Luminant

Dynegy Midwest Generation, LLC
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: Hennepin East Ash Pond (IEPA ID: W1550100002-05) Annual Consolidated Report

Dear Mr. LeCrone:

In accordance with 35 IAC § 845.550, Dynegy Midwest Generation, LLC (DMG) is submitting the annual consolidated report for the Hennepin East Ash Pond (IEPA ID: W1550100002-05), as enclosed.

Sincerely,

Dianna Tickner

Dianna Tickner
Director Decommissioning & Demolition

Enclosures

Annual Consolidated Report
Dynegy Midwest Generation, LLC
Hennepin Power Plant
East Ash Pond; W1550100002-05

In accordance with 35 IAC § 845.550, Dynegy Midwest Generation, LLC (DMG) 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

Hennepin Power Plant

Prepared for:

Luminant

Dynegy Midwest Generation, LLC

Hennepin Power Plant
13498 East 800th Street
Hennepin, IL 61327

November 2021

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

Completed by: ______________________ Director, Decommissioning and Demolition

Name Title

This Annual CCR Fugitive Dust Control Report has been prepared for the Hennepin Power Plant 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 Hennepin Power Plant 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 will be conditioned before emplacement.
	Water dry CCR material from periodic cleanout / maintenance of CCR handling or CCR dust control systems as it is added into the CCR surface impoundments, as necessary.
	Wet management of CCR bottom ash 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.
	Apply chemical dust suppressant on areas of exposed CCR in CCR units, as necessary.
	Wet sluice CCR fly ash and CCR bottom ash to CCR surface impoundments.

CCR Activity	Actions Taken to Control CCR Fugitive Dust
Handling of CCR at the facility	Pneumatically convey dry CCR fly ash and FGD ash to storage silos in an enclosed system.
	CCR to be emplaced in the landfill will be conditioned before emplacement.
	Load CCR transport trucks from the CCR fly ash silos in a partially enclosed area.
	Load CCR transport trucks from the CCR fly ash silos using vented spouts.
	Load FGD ash transport trucks from the FGD ash silo using a pug mill or vented spouts, as necessary.
	Perform housekeeping, as necessary, in the fly ash loading area.
	Operate fly ash handling system in accordance with good operating practices.
	Maintain and repair as necessary dust controls on the fly ash handling system.
Transportation of CCR at the facility	CCR to be emplaced in the landfill is conditioned before emplacement.
	Limit the speed of vehicles to no more than 15 mph on facility roads.
	Sweep or rinse off the outside of the trucks transporting CCR, as necessary.
	Remove CCR, as necessary, deposited on facility road surfaces during transport.

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. Revisions were made in the plan to include the 35 I.A.C 845.500 regulations. The Hennepin Power Plant ceased to operate and cease to be a generating unit effective November 1, 2019.

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. The plan was amended to reflect administrative changes and adjustments to site condition controls.

Section 2 Record of Citizen Complaints

No citizen complaints were received regarding CCR fugitive dust at Hennepin Power Plant 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	Hennepin Power Station Putnam County, Illinois 62327 10/21/2021
Operator Name / Address	Luminant Generation Company LLC 6555 Sierra Drive, Irving, TX 75039
CCR unit	East Ash Pond

INSPECTION REPORT 35 IAC § 845.540 Date of Inspection 10/21/2021	
(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 II 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	See the attached.
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 800 acre-feet
(b)(2)(E) The approximate volume of the impounded water and CCR contained in the unit at the time of the inspection.	Approximately 350 acre-feet
(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 10/21/2021	
(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:	Hennepin Power Station
CCR Unit:	East Ash Pond

35 IAC § 845.540 (b)(2)(B)		
Instrument ID #	Type	Maximum recorded reading since previous annual inspection (ft)
P006	Piezometer	451.92'
P007	Piezometer	447.25'

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		479.5			5	
CCR	479		505	23		49

Geosyntec consultants

1 McBride and Son Center Drive, Suite 202
Chesterfield, MO 63005
PH 636-812-0800
www.geosyntec.com

October 11, 2021

Dynegy Midwest Generation, LLC
13498 E. 800th Street
Hennepin, Illinois 61327

Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
East Ash Pond, Hennepin Power Plant, Hennepin, Illinois

At the request of Dynegy Midwest Generation, LLC 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 10 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 P. Seymour P.E.
Senior Principal

2021 USEPA CCR RULE PERIODIC CERTIFICATION REPORT §257.73(a)(2), (c), (d[1]), (e) and §257.82 EAST ASH POND Hennepin Power Plant Hennepin, Illinois

Submitted to

Dynegy Midwest Generation, LLC

1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Submitted by

Geosyntec consultants

engineers | scientists | innovators

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

October 11, 2021

[1] Except for §257.73(d)(1)(vi).

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EXECUTIVE SUMMARY

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule [1] certification report (Periodic Certification Report) for the East Ash Pond (EAP)[2] at the Hennepin Power Plant (HPP), also referred to as the Hennepin Power Station (HEN), 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 Dynegy Midwest Generation, LLC (DMG) 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 EAP 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, updates were performed for the:

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

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the EAP meets all requirements for hazard potential classification, history of construction reporting, structural stability assessment, safety factor assessment, and hydrologic and hydraulic control, with the exception of the structural integrity of hydraulic structures (§257.73(d)(1)(vi)), which was independently certified by others. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[2] The EAP is also referred to as ID Number W1550100002-05, East New Primary Pond by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 803 by DMG; and IL50363 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 EAP.

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 Significant hazard potential classification [2].	Yes	Updates were not determined to be necessary. Geosyntec recommends retaining the Significant hazard potential classifications.
History of Construction						
4	§257.73(c)(1)	Compile a history of construction	Yes	A history of Construction report was prepared for the EAP, Old West Polishing Pond, Old West Ash Pond and Ash Pond No. 2 [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 and abutments were found to be stable [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 is 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 and were expected to adequately manage flow during 1,000-year flood [8].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manager flow during the 1,000-year flood, after performing updated hydrologic and hydraulic analyses.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	No	Requirement could not be certified in 2016 due to inability to complete a CCTV inspection of the discharge pipe into the Polishing Pond due to submerged outfall conditions needed for plant operations. AECOM recommended inspected this pipe as soon as feasible to address the issue [8].	Periodic certification of §257.73(d)(1)(vi) was performed independently by Luminant in 2021 [9].	
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Not Applicable	Inundation of exterior slopes was not expected; this requirement was not applicable [8].	Yes	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 2.14 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 2.14 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 2.14 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 2.14 and higher.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 2.53 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 2.52 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 [5].	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 manages inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood [8].	Yes	The inflow flood control system was found to adequately manage inflow and peak discharge during the 1,000-year, 24-hour Inflow Design Flood, after performing updated hydrologic and hydraulic analyses.
	§257.82(b)	Discharge from CCR Unit	Yes	Discharges from the CCR Unit is routed through a NPDES-Permitted outfall during both normal and 1,000-year, 24-hour Inflow Design Flood conditions [6].	Yes	Discharge from the CCR Unit is routed through a NPDES-Permitted outfall during both normal and 1,000-year, 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 Dynegy Midwest Generation, LLC (Dynegy) to document the periodic certification of the East Ash Pond (EAP) at the Hennepin Power Plant (HPP), also known as the Hennepin Power Station (HEN), located at 13498 East 800th Street in Hennepin, Illinois, 61327. The location of HPP is provided in **Figure 1**, and a site plan showing the location of the EAP and LF, among other closed and open CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

