally distributed and the frequency of non-detects is below 50%. The sample mean is given by the arithmetic average of each value in the sample:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

$\bar{x}$ = sample mean

n = sample count

x_i = i^{th} observation of x

The sample median is the 50th percentile of values in a sample and represents the midpoint of the ordered list of values. Because it is based on rank-order, the sample median is insensitive to data distribution; therefore, the median will be used if the data are not normally distributed or the frequency of non-detects is 50% or greater. The sample median is determined by arranging all values in order and selecting the middle value (or, if an even number of values exists, the mean of the two middle values).

4.1.2 Trend of Average Concentration in Individual Wells and in a Plume

Insight into remedy progress can be gained by evaluating changes in concentration at both the individual well and plume levels.

Trends at the individual well level are evaluated according to **Section 2.5**. To evaluate trends at the plume level, the trend on quarterly average concentrations is evaluated (per **Section 4.1.1**). Quarterly average concentrations in the plume are generated by calculating the mean or median as appropriate based on distribution (**Section 4.1.1**) of concentrations collected during a single sample event. Trend is then evaluated as described in **Section 2.5**. The magnitude of the trend (*i.e.*, slope) may be evaluated according to methods in **Section 3.3.1**.

4.2 Stability Evaluation

In order to evaluate ultimate effectiveness of the remedy, it is critical to evaluate if a new stable equilibrium has been reached after the implementation of corrective action (e.g., completion of source control or conclusion of groundwater extraction). Stability evaluation will be completed using trend analysis as described in **Section 2.5**.

4.3 Attainment Evaluation

Per 35 I.A.C. § 845.680(c), corrective action is considered complete when compliance with the GWPS has been demonstrated "at all points within the plume of contamination that lies beyond the waste boundary […] for a period of three consecutive years". Accordingly, attainment of the GWPS will be evaluated for well-constituent pairs previously determined to exceed the GWPS. This evaluation will include data collected after groundwater conditions have stabilized (**Section 4.2**).

The Unified Guidance recommends comparing a CI to the fixed GWPS to evaluate attainment of corrective action. The null hypothesis of this test is the reverse of that in Compliance Monitoring: corrective action well groundwater concentrations are assumed to exceed the GWPS unless the statistical test indicates otherwise. The CI will be calculated according to methods presented in **Section 3.3**. For pH, the only parameter with an upper and lower background and GWPS, the GWPS will be attained (*i.e.*, the null hypothesis rejected) when the CI falls within the range of the GWPS (*i.e.*, if the LCL of the CI is above the lower limit and the UCL is below the upper limit). For all other parameters, the GWPS will be attained when the UCL is below the GWPS. Once this

statistical evaluation indicates that GWPS has been met for three years (*i.e.*, that the null hypothesis is rejected), corrective action will be concluded.

5. REFERENCES

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