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

January 28, 2022

Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Coffeen GMF Gypsum Stack Pond (IEPA ID: W1350150004-03) Annual Consolidated Report

Dear Mr. LeCrone:

In accordance with 35 IAC § 845.550, Illinois Power Generating Company (IPGC) is submitting the annual consolidated report for the GMF Gypsum Stack Pond (IEPA ID: W1350150004-03), as enclosed.

Sincerely,

Dianna Tickner

Dianna Tickner
Director Decommissioning & Demolition

Enclosures

Annual Consolidated Report
Illinois Power Generating Company
Coffeen Power Plant
GMF Gypsum Stack Pond; IEPA **ID: W1350150004-03**

In accordance with 35 IAC § 845.550, Illinois Power Generating Company (IPGC) has prepared the annual consolidated report. The report is provided in three sections as follows:

Section 1
1) Annual CCR fugitive dust control report (Section 845.500(c))

Section 2
2) Annual inspection report (Section 845.540(b)), including:

A) Annual hazard potential classification certification

B) Annual structural stability assessment certification

C) Annual safety factor assessment certification

D) Inflow design flood control system plan certification

It should be noted that the drawings and attachments of the certification report were included in the operating permit application submittal.

Section 3
3) Annual Groundwater Monitoring and Corrective Action Report (Section 845.610(e))

Section 1
Annual CCR Fugitive Dust Control Report

Annual CCR Fugitive Dust Control Report

for

Coffeen Power Station

Illinois Power Generating Company

Coffeen Power Plant
134 CIPS Lane
Coffeen, IL 62017

November 2021

Reporting Year: 4th Quarter 2020 through 3rd Quarter 2021

Approved by:  Director, Decommissioning and Demolition

Name Title

This Annual CCR Fugitive Dust Control Report has been prepared for the Coffeen Power Station in accordance with 40 CFR 257.80(c) and 35 I.A.C. 845.500. Section 1 provides a description of the actions taken to control CCR fugitive dust at the facility during the reporting year, including a summary of any corrective measures taken. Section 2 provides a record of citizen complaints received concerning CCR fugitive dust at the facility during the reporting year, including a summary of any corrective measures taken.

Section 1 Actions Taken to Control CCR Fugitive Dust

In accordance with the Coffeen Power Station CCR Fugitive Dust Control Plan (Plan), the following measures were used to control CCR fugitive dust from becoming airborne at the facility during the reporting year:

CCR Activity	Actions Taken to Control CCR Fugitive Dust
Management of CCR in the facility's CCR units	CCR to be emplaced in the landfill is conditioned before emplacement.
	Wet management of CCR bottom ash and flue gas desulfurization materials in CCR surface impoundments.
	Water areas of exposed CCR in CCR units, as necessary.
	Naturally occurring grass vegetation in areas of exposed CCR in CCR surface impoundments.
Handling of CCR at the facility	CCR bottom ash removed from CCR surface impoundments and loaded into trucks for transport remains conditioned during handling.
	CCR fly ash to be emplaced in the landfill is conditioned before emplacement.
	Load CCR transport trucks from the CCR fly ash silo using a chute with a sock (skirt).
	Perform housekeeping, as necessary, in the fly ash loading area.

CCR Activity	Actions Taken to Control CCR Fugitive Dust
Handling of CCR at the facility	CCR to be emplaced in the landfill is conditioned before emplacement.
	Cover or enclose trucks used to transport CCR fly ash.
	Limit the speed of vehicles to no more than 15 mph on facility roads.
Transportation of CCR at the facility	Cover or enclose trucks used to transport CCR other than fly ash, as necessary.
	Sweep or rinse off the outside of the trucks transporting CCR, as necessary.
	Remove CCR, as necessary, deposited on facility road surfaces during transport.
	Water CCR haul roads, including landfill roads, as necessary.

Based on a review of the Plan and inspections associated with CCR fugitive dust control performed in the reporting year, the control measures identified in the Plan as implemented at the facility effectively minimized CCR from becoming airborne at the facility. No revisions or additions to control measures identified in the Plan were needed.

No material changes occurred in the reporting year in site conditions potentially resulting in CCR fugitive dust becoming airborne at the facility that warrant an amendment of the Plan.

Section 2 Record of Citizen Complaints

No citizen complaints were received regarding CCR fugitive dust at Coffeen Power Station in the reporting year.

Section 2

Annual Inspection Report (Section 845.540(b)), including:

A) Annual Hazard Potential Classification Certification, if applicable (Section 845.440)

B) Annual Structural Stability Assessment Certification, if applicable (Section 845.450)

C) Annual Safety Factor Assessment Certification, if applicable (Section 845.460)

D) Inflow Design Flood Control System Plan Certification (Section 845.510(c))

ANNUAL INSPECTION BY A QUALIFIED PROFESSIONAL ENGINEER 35 IAC § 845.540
(b)(1) The CCR surface impoundment must be inspected on an annual basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted engineering standards. The inspection must, at a minimum, include: A) A review of available information regarding the status and condition of the CCR surface impoundment, including files available in the operating record (e.g., CCR surface impoundment design and construction information required by Sections 845.220(a)(1) and 845.230(d)(2)(A), previous structural stability assessments required under Section 845.450, the results of inspections by a qualified person, and results of previous annual inspections); B) A visual inspection of the CCR surface impoundment to identify signs of distress or malfunction of the CCR surface impoundment and appurtenant structures; C) A visual inspection of any hydraulic structures underlying the base of the CCR surface impoundment or passing through the dike of the CCR surface impoundment for structural integrity and continued safe and reliable operation; D) The annual hazard potential classification certification, if applicable (see Section 845.440); E) The annual structural stability assessment certification, if applicable (see Section 845.450); F) The annual safety factor assessment certification, if applicable (see Section 845.460); and G) The inflow design flood control system plan certification (see Section 845.510(c)).

SITE INFORMATION	
Site Name / Address / Date of Inspection	Coffeen Power Station Montgomery County, Illinois 62017 10/18/2021
Operator Name / Address	Luminant Generation Company LLC 6555 Sierra Drive, Irving, TX 75039
CCR unit	Gypsum Stack Pond

INSPECTION REPORT 35 IAC § 845.540 Date of Inspection 10/18/2021	
(b)(1)(D) The annual hazard potential classification certification, if applicable (see Section 845.440).	Based on a review of the CCR unit's annual hazard potential classification, the unit is classified as a Class I CCR surface impoundment.
(b)(2)(A) Any changes in geometry of the structure since the previous annual inspection.	Based on a review of the CCR unit's records and visual observation during the on-site inspection, no changes in geometry of the structure have taken place since the previous annual inspection.
(b)(2)(B) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection	No Instrumentation
b)(2)(C) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;	See the attached.
b)(2)(D) The storage capacity of the impounding structure at the time of the inspection	Approximately 1150 acre-feet – Plant closed in 2020
(b)(2)(E) The approximate volume of the impounded water and CCR contained in the unit at the time of the inspection.	Approximately 950 acre-feet – Plant closed in 2020
(b)(2)(F) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit	Based on a review of the CCR unit's records and visual observation during the on-site inspection, there was no appearance of an actual or potential structural weakness of the CCR unit, nor an existing condition that is disrupting or would disrupt the operation and safety of the unit.

INSPECTION REPORT 35 IAC § 845.540 Date of Inspection 10/18/2021	
(b)(2)(G) Any other changes that may have affected the stability or operation of the impounding structure since the previous annual inspection.	Based on a review of the CCR unit's records and visual observation during the on-site inspection, no other changes which may have affected the stability or operation of the CCR unit have taken place since the previous annual inspection.
(b)(1)(G) The inflow design flood control system plan certification (see Section 845.510(c))	Based on a review of the CCR unit's records, the CCR unit is designed, operated, and maintained to adequately manage the flow from the CCR impoundment and control the peak discharge from the inflow design flood.

35 IAC § 845.540 - Annual inspection by a qualified professional engineer.

I, James Knutelski, P.E., certify under penalty of law that the information submitted in this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Illinois. The information submitted, is to the best of my knowledge and belief, true, accurate and complete. Based on the annual inspection, the design, construction, operation, and maintenance of the CCR Unit is consistent with recognized and generally accepted good engineering standards. Based on a review of the records for the CCR unit, the hazard potential classification was conducted in accordance with the requirements of Section 845.440 and the Safety Factor Assessment was conducted in accordance with the requirements of Section 845.460.

James Knutelski, PE
Illinois PE No. 062-054206, Expires: 11/30/2023
Date: 01/05/2022

Site Name: Coffeen Power Station

CCR Unit: Gypsum Stack Pond

35 IAC § 845.540 (b)(2)(B)		
Instrument ID #	Type	Maximum recorded reading since previous annual inspection (ft)
None		

35 IAC § 845.540 (b)(2)(C)						
	Approximate Depth / Elevation					
Since previous inspection:	Elevation (ft)			Depth (ft)		
	Minimum	Present	Maximum	Minimum	Present	Maximum
Impounded Water		622			20	
CCR	609		627	7.5		26

Geosyntec consultants

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Chesterfield, MO 63005
PH 636-812-0800
www.geosyntec.com

October 11, 2021

Illinois Power Generating Company
134 Cips Lane
Coffeen, Illinois 62017

Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
GMF Gypsum Stack Pond, Coffeen Power Plant, Coffeen, Illinois

At the request of Illinois Power Generating Company (IPGC), Geosyntec Consultants (Geosyntec) has prepared this letter to document how the attached 2021 United States Environmental Protection Agency (USEPA) CCR Rule Periodic Certification Report (Report) was prepared in accordance with both the Federal USEPA CCR Rule[1] and the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 Rule[2]. Specific sections of the report and the applicable sections of the USEPA CCR Rule and Illinois Part 845 Rule are cross-referenced in **Table 1**. A certification from a Qualified Professional Engineer for each of the CCR Rule sections listed in **Table 1** is provided in Section 9 of the attached Report. This certification statement is also applicable to each section of the Part 845 Rule listed in **Table 1.**

Table 1 – USEPA CCR Rule and Illinois Part 845 Rule Cross-Reference

Report Section	USEPA CCR Rule		Illinois Part 845 Rule	
3	§257.73 (a)(2)	Hazard Potential Classification	845.440	Hazard Potential Classification Assessment[3]
4	§257.73 (c)(1)	History of Construction	845.220(a)	Design and Construction Plans (Construction History)
5	§257.73 (d)(1)	Structural Stability Assessment	845.450 (a) and (c)	Structural Stability Assessment
6	§257.73 (e)(1)	Safety Factor Assessment	845.460 (a-b)	Safety Factor Assessment
7	§257.82 (a)(1-3)	Adequacy of Inflow Design Control System Plan	845.510(a), (c)(1), (c)(3)	Hydrologic and Hydraulic Capacity Requirements / Inflow Design Flood Control System Plan
	§257.82 (b)	Discharge from CCR Unit	845.510(b)	Discharge from CCR Surface Impoundment

[1] United Stated Environmental Protection Agency, 2015. *40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.*
[2] State of Illinois, Joint Committee on Administrative Rule, Administrative Code (2021). *Title 35: Environmental Protection, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter j: Coal Combustion Waste Surface Impoundment, Part 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments.*
[3] "Significant" and "High" hazard, per the CCR Rule[1], are equivalent to Class II and Class I hazard potential, respectively, per Part 845[2].

CLOSING

This letter has been prepared to demonstrate that the content and Qualified Professional Engineer Certification of the 2021 Periodic USEPA CCR Rule Certification Report fulfills the corresponding requirements of Part 845 of Illinois Administrative Code listed in **Table 1**.

Sincerely,

Lucas P. Carr, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

2021 USEPA CCR RULE PERODIC CERTIFICATION REPORT §257.73(a)(2), (c), (d), (e) and §257.82 GMF GYPSUM STACK POND Coffeen Power Plant Coffeen, Illinois

Submitted to

Illinois Power Generating Company

134 Cips Lane
Coffeen, Illinois 62017

Submitted by

Geosyntec consultants

engineers | scientists | innovators

1 McBride and Son Center Drive, Suite 202
Chesterfield, Missouri 63005

October 11, 2021

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF DRAWINGS

LIST OF ATTACHMENTS

EXECUTIVE SUMMARY

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule [1] certification report (Periodic Certification Report) for the Gypsum Management Facility (GMF) Gypsum Stack Pond (GMF GSP)[1] at the Coffeen Power Plant (CPP), also known as the Coffeen Power Station (COF), has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257. herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial certifications for existing CCR surface impoundment, completed in 2016 and subsequently posted on the Illinois Power Generating Company (IPGC) CCR Website ([2], [3], [4], [5], [6]) be updated on a five-year basis.

The initial certification reports developed in 2016 and 2017 were independently reviewed by Geosyntec ([2], [7], [3], [8], [4], [5], [6]). Additionally, field observations, interviews with plant staff, updated engineering analyses, and evaluations were performed to compare conditions in 2021 at the GMF GSP relative to the 2016 and 2017 initial certifications. These tasks determined that updates are not required for the Initial Hazard Potential Classification. However, due to changes at the site and technical review comments, updates were required and were performed for the:

- History of Construction Report,
- Structural Stability Assessment,
- Initial Safety Factor Assessment, and
- Initial Inflow Design Flood Control System Plan.

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the GMF GSP meets all requirements for hazard potential classification, history of construction reporting, structural stability, safety factor assessment, and hydrologic and hydraulic control. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[1] The GMF GSP is also referred to as ID Number W13501250004-03, GMF GSP by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 103 by IPGC; and IL50579 within the National Inventory of Dams (NID) maintained by the Illinois Department of Natural Resources (IDNR). Within this document it is referred to as the GMF GSP.

Table 1 – Periodic Certification Summary

	CCR Rule Reference	Requirement Summary	2016 Initial Certification		2021 Periodic Certification	
			Requirement Met?	Comments	Requirement Met?	Comments
Hazard Potential Classification						
3	§257.73(a)(2)	Document hazard potential classification	Yes	Impoundment was determined to have a High hazard potential classification [2].	Yes	The Initial Hazard Potential Classification (HPC) is conservative due to the consideration of ultimate buildout conditions relative to existing conditions. An update to the Initial HPC is not required at this time but could be performed to potentially reduce the HPC to Significant.
History of Construction						
4	§257.73(c)(1)	Compile a history of construction	Yes	A History of Construction report was prepared for the GMF GSP, Ash Pond 1, Ash Pond 2, and the GMF Recycle Pond [3].	Yes	A letter listing updates to the History of Construction report is provided in **Attachment C**.
Structural Stability Assessment						
5	§257.73(d)(1)(i)	Stable foundations and abutments	Yes	Foundations were found to be stable. Abutments were not present [8].	Yes	Foundations and abutments were found to be stable after performing updated slope stability analyses.
	§257.73(d)(1)(ii)	Adequate slope protection	Yes	Slope protection was adequate [8].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of dike compaction	Yes	Dike compaction was sufficient for expected ranges in loading conditions [8].	Yes	Dike compaction was found to be sufficient after performing updated slope stability analyses.
	§257.73(d)(1)(iv)	Presence and condition of slope vegetation	Yes	Vegetation was present on exterior slopes and was maintained. Interior slopes had alternate protection (geomembrane liner) [8].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(v)(A) and (B)	Adequacy of spillway design and management	Yes	Spillways were adequately designed and constructed to adequately manage flow during the probable maximum flood (PMF) [8].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manager flow during the PMF, after performing updated hydrologic and hydraulic analyses.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	Not Applicable	Hydraulic structures penetrating the dikes or underlying the base of the GMF GSP were not present. This requirement was not applicable [8].	Not Applicable	No changes were identified that may affect this requirement.
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Not Applicable	Inundation of exterior slopes were not expected. This requirement was not applicable [8].	Not Applicable	No changes were identified that may affect this requirement.
Safety Factor Assessment						
6	§257.73(e)(1)(i)	Maximum storage pool safety factor must be at least 1.50	Yes	Safety factors were calculated to be 3.45 and higher [8].	Yes	Safety factors from updated slope stability analyses were calculated to be 3.45 and higher.
	§257.73(e)(1)(ii)	Maximum surcharge pool safety factor must be at least 1.40	Yes	Safety factors were calculated to be 3.45 and higher [8].	Yes	Safety factors from updated slope stability analyses were calculated to be 3.45and higher.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 1.47 and higher [8].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.45 and higher.
	§257.73(e)(1)(iv)	For dike construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Dike soils were not susceptible to liquefaction. This requirement was not applicable [8].	Not Applicable	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
7	§257.82(a)(1), (2), (3)	Adequacy of inflow design control system plan.	Yes	Flood control system adequately managed inflow and peak discharge during the Probable Maximum Precipitation, 24-hr Inflow Design Flood [8].	Yes	The flood control system was found to adequately manage inflow and peak discharge during the Probable Maximum Precipitation, 24-hour Inflow Design Flood, after performing updated hydrologic and hydraulic analyses.
	§257.82(b)	Discharge from CCR Unit	Yes	Discharges into Waters of the United States were not expected to occur during normal and Probable Maximum Precipitation, 24-hr, Inflow Design Flood conditions [8].	Yes	Discharge into Waters of the United States were found to not be expected to occur during both normal and Probable Maximum Precipitation, 24-hour Inflow Design Flood conditions, after performing updated hydrologic and hydraulic analyses.