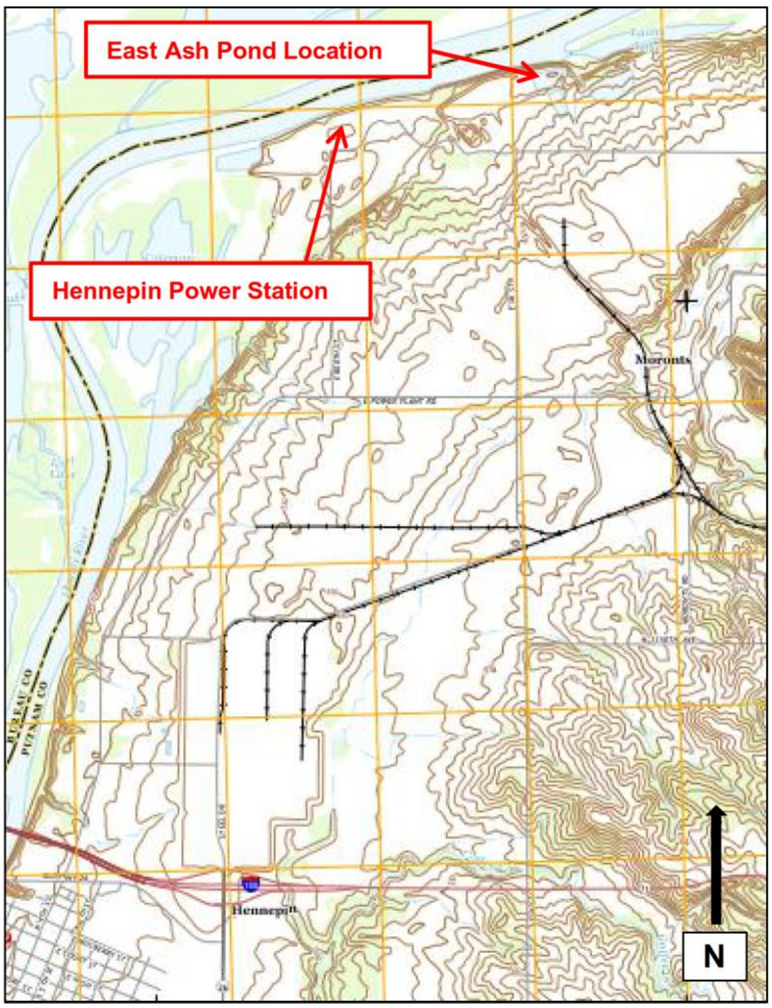

Figure 1 – Site Location Map (from AECOM, 2016)

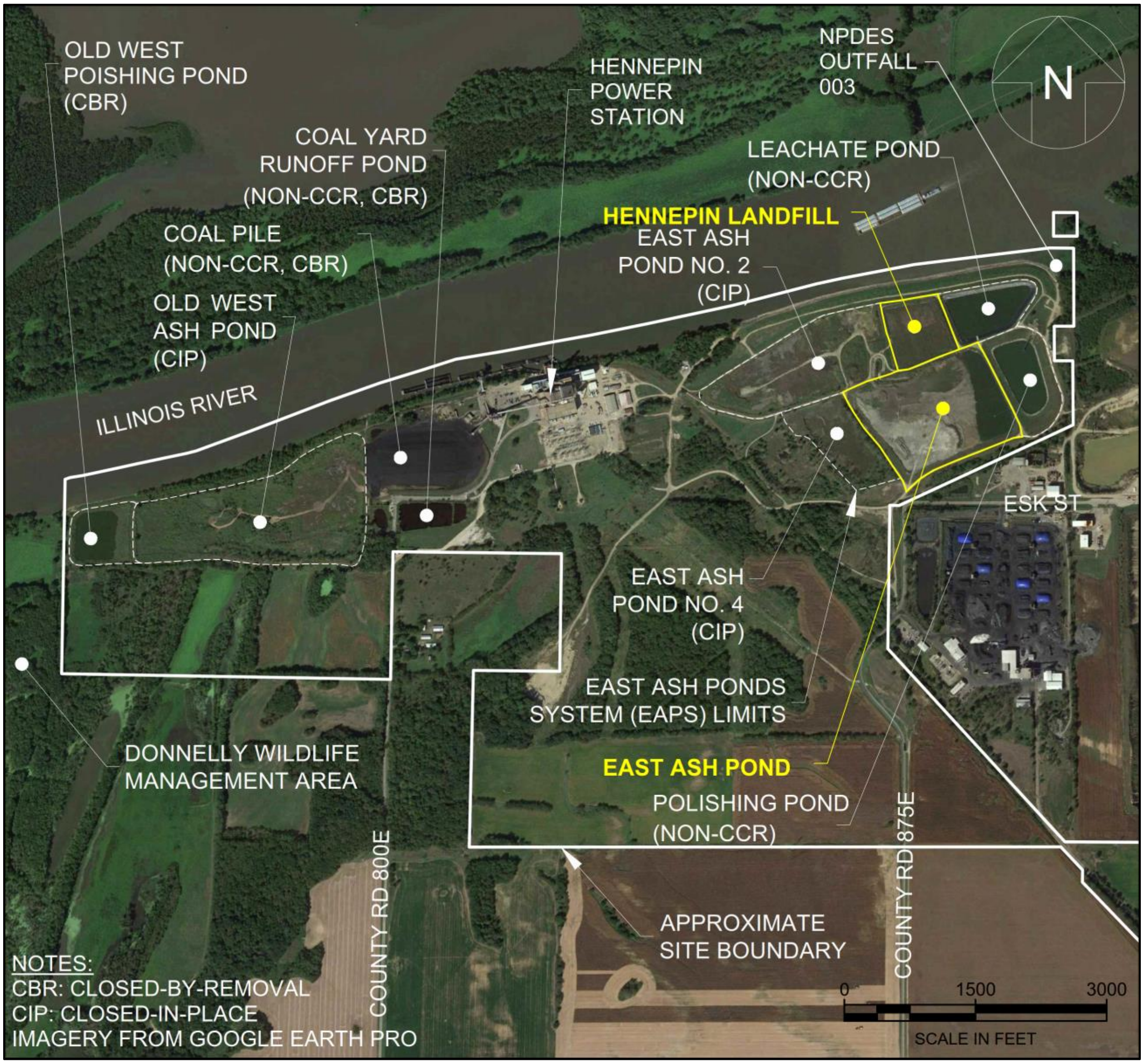

Figure 2 – Site Plan

1.1 EAP Description

The EAP formerly served as a wet impoundment basin for CCR that materials that were produced by HPP, prior to retirement of HPP in 2019. The EAP is approximately 21 acres in area, and the total length of the embankments is approximately 3,800 ft [8]. The EAP formerly received CCR and non-CCR discharge from a single high-density polyethylene (HDPE) sluice pipe that discharged until the northwestern corner of the EAP [8], prior to abandonment of the pipes in 2020 [10].

Outflow from the EAP is discharged downstream into the Leachate Pond, an adjacent non-CCR surface impoundment, via an 18-in diameter reinforced concrete pipe (RCP) culvert, with an invert elevation[3] of 489.9 ft that acts as the primary spillway. Additional outflow is discharged to the Polishing Pond, which is another adjacent non-CCR surface impoundment. Flow form the EAP into the polishing pond is transmitted via a 7- by 9-ft wide concrete riser structure (invert elevation of 490.6 ft) with a generally horizontal 36-in. diameter reinforced concrete pipe (RCP) secondary spillway pipe. Flow from the Leachate Pond is transmitted to the Polishing Pond, which then discharges into the Illinois River at a NPDES-permitted outfall [8].

The EAP is comprised of earthen embankments. Maximum embankment heights on the west and east sides are 16 and 36 feet, respectively, as referenced to the downstream toe. The downstream embankment slopes range from 3.5H:1V (horizontal to vertical) to 4H:1V and the interior slopes have an orientation of 3H:1V above El. 482 ft and 4H:1V below EL. 482 ft. An embankment is not present on the south side of the EAP, where the impoundment is adjacent to natural high ground that slopes upward to the south [3]. The dike on the north side of the EAP is adjacent to East Ash Pond No. 2 (EAP#2), which was closed-in-place in 2020 [10], and final cover grades are similar to the crest elevation of the EAP dike. The dike on the west side of the EAP is adjacent to EAP#4, which was also closed-in-place in 2020 [10]. Embankment crest widths are approximately 18 to 19 ft [8].

