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October 11, 2021

Illinois Power Generating Company
134 Cips Lane
Coffeen, Illinois 62017

Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
Ash Pond No. 1, Coffeen Power Plant, Coffeen, Illinois

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

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

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

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

CLOSING

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

Sincerely,

Lucas P. Carr, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

2021 USEPA CCR RULE PERODIC CERTIFICATION REPORT §257.73(a)(2), (c), (d[1]), (e) and §257.82 ASH POND NO. 1

Coffeen Power Plant

Coffeen, Illinois

Submitted to

Illinois Power Generating Company

134 Cips Lane
Coffeen, Illinois 62017

Submitted by

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[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 Ash Pond No. 1 (AP1)[2] at the Coffeen Power Plant, also known as the Coffeen Power Station (COF), has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257. herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial certifications for existing CCR surface impoundment, completed in 2016 and subsequently posted on the Illinois Power Generating Company (IPGC) CCR Website ([2], [3], [4], [5], [6], [7]) be updated on a five-year basis.

The initial certification reports developed in 2016 and 2017 were independently reviewed by Geosyntec ([2], [8], [3], [4], [9], [5], [6], [7]). Additionally, field observations, interviews with plant staff, and evaluations were performed to compare conditions in 2021 at AP1 relative to the 2016 and 2017 initial certifications. These tasks determined that updates are not required for the Initial Hazard Potential Classification and Initial Safety Factor Assessment. However, due to changes at the site and technical review comments, updates were required and were performed for the:

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

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the AP1 meets all requirements for hazard potential classification, history of construction reporting, structural stability, 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 certified by others. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[2] AP1 is also referred to as ID Number W1350150004-01, Ash Pond 1 by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 101 by IPGC; and IL50722 by the National Inventory of Dams (NID) maintained by the Illinois Department of Natural Resources (IDNR). Within this document it is referred to as API.

Table 1 – Periodic Certification Summary

Section	CCR Rule Reference	Requirement Summary	2016 Initial Certification		2021 Periodic Certification	
			Requirement Met?	Comments	Requirement Met?	Comments
Hazard Potential Classification						
3	§257.73(a)(2)	Document hazard potential classification	Yes	Impoundment was determined to have a Significant hazard potential classification [2].	Yes	Updates were not determined to be necessary. Geosyntec recommends retaining the Significant hazard potential classification.
History of Construction						
4	§257.73(c)(1)	Compile a history of construction	Yes	A History of Construction report was prepared for Ash Pond No. 1 and Ash Pond No. 2, in addition to other CCR surface impoundments at COF [4].	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 was found to be stable. Abutments were not present [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(ii)	Adequate slope protection	Yes	Slope protection was adequate [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of dike compaction	Yes	Dikes compaction was sufficient for expected ranges in loading conditions [9] .	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iv)	Presence and condition of slope vegetation	Yes	Vegetation was present on interior and exterior slopes and was maintained [9].	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 [9].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manger flow during the 1,00-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 due to inability to complete a CCTV inspection of the recycle intake pipe due to high sustained pipe flows needed for plant operations. Inspection of this pipe was recommended as soon as feasible [9].	Periodic certification of §257.73(d)(1)(vi) was independently by Luminant in 2020 [10]	
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Not Applicable	Inundation of exterior slopes were not expected. This requirement was not applicable [9] .	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 1.50 and higher [9] .	Yes	No changes were identified that may affect this requirement.
	§257.73(e)(1)(ii)	Maximum surcharge pool safety factor must be at least 1.40	Yes	Safety factors were calculated to be 1.49 and higher [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 1.03 and higher [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(e)(1)(iv)	For dike construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Dike soils were not susceptible to liquefaction. This requirement was not applicable [9].	Yes	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
7	§257.82(a)(1), (2), (3)	Adequacy of inflow design control system plan.	Yes	Flood control system adequately managed inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood	Yes	The 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	Discharge from the CCR Unit into Waters of the United States were not expected during normal or 1,000-year, 24-hour Inflow Design Flood conditions [9].	Yes	Discharge from the CCR Unit into Waters of the United States were not expected during normal or 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 (USEPA) Coal Combustion Residual (CCR) Rule [1] Certification Report was prepared by Geosyntec Consultants (Geosyntec) for Illinois Power Generating Company (IPGC) to document the re-certification of the Ash Pond No. 1 (AP1) at the Coffeen Power Plant (CPP), also known as the Coffeen Power Station (COF), located at 134 Cips Lane in Coffeen, Illinois, 62017. The location of CPP is provided in **Figure 1**, and a site plan showing the location of AP1, among other closed and open CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