SECTION 1

INTRODUCTION AND BACKGROUND

This Periodic United States Environmental Protection Agency (USPA) Coal Combustion Residual (CCR) Rule [1] Certification Report was prepared by Geosyntec Consultants (Geosyntec) for Illinois Power Generating Company (IPGC) to document the re-certification of the GMF GSP at the Coffeen Power Plant (CPP), also known as the Coffeen Power Station (COF), located at 134 Cips Lane in Coffeen, Illinois, 62017. The location of CPP is provided in **Figure 1**, and a site plan showing the location of the GMF GSP, among other closed and active CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

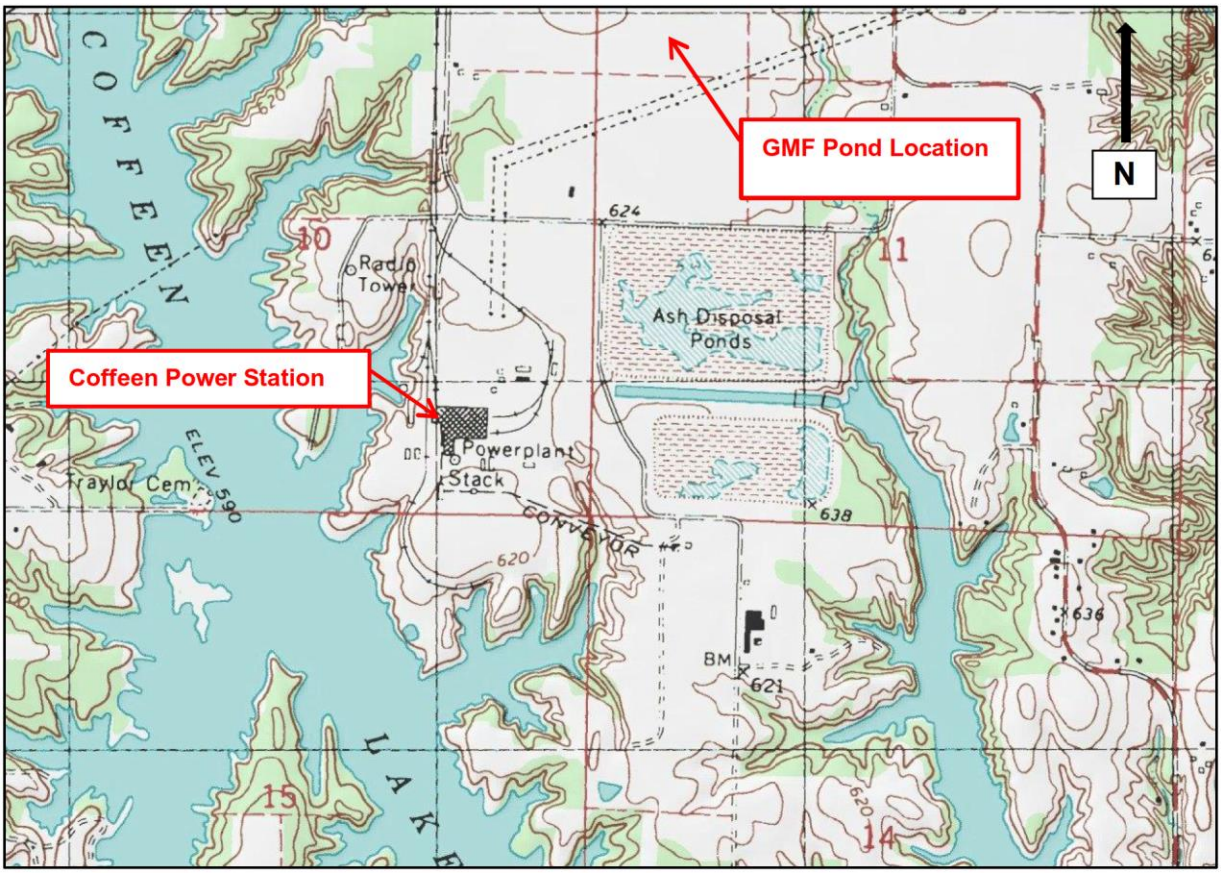

Figure 1 – Site Location Map (from AECOM, 2016)

Figure 2 – Site Plan (adapted from AECOM, 2016)

1.1 GMF GSP Description

CPP was retired in 2019. Prior to retirement, three active CCR surface impoundments – the GMF GSP, the GMF Recycle Pond, and AP1 – and one CCR landfill – were used for managing CCRs generated at CPP. This certification report only pertains to the GMF GSP. The GMF GSP has a High hazard potential, based on the initial hazard potential classification assessment performed by Stantec in 2016 in accordance with §257.73(a)(2) ([2], [7]).

The GMF GSP formerly served as the primary wet impoundment basin for gypsum produced by the wet scrubber system at CPP. The GMF GSP was constructed between 2008 and 2009 and received inflow from two pairs of high-density polyethylene (HDPE) gypsum slurry pipes. Clear water discharge from the GMF GSP flowed downstream into the GMF Recycle Pond via a lined channel (transfer channel) and a 14-in. diameter HDPE low-flow pipe buried beneath the transfer channel. The transfer channel effectively acts as the primary spillway for the GMF GSP, as the bottom elevation of the transfer channel is equal to the adjacent exterior toe elevation of the dike. The transfer channel is approximately 580 ft in length, trapezoidal in shape, lined with 60-mil HDPE, has three horizontal to one vertical (3H:1V) side slopes, and the bottom elevation[2] decreases from 624 ft at the upstream end to 622 ft at the downstream end.

The 14-in. diameter low-flow pipe has an invert elevation of 619.0 ft at the upstream end and 617.6 ft at the downstream end. A berm was constructed within the transfer channel in 2020 with a crest elevation of approximately elevation 627 ft [9] to retain additional water in the GMF GSP and reduce the pool level in the downstream GMF Recycle Pond. The GMF Recycle Pond formerly acted as a polishing pond, and outflow was pumped to the CPP to be recycled for use in the wet scrubber system [8].

The GMF GSP has a composite liner system that extends up to interior dike crests at elevation 630.5 ft and is present beneath the entire footprint of the pond. The liner system includes a 3-ft thick layer of compacted clay that is overlain by a 60-mil textured HDPE geomembrane. The geomembrane liner is exposed at the pond bottom and side slopes [8].

As formerly operated, the normal pool elevation of the GMF GSP was observed to be 621.2 ft in the 2015 Weaver Consultants survey of the site [10], as controlled by the 14-in. diameter low-level outlet pipe and recycle water inflow and outflow pumping rates [8]. The water elevation in the GMF GSP had increased to 625.2 ft by the time of the periodic survey in December of 2020 [9], due to the construction of the berm in the transfer channel and could rise as high as approximately El. 627 ft due to the berm that was constructed in the transfer channel.

The GMF GSP is approximately 36.2 acres in size and was formed with a continuous embankment, a ring dike, which has a total perimeter length of approximately 5,000 ft. The perimeter dike was constructed to include a crest width of between approximately 15 to 25 ft and a crest height of 5 ft at the north embankment and 9 ft at the east embankment. The interior of the GMF GSP extends deeper than the exterior natural grade, and the maximum interior slope height is approximately 25 ft in the southeast corner of the pond. The elevation of the embankment crest ranges from 631 to 632 ft. Both interior and exterior slopes have 3H:1V orientations [8].

Initial certifications for the GMF GSP for Hazard Potential Classification (§257.73(a)(2)), History of Construction (§257.73(c)), Structural Stability Assessment (§257.73(d)), Safety Factor Assessment (§257.73(e)(1)), and Inflow Design Flood Control System Plan (§257.82) were

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

completed by Stantec and AECOM in 2016 and 2017 and subsequently posted to IPGC's CCR Website ([2], [3], [4], [5], [6]). Additional documentation for the initial certifications included detailed operating record reports containing calculations and other information prepared for the hazard potential classification by Stantec [7] and for the structural stability assessment, safety factor assessment, and inflow design flood control system plan by AECOM [8]. These operating record reports were not posted to IPGC's CCR Website.

1.2 Report Objectives

These following objectives are associated with this report:

- Compare site conditions from 2015/2016 to site conditions in 2020/2021, and evaluate if updates are required to the:
    - §257.73(a)(2) Hazard Potential Classification [2];
    - §257.73(c) History of Construction [3];
    - §257.73(d) Structural Stability Assessment [4];
    - §257.73(e) Safety Factor Assessment [5], and/or
    - §257.82 Inflow Design Flood Control System Plan [6].
- Independently review the Hazard Potential Classification ([2], [7]), Structural Stability Assessment ([4], [8]), Safety Factor Assessment ([5], [8]), and Inflow Design Flood Control System Plan ([6], [8]) to determine if updates may be required based on technical considerations.
    - The History of Construction report [3] was not independent reviewed for technical consideration, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at CPP, and did not include calculations or other information used to certify performance and/or integrity of the impoundments under §257.73(a)(2)-(3), §257.73(c)-(e), or §257.82.
- Confirm that the GMF GSP meets all of the requirements associated with §257.73(a)(2)-(3), (c), (d), (e), and §257.82, or, if the GMF GSP does not meet any of the requirements, provide recommendations for compliance with these sections of the CCR Rule [1].

SECTION 2

COMPARISION OF INITIAL AND PEROIODIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the GMF GSP between the start of the initial CCR certification program in 2015 and subsequent collection of periodic certification site data in 2020 and 2021.

2.2 Review of Annual Inspection Reports

Annual onsite inspections of the GMF GSP were performed from 2016 to 2020 ([11], [12], [13], [14], [15]) and were certified by a licensed professional engineer in accordance with §257.83(b). Each inspection report stated the following information, relative to the previous inspection:

- A statement that no changes in geometry of the impounding structure were observed since the previous inspection;
- A statement that no geotechnical instrumentation was present;
- Approximate volumes of impounded water and CCR at the time of inspection;
- A statement that no appearances of actual or potential structural weakness or other disruptive conditions were observed; and
- A statement that no other changes which may have affected the stability or operation of the impounding structure were observed.

In summary, the reports did not indicate any significant changes to the GMF GSP between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the GMF GSP were noted in the inspection reports.

2.3 Review of Instrumentation Data

Nineteen groundwater monitoring wells, (G102, G103, R104, G105, G106, G205, G206, G207, G208, G209, G210, G211, G212, G213, G214, G215, G216, G217, and G218), are present at the GMF GSP. Groundwater level readings were collected generally on a quarterly basis and provided between February 17, 2016 and January 27, 2021. Geosyntec reviewed the groundwater level data to evaluate if significant fluctuations, partially increases in phreatic levels, may have occurred after development of the initial structural stability and factor of safety certifications ([4], [5], [8]), which utilized phreatic conditions estimated from cone penetration testing (CPT) data. Available water

level readings are plotted in **Attachment A** and **Figure 3** provides approximate locations of the monitoring wells.

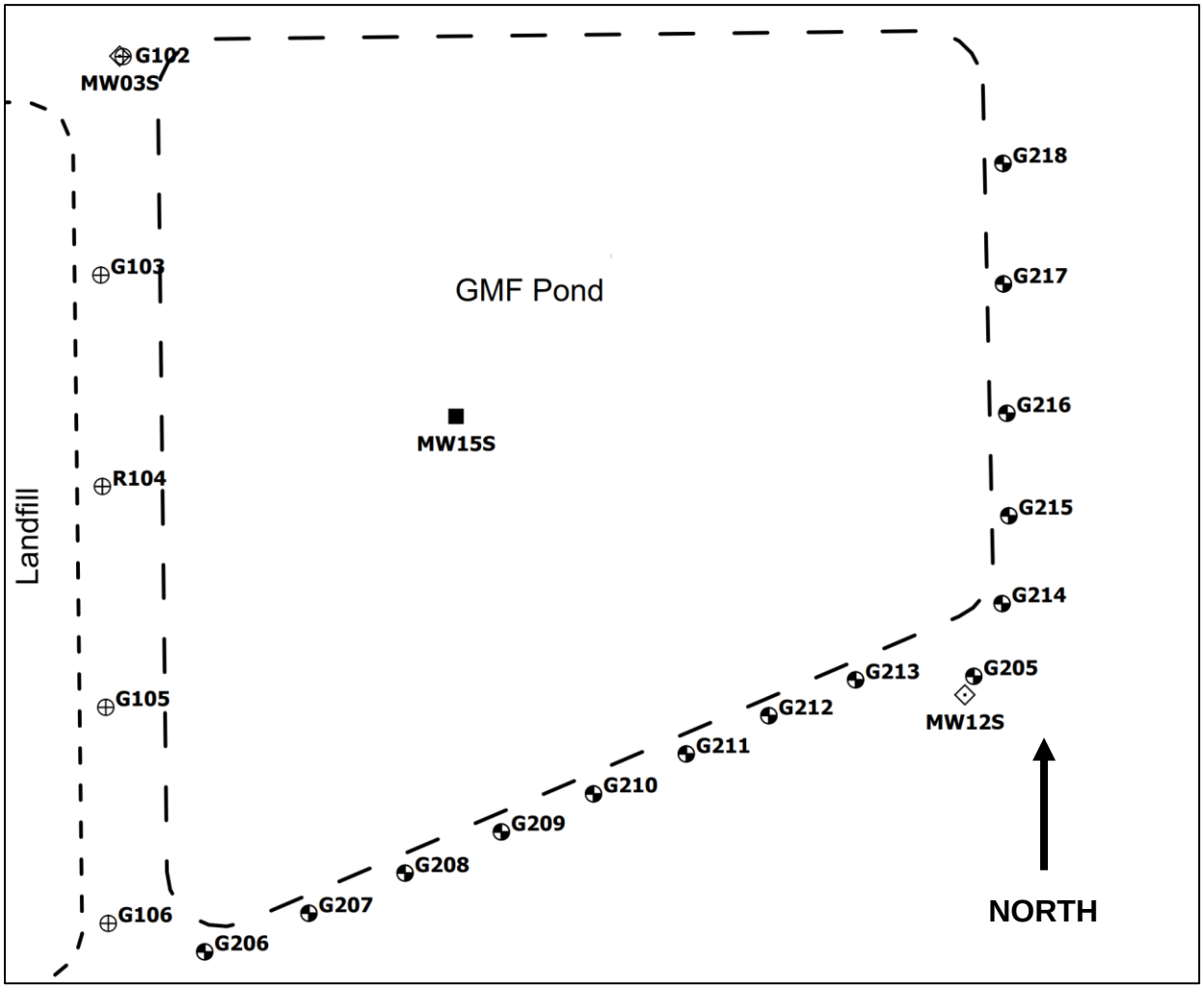

Figure 3 – GMF GSP Monitoring Well Locations
(Not to Scale, adapted from Hanson, 2021)

In summary, groundwater levels in the monitoring well network were observed to be relatively consistent between individual wells. Water levels were typically no more than 1 to 4 ft different between individual wells and seasonal fluctuations were on the order of 1 to 4 ft. Water levels ranged from a low of El. 617 ft to a high of El. 627 ft, resulting in a total fluctuation of 10 ft. These water levels are approximately 1 to 3 ft higher than water levels utilized in the slope stability analyses prepared to support the initial structural stability and safety factor assessments ([4], [5], [8]).