The perimeter embankment of the EAP was raised from elevation 483 ft to the current elevations of 493 to 500 ft in the early 2000s. As part of this construction, a double layer of 45-mil reinforced polypropylene geomembrane liner was installed over a 12-inch-thick clay layer on the slopes and keyed into the existing 4-ft thick clay bottom liner system (design permeability of 1×10^{-7} cm/sec) at elevation 480 ft. The clay liner then extends at a 4H:1V slope with the top of liner at an elevation of approximately 460.5 ft. A layer of 8-oz polypropylene geotextile was placed under the 1-ft thick layer of clay and was then terminated at the existing liner. Under the existing 4-ft thick clay layer is a 6-inch-thick sand filter layer on the bottom of the pond and as 12-inch-thick sand layer on the side slopes of the pond [8].

The normal operating pool of the EAP is El. 490.4 ft, as controlled by the primary spillway pipe invert, although the normal pool may lower at times due to the cessation of process flows into the EAP associated with closure of HPP in 2019.

Initial certifications for the EAP 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 completed by Stantec and AECOM in 2016 and 2017 and subsequently posted to DMG's CCR Website ([2], [11], [3], [4], [5], [6]). Additional documentation for the initial certifications included a detailed operating record reports containing calculations and other information prepared for the hazard potential classification by Stantec [7] and for the structural stability assessment,

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

safety factor assessment, and inflow design flood control system plan by AECOM [8]. These operating record reports were not posted to DMG's CCR Website.

1.2 Report Objectives

These following objectives are associated with this report:

- Compare site conditions from 2015/2016, when the initial certifications were developed, to site conditions in 2020/2021, when data for the periodic certification was obtained, 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]) reports to determine if updates may be required based on technical considerations.
  - The History of Construction report [3] was not independently reviewed for technical considerations, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at HPP, 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 EAP meets all of the requirements associated with §257.73(a)(2), (c), (d), (e), and §257.82, or, if the EAP does not meet all requirements, provide recommendations for compliance with these sections of the CCR Rule [1].

SECTION 2

COMPARISON OF INITIAL AND PERIODIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the EAP between the start of the initial CCR certification program in 2015 and 2016 (initial conditions) and subsequent collection of periodic certification site data in 2020 and 2021 (periodic conditions).

2.2 Review of Annual Inspection Reports

Annual onsite inspections for the EAP were performed between 2016 and 2020 ([12], [13], [14], [15], [16]) and were certified by a licensed professional engineer in accordance with §257.83(b). Each inspection report provided 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.
- Information on maximum recorded instrumentation readings and water levels.
- 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.
- 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 EAP between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the EAP were noted in the inspection reports.

2.3 Review of Instrumentation Data

Two piezometers, P006 and P007, are present at the EAP and were monitored monthly by DMG between October 27, 2015 and April 23, 2021. The piezometers are screened in coarse-grained alluvial soils beneath the EAP. Monitoring is still ongoing. Geosyntec reviewed the piezometer data to evaluate if significant fluctuations, partially increases in phreatic levels, may have occurred between development of the initial structural stability and factor of safety certifications ([8], [4], [5]) and April 23, 2021. Available piezometer readings are plotted in **Attachment A**.

In summary, the piezometer readings were consistent during this time period. Piezometer levels in P006 were consistently El. 452 ft, other than two spikes to approximately El. 456 ft that occurred in May of 2019 and May of 2020. Levels in P007 were somewhat variable, fluctuating between EL. 446 ft and El. 456 ft, with a typical level of around El. 449 ft. These water levels are similar to normal water levels in the adjacent Illinois River and the spikes are coincident with observed flooding events. Piezometer levels are similar to levels utilized for the initial structural stability and factor of safety certifications ([8], [4], [5]).

2.4 Comparison of Initial to Periodic Surveys

The initial survey of the EAP, conducted by Weaver Consultants (Weaver) in 2015 [17], was compared to the periodic survey of the EAP, conducted by IngenAE, LLC (IngenAE) in 2020 [18], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the EAP 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 [8]. Potential changes to embankment geometry were also evaluated. This comparison is presented by showing both surveys side-by-side in **Drawing 1** and in 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 1**.

Table 2 – Initial to Periodic Survey Comparison

Initial Surveyed Pool Elevation (ft)	490.4
Periodic Surveyed Pool Elevation (ft)	487.5
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	490.4
Total Change in CCR Volume (CY)	+ 48,856
Change in CCR Volume Above SWSE (CY)	+26,801
Change in CCR Volume Below SWSE (CY)	+19,038

The comparison indicated that approximately 49,000 CY of CCR was placed in the EAP between the initial and periodic surveys, including approximately 27,000 CY placed above the SWSE thereby leading to a potential for the peak water surface elevation (PWSE) to increase during the inflow design 1,000-year flood event.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the EAP collected by Weaver in 2015 [17] were compared to periodic aerial photographs collected by IngenAE in 2020 [18] to visually evaluate if potential site changes (i.e., changes to the embankment, outlet structures, limits of CCR, other appurtenances) may have occurred. A comparison of these aerial photographs is provided in **Drawing 3**, and the following changes were identified:

- Adjacent CCR surface impoundments (East Ash Pond No. 2 and East Ash Pond No. 4) were closed.

- The CCR sluice pipe discharge structure, consisting of a fabric-formed concrete-lined pool and channel that was constructed overlying East Ash Pond No. 2, was removed as part of the East Ash Pond No. 2 closure.

- Additional CCR was placed in the East Ash Pond and the free water pool area was reduced.

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to the EAP was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [19]. A periodic site visit was conducted by Geosyntec on May 27, 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 the initial certifications were prepared (i.e., modification to the embankment, outlet structures or other appurtenances, limits of CCR, maintenance programs, repairs), in addition to performing visual observations of the EAP to evaluate if the structural stability requirements (§257.73(d)) were still met. The site visit included walking the perimeter access roads and slope crests of the EAP, visually observing conditions, recording filed notes, and collecting photographs. The site visit is documented in a photographic log provided in **Appendix A**. A summary of significant findings from the periodic site visit is provided below:

- Maintenance and operational conditions appeared similar between 2015 and 2021.

- No new development was observed in the EAP downstream breach area shown in the Initial EmAP inundation map [11].

- Modifications to the EAP were observed including altering the sluice discharge location as part of the East Ash Pond No. 2 closure and modifying the dike between East Ash Pond No. 4 and the EAP as part of the East Ash Pond No. 4 closure.

- No signs of structural instability were noted. Visual observations did not indicate insufficient slope vegetation and protection, compaction or instability at the dikes or abutments, sudden drawdown instability, or spillway erosion.

- The interior of the culverts connecting the EAP to the Leachate Pond and the EAP to the Polishing Pond could not be visually observed at the time of the site visit due to access and health and safety considerations.

2.7 Interview with Power Plant Staff

An interview with Mr. Jason Stuckey and Mr. Michael Olle of the HPP was conducted by Mr. Lucas P. Carr, P.E. of Geosyntec on May 27, 2021. Mr. Stuckey had been employed at HPP for 14 years and Mr. Olle had been employed at HPP for 13 years at the time of the interview. Mr. Stuckey has been responsible for performing weekly impoundment inspections, managing maintenance, and operating the EAP since the HPP closed in 2019. The interview included a discussion of potential changes that may have occurred at the EAP since development of the initial certifications ([2], [11], [3], [4], [5], [6]).