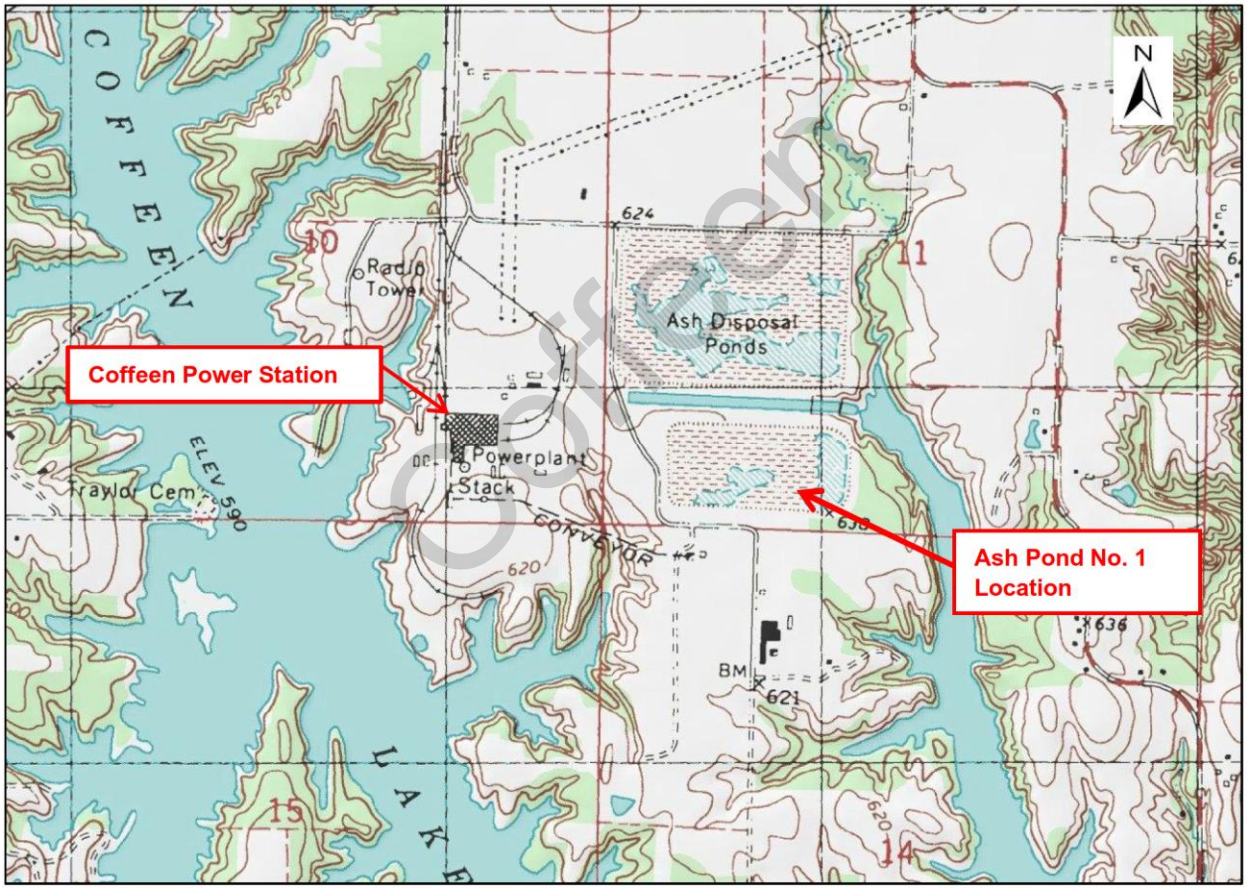


Figure 1 – Site Location Map (from AECOM, 2016)

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

1.1 AP1 Description

CPP was retired in 2019. Prior to retirement, three active CCR surface impoundments: the GMF Pond, the GMF Gypsum Recycle Pond, and AP1 and one CCR landfill were used for managing CCRs generated at CPP. AP1 has a Significant hazard potential, based on the initial hazard potential classification assessment performed by Stantec in 2016 in accordance with §257.73(a)(2) ([2], [9]).