The water levels in the initial assessments were based on cone penetration testing (CPT) pore pressure dissipation (PPD) testing collected at a discrete point in time (August 2015) and are

therefore less representative of long-term groundwater trends than the water level data collected from monitoring wells.

2.4 Comparison of Initial to Periodic Surveys

The initial survey of the GMF GSP, conducted at the site by Weaver Consultants (Weaver) in 2015 [10], was compared to the periodic survey of the GMF GSP, conducted by IngenAE, LLC (IngenAE) in 2020 [9], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the GMF GSP and considered volumetric changes above and below the starting water surface elevation (SWSE) used for the 2016 §257.82 inflow design flood control plan hydraulic analysis [6]. Potential changes to embankment geometry were also evaluated. This comparison is presented in a side-by-side comparison of the surveys in **Drawing 1** and a plan view isopach map denoting changes in ground surface elevation in **Drawing 2**. A summary of the water elevations and changes in CCR volumes is provided in **Table 2**.

Table 2 – Initial to Periodic Survey Comparison

Initial Surveyed Pool Elevation (ft)	621.2
Periodic Surveyed Pool Elevation (ft)	625.2
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	621.2
Total Change in CCR Volume (CY)	+74,294
Change in CCR Volume Above SWSE (CY)	+30,006
Change in CCR Volume Below SWSE (CY)	+44,288

The comparison indicated that approximately 74,000 CY of CCR was placed in the GMF GSP between 2015 and 2020, including approximately 30,000 CY above the SWSE, thereby leading to a potential for the peak water surface elevation (PWSE) to increase during the design 1,000-year flood event.

Furthermore, the surveyed pool elevation increased by approximately 4 ft, due to the construction of a berm in the transfer channel. A review of the 2020 survey data indicated the crest elevation of the new berm is approximately 628 ft; this is higher than the periodic surveyed pool level elevation of 625.2 ft. No other significant changes in embankment geometry or other features were noted in the comparison.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the GMF GSP collected by Weaver 2015 [10] were compared to periodic aerial photographs collected by IngenAE in 2020 [10] to visually evaluate if potential site changes (i.e., changes to the embankment, outlet structures, limits of CCR, other appurtenances) may have occurred between. A comparison of these aerial photographs is provided in **Drawing 3**, and the following changes were identified:

- The berm in the transfer channel discussed in **Section 2.4** was identified in the channel.

- Minor changes in site conditions outside of the GMF GSP were identified, including the expansion of existing haul roads and the seeding of the GMF GSP exterior embankment near the transfer channel. However, these minor changes are not expected to significantly affect the design and/or operation of the GMF GSP.

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to the GMF GSP was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [16]. A periodic site visit was conducted by Geosyntec on May 28, 2021, with Mr. Lucas P. Carr, P.E. conducting the site visit. The site visit was intended to evaluate potential changes at the site since 2015 (i.e., modification to the embankment, outlet structures or other appurtenances, limits of CCR, maintenance programs, and repairs), in addition to performing visual observations of the GMF GSP to evaluate if the structural stability requirements (§257.73(d)) were still met. The site visit included driving the perimeter of the GMF GSP, periodically stopping to exit the vehicle and visually observe conditions, recording filed notes, and collecting photographs. The site visit is documented in a photographic log provided in **Appendix B**. One significant finding was identified during the periodic site visit and is listed below:

- A berm was constructed in the transfer channel in 2020, as discussed in **Section 2.4**.

2.7 Interview with Power Plant Staff

An interview with Mr. John Romang of CPP was conducted by Mr. Lucas P. Carr, P.E. of Geosyntec on May 28, 2021. Mr. Romang had been, at the time of the interview, employed at CPP for approximately 20 years as the environmental and chemistry manager or supervisor and was responsible for general oversight and compliance for the GMF GSP, including weekly CCR inspections and identifying required repairs. The interview included a discussion of potential changes that may have occurred at the GMF GSP since the development of the initial certifications ([2], [7] [3], [8], [4], [5], [6]). A summary of the interview is provided below.

- Were any construction projects completed for the GMF GSP between 2015 and 2021, and, if so, are design drawings and/or details available?
    - A berm was constructed in the transfer channel between the GMF GSP and the GMF Recycle Pond in 2020 and excess water from the GMF Recycle Pond was pumped into the GMF GSP.
- Were there any changes to the purpose of the GMF GSP between 2015 and 2017?
    - No, outside of plant retirement.

- Were there any changes to the to the instrumentation program and/or physical instruments for the GMF GSP between 2015 and 2021?
    - No instruments are present at the GMF GSP.
- Were there any changes to spillways and/or diversion features for the GMF GSP completed between 2015 and 2021?
    - Yes, the berm was constructed within the GMF GSP transfer channel.
- Have any area-capacity curves been developed for the GMF GSP since 2015?
    - No known curves have been developed.
- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for the GMF GSP between 2015 and 2021?
    - No.
- Were there any instances of dike and/or structural instability for the GMF GSP between 2015 and 2021?
    - No known instances occurred.

SECTION 3

HAZARD POTENTIAL CLASSIFICATION - §257.73(A)(2)

3.1 Overview of Initial HPC

The Initial Hazard Potential Classification (Initial HPC) was prepared by Stantec Consulting Services, Inc. (Stantec) in 2016 ([2], [7]), following the requirements of §257.73(a)(2). The Initial HPC included the following information:

- Reviewing a breach analysis prepared by Hanson Professional Services (Hanson) in 2007 [17], as part of the permitting of obtaining a permit to construct the GMF GSP as a regulated dam though the Illinois Department of Natural Resources, Offices of Water Resources (IDNR-OWR).
    - The review indicated that 12 structures were located within an area where the inundation depth was estimated to be 5 ft, including:
        - Eight (8) occupied structures, including seven residential structures, for a breach at the northwest corner of the GMF GSP perimeter dike.
        - Two (2) residential structures for a breach at the east side of the GMF GSP perimeter dike.
        - The CPP plant building, which was frequently occupied, for a breach to at the south side of the GMF GSP perimeter dike.
    - The review also noted that the breach analyses considered the final buildout height of the GMF GSP as a gypsum stack extending approximately 100 ft above the surrounding grades, rather than the current configurations, where the level of CCR and water inf the GMF GSP is approximately equal to surrounding grades.
- While a breach map is not included within the Initial HPC, it included within the §257.73(a)(3) Initial Emergency Action Plan (Initial EmAP) [18].

The breach analysis concluded that a breach of the GMF GSP, at its maximum height, would result in a probable threat to human life at multiple residential and other occupied structures. The Initial HPC therefore recommended a “High” hazard potential classification for the GMF GSP [7].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [7]), in terms of technical approach, input parameters, and assessment of results. The review included the following tasks:

- Reviewing the breach assessment inputs for appropriateness;
- Reviewing the selected HPC for appropriateness based on the results of the breach analysis, including flow velocities and depths;
- Reviewing the HPC vs. applicable requirements of the CCR Rule.

The review noted that the Initial HPC considered ultimate buildout conditions for the GMF GSP, where it extends approximately 100 ft above grade using the upstream method of construction and dikes comprised of CCR, relative to existing conditions where the GMF GSP is essentially at-grade, as discussed in **Section 3.1**. The GMF GSP is unlikely to reach ultimate buildout conditions due to closure of CPP and the cessation of CCR generation. Therefore, the Initial HPC includes a conservative volume of breach material relative to the amount of material than is currently in the pond.

No other significant technical issues were noted in the technical review, although a detailed review (e.g., check) of the calculations was not performed.

3.3 Summary of Site Changes Affecting the Initial HPC

The GMF GSP is currently considered a High hazard potential CCR surface impoundment [2]; this is the highest hazard classification within §257.53 of the CCR Rule [1]. Therefore, the hazard potential classification would not increase if new structures were to be constructed within the existing mapped breach areas, and a visual assessment of these areas was not performed.

3.4 Periodic Hazard Potential Classification

The current hazard potential classification for the GMF GSP, which is "High" per §257.73(a)(2), is considered conservative as the GMF GSP has not reached and is not expected to reach ultimate buildout conditions. The "High" hazard potential classification is conservative and could maintained or could potentially be revised to "Significant" if a revised breach analysis is performed. However, Geosyntec recommends retaining the current "High" hazard potential classification, unless a revised breach analysis is performed to justify a "Significant" hazard potential classification.

SECTION 4

HISTORY OF CONSTRUCTION REPORT - §257.73(C)

4.1 Overview of Initial HoC

The Initial History of Construction report (Initial HoC) was prepared by AECOM in 2016 [3], following the requirements of §257.73(c), and included information on all CCR surface impoundments at CPP, including AP1, AP2, the GMF GSP, and the GMF Recycle Pond. The Initial HoC included the following information for each CCR surface impoundment:

- The name and address of the owner/operator,
- Location maps,
- Statements of purpose,
- The names and size of the surrounding watershed,
- A description of the foundation and abutment materials,
- A description of the dike materials,
- Approximate dates and stages of construction,
- Available design and engineering drawings,
- A summary of instrumentation,
- Area-capacity curves for the GMF GSP,
- Information on spillway structures,
- Construction specifications,
- Inspection and surveillance plans,
- Information on operational and maintenance procedures, and
- A statement that no known instability has occurred at the GMF GSP.

4.2 Summary of Site Changes Affecting the Initial HoC

Several significant changes at the site were identified since development of the Initial HOC and required updates to the HoC report. Each change is described below:

- A state identification number (ID) of W1350150004-03 was assigned to the GMF GSP by the Illinois Environmental Protection Agency (IEPA).

- Electricity generation at CPP ceased in 2019 and the GMF GSP is no longer being used to actively store CCR generated by CPP as CCR is no longer being generated. Additionally, the GMF GSP no longer received regular process water inflows our outflows.

- A berm was constructed within the transfer channel between the GMF GSP and GMF Recycle Pond in 2020, as discussed in **Section 2.4**.

- Revised area-capacity curves and spillway design calculations for the GMF GSP were prepared as part of the updated Periodic Inflow Design Flood Control System Plan, as described in **Section 6.3**.

A letter documenting changes to the HoC report is provided in **Attachment C**.

SECTION 5

STRUCTURAL STABILITY ASSESSMENT - §257.73(D)

5.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 [4], following the requirements of §257.73(d)(1), and included the following evaluations:

- Stability of dike foundations, dike abutments, slope protection, dike compaction, and slope vegetation;
- Spillway stability including capacity, structural stability and integrity;
- An evaluation of the effects of liquefaction in the foundation soils using a slope stability analysis considering post-cyclic softening in the foundation soils; and
- An evaluation to determine if downstream water bodies that could induce a sudden drawdown condition to the exterior slopes were present.

The Initial SSA concluded that the GMF GSP met all structural stability requirements for §257.73(d)(1)(i)-(vii).

The Initial SSA referenced the results of the Initial Structural Factor Assessment (Initial SFA) ([5], [8]), to demonstrate stability of the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) portions of the SSA criteria. This included stating that slope stability analyses for slip surfaces passing through the foundation met or exceeded the criteria listed in §257.73(e)(1), for the stability of foundations and abutments. For the sufficiency of dike compaction, this included stating that slope stability analyses for slip surfaces passing through the dike also met or exceeded the §257.73(e)(1) criteria.

5.2 Review of Initial SSA

Geosyntec performed a review of the Initial SSA ([4], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing photographs collected in 2015 and used to demonstrate compliance with §257.73(d)(1)(i)-(vii).
- Reviewing geotechnical calculations used to demonstrate the stability of foundations, per §257.73(d)(1)(i) and sufficiency of dike compaction, per §257.73(d)(1)(iii), in terms of

supporting geotechnical investigation and testing data, input parameters, analysis methodology, selection of critical cross-sections, and loading conditions.

- Review of the methodology used to demonstrate that a downstream water body that could induce a sudden drawdown condition, per §257.73(d)(1)(vii), is not present.

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

5.3 Summary of Site Changes Affecting Initial SSA

Several changes at the site occurred after development of the Initial SSA were identified. These changes required updates to the Initial SSA. The changes and the recommend updates to the Initial SSA and are described below.

- The Initial SSA utilized the results of the Initial Inflow Design Flood Control System Plan (IDF) to demonstrate compliance with the adequacy of spillway design and management (§257.73(d)(1)(v)(A)-(B)). The Initial IDF was subsequently updated to develop a Periodic IDF, based on site changes, as discussed in **Section 7**.

- The Initial SSA utilized the slope stability analysis results of the Initial Safety Factor Assessment (SFA) as part of the compliance demonstration for the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) as discussed in **Section 5.1**. The Initial SFA slope stability analyses, including the sudden drawdown analyses, were subsequently updated to develop a Periodic SFA, based on site changes, as discussed in **Section 6**.

5.4 Periodic SSA

The Periodic SFA (**Section 6**) indicated that foundations and abutments are stable and dike compaction is sufficient for expected ranges in loading conditions, as slope stability factors of safety were found to meet or exceed the requirements of §257.73(e)(1), including for post-earthquake (i.e., liquefaction) loading conditions considering seismically induced strength loss in the foundation soils. Therefore, the requirements of §257.73(d)(1)(i) and §257.73(d)(1)(iii) are still met for the Periodic SSA.

The updated Periodic IDF (**Section 7**) indicated that spillways are adequately designed and constructed to adequately manage flow during the PMF flood, as the spillway can adequately manage flow during peak discharge from the PMP storm event without overtopping of the embankments. Therefore, the requirements of §257.73(d)(1)(v)(A)-(B) are met for the Periodic SSA.

SECTION 6

SAFETY FACTOR ASSESSMENT - §257.73(E)(1)

6.1 Overview of Initial SFA

The Initial Safety Factor Assessment (Initial SFA) was prepared by AECOM in 2016 ([5], [8]), following the requirements of §257.73(e)(1). The Initial SFA included the following information:

- A geotechnical investigation program with in-situ testing;
- An assessment of the potential for liquefaction in the dike and foundation soils;
- The development of four (4) slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software; and
- The analysis of each cross-sections for maximum storage pool, maximum surcharge pool, and seismic loading conditions.
    - Liquefaction (i.e., post-earthquake) loading conditions were analyzed due to the presence of a soft layer in the foundation material that may be susceptible to cyclic softening and/or liquefaction. However, this assessment was utilized to support the Initial SSA rather than the Initial SFA, as liquefaction-susceptible soil layers were not identified in the embankment soils.