- Were any construction projects completed for the EAP since 2015, and, if so, are design drawings and/or details available?
  - No construction projects were completed since 2015.
- Were there any changes to the purpose of the EAP since 2015?
  - CCR placement into the EAP ceased when the HPP was closed in November of 2019. The EAP also received unwatering flows from closure of the Old West Ash Pond and Old West Polishing Pond during 2019 and 2020, via the Coal Pile Runoff Pond, although these flows have since ceased.
- Were there any changes to the to the instrumentation program and/or physical instruments for the EAP since 2015?
  - No known changes have occurred.
- Have area-capacity curves for the EAP been prepared since 2015?
  - No known area-capacity curves have been developed.
- Were there any changes to spillways and/or diversion features for the EAP completed since 2015?
  - The sluice discharge area was partially removed and altered in 2020 as part of the East Ash Pond No. 2 closure.
- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for the EAP since 2015?
  - No changes have occurred.
- Were there any instances of dike and/or structural instability for the EAP since 2015?
  - No known instances of instability have 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:

- Performing a visual analysis to evaluate potential hazards associated with a failure of the EAP perimeter dike, along the east and northeast embankments of the EAP, as the EAP is contained by natural high ground to the south and other CCR units to the west and north.
- Evaluation of potential breach flow paths were evaluated using elevation data and aerial imagery to evaluate potential impacts to downstream structures, infrastructure, frequently occupied facilities/areas, and waterways [2].
- 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) [11].

The visual analysis indicated that none of the breach scenarios appeared to impact occupied structures, although a breach of the east embankment could impact an infrequently used gravel site access road and a breach to the north would inundate the leachate pond. The Initial HPC concluded that neither breach would be likely to result in a probable loss of human life, although the breach could cause CCR to be released into the Illinois River, thereby causing environmental damage. The Initial HPC therefore recommended a "Significant" hazard potential classification for the EAP [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [7]), in terms of technical approach, input parameters, assessment of the results, and applicable requirements of the CCR Rule [1]. No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed as the Initial HPC utilized a visual assessment.

3.3 Summary of Site Changes Affecting the Initial HPC

Geosyntec did not identify any changes at the site that may affect the HPC. No new structures, infrastructure, frequently occupied facilities/areas, or waterways were present in the probable breach area indicated in the Initial EmAP [11]. Additionally, no significant changes to the topography in the probable breach were identified.

3.4 Periodic HPC

Geosyntec recommends retaining the "Significant" hazard potential classification for the EAP, per §257.73(a)(2), based on the lack of site changes potentially affecting the Initial HPC occurring since the initial HPC was developed, as described in **Section 3.3**, and the lack of significant review comments, as described in **Section 3.2**. Updates to the Initial HPC reports ([2], [7]) are not recommended at this time.

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 HPP, including the OWPP, OWAP, EAP#2, EAP#4, and the EAP. 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,
- A statement that area-capacity curves are not available,
- Information on spillway structures,
- Constructions specifications,
- Inspection and surveillance plans,
- Information on operational and maintenance procedures, and
- A statement that historical structural instability had not occurred at any of the CCR surface impoundments.

4.2 Summary of Site Changes Affecting the Initial HoC

Several changes at the site that occurred after development of the initial HoC report were identified. These changes required updates to the HoC report. Each change and the corresponding updates to the HoC report [3] are described below:

- A state identification number (ID) of W1550100002-05 was assigned to the EAP by the Illinois Environmental Protection Agency (IEPA).
- Electricity generation at the HPP ceased in 2019. The purpose of the EAP changed to only store CCR that was present at the time of HPP closure. The EAP no longer receives actively generated CCR or process water, as CCR is no longer generated at the HPP. However, the EAP has not yet been closed.
- Other inflows into the EAP including discharge water from the non-CCR Coal Yard Runoff Pond and water from Ash Pond No. 2 were ceased due to closure of those impoundments.
- Revised area-capacity curves and spillway design calculations for the EAP were prepared as part of the updated periodic Inflow Design Flood Control System Plan, as described in **Section 7.3**.

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], [8]), 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; and
- Downstream slope stability under sudden drawdown conditions for a downstream water body.

The Initial SSA concluded that the EAP met all structural stability requirements for §257.73(d)(1)(i)-(v) and (vii). However, the EAP was not certified for the stability and structural integrity criteria for hydraulic outfall structures, per §257.73(d)(1)(vi), as an inspection of the 36-inch secondary spillway pipe between the EAP and Settling Pond was not performed due to the pipe being submerged during normal operating conditions, as required for plant operations. The 18-inch primary spillway pipe between the EAP and Leachate Pond was inspected and certified. The Initial SSA recommended inspection of the secondary spillway pipe.

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;

- Completeness and technical approach used to evaluate the stability of hydraulic structures, per §257.73(d)(1)(vi); and

- Reviewing the contents vs. the applicable CCR Rule requirements [1].

No significant technical issues were noted within the technical review of the Initial SSA, 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 that occurred after development of the Initial SSA were identified. These changes required 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** Error! Reference source not found.. The Initial SFA slope stability 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**) indicates 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). Therefore, the requirements of §257.73(d)(1)(i) and §257.73(d)(1)(iii) are met for the Periodic SSA.

The Periodic IDF (**Section 7**) indicates that spillways are adequately designed and constructed to adequately manage flow during the 1,000-year flood, as the spillways can adequately manage flow during peak discharge from the 1,000-year storm event without overtopping of the embankments. Therefore, the requirements of §257.73(d)(1)(v)(A)-(B) are met for the Periodic SSA. Certification of §257.73(d)(1)(vi) was independently performed by Luminant [9].

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 and laboratory testing.
- An assessment of the potential for liquefaction in the dike and foundation soils.
- The development of two slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software.
- The analysis of both cross-sections for maximum storage pool, maximum surcharge pool, and seismic loading conditions.
- Liquefaction loading conditions were not evaluated as liquefaction-susceptible soil layers were not identified in the either the embankments or foundation soils.

The Initial SFA concluded that the EAP 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.
    - Analyzed loading conditions relative to the applicable CCR Rule [1] requirements and site-specific conditions.

  - Input parameters, analysis methodology, selection of critical cross-sections, loading conditions, and piezometric/groundwater levels utilized for slope stability analyses.

- Reviewing the contents vs. the applicable CCR Rule requirements [1].

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

- Additional CCR was placed below the SWSE in the free water pool upstream of the dike between the EAP and the Polishing Pond, thereby potentially applying additional load to the EAP dike than was present at the time of the Initial SFA.

- The Periodic IDF (**Section 7)** found that the normal pool elevation within the EAP decreased from 490.4 to 490.0 ft, resulting in 0.4 ft less water loading on the embankment dikes than was considered in the Initial SFA for the maximum storage pool and seismic loading conditions (§257.73(e)(1)(i) and (iii)). Peak water surface elevations during the IDF also decreased from 492.9 to 491.4 ft, resulting in 1.5 ft less water loading on the embankment dikes than was considered in the Initial SFA for the maximum surcharge pool loading conditions (§257.73(e)(1)(i)).

6.4 Periodic SFA

Geosyntec revised existing slope stability analyses associated with the Initial SFA ([5], [8]) for two cross-sections (SL-10 &SL-12) 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:

- Ground surface geometry was revised for all the loading conditions in section SL-10 and SL-12 using the 2021 site survey [18] to account for the changes that occurred to CCR grades.

- Water levels in the EAP for the maximum storage pool, and seismic slope stability analysis loading conditions were decreased to El. 490.0 ft for section SL-10 and section SL-12, based on the Periodic IDF.

- Water levels in the EAP for the maximum surcharge pool slope stability analysis loading conditions were decreased to El. 491.4 ft for section SL-10 and section SL-12, based on the Periodic IDF.

Factors of safety from the Periodic SFA are summarized in **Table 3** and confirm that the EAP 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))			
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**
SL-10	2.14*	2.14*	4.22	N/A
SL-12	3.16	3.16	2.52*	N/A

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

SECTION 7

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN - §257.82

7.1 Overview of Initial IDF

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 1,000-year design flood event because of the hazard potential classification of "Significant", which corresponded to 9.70 inches of rainfall over a 24-hour period.
- The Initial IDF utilized a HydroCAD Version 10 model to evaluate spillway flows and pool level increases during the IDF, with an EAP SWSE of 490.4 ft and considered water flows between the EAP and the interconnected adjacent ponds.