AP1 formerly served as the primary wet impoundment basin for bottom ash produced at CPP. AP1 was utilized as a flow-through structure, where outflow was ultimately discharged to Coffeen

Lake, until approximately 1981, when the pond was modified by abandoning the penetrating discharge pipe in the northeast corner of the impoundment, adding a recycle intake structure in the northwest corner, removing some of the accumulated bottom ash, and regrading the remainder of the bottom ash to form a new impoundment flow.

When CPP was operational, outflow from AP1 flowed into the recycle intake structure (outlet pipe) and was transferred back to CPP for use as process water. An approximately 1,300-ft long interior dike creates an interior channel leading to the recycle intake structure. AP1 was operated as a closed-loop hydraulic system as outflow was transmitted back to CPP during normal operational conditions. Bottom ash was mechanically excavated from the southwest corner of AP1 for offsite beneficial use [9].

Sluiced bottom ash from CPP entered AP1 through three steel sluice pipes, which discharged along the western embankment, on the south side of the interior dike. Additional clear water inflow from CPP entered AP1 through two pipes, which discharged at a concrete structure approximately 120 feet north of the sluice pipes, and a 12-in. diameter iron pipe located at the northwest corner of the embankment. Outflow water was transmitted back to CPP via a concrete riser recycle intake structure and 48-in. diameter steel recycle intake pipe located at the northwest corner of AP1, which function as the primary outflow pipe for AP1. The pool level is controlled by a steel spillway gate, which allowed for pool levels ranging from El. 624.5 ft to 631.0 ft[3] However, a berm was constructed with bottom ash around the inlet to the spillway after plant closure in 2019 to provide freeze protection for the gate while still allowing overflow during higher pool levels. A secondary 24-in. diameter pipe, which starts as a corrugated metal pipe (CMP) and transitions to steel, is connected to the 48-in. diameter steel recycle intake pipe within the embankment, and was used to discharge excess flow into the process water flume during upset conditions and act as an overflow pipe., but the pipe did not transmit outflow during [9].

The surface area of AP1 is approximately 26.2 acres. The embankment portion of AP1 is comprised of a ring dike with a total length of approximately 4,350 ft and has a maximum height above exterior grade of 30 ft. The embankment was constructed as a homogenous earthen structure with well-compacted clayey fill. An approximately 570-ft long, Hoesch 2500k steel sheet pile wall, is located at the toe of the northeast corner of AP1, to separate the embankment from the plant process water flume. The process water flume was used to transmit plant cooling water back to Coffeen Lake over a series of weirs. The water level in the process water flume was surveyed to be approximately El. 600 ft in 2020, after plant closure [11]. The sheet pile wall was installed around 2000 and driven approximately 13 feet into the foundation soils and has a maximum exposed height of 13.8 feet, for a total pile length of approximately 27 ft. Downstream dike slopes, outside of the sheet pile wall area, range from approximately 1.4H:1V (horizontal to vertical) to 3H:1V and generally are covered in vegetation. Interior embankment slopes are partially covered in bottom ash, vegetation, or gravel and exhibit an approximately 2H:1V orientation. The

[3] Assumed to be the NGVD29 datum, based on the date of the design drawings, but all other elevations in this report are in the North American Vertical Datum of 1988 (NAVD88), unless otherwise noted.

embankment crest width varies from approximately 14 to 22 feet. An engineered liner system is not present beneath AP1 [9].

The normal maximum normal operating pool of AP1 was 631.0 ft when the plant was operational, as controlled by the recycle intake structure and emergency outflow pipes. The maximum normal operating pool may be different now due to the bottom ash berm placed around the recycle intake structure. The minimum crest elevation is 635.0 ft [9].