The Initial SFA concluded that the GMF GSP met all safety factor requirements, per §257.73(e), as all calculated safety factors were equal to or higher than the minimum required values.

6.2 Review of Initial SFA

Geosyntec performed a review of the Initial SFA ([5], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing geotechnical calculations used to demonstrate the acceptable safety factors, per §257.73(e)(1), in terms of:
    - Completeness and adequacy of supporting geotechnical investigation and testing data;
    - Completeness and approach of liquefaction triggering assessments; and
    - Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses.

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

6.3 Summary of Site Changes Affecting the Initial SFA

Several changes at the site, occurred after development of the Initial SFA ([5], [8]), were identified. These changes required updates to the Initial SFA and are described below:

- The normal pool levels within the GMF GSP increased from 621.2 ft to 625.2 ft, due to the construction of a berm in the transfer channel (**Section 7**), resulting in 4.0 ft of additional water loading on the embankment dikes for the maximum storage pool and seismic loading conditions (§257.73(e)(1)(i) and (iii)), relative to the Initial SFA.

- Peak pool levels in the GMF GSP during the PMP design flood event increased from 623.8 ft to 626.7 ft, per the updated Periodic IDF (**Section 7**), resulting in 2.9 ft of additional water loading on the embankment dikes for the maximum surcharge pool loading conditions (§257.73(e)(1)(iv)), relative to the initial SFA.

- Groundwater levels in foundation soils around the GMF GSP, as measured from the monitoring well network over a multi-year period, were observed to be approximately 1 to 3 ft higher than groundwater levels utilized in the slope stability analyses supporting the Initial SFA (see **Section 2.3**). Therefore, the groundwater levels in the slope stability analysis do not represent long-term trends at the GMF GSP.

6.4 Periodic SFA

Geosyntec revised existing slope stability analyses associated with the Initial SFA ([5], [8]), for the four cross-sections (13+50, 22+50, 46+50, and 58+00) previously evaluated to account for site changes, as described in **Section 6.3**. The following approach and input data were used to revise the analyses:

- Water levels in the GMF GSP for the maximum storage pool, and seismic slope stability analysis loading conditions were increased to El. 625.2 ft in all the cross-sections, based on the Periodic IDF (**Section 7.4)**.

- Water levels in the GMF GSP for the maximum surcharge pool slope stability analysis loading conditions were increased to El. 626.7 ft in al the cross-sections based on the Periodic IDF (**Section 7.4)**.

- According to updated groundwater level monitoring plot (**Section 2.3**), the phreatic level in the location of related piezometers increased for all the loading conditions from El. 621.8 to El. 623.3 ft in cross-section 22+50, from El. 623.3 to El. 624.0 ft in cross-section 46+50, and from El. 620.0 to El. 623.0 ft in cross-section 58+00.

- All other analysis input data and settings from the Initial SFA ([5], [8]), were utilized, including, but not limited to, subsurface stratigraphy and soil strengths, phreatic conditions, ground surface geometry, software package and version, slip surface search routines and methods, and input data for the seismic analyses.

Factors of safety from the Periodic SFA are summarized in **Table 3** and confirm that the GMF GSP meets the requirements of §257.73(e)(1). Slope stability analysis output associated with the Initial SFA is provided in **Attachment D**.

Table 3 – Factors of Safety from Periodic SFA

	Structural Stability Assessment (§257.73(d)) and Safety Factor Assessment (§257.73(e))				**Structural Stability Assessment (§257.73(d))**
Cross-Section	**Maximum Storage Pool §257.73(e)(1)(i) Minimum Required = 1.50**	**Maximum Surcharge Pool[1] §257.73(e)(1)(ii) Minimum Required = 1.40**	**Seismic §257.73(e)(1)(iii) Minimum Required = 1.00**	**Dike Liquefaction §257.73(e)(1)(iv) Minimum Required = 1.20**	**Foundation Liquefaction §257.73(d)(1)(i) Minimum Required = 1.20**
13+50	3.45*	3.45*	1.6	N/A	2.46
22+50	3.48	3.48	1.45*	N/A	2.39*
46+50	4.17	4.17	1.74	N/A	3.01
58+00	3.57	3.57	1.63	N/A	2.57

Notes:
*Indicates critical cross-section (i.e., lowest calculated factor of safety out of the ten cross-sections analyzed)
N/A – Loading condition is not applicable.

SECTION 7

INFLOW DESIGN FLOOD CONROL SYSTEM PLAN - §257.82

7.1 Overview of 2016 Inflow Design Flood Control System Plan

The Initial Inflow Design Flood Control System Plan (Initial IDF) was prepared by AECOM in 2016 ([6], [8]), following the requirements of §257.82. The Initial IDF included the following information:

- A hydraulic and hydrologic analysis, performed for the Probable Maximum Flood design flood event because of the hazard potential classification of "High", which corresponded to 34.25 inches of precipitation over a 24-hour period.
- The Initial IDF utilized a HydroCAD Version 10 [19] model to evaluate spillway flows and pool level increases during the design flood, with a SWSE of 621.2 ft.

The Initial IDF concluded that the GMF GSP met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 623.8 ft, relative to the minimum GMF GSP dike crest elevation of 631.0 ft. Therefore, overtopping was not expected. The Initial IDF also evaluated the potential for discharge from the CCR unit and determined that discharge from the unit was not expected, as the GMF GSP does not discharge into waters of the United States and overtopping of the GMF GSP embankments was not expected during the PMF inflow design flood.

7.2 Review of Initial IDF

Geosyntec performed a review of the Initial IDF ([6], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing the return interval used vs. the hazard potential classification.
- Reviewing the rainfall depth and distribution for appropriateness.
- Performing a high-level review of the inputs to the hydrological modeling.
- Reviewing the hydrologic model parameters for spillway parameters, starting pool elevation, and storage vs. the reference data.
- Reviewing the overall IDF vs. the applicable requirements of the CCR Rule [1].

One comment was identified during review of the Initial IDF. The comment is described below:

- The Initial IDF considered the GMF GSP, but the HydroCAD analysis supporting the Initial IDF did not explicitly consider the downstream GMF Recycle Pond (GMF RP) within the model.

7.3 Summary of Site Changes Affecting the Initial IDF

Two changes at the site that occurred after development of the Initial IDF were identified. These changes required updates to the Initial IDF and are described below:

- A berm was constructed in the transfer channel between the GMF GSP and the GMF RP, with a crest elevation of approximately 626 ft, thereby increasing the SWSE in the GMF GSP relative to the Initial IDF.

- Approximately 30,000 CY was placed above the SWSE in the GMF GSP, thereby altering the stage-storage curve relative to the Initial IDF.

7.4 Periodic IDF

Geosyntec revised the Initial IDF to account for the increase in SWSE and additional CCR placement, as described in **Section 7.2** and **7.3**. The following approach and input data were used for the revised analyses: The model was expanded to include the Gypsum Management Facility Recycle Pond (GMF RP) pond and its drainage area.

- The drainage area to the GMF RP was modeled as a subcatchment and assigned an area of 18.3 ac per the 2020 site survey [9]. It was assigned a Curve number (CN) of 98 and a time of concentration of 6 min (direct inflow).

Table 4 – GMF RP Culvert Attributes in Periodic IDF

Parameter	Value
Orifice/Grate	
Invert Elevation (ft)	624.0
Discharge Coefficient	0.6
Orifice Width (in)	60
Orifice Length (in)	60
Culvert	
Inlet Elevation (ft)	615.0
Crest Breadth (ft)	1.0
Outlet Elevation (ft)	613.0
Length (ft)	92.0
Diameter (in)	45
Manning's n	0.013
Entrance Loss Coefficient	0.5
Contraction Coefficient	0.9

- The GMFR Pond was modeled as a pond with three identical emergency spillway outlets.
    - The outlets were modeled as horizontal orifices routed to culverts, with attributed listed in **Table 4**.
- The routing method for the model was updated to account for routing between the ponds. The Reach Routing Method was updated from "Storage Indication+ Translation" to "Dynamic Storage Indication". The Pond Routing Method was updated from "Storage – Indication" to "Dynamic Storage Indication".
- The stage-storage curve was updated for both the GMF GSP and GMF RP Ponds based on the 2020 site survey [9].
    - Revised stage-volume curves for the GMF RP and GMF GSP were prepared based on measuring the storage volume of the GMF RP and GMF GSP at every one-foot increment of depth from an elevation at the bottom of the ponds (621.1 ft for GMF GSP; 604.9 ft for GMF RP) to the approximate minimum perimeter dike embankment crest elevation (632 ft for GMF GSP; 629 ft for GMF RP). This analysis identified an overall decrease of 9.67 ac-ft of storage volume at the GMF GSP from the storage used in the 2016 Initial IDF Certification.
- The subcatchment area draining to the GMF GSP was updated from 33.8 ac to 36.2 ac to reflect the 2020 site survey [9].
- The time of concentration (ToC) for drainage areas to the GMF GSP was updated from 5 minutes to 6 minutes to reflect direct run-on inflow in accordance with TR-20 [20].
- The SWSE within the GMF GSP was updated from 621.2 ft to 625.2 ft to reflect the water surface elevation from 2020 site survey [9].
- The SWSE in the GMF RP was assumed to be El. 622.1 ft, based on the Updated IDF for the GMF RP [21].
- The GMF GSP and transfer channel geometry were updated to reflect the new berm at the inlet to the transfer channel.
    - The outlet invert from the GMF Pond to the transfer channel between the GMF Pond and the GMFR Pond was raised from 625 ft to 626 ft per the 2020 site survey [9]. The geometry of the outlet was updated based on the 2020 site survey, as listed in **Table 5**.

Table 5 – GMF GSP Outlet Geometry in Periodic IDF

Head (ft)	Channel Width (ft)
0	45
2	60
4	75

- The transfer channel geometry was updated based on the 2020 site survey, as listed in **Table 6**.

Table 6 – GMF GSP Transfer Channel Geometry in Periodic IDF

Parameter	Value
Bottom Width (ft)	32.7
Channel Depth (ft)	6
Left Side Slope	3
Right Side Slope	1.6
Channel Length (ft)	450

- The three outlet structures in the GMF RP were updated from 24 ft broad-crested weirs to horizontal, rectangular orifices with dimensions of 5 ft by 5 ft to reflect the riser structures existing on site. The inlet elevation of the orifices was set to 624 ft per the initial certification reports for the GMF RP ([22], [23]).

The results of the Periodic IDF are summarized in **Table 7** and confirm that the GMF GSP meets the requirements of §257.82(a)-(b), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevations, as long as the SWSE in the GMF GSP is maintained at El. 625.2 ft or lower. Additionally, all discharge from the GMF GSP is routed through the existing spillway system to the GMF RP during both normal and IDF conditions. Updated area-capacity curves and HydroCAD model output are provided in **Attachment E**.

Table 7 – Water Levels from Updated Periodic IDF

Analysis	Starting Water Surface Elevation (ft)	Peak Water Surface Elevation (ft)	Minimum Dike Crest Elevation (ft)
Initial IDF	621.2	623.8	631.0
Periodic IDF Update	625.2	626.7	632.0
Initial to Periodic Change[1]	+4.0	+2.9	

Notes:
[1]Postive change indicates increase in the WSE relative to the Initial IDF, negative change indicates decrease in the WSE, relative to the Initial IDF.

SECTION 8

CONCLUSIONS

The GMF GSP at CPP was evaluated relative to the USPEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2)),
- History of Construction reporting (§257.73(d)),
- Structural stability assessment (§257.73(d)),
- Safety factor assessment (§257.73(e)), and
- Inflow design flood control system planning (§257.82).

Based on the evaluations presented herein, the referenced requirements are satisfied.

SECTION 9

CERTIFICATION STATEMENT

CCR Unit: Illinois Power Generating Company, Coffeen Power Plant, GMF Gypsum Stack Pond

I, Lucas P. Carr, 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 2021 USEPA CCR Rule Periodic Certification Report, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the periodic assessment of the hazard potential classification, history of construction report, structural stability, safety factors, and inflow design flood control system planning, dated October 2021, were conducted in accordance with the requirements of 40 CFR §257.73(a)(2), (c), (d), (e), and §257.82.

Lucas P. Carr

10/11/2021

Date

SECTION 10

REFERENCES

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

[2] Stantec Consulting Services, Inc., "Initial Hazard Potential Classification Assessment, EPA Final CCR Rule, GMF Pond, Coffeen Power Station, Montgomery County, Illinois," Fenton, MO, October 12, 2016.

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

[4] AECOM, "CCR Rule Report: Initial Structural Stability Assessment for GMF Pond At Coffeeen Power Station," St. Louis, MO, October 2015.

[5] AECOM, "CCR Rule Report: Initial Safety Factor Assessment for GMF Pond at Coffeen Power Station," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan for GMF Pond at Coffeen Power Station," St. Louis, MO, October 2016.

[7] Stantec Consulting Services, Inc., "Documentation of Initial Hazard Potential Classification Assessment, GMF Pond, Coffeen Power Station, Montgomery County, Illinois," October 12, 2016.

[8] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for GMF Pond at Coffeen Power Station," St. Louis, MO, October 2016.

[9] IngenAE, "Luminant, Illinois Power Generating Company, Coffeen Power Station, December 2020 Topography," February 26, 2021.

[10] Weaver Consultants Group, "Dynegy, Collinsville, IL, 2015 - Coffeen Topography," December 1, 2015.

[11] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Coffeen Power Station, Gypsum Stack Pond,* January 18, 2017.

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Section 3

Annual Groundwater Monitoring and Corrective Action Report (Section 845.610(e))

Prepared for
Illinois Power Generating Company

Date
January 31, 2022

Project No.
1940100711-003

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

GMF GYPSUM STACK POND

COFFEEN POWER PLANT

COFFEEN, ILLINOIS

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2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
COFFEEN POWER PLANT GMF GYPSUM STACK POND

Project name	**Coffeen Power Plant GMF Gypsum Stack Pond**
Project no.	**1940100711-003**
Recipient	**Illinois Power Generating Company**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
Version	**FINAL**
Date	**January 31, 2022**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Lauren Cook**
Approved by	**Brian Hennings**
Description	**Annual Report in Support of Part 845**

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CONTENTS

TABLES (IN TEXT)

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

§	Section
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
CCR	coal combustion residuals
CPP	Coffeen Power Plant
DA	deep aquifer
GMF GSP	Gypsum Management Facility Gypsum Stack Pond
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HCR	Hydrogeologic Site Characterization Report
ID	identification
IEPA	Illinois Environmental Protection Agency
IPGC	Illinois Power Generating Company
NA	not applicable
NID	National Inventory of Dams
No.	number
Part 845	35 I.A.C. § 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SI	surface impoundment
SSI	statistically significant increase
TDS	total dissolved solids
UA	uppermost aquifer
WLO	water level only

EXECUTIVE SUMMARY

This report has been prepared to provide the information required by Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.610(e) (*Annual Groundwater Monitoring and Corrective Action Report*) for the Gypsum Management Facility Gypsum Stack Pond (GMF GSP) located at Coffeen Power Plant (CPP) near Coffeen, Illinois.