The Initial IDF concluded that the EAP met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 492.2 ft, relative to a minimum EAP dike crest elevation of 493.0 ft. Therefore, EAP embankment overtopping was not expected from the evaluated IDF. The Initial IDF also evaluated the potential for discharge from the CCR unit, and determined discharge from the EAP during both normal and inflow design flood conditions was expected to be routed through the existing spillway and NDPES-permitted outfall.

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 Initial IDF vs. the applicable requirements of the CCR Rule [1].

Several comments were identified during review of the Initial IDF. The comments are described below:

- The Initial IDF utilized the National Resource Conservation Service (NRCS) Type II rainfall distribution type [20]. Geosyntec recommends utilizing the Huff 3rd Quartile distribution for areas less than 10 square miles [21] for the reasons listed below.
  - Huff 3rd Quartile distribution was identified to be a more appropriate representation of a 1,000-year, 24-hour storm event per the Illinois State Water Survey (ISWS) Circular 173 [22] which developed standardized rainfall distributions from compiled rainfall data at sites throughout Illinois.
  - Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) [23] recommends use of the Huff Quartile distributions in Circular 173 when using frequency events to determine the spillway design flood inflow hydrograph, "*The suggested method to distribute this rainfall is described in the ISWS publication, Circular 173, "Time Distributions of Heavy Rainstorms in Illinois"*.
- The dimensions of hydraulic structures within the EAP and East Leachate Pond were reported to be larger than the dimensions included within the hydrologic and hydraulic analysis file.
- Hydrologic soil group types for some areas require updates based on conditions observed at HPP.

7.3 Summary of Site Changes Affecting the Initial IDF

Several 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:

- Approximately 27,000 CY of CCR were placed above the SWSE utilized for the Initial IDF certification, thereby altering the stage-storage curve for the EAP relative to the Initial IDF. Process inflows to the EAP have ceased due to the cessation of operations at the HPP, thereby the process inflow conditions utilized in the Initial IDF were no longer consistent with conditions observed in 2020
- Minor differences in the surveyed elevations of pipe inverts and dike crest elevations were noted between the initial and periodic site surveys.
- Two 12-inch diameter culverts connecting the EAP to the Leachate Pond were noted in the 2020 site survey and had not been included in the Initial IDF hydrologic and hydraulic analysis.

- Several changes to the ground surface within the EAP occurred, including a reduction in the area of the EAP due to closure of adjacent East Ash Pond No. 2.

7.4 Periodic IDF

Geosyntec revised the HydroCAD model associated with the Initial IDF to account for the revised rainfall distribution type, cessation of process flows, and additional CCR placement, as described in **Sections7.3**. The following approach and input data were used for the revised analyses and are referenced in **Attachment E**:

- Stage-storage (i.e., area-capacity) curves for the EAP were updated based on the 2020 site survey [18].
  - A revised stage-volume curve for the EAP was prepared based on measuring the storage volume of the EAP at every one-foot increment of depth from the minimum depth (482 ft) to the typical crest elevation (495 ft). This analysis identified an overall decrease of 20,777 CY (13 ac-ft) of storage volume at the EAP from 2016 to 2021.
- The SWSE within the EAP was updated from 490.4 ft to 490.0 ft and Leachate Pond from 485.0 ft to 485.1 ft to reflect spillway invert updates detailed by the 2020 site survey [18].
  - The 2016 certification included an addition of 0.5 ft to the SWSE at the EAP to account for process flows. Plant operations, including process flow generation and unwatering of CCR units at the site have since ceased. Inflows in excess of stormwater are omitted from this model; however, the SWSE of each pond is set to the surveyed WSE or the discharge structure invert, whichever is greater, to provide conservatism in the updated model.
- The minimum dike crest elevation of EAP was updated from 493.0 ft to 492.0 ft to reflect the 2020 site survey [18].
- The precipitation depth for the 1,000-year, 24-hour design storm event was updated from 9.70 inches to 9.72 inches per NOAA Atlas 14 precipitation frequency estimates [24].
- The rainfall distribution type was updated to the “Huff 3rd Quartile” storm type provided by HydroCAD [25].
- The following hydrologic parameters for drainage areas were updated:
  - The time of concentration flow path for the Landfill drainage area, which drains into the Leachate Pond and therefore is part of the multi-pond hydraulic system including the EAP, was updated based on the 2020 site survey. The surface description of the shallow concentrated flow corresponding to the exposed geomembrane segment was changed to “unpaved” to account for the smooth surface.

- The curve numbers for the EAP and Polishing Pond drainage areas were updated to reflect hydrologic soil group (HSG) D soils. The Initial IDF considered these areas as HSG C; however, the NRCS soil survey referenced in the Initial IDF describes these areas as predominately "Pits, gravel" with no HSG rating. A HSG rating of D was selected for conservatism.

- The EAP drainage area was updated to reflect the 2020 site survey. Grading changes along the northern edge of the pond associated with closure of East Ash Pond No. 2 resulted in a decrease of 1.05 acres. CCR placement in the EAP resulted in an increase of exposed CCR material and decrease of water surface. CCR surface, identified as "Urban industrial, 72% imp" land use, increased from 810.0 ac to 16.7 ac and water surface decreased from 7.8 ac to 1.5 ac. Gravel surfaces were considered to account for 25% of the drainage area exterior to the exposed CCR and grass cover for the remainder of the area. Gravel land use was updated from 1.095 ac to 1.120 ac and grass land use was updated from 4.9 ac to 3.4 ac.

- The following pipe parameters were updated based on length measurements from pipe inspections performed as part of the Initial SSA ([4], [8]) and invert elevations from the 2020 site survey [18]:
  - 18-inch diameter culvert conveying flow from EAP to the Leachate Pond:
    - Updated length from 70 linear feet (LF) to 61 LF, per the pipe inspections.
    - Updated inlet invert from 489.9 ft to 490.0 ft per the 2020 survey.
    - Updated outlet invert from 487.2 ft to 486.8 ft per the 2020 survey.
  - 36-inch diameter culvert conveying flow from EAP to Polishing Pond:
    - Updated length from 300 LF to 283 LF per design drawing CE-HEN1-C3 included in the History of Construction report [3], with the length calculated from northing and easting values.
  - Added two, 12-inch diameter pipes conveying flow from EAP to the Leachate Pond:
    - Diameters were calculated as the nearest typical pipe diameter calculated from difference between top of pipe and invert elevation.
    - Length of 97 LF estimated per the 2020 site survey.
    - Higher invert elevation of two pipes, 492.66 ft, used in model.
    - Outlet invert of 488.34 ft per the 2020 site survey.

        - Manning's n value of 0.010 corresponding to smooth plastic pipe per conditions observed during Geosyntec's stie visit.

    - 24-inch diameter culvert conveying flow from Leachate Pond to the Polishing Pond:

        - Updated length from 162 LF to 157 LF per the pipe inspections.

        - Updated inlet invert from 480.48 ft to 480.40 ft per the 2020 site survey.

        - Updated outlet invert from 479.73 ft to 479.81 ft per the 2020 site survey.

    - 36-inch diameter culvert conveying flow from Polishing Pond to the NPDES outfall at the Illinois River:

        - Updated length from 613 LF to 655 LF per design drawing CE-HEN1-C3 included in the History of Construction Report, with the length calculated from northing and easting values.

        - Updated outlet invert from 452.00 ft to 452.16 ft per the 2020 site survey.

- The following outlet structure parameters were updated:

    - EAP:

        - Top of outlet structure elevation updated from 493.2 ft to 493.5 ft per 2020 site survey.

        - Top opening dimensions updated from 60-in by 36-in to 84-in by 108-in to be consistent with the description of the structure in the Initial IDF.

    - Leachate Pond:

        - Top of outlet structure elevation updated from 485.0 ft to 485.1 ft per 2020 site survey.

    - Polishing Pond:

        - Top opening dimensions updated from 60-in by 36-in to 84-in by 108-in to be consistent with the description of the structure in the Initial IDF.

- All other input data and settings from the Initial IDF HydroCAD model were utilized, including, but not limited to software package and version, runoff method, analysis time span and analysis time step.