Initial certifications for AP1 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 IPGC's CCR Website ([2], [3], [4], [5], [6], [7]). Additional documentation for the initial certifications included detailed operating record reports containing calculations and other information prepared for the hazard potential classification by Stantec [8] and for the structural stability assessment, safety factor assessment, and inflow design flood control system plan by AECOM [9]. These operating record reports were not posted to IPGC's CCR Website.

1.2 Report Objectives

The following objectives are associated with this report:

- Compare site conditions from 2015/2016 to site conditions in 2020/2021, and evaluate if updates are required to the:
    - §257.73(a)(2) Hazard Potential Classification [2];
    - §257.73(c) History of Construction [4];
    - §257.73(d) Structural Stability Assessment [5];
    - §257.73(e) Safety Factor Assessment [6], and/or
    - §257.82 Inflow Design Flood Control System Plan [7].
- Independently review the Hazard Potential Classification ([2], [8]), Structural Stability Assessment ([5], [9]), Safety Factor Assessment ([6], [9]), and Inflow Design Flood Control System Plan ([7], [9]) to evaluate whether updates are required based on technical considerations.
- The History of Construction report [4] was not independently reviewed for technical consideration, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at CPP, and did not include

calculations or other information used to certify performance and/or integrity of the impoundments under §257.73(a)(2)-(3), §257.73(c)-(e), or §257.82.

- Confirm that AP1 meets all of the requirements associated with §257.73(a)(2)-(3), (c), (d), (e), and §257.82, or, if AP1 does not meet any of the requirements, provide recommendations for compliance with that section of the CCR Rule [1].

SECTION 2

COMPARISION OF INITIAL AND PERIODIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at AP1 between the start of the initial CCR certification program in 2015 and subsequent collection of periodic certification site data in 2020 and 2021.

2.2 Review of Annual Inspection Reports

Annual onsite inspections of AP1 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 stated the following information, relative to the previous inspection:

- A statement that no changes in geometry of the impounding structure were observed since the previous inspection;
- 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; and
- A statement that no other changes which may have affected the stability or operation of the impounding structure were observed.

In summary, the reports did not indicate any significant changes to AP1 between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the AP1 were noted in the inspection reports. The 2019 report [15] indicated that approximately 5 acre-feet (8,100 cubic yards) of CCR was removed from AP1 in 2019 for beneficial use, and the 2020 report noted that CPP had closed in 2019.

2.3 Review of Instrumentation Data

Eight piezometers, COF-P000, COF-P001, COF-P002, COF-P003, COF-P005, COF-P006, COF-P007, and COF-P008, are present at AP1 have been monitored monthly by CPP staff since August 29, 2015. Geosyntec reviewed the piezometer data collected through April 22, 2021 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 ([9], [5], [6]) and April 22, 2021. Available piezometer readings are plotted in **Attachment A**.

In summary, only minor changes in phreatic conditions were observed in the available piezometric data. Phreatic levels typically varied by one to five feet for most piezometers, with average levels remaining steady and not exhibiting any sustained trends of increase or decrease. These changes do not indicate significantly different phreatic levels than those utilized for the initial structural stability and factor of safety certifications ([9], [5], [6]).

2.4 Comparison of Initial to Periodic Surveys

The initial survey of AP1, conducted by Weaver Consultants (Weaver) in 2015 [17], was compared to the periodic survey of AP1, conducted by IngenAE, LLC (IngenAE) in 2020 [11], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within AP1 and considered volumetric changes above and below the starting water surface elevation (SWSE) used for the initial §257.82 inflow design flood control plan hydraulic analysis [7]. Potential changes to embankment geometry were also evaluated.

This comparison is presented in side-by-side views of each survey in **Drawing 1** and a plan view isopach map denoting changes in ground surface elevation in **Drawing 2**. A summary of the water elevations and changes in CCR volumes is provided in **Table 1**.