An operating permit application for the GMF GSP was submitted by Illinois Power Generating Company (IPGC) to the Illinois Environmental Protection Agency (IEPA) by October 31, 2021 in accordance with the requirements specified in 35 I.A.C. § 845.230(d), and is pending approval. The GMF GSP is recognized by Vistra identification (ID) number (No.) 103, IEPA ID No. W1350150004-03, and National Inventory of Dams (NID) No. IL50579.

A Groundwater Monitoring Plan (GMP; Ramboll Americas Engineering Solutions, Inc. [Ramboll], 2021a), which included a Statistical Analysis Plan, was developed and submitted as part of the operating permit application to propose a monitoring well network and monitoring program specific to the GMF GSP that will comply with 35 I.A.C. § 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (Part 845; IEPA, 2021). The proposed groundwater protection standards (GWPS), as presented in the GMP, are shown in **Appendix A**.

Groundwater concentrations observed from 2015 to 2021 were presented in the Hydrogeologic Site Characterization Report (HCR; Ramboll, 2021b) and evaluated in the presentation of the History of Potential Exceedances (Ramboll, 2021c) included in the operating permit application, as required by 35 I.A.C. § 845.230(d). Groundwater concentrations from 2015 to 2021 that exceeded the GWPS set forth in 35 I.A.C. § 845.600(a) are considered potential exceedances because the methodology used to determine them is proposed in the Statistical Analysis Plan, which is pending IEPA approval. The determination of potential historical exceedances of 35 I.A.C. § 845.600(a) and a summary of potential historical exceedances of proposed GWPS are shown in **Appendix B**.

Evaluation of background groundwater quality was presented in the GMP (Ramboll, 2021a), and compliance with Part 845 will be determined after the first round of groundwater sampling following IEPA's issuance of an operating permit.

This report summarizes only the information presented in the operating permit application for the GMF GSP, submitted to IEPA by October 31, 2021, which is pending IEPA approval.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of IPGC, to provide the information required by 35 I.A.C. § 845.610(e) for the GMF GSP located at CPP near Coffeen, Illinois. The owner or operator of a coal combustion residuals (CCR) surface impoundment (SI) must prepare and submit to IEPA by January 31st of each year an Annual Groundwater Monitoring and Corrective Action Report for the preceding calendar year as part of the Annual Consolidated Report required by 35 I.A.C. § 845.550. The Annual Groundwater Monitoring and Corrective Action Report shall document the status of the groundwater monitoring and corrective action plan for the CCR SI, summarize key actions completed, including the status of permit applications and Agency approvals, describe any problems encountered and actions to resolve the problems, and project key activities for the upcoming year. At a minimum, the annual report must contain the following information, to the extent available:

1. A map, aerial image, or diagram showing the CCR SI and all background (or upgradient) and downgradient monitoring wells, including the well ID Nos., that are part of the groundwater monitoring program for the CCR SI, and a visual delineation of any exceedances of the GWPS.
2. Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
3. A potentiometric surface map for each groundwater elevation sampling event required by 35 I.A.C. § 845.650(b)(2).
4. In addition to all the monitoring data obtained under 35 I.A.C. §§ 845.600-680, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, and the dates the samples were collected.
5. A narrative discussion of any statistically significant increases (SSIs) over background levels for the constituents listed in 35 I.A.C. § 845.600.
6. Other information required to be included in the annual report as specified in 35 I.A.C. §§ 845.600-680.
7. A section at the beginning of the annual report that provides an overview of the current status of the groundwater monitoring program and corrective action plan for the CCR SI. At a minimum, the summary must:
    i. Specify whether groundwater monitoring data shows a SSI over background concentrations for one or more constituents listed in 35 I.A.C. § 845.600.
    ii. Identify those constituents having a SSI over background concentrations and the names of the monitoring wells associated with the SSI(s).
    iii. Specify whether there have been any exceedances of the GWPS for one or more constituents listed in 35 I.A.C. § 845.600.
    iv. Identify those constituents with exceedances of the GWPS in 35 I.A.C. § 845.600 and the names of the monitoring wells associated with the exceedance.
    v. Provide the date when the assessment of corrective measures was initiated for the CCR SI.

vi. Provide the date when the assessment of corrective measures was completed for the CCR SI.

vii. Specify whether a remedy was selected under 35 I.A.C. § 845.670 during the current annual reporting period, and if so, the date of remedy selection.

viii. Specify whether remedial activities were initiated or are ongoing under 35 I.A.C. § 845.780 during the current annual reporting period.

An operating permit application for the GMF GSP was submitted by IPGC to IEPA by October 31, 2021 in accordance with the requirements specified in 35 I.A.C. § 845.230(d), and is pending approval. Therefore, the Part 845 groundwater monitoring program has not yet been initiated. This report summarizes the data collected for the GMF GSP as it was presented in the operating permit application, and includes the following:

- A map showing the CCR SI and all proposed background (or upgradient) and downgradient monitoring wells, including their identification numbers, that are part of the proposed groundwater monitoring program for the CCR SI presented in the GMP included in the operating permit application (Ramboll, 2021a).
- Identification of monitoring wells that were installed during 2021 to fulfill the requirements of 35 I.A.C. § 845.620(b).
- Representative potentiometric surface maps from the independent sampling events conducted in 2021 to meet the requirements of 35 I.A.C. § 845.650(b)(1)(A), as presented in the HCR included in the operating permit application (Ramboll, 2021b).
- A summary from the independent sampling events completed in 2021, including the number of groundwater samples that were collected for analysis for each proposed background and downgradient well and the dates the samples were collected.
- The proposed GWPS as presented in the GMP.
- A summary of the History of Potential Exceedances included in the operating permit application (Ramboll, 2021c), as required by 35 I.A.C. § 845.230(d), summarizing groundwater concentrations from 2015 to 2021 that exceeded the proposed GWPS.
  - These are considered potential exceedances because the methodology used to determine them is proposed in the Statistical Analysis Plan (Appendix A of the GMP), which is pending IEPA approval.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

The Part 845 groundwater monitoring program will commence the quarter following IEPA approval and issuance of the operating permit for the GMF GSP.

3. KEY ACTIONS COMPLETED IN 2021

Work was completed in 2021 to meet the requirements of Part 845 and details were provided in the operating permit application submitted to IEPA. The boring logs and well construction forms are included in the HCR provided with the operating permit application (Ramboll, 2021b).

The proposed Part 845 monitoring well network is presented in **Figure 1** and summarized below in **Table A**. The proposed Part 845 monitoring well network also includes wells previously installed for other programs.

Table A. Proposed Part 845 Monitoring Well Network

Well ID	Monitored Unit	Well Screen Interval (feet bgs)	Well Type [1]
G200	UA	12.2 - 17.0	Background
G206	UA	17.5 - 21.9	Compliance
G206D	DA	49.2 - 59.0	Compliance
G209	UA	17.7 - 22.3	Compliance
G212	UA	16.7 - 21.3	Compliance
G213	UA	16.8 - 21.3	Compliance
G215	UA	19.4 - 23.8	Compliance
G217	UA	20.5 - 24.9	Compliance
G218	UA	20.3 - 24.8	Compliance
R201	UA	14.6 - 19.3	Background
NE Riser [2]	CCR	NA	WLO
SG-04 [2]	Surface Water	NA	WLO

[1] Well type refers to the role of the well in the monitoring network.
[2] Location is temporary pending implementation of impoundment closure per an approved construction permit application.
bgs = below ground surface
CCR = coal combustion residuals
DA = deep aquifer
NA = not applicable
UA = uppermost aquifer
WLO = water level only

Proposed Part 845 monitoring wells were sampled for eight rounds of independent groundwater samples from March to July 2021 and the results were analyzed for the parameters listed in 35 I.A.C. § 845.600. Select proposed Part 845 monitoring wells are also monitored as part of the monitoring system for the requirements of Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257. A summary of the samples collected from background and compliance monitoring wells for determination of the history of potential exceedances is included in **Table B** below. All groundwater elevation data and analytical results obtained in 2021 are presented in the HCR (Ramboll, 2021b). Groundwater elevation contour maps representative of the independent sampling events are presented in **Figures 2 and 3**.

Table B. Summary of Groundwater Samples Collected

Sampling Dates	Parameters Collected	Monitoring Wells Sampled [1]
January 26 - 29, 2021	Appendix III [2], field parameters [3]	G102, G106, G200, G206, G209, G212, G215, G218, and R201
March 29 - 30, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201
April 21 - 22, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201
May 5 - 6, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201
May 17 - 18, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201
June 14, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201
June 29, 2021	Calcium; chloride; pH; sulfate; TDS	G106, G212, and G215
June 29, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	R201
July 13, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	R201
July 27 - 28, 2021	Metals [4], mercury, inorganic parameters [5], radium 226 and 228, field parameters [3]	G200, G206D, and R201

[1] In general, one sample was collected per monitoring well per event.
[2] Appendix III parameters include boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids (TDS).
[3] Field parameters include pH, dissolved oxygen, temperature, oxidation/reduction potential, specific conductance, and turbidity.
[4] Metals include antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium.
[5] Inorganic parameters include fluoride, chloride, sulfate, and TDS.

Evaluation of background groundwater quality is presented in the GMP and the proposed GWPSs are included in **Appendix A.** Compliance with Part 845 will be determined after the first round of groundwater sampling following IEPA's issuance of the operating permit for the GMF GSP.

Groundwater concentrations from 2015 to 2021 were presented in the HCR and evaluated in the presentation of the History of Potential Exceedances included in the operating permit application. Groundwater concentrations that exceeded the proposed GWPS are considered potential exceedances because the methodology used to determine them is proposed in the Statistical Analysis Plan, which is pending IEPA approval. Tables summarizing how potential historical exceedances were determined and the potential exceedances themselves are provided in **Appendix B**.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

The first round of groundwater sampling for compliance with the Part 845 groundwater monitoring program will commence the quarter following IEPA approval and issuance of the operating permit for the GMF GSP, and in accordance with the GMP.

5. KEY ACTIVITIES PLANNED FOR 2022

The following key activities are planned for 2022:

- Groundwater sampling and reporting for compliance will be initiated the quarter following issuance of the operating permit at all monitoring wells in the approved monitoring well network as presented in the GMP and required by 35 I.A.C. § 845.610(b)(3), including:
  - Monthly groundwater elevations.
  - Quarterly groundwater sampling.

6. REFERENCES

Illinois Environmental Protection Agency (IEPA), 2021. *In the Matter of: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments: Title 35 Illinois Administration Code 845, Addendum*. April 15, 2021.

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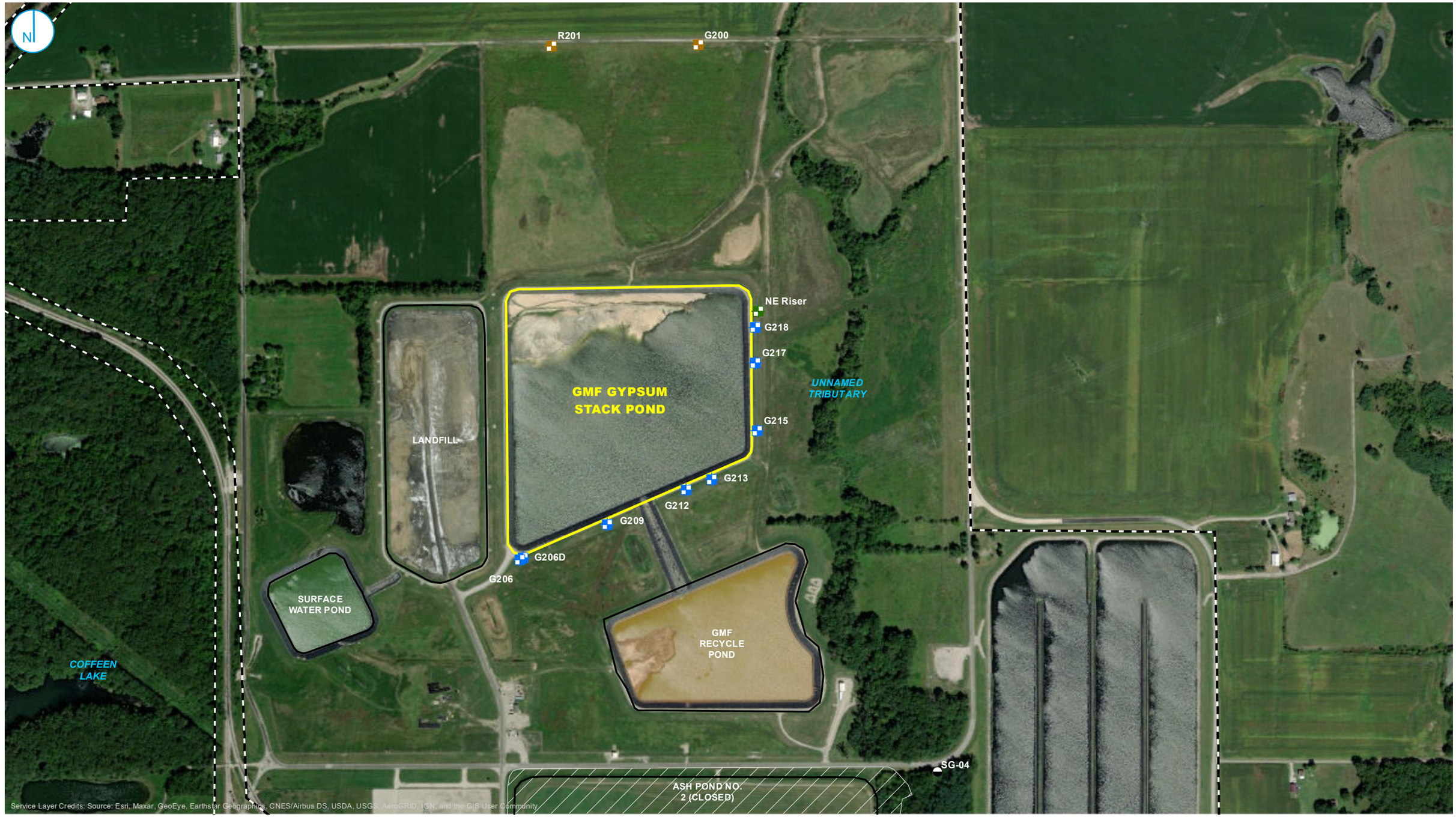
Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2021b. *Hydrogeologic Site Characterization Report. Coffeen Power Plant, Gypsum Management Facility Gypsum Stack Pond, Coffeen, Illinois*. Illinois Power Generating Company. October 25, 2021.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2021c. *History of Potential Exceedances. Coffeen Power Plant, Gypsum Management Facility Gypsum Stack Pond, Coffeen, Illinois*. Illinois Power Generating Company. October 25, 2021.