The results of the Updated IDF are summarized in **Table 4** and confirm that the EAP meets the requirements of §257.82(a)-(b), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevations. Additionally, all discharge from the EAP is routed through the existing spillway system to the NPDES-permitted outfall, during both normal and IDF conditions. Updated area-capacity curves and HydroCAD model output is provided in **Attachment E**.

Table 4- Water Levels from Periodic IDF

	East Ash Pond		
Analysis	**Starting Water Surface Elevation (ft)**	**Peak Water Surface Elevation (ft)**	**Minimum Dike Crest Elevation (ft)**
Initial IDF	490.4	492.9	493.0
Updated Periodic IDF	490.0	491.4	492.0
Initial to Periodic Change[1]	-0.4	-1.5	

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

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SECTION 8

CONCLUSIONS

The EAP at HPP was evaluated relative to the USEPA 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)), with the exception of §257.73(d)(1)(vi) that was independently certified by Luminant [9],
- 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: Dynegy Midwest Generation, LLC, Hennepin Power Plant, East Ash 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, with the exception of §257.73(d)(1)(vi)) that was independently certified by others.

Lucas P. Carr

Printed Name

10/11/2021

Date

LICENSED PROFESSIONAL ENGINEER
LUCAS PHILIP CARR
062066694
STATE OF ILLINOIS

Exp. 11/30/2021

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, East Ash Pond, Hennepin Power Station, Putnam County, Illinois," Fenton, MO, October 12, 2016.

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Section 3

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

Prepared for
Dynegy Midwest Generation, LLC

Date
January 31, 2022

Project No.
1940100711-007

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

EAST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

RAMBOLL Bright ideas. Sustainable change.

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT HENNEPIN POWER PLANT EAST ASH POND

Project name	**Hennepin Power Plant East Ash Pond**
Project no.	**1940100711-007**
Recipient	**Dynegy Midwest Generation, LLC**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
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Checked by	**Lauren Cook**
Approved by	**Brian Hennings**
Description	**Annual Report in Support of Part 845**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
https://ramboll.com

Chase J. Christenson, PG
Hydrogeologist

Brian Hennings, PG
Senior Managing Hydrogeologist

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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
DMG	Dynegy Midwest Generation, LLC
EAP	East Ash Pond
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HCR	Hydrogeologic Site Characterization Report
HPP	Hennepin Power Plant
ID	identification
IEPA	Illinois Environmental Protection Agency
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 East Ash Pond (EAP) located at Hennepin Power Plant (HPP) near Hennepin, Illinois.

An operating permit application for the EAP was submitted by Dynegy Midwest Generation, LLC (DMG) 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 EAP is recognized by Vistra identification (ID) Number (No.) 803, IEPA ID No. W1550100002-05, and National Inventory of Dams (NID) No. IL50363.

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 EAP 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 EAP, submitted to IEPA by October 31, 2021, which is pending IEPA approval.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of DMG, to provide the information required by 35 I.A.C. § 845.610(e) for the EAP located at HPP near Hennepin, 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 EAP was submitted by DMG 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 EAP 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 EAP.

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]
07	UA	67.5 - 77.5	Background
08	UA	51.5 - 61.5	Background
08D	UA	83 - 88	Background
12	UA	49.5 - 59.5	Compliance
13	UA	67 - 69	Compliance
16	UA	56 - 66	Background
17	UA	58.1 - 68.1	Background
46	UA	50 - 60	Compliance
47	UA	50 - 60	Compliance
52	UA	51 - 61	Compliance
54	UA	65 - 75	Compliance
XSG01 [2,3]	CCR	NA	WLO
SG02 [2,3]	Surface Water	NA	WLO

[1] Well type refers to the role of the well in the monitoring network.
[2] Surface water level measuring point.
[3] Location is temporary pending implementation of impoundment closure per an approved construction permit application.
bgs = below ground surface
CCR = coal combustion residuals
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 February to August 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 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 through 4**.

Table B. Summary of Groundwater Samples Collected

Sampling Dates	Parameters Collected	Monitoring Wells Sampled [1]
March 18, 2021	Appendix III [2], Appendix IV [3], field parameters [4]	12, 13, 16, 17, 46, and 47
February 24 - 25, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, 53, 54, and 55
March 19 - 22, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	52, 53, 54, and 55
April 7 - 8, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, 53, 54, and 55
May 5 - 6, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, 53, 54, and 55
June 8, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, and 54
June 23 - 24, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	12, 13, 16, 17, 52, and 54
July 13, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, and 54
August 3, 2021	Metals [5], mercury, inorganic parameters [6], radium 226 and 228, field parameters [4]	16, 17, 52, 54, and 55

[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] Appendix IV parameters include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, radium 226 and 228 combined, selenium, and thallium.
[4] Field parameters include pH, dissolved oxygen, temperature, oxidation/reduction potential, specific conductance, and turbidity.
[5] Metals include antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium.
[6] 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 EAP.

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 EAP, 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), 2021c. *History of Potential Exceedances. Hennepin Power Plant, East Ash Pond, Hennepin, Illinois*. Dynegy Midwest Generation, LLC. October 25, 2021.

FIGURES

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Hennepin\GMP\Figure 2-1_Proposed Monitoring Well Network.mxd

PROJECT: 169000XXXX | DATED: 10/13/2021 | DESIGNER: HOTCALD

PROPOSED PART 845 GROUNDWATER MONITORING WELL NETWORK

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EAST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 1

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BACKGROUND WELL
MONITORING WELL
SOURCE SAMPLE LOCATION
STAFF GAGE
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTE:
ELEVATIONS IN PARENTHESIS WERE NOT USED FOR CONTOURING.

0 175 350 Feet

POTENTIOMETRIC SURFACE MAP FEBRUARY 24-26, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT EAST ASH POND

HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Hennepin\Figure 3-3_GWE Contours 20210224_26.mxd

PROJECT: 169000XXXX | DATED: 9/28/2021 | DESIGNER: STOLZSD

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Hennepin\Figure 3-4_GWE Contours 20210317.mxd

PROJECT: 169000XXXX | DATED: 9/30/2021 | DESIGNER: STOLZSD

- BACKGROUND WELL
- MONITORING WELL
- SOURCE SAMPLE LOCATION
- STAFF GAGE
- GROUNDWATER ELEVATION CONTOUR (0.5 FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW ARROW
- PART 845 REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

NOTE:
ELEVATIONS IN PARENTHESIS WERE NOT USED FOR CONTOURING.

0 175 350 Feet

POTENTIOMETRIC SURFACE MAP
MARCH 17-19 AND 22, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EAST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\Hennepin\Figure 3-5_GWE Contours 20210407.mxd

PROJECT: 169000XXXX | DATED: 9/28/2021 | DESIGNER: STOLZSD

BACKGROUND WELL
MONITORING WELL
SOURCE SAMPLE LOCATION
STAFF GAGE
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
PART 845 REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
LIMITS OF FINAL COVER
PROPERTY BOUNDARY

NOTE:
ELEVATIONS IN PARENTHESIS WERE NOT USED FOR CONTOURING.

0 175 350 Feet

POTENTIOMETRIC SURFACE MAP
APRIL 7, 2021

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EAST ASH POND
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

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

TABLE 3-1. BACKGROUND GROUNDWATER QUALITY AND STANDARDS
GROUNDWATER MONITORING PLAN
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Parameter	Background Concentration	845 Limit	Groundwater Protection Standard	Unit
Antimony, total	0.001	0.006	0.006	mg/L
Arsenic, total	0.001	0.010	0.010	mg/L
Barium, total	0.212	2.0	2.0	mg/L
Beryllium, total	0.001	0.004	0.004	mg/L
Boron, total	0.163	2	2	mg/L
Cadmium, total	0.0023	0.005	0.005	mg/L
Chloride, total	435	200	435	mg/L
Chromium, total	0.001	0.1	0.1	mg/L
Cobalt, total	0.038	0.006	0.038	mg/L
Fluoride, total	0.12	4.0	4.0	mg/L
Lead, total	0.0015	0.0075	0.0075	mg/L
Lithium, total	0.019	0.04	0.04	mg/L
Mercury, total	0.0002	0.002	0.002	mg/L
Molybdenum, total	0.0017	0.1	0.1	mg/L
pH (field)	7.5 / 6.6	9.0 / 6.5	9.0 / 6.5	SU
Radium 226 and 228 combined	2	5	5	pCi/L
Selenium, total	0.0014	0.05	0.05	mg/L
Sulfate, total	215	400	400	mg/L
Thallium, total	0.001	0.002	0.002	mg/L
Total Dissolved Solids	1620	1200	1620	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

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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 Hennepin Power Plant East Ash Pond, Illinois Environmental Protection Agency (IEPA) ID No. W1550100002-05.