Table 2 – 2015 and 2020 Survey Comparison

Initial Surveyed Pool Elevation (ft)	629.9
Periodic Surveyed Pool Elevation (ft)	629.2
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	631.0
Total Change in CCR Volume (CY)	+3,550
Change in CCR Volume Above SWSE (CY)	+2,877
Change in CCR Volume Below SWSE (CY)	+673

The comparison indicated that approximately 2,900 CY of CCR was placed in AP1 between 2015 and 2020 above the SWSE, thereby leading to a potential for the peak water surface elevation (PWSE) to increase slightly during the inflow design 1,000-year flood event. No significant changes to embankment geometry appeared to have occurred between the initial and periodic surveys, although changes in CCR disposal grades within the impoundment were noted, reportedly due to excavation of bottom ash for beneficial use.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of AP1 collected by Weaver in 2015 [17] were compared to periodic aerial photographs collected by IngenAE in 2020 [17] 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 the aerial photographs is provided in **Drawing 3**, and the following change was identified:

- The water level within the cooling water discharge channel leading to Coffeen Lake was observed to be lower (approximately El. 600 ft, as indicated by the 2020 survey [11]), likely due to closure of the CPP power plant and cessation of cooling water discharge.

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to AP1 was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [18]. A periodic site visit was conducted by Geosyntec on May 28, 2021, with Mr. Lucas P. Carr, P.E. conducting the site visit. The site visit was intended to evaluate potential changes at the site since 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 AP1 to evaluate if the structural stability requirements (§257.73(d)) were still met. The site visit included walking the perimeter of AP1, visually observing conditions, recording field notes, and collecting photographs. The site visit is documented in a field observation form and photographic log provided in **Appendix A**. A summary of significant findings from the periodic site visit is provided below:

- Overall site maintenance appeared to have improved since 2015, with the exception of continued tree growth at the top of the sheet pile wall. Geosyntec recommended cutting the trees to IPGC staff as part of routine site maintenance activities.

- A berm of bottom ash was observed to have been installed around the inlet to the Recycle Intake Structure, reportedly to reduce freeze-thaw concerns.

- Seepage was observed at the east and south dikes of AP1. Geosyntec recommended to IPGC staff that the seepage be monitored during routine inspections.

- No signs of structural instability or erosion were observed during the site visit.

2.7 Interview with Power Plant Staff

An interview with Mr. John Romang of CPP was conducted by Mr. Lucas P. Carr, P.E. of Geosyntec on May 28, 2021. Mr. Romang had been employed, at the time of the interview, by CPP for approximately 20 years as the environmental and chemistry manager and supervisor. His responsibilities included general oversight and environmental compliance, including weekly impoundment inspections and identifying items requiring repair. The interview included a discussion of potential changes that may have occurred at AP1 since the development of the initial certifications ([2], [8], [3], [4], [9], [5], [6], [7]).

- Were any construction projects completed for AP1 between 2015 and 2021, and, if so, are design drawings and/or details available?

  - No construction projects were completed.

- Were there any changes to the purpose of AP1 between 2015 and 2017?

  - CPP was closed in October of 2019 and CCR placement stopped at that time.

  - Beneficial use contractors continued mining the AP1 for some time after closure, until CCR viable for beneficial use was no longer encountered.

- Were there any changes to the to the instrumentation program and/or physical instruments for AP1 between 2015 and 2021?

  - No known changes occurred.

- Were there any changes to spillways and/or diversion features for AP1 completed between 2015 and 2021?

  - The inlet to the Recycle Intake Structure was partially blocked with a berm of bottom ash in 2019, after plant closure, to provide freeze protection. Overflow into the Recycle Intake Structure will still occur at higher pool levels.

- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for AP1 between 2015 and 2021?

  - No known changes occurred.

- Were there any instances of dike and/or structural instability for AP1 between 2015 and 2021?

  - No known instance of dike and/or structural instability 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], [8]), following the requirements of §257.73(a)(2). The Initial HPC included the following information:

- Results of two breach analyses using HEC-HMC software [19], using pool levels estimated within AP1 during the Probable Maximum Precipitation (PMP) rainfall event, for breaches occurring at the northeast and northwest corners of AP1.
- Evaluating potential effects of flooding in multiple areas, including breach flood wave velocities, flood depths, and/or pool increases, for the following locations:
    - Coffeen Lake, including the eastern cove (east of AP1) and the main lake (west of AP1),
    - Coffeen Lake Dam,
    - Coffeen Power Plant, including the building and parking lots,
    - AP1 recycle pump house,
    - Coal yard maintenance buildings near AP1, and
    - Abandoned coal mining structures south of AP1.
- While a breach map is not included within the Initial HPC, it is included within the §257.73(a)(3) Initial Emergency Action Plan (Initial EmAP) [2].