FIGURES



BACKGROUND WELL
COMPLIANCE WELL
SOURCE SAMPLE LOCATION
STAFF GAGE

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

0 250 500 Feet

PROPOSED PART 845 GROUNDWATER MONITORING WELL NETWORK

FIGURE 1

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
GMF GYPSUM STACK POND
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

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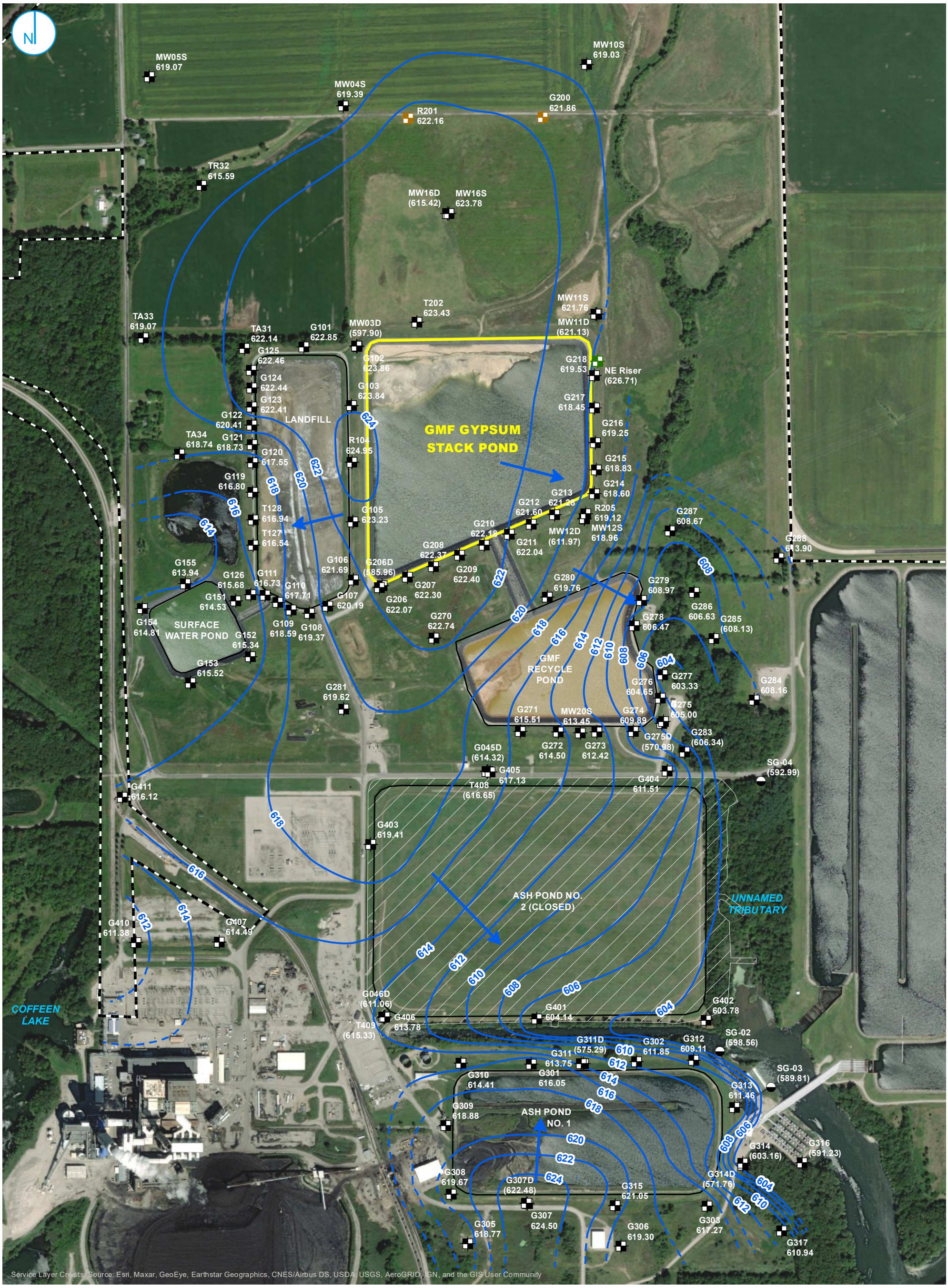
Y:\Mapping\Projects\22\2285\MXD\845_Operating_PermitCoffeen\GMF_GSP\GMP\Figure 2-1_Proposed Monitoring Well Network.mxd
PROJECT: 169000XXXX | DATED: 10/12/2021 | DESIGNER: HOTCALD

PROJECT: 169000XXXX | DATED: 1/13/2022 | DESIGNER: galarnmc

Y:\Mapping\Projects\22\2285\MXD\845_2021_AnnualGWM\Coffeen\GSP_103\Figure 2. Potentiometric Surface Map 20210420 GSP.mxd



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

- BACKGROUND WELL
- MONITORING WELL
- SOURCE SAMPLE LOCATION
- STAFF GAGE
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

0 275 550 Feet

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

NOTE:

ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.

NM = NOT MEASURED

POTENTIOMETRIC SURFACE MAP APRIL 20, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT GMF GYPSUM STACK POND

COFFEEN POWER PLANT
COFFEEN, ILLINOIS

FIGURE 2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

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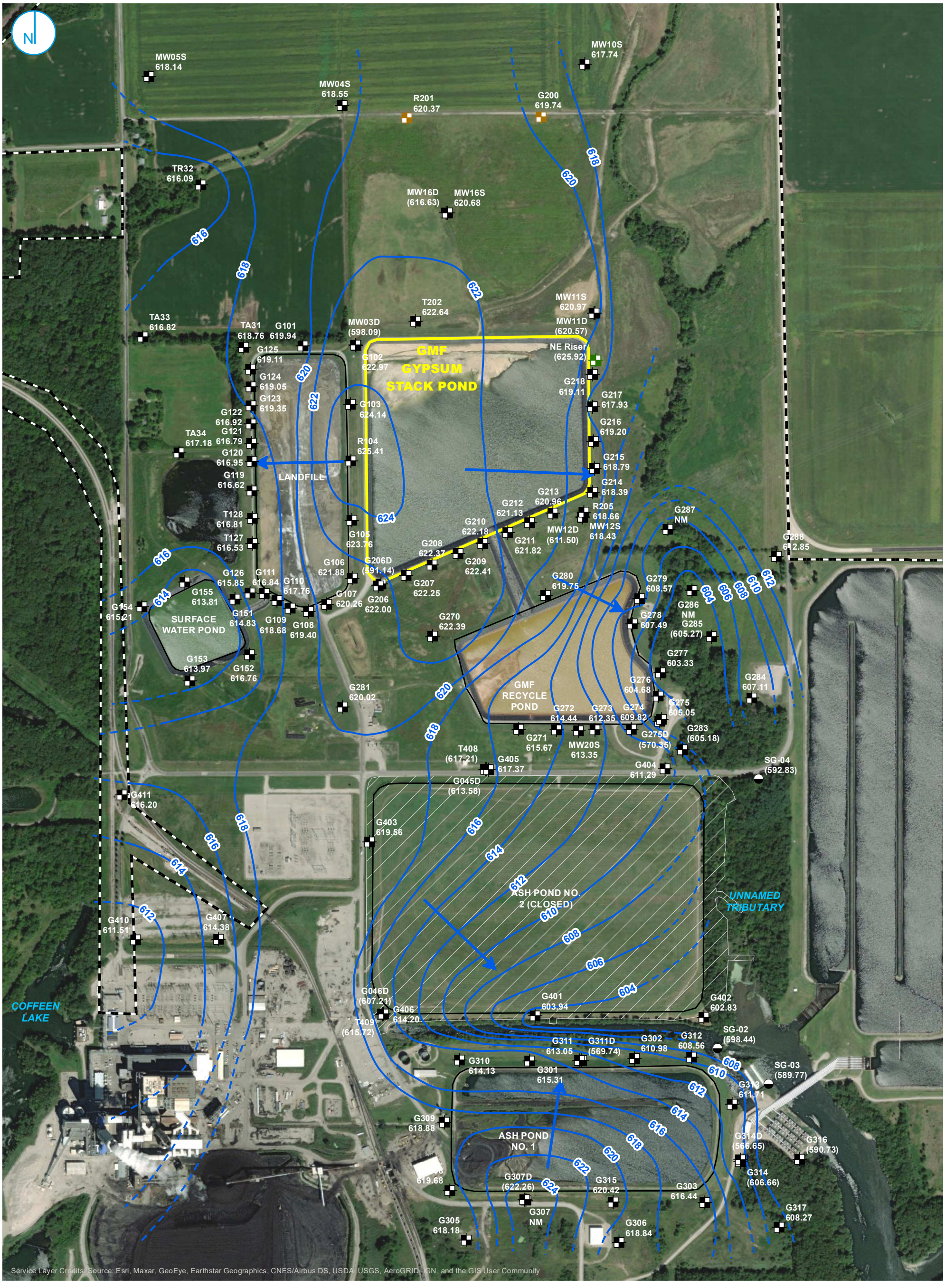
PROJECT: 169000XXXX | DATED: 1/13/2022 | DESIGNER: galarnmc

Y:\Mapping\Projects\22\2285\MXD\845_2021_AnnualGWM\Coffeen\GSP_103\Figure 3. Potentiometric Surface Map 20210726 GSP.mxd



BACKGROUND WELL

MONITORING WELL

SOURCE SAMPLE LOCATION

STAFF GAGE

GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

0 275 550 Feet

PART 845 REGULATED UNIT (SUBJECT UNIT)

SITE FEATURE

LIMITS OF FINAL COVER

PROPERTY BOUNDARY

NOTE:

ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.

NM = NOT MEASURED

POTENTIOMETRIC SURFACE MAP JULY 26, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT GMF GYPSUM STACK POND

COFFEEN POWER PLANT

COFFEEN, ILLINOIS

FIGURE 3

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

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APPENDICES

APPENDIX A
TABLE 3-1. BACKGROUND GROUNDWATER QUALITY AND STANDARDS

TABLE 3-1. BACKGROUND GROUNDWATER QUALITY AND STANDARDS
GROUNDWATER MONITORING PLAN
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Parameter	Background Concentration	845 Limit	Groundwater Protection Standard	Unit
Antimony, total	0.003	0.006	0.006	mg/L
Arsenic, total	0.011	0.010	0.011	mg/L
Barium, total	0.13	2.0	2.0	mg/L
Beryllium, total	0.001	0.004	0.004	mg/L
Boron, total	0.11	2	2	mg/L
Cadmium, total	0.001	0.005	0.005	mg/L
Chloride, total	94.9	200	200	mg/L
Chromium, total	0.0096	0.1	0.1	mg/L
Cobalt, total	0.0037	0.006	0.006	mg/L
Fluoride, total	0.552	4.0	4.0	mg/L
Lead, total	0.0059	0.0075	0.0075	mg/L
Lithium, total	0.02	0.04	0.04	mg/L
Mercury, total	0.0011	0.002	0.002	mg/L
Molybdenum, total	0.044	0.1	0.1	mg/L
pH (field)	7.4 / 6.8	9.0 / 6.5	9.0 / 6.5	SU
Radium 226 and 228 combined	1.48	5	5	pCi/L
Selenium, total	0.0035	0.05	0.05	mg/L
Sulfate, total	387	400	400	mg/L
Thallium, total	0.001	0.002	0.002	mg/L
Total Dissolved Solids	975	1200	1200	mg/L

Notes:
For pH, the values presented are the upper / lower limits
Groundwater protection standards for calcium and turbidity do not apply per 35 I.A.C. § 845.600(b)
mg/L = milligrams per liter
SU = standard units
pCi/L = picocuries per liter

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APPENDIX B
HISTORY OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES

This presentation of the History of Potential Exceedances, and any corrective action taken to remediate groundwater, is provided to meet the requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.230(d)(2)(M) for the Coffeen Power Plant GMF Gypsum Stack Pond, Illinois Environmental Protection Agency (IEPA) ID No. W1350150004-03.

Note

Groundwater concentrations from 2015 to 2021 presented in the Hydrogeologic Site Characterization Report (HCR) Table 4-1, and evaluated and summarized in the following tables, are considered potential exceedances because the methodology used to determine them is proposed in the Statistical Analysis Plan (Appendix A to Groundwater Monitoring Plan [GMP]), which has not been reviewed or approved by IEPA at the time of submittal of the 35 I.A.C. § 845 Operating Permit application.

Alternate sources for potential exceedances as allowed by 35 I.A.C. § 845.650(e) have not yet been evaluated. These will be evaluated and presented in future submittals to IEPA as appropriate.

Table 1 summarizes how the potential exceedances were determined.

Background Concentrations

Background monitoring wells identified in the GMP include G200 and R201.

For monitoring wells that have been historically monitored in accordance with Title 40, Code of Federal Regulations, Part 257, Subpart D (Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments), background concentrations calculated from sampling events in 2015-2017 were compared to the standards identified in 35 I.A.C. § 845.600(a)(1). For constituents with calculated background concentrations in 2015-2017 greater than the standards in 35 I.A.C. § 845.600(a)(1), those calculated background concentrations were used as Groundwater Protection Standards (GWPSs) for comparing to statistical calculation results for each compliance well to determine potential exceedances. Compliance well statistical calculations consider concentrations from all sampling events in 2015-2021.

For all other monitoring wells, either newly constructed in 2021 or existing wells not monitored under Title 40, Code of Federal Regulations, Part 257, Subpart D, background concentrations calculated from the eight sampling events required by 35 I.A.C. § 845.650(b)(1)(A), to be collected within 180 days from April 21, 2021, were compared to the standards identified in 35 I.A.C. § 845.600(a)(1). For constituents with calculated background concentrations greater than the standards in 35 I.A.C. § 845.600(a)(1), those calculated background concentrations were used as GWPSs. Compliance well statistical calculations from that same time period were compared to the GWPSs to determine potential exceedances.

Corrective Action

No corrective actions have been taken to remediate the groundwater.