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 07, 08, 08D, 16, and 17.

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 are required to remediate the groundwater.

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
12	UA	257	Antimony, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
12	UA	257	Arsenic, total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
12	UA	257	Barium, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.050	2.0	0.21	2	Standard
12	UA	257	Beryllium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
12	UA	257	Boron, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.36	2.0	0.15	2	Standard
12	UA	257	Cadmium,total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
12	UA	257	Chloride, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	68	396	396	200	Background
12	UA	257	Chromium, total	mg/L	06/22/2015 - 06/23/2021	CI around median	0.001	0.10	0.001	0.1	Standard
12	UA	257	Cobalt, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.038	0.038	0.006	Background
12	UA	257	Fluoride, total	mg/L	06/22/2015 - 06/23/2021	CB around linear reg	0.25	4.0	0.12	4	Standard
12	UA	257	Lead, total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
12	UA	257	Lithium, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	0.012	0.040	0.019	0.04	Standard
12	UA	257	Mercury, total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
12	UA	257	Molybdenum, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.026	0.10	0.0017	0.1	Standard
12	UA	257	pH (field)	SU	03/19/2015 - 06/23/2021	CB around linear reg	7.0	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
12	UA	257	Radium-226 + Radium 228, tot	pCi/L	12/09/2015 - 03/18/2021	CI around mean	0.34	5.0	1.5	5	Standard
12	UA	257	Selenium, total	mg/L	06/22/2015 - 06/23/2021	CI around median	0.0011	0.050	0.0014	0.05	Standard
12	UA	257	Sulfate, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	64	400	200	400	Standard
12	UA	257	Thallium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
12	UA	257	Total Dissolved Solids	mg/L	12/09/2015 - 03/18/2021	CI around mean	443	1520	1520	1200	Background
13	UA	257	Antimony, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
13	UA	257	Arsenic, total	mg/L	06/22/2015 - 06/23/2021	CI around median	0.001	0.010	0.001	0.01	Standard
13	UA	257	Barium, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.043	2.0	0.21	2	Standard
13	UA	257	Beryllium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
13	UA	257	Boron, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.75	2.0	0.15	2	Standard
13	UA	257	Cadmium,total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard

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TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
13	UA	257	Chloride, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	72	396	396	200	Background
13	UA	257	Chromium, total	mg/L	06/22/2015 - 06/23/2021	CI around median	0.001	0.10	0.001	0.1	Standard
13	UA	257	Cobalt, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.038	0.038	0.006	Background
13	UA	257	Fluoride, total	mg/L	06/22/2015 - 06/23/2021	CB around linear reg	0.23	4.0	0.12	4	Standard
13	UA	257	Lead, total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
13	UA	257	Lithium, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	0.018	0.040	0.019	0.04	Standard
13	UA	257	Mercury, total	mg/L	06/22/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
13	UA	257	Molybdenum, total	mg/L	06/22/2015 - 06/23/2021	CI around geomean	0.015	0.10	0.0017	0.1	Standard
13	UA	257	pH (field)	SU	03/19/2015 - 06/23/2021	CI around mean	7.4	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
13	UA	257	Radium-226 + Radium 228, tot	pCi/L	12/09/2015 - 03/18/2021	CI around mean	0.38	5.0	1.5	5	Standard
13	UA	257	Selenium, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	0.00181	0.050	0.0014	0.05	Standard
13	UA	257	Sulfate, total	mg/L	06/22/2015 - 06/23/2021	CI around mean	80	400	200	400	Standard
13	UA	257	Thallium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
13	UA	257	Total Dissolved Solids	mg/L	12/09/2015 - 03/18/2021	CI around mean	480	1520	1520	1200	Background
46	UA	257	Antimony, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
46	UA	257	Arsenic, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
46	UA	257	Barium, total	mg/L	12/09/2015 - 03/18/2021	CB around linear reg	0.058	2.0	0.21	2	Standard
46	UA	257	Beryllium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
46	UA	257	Boron, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	0.21	2.0	0.15	2	Standard
46	UA	257	Cadmium,total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
46	UA	257	Chloride, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	66	396	396	200	Background
46	UA	257	Chromium, total	mg/L	12/09/2015 - 03/18/2021	CB around linear reg	0.00137	0.10	0.001	0.1	Standard
46	UA	257	Cobalt, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.038	0.038	0.006	Background
46	UA	257	Fluoride, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	0.25	4.0	0.12	4	Standard
46	UA	257	Lead, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
46	UA	257	Lithium, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	0.00966	0.040	0.019	0.04	Standard