The breach analysis concluded that a breach of AP1 would impact non-occupied CPP structures and lightly used access roads, where the populations at risk were considered transient and there would be no probable loss of life. Probable loss of life differentiates high hazard potential from significant hazard potential classification. The analysis found that a breach could impact several buildings with regular occupancy, but that the depth-velocity relationships of the breach wave did not constitute a probable loss of life. 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 Coffeen Lake, thereby causing environmental damage. The Initial HPC therefore recommended a “Significant” hazard potential classification for AP1 [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [8]), in terms of technical approach, input parameters, and assessment of results. The review included the following tasks:

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

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

3.3 Summary of Site Changes Affecting the Initial HPC

Geosyntec did not identify any changes at the stie 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 [3]. 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 AP1, 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], [8]) 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 [4], following the requirements of §257.73(c), and included information on all CCR surface impoundments at CPP, including AP1, AP2, the GMF Pond, and the GMF Recycle Pond. The Initial HoC included the following information for each CCR surface impoundment:

- The name and address of the owner/operator,
- Location maps,
- Statements of purpose,
- The names and size of the surrounding watershed,
- A description of the foundation and abutment materials,
- A description of the dike materials,
- Approximate dates and stages of construction,
- Available design and engineering drawings,
- A summary of instrumentation,
- Area-capacity curves for AP1,
- Information on spillway structures,
- Construction specifications,
- Inspection and surveillance plans,
- Information on operational and maintenance procedures, and
- Information on past sloughs in the embankments for AP1.

4.2 Summary of Site Changes Affecting the Initial HoC

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

- A state identification number (ID) of W1350150004-01 was assigned to AP1 by the Illinois Environmental Protection Agency (IEPA).
- Electricity generation at the CPP ceased in 2019 and AP1 is no longer being used to actively store CCR generated by CPP as CCR is no longer being generated. Additionally, AP1 no longer receives regular process water inflows or outflows.
- A berm of bottom ash was constructed around the AP1 recycle intake structure.
- Revised area-curves and spillway design calculations for AP1 were prepared as part of the updated Periodic Inflow Design Flood Control System Plan, as described in **Section 6.3**.

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

SECTION 5

STRUCTURAL STABILITY ASSESSMENT - §257.73(D)

5.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 [9], 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, including using closed-circuit television (CCTV) equipment to inspect the interior of the 24-in. diameter secondary overflow pipe;
- An evaluation of the effects of liquefaction in the foundation soils using a slope stability analysis considering post-cyclic softening in the foundation soils; and
- Downstream slope stability under sudden drawdown conditions for a downstream water body.

The Initial SSA concluded that AP1 met all structural stability requirements for §257.73(d)(1)(i)-(v) and (vii), but recommended inspection of the 48-in. diameter recycle intake pipe to verify that AP1 meets the stability and structural integrity criteria for hydraulic outfall structures, per §257.73(d)(1)(vi). An inspection of this spillway pipe was not performed in 2015 or 2016 due to high sustained flows in the pipe being critical for plant operations.

A periodic certification of the structural stability and structural integrity of hydraulic outfall structures (§257.73(d)(1)(vi)) was performed by Luminant in 2020 [10]. This certification independently determined that the criteria was met due to the condition of the spillway pipes and the soil types within the embankment. Therefore, the review and certification of §257.73(d)(1)(vi) was not included within the scope of this report.

The Initial SSA referenced the results of the Initial Structural Factor Assessment (Initial SFA) ([6], [9]), 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 ([5], [9]) 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.
- Reviewing the contents vs. the applicable CCR Rule requirements [1].

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

5.3 Summary of Site Changes Affecting the 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**.

5.4 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 [10].

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 ([6], [9]), 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 five slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software; and
- The analysis of each cross-section 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 AP1 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 ([6], [9]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing geotechnical calculations used to demonstrate the acceptable safety factors, per §257.73(e)(1), in terms of:
    - Completeness and adequacy of supporting geotechnical investigation and testing data;
    - Completeness and approach of liquefaction triggering assessments; and
    - Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses.
    - Phreatic conditions based on piezometric data collected between August 29, 2015 and April 22, 2021 as discussed in **Section 2.3**.