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G102	UA	845	Antimony, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.003	0.006	0.003	0.006	Standard
G102	UA	845	Arsenic, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.001	0.011	0.011	0.01	Background
G102	UA	845	Barium, total	mg/L	04/08/2015 - 07/09/2017	CI around mean	0.037	2.0	0.13	2	Standard
G102	UA	845	Beryllium, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.004	0.001	0.004	Standard
G102	UA	845	Boron, total	mg/L	04/08/2015 - 01/26/2021	CI around median	0.010	2.0	0.11	2	Standard
G102	UA	845	Cadmium,total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.005	0.001	0.005	Standard
G102	UA	845	Chloride, total	mg/L	04/08/2015 - 01/26/2021	CI around mean	19	200	95	200	Standard
G102	UA	845	Chromium, total	mg/L	04/08/2015 - 07/09/2017	CI around geomean	0.00437	0.10	0.0096	0.1	Standard
G102	UA	845	Cobalt, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.002	0.006	0.0037	0.006	Standard
G102	UA	845	Fluoride, total	mg/L	04/08/2015 - 01/26/2021	CI around mean	0.30	4.0	0.55	4	Standard
G102	UA	845	Lead, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.001	0.0075	0.0059	0.0075	Standard
G102	UA	845	Lithium, total	mg/L	11/16/2015 - 07/09/2017	CI around median	0.010	0.040	0.020	0.04	Standard
G102	UA	845	Mercury, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.0002	0.002	0.0011	0.002	Standard
G102	UA	845	Molybdenum, total	mg/L	07/23/2015 - 07/09/2017	CI around mean	0.000974	0.10	0.044	0.1	Standard
G102	UA	845	pH (field)	SU	01/20/2015 - 01/26/2021	CI around median	7.1	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G102	UA	845	Radium-226 + Radium 228, tot	pCi/L	11/16/2015 - 07/09/2017	CI around mean	0.42	5.0	1.5	5	Standard
G102	UA	845	Selenium, total	mg/L	04/08/2015 - 07/09/2017	CI around mean	0.0014	0.050	0.0035	0.05	Standard
G102	UA	845	Sulfate, total	mg/L	04/08/2015 - 01/26/2021	CI around mean	73	400	387	400	Standard
G102	UA	845	Thallium, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G102	UA	845	Total Dissolved Solids	mg/L	01/20/2015 - 01/26/2021	CI around mean	389	1200	975	1200	Standard
G103	UA	845	Antimony, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G103	UA	845	Arsenic, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0012	0.011	0.011	0.01	Background
G103	UA	845	Barium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.10	2.0	0.13	2	Standard
G103	UA	845	Beryllium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G103	UA	845	Boron, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.010	2.0	0.11	2	Standard
G103	UA	845	Cadmium,total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.005	0.001	0.005	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G103	UA	845	Chloride, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	66	200	95	200	Standard
G103	UA	845	Chromium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.019	0.10	0.0096	0.1	Standard
G103	UA	845	Cobalt, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G103	UA	845	Fluoride, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.25	4.0	0.55	4	Standard
G103	UA	845	Lead, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.0075	0.0059	0.0075	Standard
G103	UA	845	Mercury, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G103	UA	845	Molybdenum, total	mg/L	07/23/2015 - 10/06/2015	Most recent sample	0.0034	0.10	0.044	0.1	Standard
G103	UA	845	pH (field)	SU	01/20/2015 - 10/06/2015	CI around mean	6.9	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G103	UA	845	Selenium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G103	UA	845	Sulfate, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	69	400	387	400	Standard
G103	UA	845	Thallium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G103	UA	845	Total Dissolved Solids	mg/L	01/20/2015 - 10/06/2015	CI around mean	353	1200	975	1200	Standard
G105	UA	845	Antimony, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G105	UA	845	Arsenic, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0013	0.011	0.011	0.01	Background
G105	UA	845	Barium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.078	2.0	0.13	2	Standard
G105	UA	845	Beryllium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G105	UA	845	Boron, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.13	2.0	0.11	2	Standard
G105	UA	845	Cadmium,total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.005	0.001	0.005	Standard
G105	UA	845	Chloride, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	37	200	95	200	Standard
G105	UA	845	Chromium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0046	0.10	0.0096	0.1	Standard
G105	UA	845	Cobalt, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G105	UA	845	Fluoride, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.30	4.0	0.55	4	Standard
G105	UA	845	Lead, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0011	0.0075	0.0059	0.0075	Standard
G105	UA	845	Mercury, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G105	UA	845	Molybdenum, total	mg/L	07/23/2015 - 10/06/2015	Most recent sample	0.0028	0.10	0.044	0.1	Standard
G105	UA	845	pH (field)	SU	01/20/2015 - 10/06/2015	CI around mean	6.7	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G105	UA	845	Selenium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.0011	0.050	0.0035	0.05	Standard
G105	UA	845	Sulfate, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	110	400	387	400	Standard
G105	UA	845	Thallium, total	mg/L	04/08/2015 - 10/06/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G105	UA	845	Total Dissolved Solids	mg/L	01/20/2015 - 10/06/2015	CI around mean	486	1200	975	1200	Standard
G106	UA	845	Antimony, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.003	0.006	0.003	0.006	Standard
G106	UA	845	Arsenic, total	mg/L	04/08/2015 - 07/09/2017	CB around linear reg	0.00106	0.011	0.011	0.01	Background
G106	UA	845	Barium, total	mg/L	04/08/2015 - 07/09/2017	CI around mean	0.053	2.0	0.13	2	Standard
G106	UA	845	Beryllium, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.004	0.001	0.004	Standard
G106	UA	845	Boron, total	mg/L	04/08/2015 - 01/26/2021	CB around linear reg	0.020	2.0	0.11	2	Standard
G106	UA	845	Cadmium,total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.005	0.001	0.005	Standard
G106	UA	845	Chloride, total	mg/L	04/08/2015 - 01/26/2021	CB around linear reg	42	200	95	200	Standard
G106	UA	845	Chromium, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.004	0.10	0.0096	0.1	Standard
G106	UA	845	Cobalt, total	mg/L	04/08/2015 - 07/09/2017	CI around median	0.002	0.006	0.0037	0.006	Standard
G106	UA	845	Fluoride, total	mg/L	04/08/2015 - 01/26/2021	CI around mean	0.40	4.0	0.55	4	Standard
G106	UA	845	Lead, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.0075	0.0059	0.0075	Standard
G106	UA	845	Lithium, total	mg/L	11/17/2015 - 07/09/2017	All ND - Last	0.010	0.040	0.020	0.04	Standard
G106	UA	845	Mercury, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.0002	0.002	0.0011	0.002	Standard
G106	UA	845	Molybdenum, total	mg/L	07/23/2015 - 07/09/2017	CI around mean	0.00145	0.10	0.044	0.1	Standard
G106	UA	845	pH (field)	SU	01/20/2015 - 06/29/2021	CI around mean	7.0	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G106	UA	845	Radium-226 + Radium 228, tot	pCi/L	11/17/2015 - 07/09/2017	CI around mean	0.28	5.0	1.5	5	Standard
G106	UA	845	Selenium, total	mg/L	04/08/2015 - 07/09/2017	CI around mean	0.00108	0.050	0.0035	0.05	Standard
G106	UA	845	Sulfate, total	mg/L	04/08/2015 - 01/26/2021	CB around linear reg	66	400	387	400	Standard
G106	UA	845	Thallium, total	mg/L	04/08/2015 - 07/09/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G106	UA	845	Total Dissolved Solids	mg/L	01/20/2015 - 01/26/2021	CI around mean	416	1200	975	1200	Standard
G206	UA	257	Antimony, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.003	0.006	0.003	0.006	Standard
G206	UA	257	Arsenic, total	mg/L	01/21/2015 - 07/15/2017	CI around median	0.001	0.010	0.010	0.01	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G206	UA	257	Barium, total	mg/L	04/09/2015 - 07/15/2017	CI around mean	0.048	2.0	0.27	2	Standard
G206	UA	257	Beryllium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.0067	0.0067	0.004	Background
G206	UA	257	Boron, total	mg/L	01/21/2015 - 01/27/2021	CI around median	0.010	2.0	0.39	2	Standard
G206	UA	257	Cadmium,total	mg/L	01/21/2015 - 07/15/2017	All ND - Last	0.001	0.005	0.0012	0.005	Standard
G206	UA	257	Chloride, total	mg/L	01/21/2015 - 01/27/2021	CI around mean	25	200	96	200	Standard
G206	UA	257	Chromium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.004	0.10	0.013	0.1	Standard
G206	UA	257	Cobalt, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.002	0.0074	0.0074	0.006	Background
G206	UA	257	Fluoride, total	mg/L	04/09/2015 - 01/27/2021	CI around median	0.39	4.0	0.50	4	Standard
G206	UA	257	Lead, total	mg/L	01/21/2015 - 07/15/2017	Future median	0.001	0.018	0.018	0.0075	Background
G206	UA	257	Lithium, total	mg/L	11/18/2015 - 07/15/2017	All ND - Last	0.010	0.040	0.021	0.04	Standard
G206	UA	257	Mercury, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
G206	UA	257	Molybdenum, total	mg/L	07/22/2015 - 07/15/2017	CI around mean	0.00108	0.10	0.0069	0.1	Standard
G206	UA	257	pH (field)	SU	01/21/2015 - 01/27/2021	CI around median	7.0	6.5/9.0	6.9/7.3	6.5/9	Standard/Standard
G206	UA	257	Radium-226 + Radium 228, tot	pCi/L	11/18/2015 - 07/15/2017	CI around mean	0.34	9.8	9.8	5	Background
G206	UA	257	Selenium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.001	0.050	0.0097	0.05	Standard
G206	UA	257	Sulfate, total	mg/L	01/21/2015 - 01/27/2021	CI around median	110	400	300	400	Standard
G206	UA	257	Thallium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G206	UA	257	Total Dissolved Solids	mg/L	01/21/2015 - 01/27/2021	CI around median	450	1200	949	1200	Standard
G206D	DA	845	Antimony, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.003	0.006	0.003	0.006	Standard
G206D	DA	845	Arsenic, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.00199	0.011	0.011	0.01	Background
G206D	DA	845	Barium, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.068	2.0	0.13	2	Standard
G206D	DA	845	Beryllium, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
G206D	DA	845	Boron, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.11	2.0	0.11	2	Standard
G206D	DA	845	Cadmium,total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
G206D	DA	845	Chloride, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	38	200	95	200	Standard
G206D	DA	845	Chromium, total	mg/L	03/30/2021 - 07/27/2021	CI around median	0	0.10	0.0096	0.1	Standard

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COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G206D	DA	845	Cobalt, total	mg/L	03/30/2021 - 07/27/2021	CI around median	0	0.006	0.0037	0.006	Standard
G206D	DA	845	Fluoride, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.44	4.0	0.55	4	Standard
G206D	DA	845	Lead, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.0000301	0.0075	0.0059	0.0075	Standard
G206D	DA	845	Lithium, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.020	0.040	0.020	0.04	Standard
G206D	DA	845	Mercury, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.0002	0.002	0.0011	0.002	Standard
G206D	DA	845	Molybdenum, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	0.026	0.10	0.044	0.1	Standard
G206D	DA	845	pH (field)	SU	03/30/2021 - 07/27/2021	CI around mean	7.0	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G206D	DA	845	Radium-226 + Radium 228, tot	pCi/L	03/30/2021 - 07/27/2021	CI around mean	-0.093	5.0	1.5	5	Standard
G206D	DA	845	Selenium, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.001	0.050	0.0035	0.05	Standard
G206D	DA	845	Sulfate, total	mg/L	03/30/2021 - 07/27/2021	CI around mean	224	400	387	400	Standard
G206D	DA	845	Thallium, total	mg/L	03/30/2021 - 07/27/2021	All ND - Last	0.001	0.002	0.001	0.002	Standard
G206D	DA	845	Total Dissolved Solids	mg/L	03/30/2021 - 07/27/2021	CI around mean	1080	1200	975	1200	Standard
G207	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G207	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.000614	0.011	0.011	0.01	Background
G207	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.12	2.0	0.13	2	Standard
G207	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G207	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00421	2.0	0.11	2	Standard
G207	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G207	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	51	200	95	200	Standard
G207	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.004	0.10	0.0096	0.1	Standard
G207	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G207	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.44	4.0	0.55	4	Standard
G207	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.000508	0.0075	0.0059	0.0075	Standard
G207	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G207	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.0016	0.10	0.044	0.1	Standard
G207	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.7	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard

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HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G207	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G207	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-23.9	400	387	400	Standard
G207	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G207	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 07/22/2015	Most recent sample	440	1200	975	1200	Standard
G208	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G208	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.011	0.011	0.01	Background
G208	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.091	2.0	0.13	2	Standard
G208	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G208	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	2.0	0.11	2	Standard
G208	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G208	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	21	200	95	200	Standard
G208	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.004	0.10	0.0096	0.1	Standard
G208	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G208	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.39	4.0	0.55	4	Standard
G208	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.0075	0.0059	0.0075	Standard
G208	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G208	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.0017	0.10	0.044	0.1	Standard
G208	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.8	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G208	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0033	0.050	0.0035	0.05	Standard
G208	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	400	387	400	Standard
G208	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G208	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	156	1200	975	1200	Standard
G209	UA	257	Antimony, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.003	0.006	0.003	0.006	Standard
G209	UA	257	Arsenic, total	mg/L	01/21/2015 - 07/15/2017	CI around geomean	0.0012	0.010	0.010	0.01	Standard
G209	UA	257	Barium, total	mg/L	04/09/2015 - 07/15/2017	CI around mean	0.057	2.0	0.27	2	Standard
G209	UA	257	Beryllium, total	mg/L	04/09/2015 - 07/15/2017	Future median	0.001	0.0067	0.0067	0.004	Background