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TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
46	UA	257	Mercury, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
46	UA	257	Molybdenum, total	mg/L	12/09/2015 - 03/18/2021	CB around T-S line	0.014	0.10	0.0017	0.1	Standard
46	UA	257	pH (field)	SU	12/09/2015 - 03/18/2021	CI around mean	7.3	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
46	UA	257	Radium-226 + Radium 228, tot	pCi/L	12/09/2015 - 03/18/2021	CI around geomean	0.25	5.0	1.5	5	Standard
46	UA	257	Selenium, total	mg/L	12/09/2015 - 03/18/2021	CI around median	0.001	0.050	0.0014	0.05	Standard
46	UA	257	Sulfate, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	60	400	200	400	Standard
46	UA	257	Thallium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
46	UA	257	Total Dissolved Solids	mg/L	12/09/2015 - 03/18/2021	CI around mean	430	1520	1520	1200	Background
47	UA	257	Antimony, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
47	UA	257	Arsenic, total	mg/L	12/09/2015 - 03/18/2021	Most recent sample	0.001	0.010	0.001	0.01	Standard
47	UA	257	Barium, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	0.074	2.0	0.21	2	Standard
47	UA	257	Beryllium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
47	UA	257	Boron, total	mg/L	12/09/2015 - 03/18/2021	CI around geomean	0.18	2.0	0.15	2	Standard
47	UA	257	Cadmium,total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
47	UA	257	Chloride, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	70	396	396	200	Background
47	UA	257	Chromium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.0015	0.10	0.001	0.1	Standard
47	UA	257	Cobalt, total	mg/L	12/09/2015 - 03/18/2021	Future median	0.001	0.038	0.038	0.006	Background
47	UA	257	Fluoride, total	mg/L	12/09/2015 - 03/18/2021	CB around linear reg	0.24	4.0	0.12	4	Standard
47	UA	257	Lead, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
47	UA	257	Lithium, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	0.00812	0.040	0.019	0.04	Standard
47	UA	257	Mercury, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
47	UA	257	Molybdenum, total	mg/L	12/09/2015 - 03/18/2021	CB around linear reg	0.015	0.10	0.0017	0.1	Standard
47	UA	257	pH (field)	SU	12/09/2015 - 03/18/2021	CI around mean	7.0	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
47	UA	257	Radium-226 + Radium 228, tot	pCi/L	12/09/2015 - 03/18/2021	CI around mean	0.26	5.0	1.5	5	Standard
47	UA	257	Selenium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.001	0.050	0.0014	0.05	Standard
47	UA	257	Sulfate, total	mg/L	12/09/2015 - 03/18/2021	CI around mean	60	400	200	400	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
47	UA	257	Thallium, total	mg/L	12/09/2015 - 03/18/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
47	UA	257	Total Dissolved Solids	mg/L	12/09/2015 - 03/18/2021	CI around mean	456	1520	1520	1200	Background
52	UA	845	Antimony, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
52	UA	845	Arsenic, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
52	UA	845	Barium, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.066	2.0	0.21	2	Standard
52	UA	845	Beryllium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
52	UA	845	Boron, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.11	2.0	0.16	2	Standard
52	UA	845	Cadmium,total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
52	UA	845	Chloride, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	64	435	435	200	Background
52	UA	845	Chromium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.0015	0.10	0.001	0.1	Standard
52	UA	845	Cobalt, total	mg/L	02/24/2021 - 08/03/2021	Most recent sample	0.001	0.038	0.038	0.006	Background
52	UA	845	Fluoride, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.28	4.0	0.12	4	Standard
52	UA	845	Lead, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
52	UA	845	Lithium, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.00583	0.040	0.019	0.04	Standard
52	UA	845	Mercury, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
52	UA	845	Molybdenum, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.00891	0.10	0.0017	0.1	Standard
52	UA	845	pH (field)	SU	02/24/2021 - 08/03/2021	CI around mean	6.9	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
52	UA	845	Radium-226 + Radium 228, tot	pCi/L	02/24/2021 - 08/03/2021	CI around mean	0.25	5.0	2.0	5	Standard
52	UA	845	Selenium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.050	0.0014	0.05	Standard
52	UA	845	Sulfate, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	56	400	215	400	Standard
52	UA	845	Thallium, total	mg/L	02/24/2021 - 08/03/2021	CI around median	0.001	0.002	0.001	0.002	Standard
52	UA	845	Total Dissolved Solids	mg/L	02/24/2021 - 08/03/2021	CI around mean	397	1620	1620	1200	Background
53	UA	845	Antimony, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.002	0.006	0.001	0.006	Standard
53	UA	845	Arsenic, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
53	UA	845	Barium, total	mg/L	02/25/2021 - 05/06/2021	CI around median	0	2.0	0.21	2	Standard
53	UA	845	Beryllium, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
53	UA	845	Boron, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	0.074	2.0	0.16	2	Standard
53	UA	845	Cadmium,total	mg/L	02/25/2021 - 05/06/2021	CI around mean	0.000671	0.005	0.0023	0.005	Standard
53	UA	845	Chloride, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	90	435	435	200	Background
53	UA	845	Chromium, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.001	0.10	0.001	0.1	Standard
53	UA	845	Cobalt, total	mg/L	02/25/2021 - 05/06/2021	Future median	0.0074	0.038	0.038	0.006	Background
53	UA	845	Fluoride, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	0.22	4.0	0.12	4	Standard
53	UA	845	Lead, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	0.0000651	0.0075	0.0015	0.0075	Standard
53	UA	845	Lithium, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	-0.00176	0.040	0.019	0.04	Standard
53	UA	845	Mercury, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
53	UA	845	Molybdenum, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	0.00428	0.10	0.0017	0.1	Standard
53	UA	845	pH (field)	SU	02/25/2021 - 05/06/2021	CI around mean	6.7	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
53	UA	845	Radium-226 + Radium 228, tot	pCi/L	02/25/2021 - 05/06/2021	CI around mean	-0.249	5.0	2.0	5	Standard
53	UA	845	Selenium, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.001	0.050	0.0014	0.05	Standard
53	UA	845	Sulfate, total	mg/L	02/25/2021 - 05/06/2021	CI around mean	59	400	215	400	Standard
53	UA	845	Thallium, total	mg/L	02/25/2021 - 05/06/2021	All ND - Last	0.001	0.002	0.001	0.002	Standard
53	UA	845	Total Dissolved Solids	mg/L	02/25/2021 - 05/06/2021	CI around mean	433	1620	1620	1200	Background
54	UA	845	Antimony, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
54	UA	845	Arsenic, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
54	UA	845	Barium, total	mg/L	02/24/2021 - 08/03/2021	CB around linear reg	0.048	2.0	0.21	2	Standard
54	UA	845	Beryllium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
54	UA	845	Boron, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.64	2.0	0.16	2	Standard
54	UA	845	Cadmium,total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
54	UA	845	Chloride, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	78	435	435	200	Background
54	UA	845	Chromium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.0015	0.10	0.001	0.1	Standard
54	UA	845	Cobalt, total	mg/L	02/24/2021 - 08/03/2021	Future median	0.001	0.038	0.038	0.006	Background
54	UA	845	Fluoride, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.32	4.0	0.12	4	Standard

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TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
54	UA	845	Lead, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.001	0.0075	0.0015	0.0075	Standard
54	UA	845	Lithium, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	0.014	0.040	0.019	0.04	Standard
54	UA	845	Mercury, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
54	UA	845	Molybdenum, total	mg/L	02/24/2021 - 08/03/2021	CB around linear reg	0.012	0.10	0.0017	0.1	Standard
54	UA	845	pH (field)	SU	02/24/2021 - 08/03/2021	CI around mean	6.8	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
54	UA	845	Radium-226 + Radium 228, tot	pCi/L	02/24/2021 - 08/03/2021	CI around geomean	0.14	5.0	2.0	5	Standard
54	UA	845	Selenium, total	mg/L	02/24/2021 - 08/03/2021	CI around median	0.001	0.050	0.0014	0.05	Standard
54	UA	845	Sulfate, total	mg/L	02/24/2021 - 08/03/2021	CI around mean	72	400	215	400	Standard
54	UA	845	Thallium, total	mg/L	02/24/2021 - 08/03/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
54	UA	845	Total Dissolved Solids	mg/L	02/24/2021 - 08/03/2021	CI around mean	477	1620	1620	1200	Background
55	BR	845	Antimony, total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
55	BR	845	Arsenic, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.000438	0.010	0.001	0.01	Standard
55	BR	845	Barium, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.061	2.0	0.21	2	Standard
55	BR	845	Beryllium, total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
55	BR	845	Boron, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.35	2.0	0.16	2	Standard
55	BR	845	Cadmium,total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.001	0.005	0.0023	0.005	Standard
55	BR	845	Chloride, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	132	435	435	200	Background
55	BR	845	Chromium, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	-0.00509	0.10	0.001	0.1	Standard
55	BR	845	Cobalt, total	mg/L	02/25/2021 - 08/03/2021	Future median	0.001	0.038	0.038	0.006	Background
55	BR	845	Fluoride, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.24	4.0	0.12	4	Standard
55	BR	845	Lead, total	mg/L	02/25/2021 - 08/03/2021	CI around median	0	0.0075	0.0015	0.0075	Standard
55	BR	845	Lithium, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.023	0.040	0.019	0.04	Standard
55	BR	845	Mercury, total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
55	BR	845	Molybdenum, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	0.00217	0.10	0.0017	0.1	Standard
55	BR	845	pH (field)	SU	02/25/2021 - 08/03/2021	CI around mean	7.0	6.5/9.0	6.6/7.5	6.5/9	Standard/Standard
55	BR	845	Radium-226 + Radium 228, tot	pCi/L	02/25/2021 - 08/03/2021	CI around mean	-0.147	5.0	2.0	5	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES
HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
EAST ASH POND
HENNEPIN, ILLINOIS

Sample Location	HSU	Program	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
55	BR	845	Selenium, total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.001	0.050	0.0014	0.05	Standard
55	BR	845	Sulfate, total	mg/L	02/25/2021 - 08/03/2021	CI around mean	22	400	215	400	Standard
55	BR	845	Thallium, total	mg/L	02/25/2021 - 08/03/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
55	BR	845	Total Dissolved Solids	mg/L	02/25/2021 - 08/03/2021	CI around mean	542	1620	1620	1200	Background

Notes:
Potential exceedance of GWPS (note: No potential exceedances were determined based on data collected from 2015 through 2021)
HSU = hydrostratigraphic unit:
BR = bedrock
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)