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

6.3 Summary of Site Changes Affecting the Initial SFA

No changes since development of the Initial SFA were identified that would require updates to the Initial SFA ([6], [9]). For example, starting and peak water surface elevations from the updated Periodic IDF (**Section 7**) were both calculated to be less than level levels used within the slope stability analyses associated with the Initial SFA. Therefore, the water levels within the Initial SFA slope stability analyses are conservative and updates to the analyses were not recommended and were not performed.

SECTION 7

INFLOW DESIGN FLOOD CONROL 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 ([7], [9]) 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 9.13 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 design flood, with a SWSE of 631.0 ft.

The Initial IDF concluded that AP1 met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 632.0 ft, relative to the minimum AP1 dike crest elevation of 635.0 ft. Therefore, overtopping was not expected. The Initial IDF also evaluated the potential for discharge from the CCR unit and determined that discharge from the unit was note expected, as AP1 does not discharge into waters of the United States and overtopping of the AP1 embankments was not expected during the 1,000-year inflow design flood.

7.2 Review of Initial IDF

Geosyntec performed a review of the Initial IDF ([7], [9]) 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 utilized 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".*

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:

- A bottom ash berm was constructed around the recycle outlet structure, thereby the outlet structure configuration utilized in the Initial IDF was no longer consistent with conditions observed in 2020.
- Approximately 2,900 CY of CCR were placed in AP1 above the SWSE utilized for the Initial IDF, thereby altering the stage-storage curve for AP1 relative to the Initial IDF. Process inflows to AP1 have ceased due to the closure of the CPP power plant, thereby the process inflow conditions utilized in the Initial IDF were no longer consistent with conditions observed in 2020.

7.4 Periodic IDF

Geosyntec revised the HydroCAD model associated with the Initial IDF to account for the revised rainfall distribution type, increase in SWSE, and additional CCR placement, as described in **Sections 7.2** and **7.3**. The following approach and input data were used for the revised analyses and are referenced in **Attachment D** as appropriate:

- Updated the time of concentration associated with Ash Pond No. 1 from 5 minutes to 6 minutes in accordance with TR-20 [24].

- Updated stage-storage curve for Ash Pond No. 1 based on the 2020 site survey [11].

    - A revised stage-volume curve for Ash Pond No. 1 was prepared based on measuring the storage volume of Ash Pond No. 1 at every one-foot increment of depth from an elevation just beneath the SWSE (630.0 ft) to the perimeter dike embankment crest elevation (636.0 ft). This analysis identified an overall increase of 539,887 cf (12 ac-ft) of storage volume at Ash Pond No. 1 from 2016 to 2021 relative to the SWSE used in the Initial IDF.

- Starting Water Surface Elevation

    - Based on information provided by site personnel, a bottom ash berm is located 30 inches below the top of the concrete outlet structure. A top of concrete elevation of 632.7 ft for the outlet structure was assumed based on the 2015 site survey [25]; therefore, a top of berm elevation of 630.2 ft was used for the bottom ash berm. For this analysis, the SWSE was updated from 631.0 ft to 630.2 ft to reflect the top elevation of the bottom ash berm as described by site personnel, and the lowest free discharge elevation was set at 632.7 ft based on the surveyed 24-inch riser elevation in 2015 [25]. The 2020 site survey showed a WSE of 629.17 ft; however, the top elevation of the bottom ash berm is higher than the surveyed WSE and was used as the SWSE to provide conservatism in the model.

- The rainfall distribution type was updated to the Huff 3rd Quartile for areas less than 10 square miles storm type provided by HydroCAD [26].

- The precipitation depth for the 1,000-yr, 24-hr design storm event was updated from 9.13 in. to 9.14 in. per NOAA Atlas 14 precipitation frequency estimates **Invalid source specified.**.

- The outlet structure for AP1 was updated as follows:

    - The discharge multiplier for the weir (i.e., top of the riser structure) was updated from 0 to 1.