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G209	UA	257	Boron, total	mg/L	01/21/2015 - 01/27/2021	CI around median	0.010	2.0	0.39	2	Standard
G209	UA	257	Cadmium,total	mg/L	01/21/2015 - 07/15/2017	CI around median	0.001	0.005	0.0012	0.005	Standard
G209	UA	257	Chloride, total	mg/L	01/21/2015 - 01/27/2021	CI around mean	63	200	96	200	Standard
G209	UA	257	Chromium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.004	0.10	0.013	0.1	Standard
G209	UA	257	Cobalt, total	mg/L	04/09/2015 - 07/15/2017	Future median	0.002	0.0074	0.0074	0.006	Background
G209	UA	257	Fluoride, total	mg/L	04/09/2015 - 01/27/2021	CI around mean	0.39	4.0	0.50	4	Standard
G209	UA	257	Lead, total	mg/L	01/21/2015 - 07/15/2017	Future median	0.001	0.018	0.018	0.0075	Background
G209	UA	257	Lithium, total	mg/L	11/18/2015 - 07/15/2017	All ND - Last	0.010	0.040	0.021	0.04	Standard
G209	UA	257	Mercury, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.0002	0.002	0.0002	0.002	Standard
G209	UA	257	Molybdenum, total	mg/L	07/22/2015 - 07/15/2017	CI around geomean	0.00118	0.10	0.0069	0.1	Standard
G209	UA	257	pH (field)	SU	01/21/2015 - 01/27/2021	CI around median	7.0	6.5/9.0	6.9/7.3	6.5/9	Standard/Standard
G209	UA	257	Radium-226 + Radium 228, tot	pCi/L	11/18/2015 - 07/15/2017	CI around mean	0.32	9.8	9.8	5	Background
G209	UA	257	Selenium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.001	0.050	0.0097	0.05	Standard
G209	UA	257	Sulfate, total	mg/L	01/21/2015 - 01/27/2021	CB around T-S line	159	400	300	400	Standard
G209	UA	257	Thallium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.001	0.002	0.001	0.002	Standard
G209	UA	257	Total Dissolved Solids	mg/L	01/21/2015 - 01/27/2021	CI around mean	778	1200	949	1200	Standard
G210	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G210	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.011	0.011	0.01	Background
G210	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.033	2.0	0.13	2	Standard
G210	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G210	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around geomean	0.00255	2.0	0.11	2	Standard
G210	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G210	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	46	200	95	200	Standard
G210	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.011	0.10	0.0096	0.1	Standard
G210	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G210	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.37	4.0	0.55	4	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G210	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.0075	0.0059	0.0075	Standard
G210	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G210	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.0018	0.10	0.044	0.1	Standard
G210	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.7	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G210	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G210	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	76	400	387	400	Standard
G210	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G210	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	457	1200	975	1200	Standard
G211	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G211	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.011	0.011	0.01	Background
G211	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.092	2.0	0.13	2	Standard
G211	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G211	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	2.0	0.11	2	Standard
G211	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G211	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	34	200	95	200	Standard
G211	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.004	0.10	0.0096	0.1	Standard
G211	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G211	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.31	4.0	0.55	4	Standard
G211	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.0075	0.0059	0.0075	Standard
G211	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G211	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.001	0.10	0.044	0.1	Standard
G211	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.8	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G211	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0013	0.050	0.0035	0.05	Standard
G211	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	67	400	387	400	Standard
G211	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G211	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	443	1200	975	1200	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G212	UA	257	Antimony, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.003	0.006	0.003	0.006	Standard
G212	UA	257	Arsenic, total	mg/L	01/21/2015 - 07/15/2017	CI around median	0.001	0.010	0.010	0.01	Standard
G212	UA	257	Barium, total	mg/L	04/09/2015 - 07/15/2017	CI around mean	0.051	2.0	0.27	2	Standard
G212	UA	257	Beryllium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.0067	0.0067	0.004	Background
G212	UA	257	Boron, total	mg/L	01/21/2015 - 01/26/2021	CI around median	0.010	2.0	0.39	2	Standard
G212	UA	257	Cadmium,total	mg/L	01/21/2015 - 07/15/2017	All ND - Last	0.001	0.005	0.0012	0.005	Standard
G212	UA	257	Chloride, total	mg/L	01/21/2015 - 01/26/2021	CI around mean	39	200	96	200	Standard
G212	UA	257	Chromium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.004	0.10	0.013	0.1	Standard
G212	UA	257	Cobalt, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.002	0.0074	0.0074	0.006	Background
G212	UA	257	Fluoride, total	mg/L	04/09/2015 - 01/26/2021	CI around median	0.32	4.0	0.50	4	Standard
G212	UA	257	Lead, total	mg/L	01/21/2015 - 07/15/2017	Future median	0.001	0.018	0.018	0.0075	Background
G212	UA	257	Lithium, total	mg/L	11/18/2015 - 07/15/2017	All ND - Last	0.010	0.040	0.021	0.04	Standard
G212	UA	257	Mercury, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
G212	UA	257	Molybdenum, total	mg/L	07/22/2015 - 07/15/2017	CI around median	0.001	0.10	0.0069	0.1	Standard
G212	UA	257	pH (field)	SU	01/21/2015 - 06/29/2021	CI around mean	7.1	6.5/9.0	6.9/7.3	6.5/9	Standard/Standard
G212	UA	257	Radium-226 + Radium 228, tot	pCi/L	11/18/2015 - 07/15/2017	CI around mean	0.28	9.8	9.8	5	Background
G212	UA	257	Selenium, total	mg/L	04/09/2015 - 07/15/2017	CI around mean	0.00397	0.050	0.0097	0.05	Standard
G212	UA	257	Sulfate, total	mg/L	01/21/2015 - 01/26/2021	CB around linear reg	46	400	300	400	Standard
G212	UA	257	Thallium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G212	UA	257	Total Dissolved Solids	mg/L	01/21/2015 - 01/26/2021	CI around geomean	367	1200	949	1200	Standard
G213	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G213	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00341	0.011	0.011	0.01	Background
G213	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.10	2.0	0.13	2	Standard
G213	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.004	0.001	0.004	Standard
G213	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	2.0	0.11	2	Standard
G213	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	0.005	0.001	0.005	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G213	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	36	200	95	200	Standard
G213	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.026	0.10	0.0096	0.1	Standard
G213	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0057	0.006	0.0037	0.006	Standard
G213	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.31	4.0	0.55	4	Standard
G213	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00915	0.0075	0.0059	0.0075	Standard
G213	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G213	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.004	0.10	0.044	0.1	Standard
G213	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.6	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G213	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0038	0.050	0.0035	0.05	Standard
G213	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	46	400	387	400	Standard
G213	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0014	0.002	0.001	0.002	Standard
G213	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	362	1200	975	1200	Standard
G214	UA	845	Antimony, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G214	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.011	0.011	0.01	Background
G214	UA	845	Barium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.089	2.0	0.13	2	Standard
G214	UA	845	Beryllium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G214	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	2.0	0.11	2	Standard
G214	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G214	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	46	200	95	200	Standard
G214	UA	845	Chromium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0067	0.10	0.0096	0.1	Standard
G214	UA	845	Cobalt, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G214	UA	845	Fluoride, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.32	4.0	0.55	4	Standard
G214	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.0075	0.0059	0.0075	Standard
G214	UA	845	Mercury, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G214	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.0019	0.10	0.044	0.1	Standard
G214	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.7	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G214	UA	845	Selenium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G214	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	62	400	387	400	Standard
G214	UA	845	Thallium, total	mg/L	04/09/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G214	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	450	1200	975	1200	Standard
G215	UA	257	Antimony, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.003	0.006	0.003	0.006	Standard
G215	UA	257	Arsenic, total	mg/L	01/21/2015 - 07/15/2017	CI around mean	0.00752	0.010	0.010	0.01	Standard
G215	UA	257	Barium, total	mg/L	04/09/2015 - 07/15/2017	CI around mean	0.094	2.0	0.27	2	Standard
G215	UA	257	Beryllium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.0067	0.0067	0.004	Background
G215	UA	257	Boron, total	mg/L	01/21/2015 - 01/26/2021	CI around geomean	0.027	2.0	0.39	2	Standard
G215	UA	257	Cadmium,total	mg/L	01/21/2015 - 07/15/2017	All ND - Last	0.001	0.005	0.0012	0.005	Standard
G215	UA	257	Chloride, total	mg/L	01/21/2015 - 06/29/2021	CB around linear reg	63	200	96	200	Standard
G215	UA	257	Chromium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.004	0.10	0.013	0.1	Standard
G215	UA	257	Cobalt, total	mg/L	04/09/2015 - 07/15/2017	Future median	0.002	0.0074	0.0074	0.006	Background
G215	UA	257	Fluoride, total	mg/L	04/09/2015 - 01/26/2021	CI around median	0.33	4.0	0.50	4	Standard
G215	UA	257	Lead, total	mg/L	01/21/2015 - 07/15/2017	Future median	0.001	0.018	0.018	0.0075	Background
G215	UA	257	Lithium, total	mg/L	11/24/2015 - 07/15/2017	All ND - Last	0.010	0.040	0.021	0.04	Standard
G215	UA	257	Mercury, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
G215	UA	257	Molybdenum, total	mg/L	07/22/2015 - 07/15/2017	CI around median	0.001	0.10	0.0069	0.1	Standard
G215	UA	257	pH (field)	SU	01/21/2015 - 06/29/2021	CI around mean	6.9	6.5/9.0	6.9/7.3	6.5/9	Standard/Standard
G215	UA	257	Radium-226 + Radium 228, tot	pCi/L	11/24/2015 - 07/15/2017	CI around mean	0.18	9.8	9.8	5	Background
G215	UA	257	Selenium, total	mg/L	04/09/2015 - 07/15/2017	CI around median	0.001	0.050	0.0097	0.05	Standard
G215	UA	257	Sulfate, total	mg/L	01/21/2015 - 06/29/2021	CI around median	110	400	300	400	Standard
G215	UA	257	Thallium, total	mg/L	04/09/2015 - 07/15/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G215	UA	257	Total Dissolved Solids	mg/L	01/21/2015 - 06/29/2021	CI around median	480	1200	949	1200	Standard
G216	UA	845	Antimony, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G216	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00056	0.011	0.011	0.01	Background

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G216	UA	845	Barium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.16	2.0	0.13	2	Standard
G216	UA	845	Beryllium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G216	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00463	2.0	0.11	2	Standard
G216	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G216	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	53	200	95	200	Standard
G216	UA	845	Chromium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.004	0.10	0.0096	0.1	Standard
G216	UA	845	Cobalt, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.002	0.006	0.0037	0.006	Standard
G216	UA	845	Fluoride, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.29	4.0	0.55	4	Standard
G216	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	0.0075	0.0059	0.0075	Standard
G216	UA	845	Mercury, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G216	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.013	0.10	0.044	0.1	Standard
G216	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.7	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G216	UA	845	Selenium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G216	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	196	400	387	400	Standard
G216	UA	845	Thallium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G216	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	671	1200	975	1200	Standard
G217	UA	845	Antimony, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.003	0.006	0.003	0.006	Standard
G217	UA	845	Arsenic, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00234	0.011	0.011	0.01	Background
G217	UA	845	Barium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.11	2.0	0.13	2	Standard
G217	UA	845	Beryllium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.004	0.001	0.004	Standard
G217	UA	845	Boron, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	2.0	0.11	2	Standard
G217	UA	845	Cadmium,total	mg/L	01/21/2015 - 10/07/2015	All ND - Last	0.001	0.005	0.001	0.005	Standard
G217	UA	845	Chloride, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	72	200	95	200	Standard
G217	UA	845	Chromium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.0086	0.10	0.0096	0.1	Standard
G217	UA	845	Cobalt, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.0032	0.006	0.0037	0.006	Standard
G217	UA	845	Fluoride, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.29	4.0	0.55	4	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G217	UA	845	Lead, total	mg/L	01/21/2015 - 10/07/2015	CI around mean	-0.00356	0.0075	0.0059	0.0075	Standard
G217	UA	845	Mercury, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.0002	0.002	0.0011	0.002	Standard
G217	UA	845	Molybdenum, total	mg/L	07/22/2015 - 10/07/2015	Most recent sample	0.0013	0.10	0.044	0.1	Standard
G217	UA	845	pH (field)	SU	01/21/2015 - 10/07/2015	CI around mean	6.6	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
G217	UA	845	Selenium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.050	0.0035	0.05	Standard
G217	UA	845	Sulfate, total	mg/L	01/21/2015 - 10/07/2015	CI around median	0	400	387	400	Standard
G217	UA	845	Thallium, total	mg/L	04/10/2015 - 10/07/2015	Most recent sample	0.001	0.002	0.001	0.002	Standard
G217	UA	845	Total Dissolved Solids	mg/L	01/21/2015 - 10/07/2015	CI around mean	603	1200	975	1200	Standard
G218	UA	257	Antimony, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.003	0.006	0.003	0.006	Standard
G218	UA	257	Arsenic, total	mg/L	01/21/2015 - 07/17/2017	CI around median	0.001	0.010	0.010	0.01	Standard
G218	UA	257	Barium, total	mg/L	04/10/2015 - 07/17/2017	CI around mean	0.14	2.0	0.27	2	Standard
G218	UA	257	Beryllium, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.001	0.0067	0.0067	0.004	Background
G218	UA	257	Boron, total	mg/L	01/21/2015 - 01/26/2021	CI around median	0.010	2.0	0.39	2	Standard
G218	UA	257	Cadmium,total	mg/L	01/21/2015 - 07/17/2017	All ND - Last	0.001	0.005	0.0012	0.005	Standard
G218	UA	257	Chloride, total	mg/L	01/21/2015 - 01/26/2021	CB around linear reg	72	200	96	200	Standard
G218	UA	257	Chromium, total	mg/L	04/10/2015 - 07/17/2017	CI around median	0.004	0.10	0.013	0.1	Standard
G218	UA	257	Cobalt, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.002	0.0074	0.0074	0.006	Background
G218	UA	257	Fluoride, total	mg/L	04/10/2015 - 01/26/2021	CI around mean	0.30	4.0	0.50	4	Standard
G218	UA	257	Lead, total	mg/L	01/21/2015 - 07/17/2017	All ND - Last	0.001	0.018	0.018	0.0075	Background
G218	UA	257	Lithium, total	mg/L	11/24/2015 - 07/17/2017	All ND - Last	0.010	0.040	0.021	0.04	Standard
G218	UA	257	Mercury, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
G218	UA	257	Molybdenum, total	mg/L	07/22/2015 - 07/17/2017	CI around median	0.001	0.10	0.0069	0.1	Standard
G218	UA	257	pH (field)	SU	01/21/2015 - 01/26/2021	CI around mean	7.0	6.5/9.0	6.9/7.3	6.5/9	Standard/Standard
G218	UA	257	Radium-226 + Radium 228, tot	pCi/L	11/24/2015 - 07/17/2017	CI around mean	0.58	9.8	9.8	5	Background
G218	UA	257	Selenium, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.001	0.050	0.0097	0.05	Standard
G218	UA	257	Sulfate, total	mg/L	01/21/2015 - 01/26/2021	CB around linear reg	174	400	300	400	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
G218	UA	257	Thallium, total	mg/L	04/10/2015 - 07/17/2017	All ND - Last	0.001	0.002	0.001	0.002	Standard
G218	UA	257	Total Dissolved Solids	mg/L	01/21/2015 - 01/26/2021	CI around median	600	1200	949	1200	Standard
MW16S	UA	845	pH (field)	SU	04/09/2015 - 04/09/2015	Most recent sample	7.2	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
MW16S	UA	845	Total Dissolved Solids	mg/L	04/09/2015 - 04/09/2015	Most recent sample	410	1200	975	1200	Standard
R104	UA	845	Antimony, total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.003	0.006	0.003	0.006	Standard
R104	UA	845	Arsenic, total	mg/L	04/08/2015 - 08/03/2016	CI around median	0.001	0.011	0.011	0.01	Background
R104	UA	845	Barium, total	mg/L	04/08/2015 - 08/03/2016	CI around mean	0.061	2.0	0.13	2	Standard
R104	UA	845	Beryllium, total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.001	0.004	0.001	0.004	Standard
R104	UA	845	Boron, total	mg/L	04/08/2015 - 08/03/2016	CI around median	0.010	2.0	0.11	2	Standard
R104	UA	845	Cadmium,total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.001	0.005	0.001	0.005	Standard
R104	UA	845	Chloride, total	mg/L	04/08/2015 - 08/03/2016	CI around mean	45	200	95	200	Standard
R104	UA	845	Chromium, total	mg/L	04/08/2015 - 08/03/2016	CI around median	0.004	0.10	0.0096	0.1	Standard
R104	UA	845	Cobalt, total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.002	0.006	0.0037	0.006	Standard
R104	UA	845	Fluoride, total	mg/L	04/08/2015 - 08/03/2016	CI around mean	0.30	4.0	0.55	4	Standard
R104	UA	845	Lead, total	mg/L	04/08/2015 - 08/03/2016	CI around median	0.001	0.0075	0.0059	0.0075	Standard
R104	UA	845	Lithium, total	mg/L	11/17/2015 - 08/03/2016	All ND - Last	0.010	0.040	0.020	0.04	Standard
R104	UA	845	Mercury, total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.0002	0.002	0.0011	0.002	Standard
R104	UA	845	Molybdenum, total	mg/L	07/23/2015 - 08/03/2016	CI around mean	0.00386	0.10	0.044	0.1	Standard
R104	UA	845	pH (field)	SU	01/20/2015 - 08/03/2016	CI around mean	7.3	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
R104	UA	845	Radium-226 + Radium 228, tot	pCi/L	11/17/2015 - 08/03/2016	CI around mean	-0.166	5.0	1.5	5	Standard
R104	UA	845	Selenium, total	mg/L	04/08/2015 - 08/03/2016	CI around mean	0.00582	0.050	0.0035	0.05	Standard
R104	UA	845	Sulfate, total	mg/L	04/08/2015 - 08/03/2016	CI around mean	72	400	387	400	Standard
R104	UA	845	Thallium, total	mg/L	04/08/2015 - 08/03/2016	All ND - Last	0.001	0.002	0.001	0.002	Standard
R104	UA	845	Total Dissolved Solids	mg/L	01/20/2015 - 08/03/2016	CI around mean	424	1200	975	1200	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
COFFEEN POWER PLANT
GMF GYPSUM STACK POND
COFFEEN, ILLINOIS

Notes:
Potential exceedance of GWPS (note: No potential exceedances were determined based on data collected from 2015 through 2021)
HSU = hydrostratigraphic unit:
DA = deep aquifer
UA = uppermost aquifer
Program = regulatory program data were collected under:
257 = 40 C.F.R. Part 257 Subpart D (Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments)
845 = 35 I.A.C. Part 845 (Sampling events completed to assess well locations for inclusion in the Part 845 monitoring well network)
mg/L = milligrams per liter
pCi/L = picocuries per liter
SU = standard units
Statistical Calculation = method used to calculate the statistical result:
All ND - Last = All results were below the reporting limit, and the last determined reporting limit is shown
CB around linear reg = Confidence band around linear regression
CB around T-S line = Confidence band around Thiel-Sen line
CI around geomean = Confidence interval around the geometric mean
CI around mean = Confidence interval around the mean
CI around median = Confidence interval around the median
Future median = Median of the three most recent samples
Most recent sample = Result for the most recently collected sample used due to insufficient data
Statistical Result = calculated in accordance with Statistical Analysis Plan using constituent concentrations observed at monitoring well during all sampling events within the specified date range
For pH, the values presented are the lower / upper limits
GWPS = Groundwater Protection Standard
GWPS Source:
Standard = standard specified in 35 I.A.C. § 845.600(a)(1)
Background = background concentration (see cover page for additional information)