    - The top of riser structure elevation was updated from 631.0 ft to 632.7 ft (i.e., top of concrete) per the 2015 site survey. The assumption that 100 percent of the flow is routed through the 24-inch circular horizontal orifice was maintained for conservatism in the model.

    - The length of 48-inch steel pipe was updated from 100 linear feet (LF) to 10 LF to account for a tee into the 24-inch cast iron pipe as described by site personnel. The pipe was assumed to be blocked beyond the tee as the CPP is no longer active and the recycle pump house downstream of the tee is no longer pumping water out of AP1. A slope of 0.17 ft/ft was maintained, and the outlet invert was updated from 607.0 ft to 622.3 ft based on the presumed tee elevation.

  - Added 92 LF of 24-inch cast iron pipe and 171 LF of 24-inch corrugated metal pipe based on an overflow assessment conducted in 2011. The inlet invert was set at 622.3 ft based on the approximate tee location, and the outlet invert was set at 600.0 ft per the 2020 site survey.

- 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 AP1 meets the requirements of §257.82(a)-(b), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevation, as long as the SWSE is maintained ate El. 630.2 ft or lower. Based on the Periodic IDF analysis, the peak WSE is 631.4 ft, which is below the riser opening elevation of 632.7. Therefore, there is no discharge from AP1 during normal and inflow design flood conditions and discharge into Waters of the United States is not expected during either normal or inflow design flood conditions. Updated area-capacity curves and HydroCAD model output is provided in **Attachment D**.

Table 3 - Water Levels from Periodic IDF

	Ash Pond No. 1		
Analysis	**Starting Water Surface Elevation (ft)**	**Peak Water Surface Elevation (ft)**	**Minimum Dike Crest Elevation (ft)**
Initial IDF	631.0	632.0	636.0
Periodic IDF Update	630.2	631.4	636.0
Initial to Periodic Change[1]	-0.8	-0.6	0.0

Notes:
[1]Positive change indicates increase in the WSE relative to the Initial IDF; negative changes indicate decrease in the WSE, relative to the Initial IDF.

SECTION 8

CONCLUSIONS

AP1 at CPP was evaluated relative to the USPEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2));
- History of Construction reporting (§257.73(d));
- Structural stability assessment (§257.73(d)), with the exception of §257.73(d)(1)(vi) that was independently certified by Luminant [10];
- Safety factor assessment (§257.73(e)); and
- Inflow design flood control system planning (§257.82).

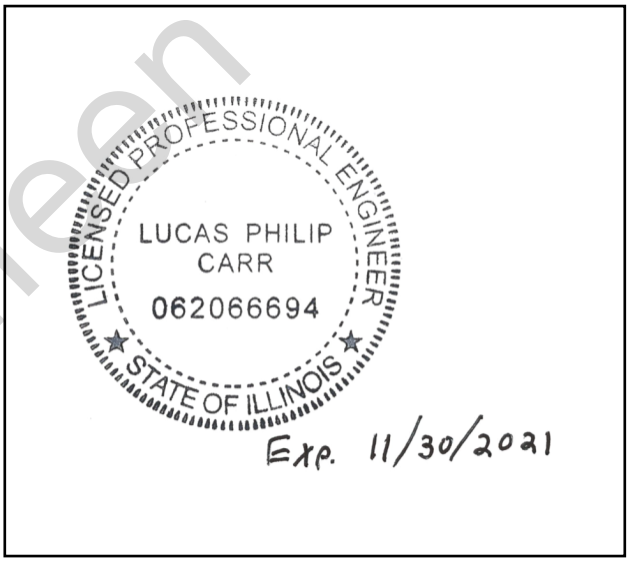
Based on the evaluations presented herein, the referenced requirements are satisfied.

SECTION 9

CERTIFICATION STATEMENT

CCR Unit: Illinois Power Generating Company, Coffeen Power Plant, Ash Pond No. 1

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

10/11/2021

Date

SECTION 10

REFERENCES

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

[2] Stantec Consulting Services, Inc., "Initial Hazard Potential Classification Assessment, EPA Final CCR Rule, Ash Pond No. 1, Coffeen Power Station, Montgomery County, Illinois," Fenton, Mo, October 12, 2016.

[3] Stantec Consulting Services, Inc., "Illinois Power Generating Company, Coffeen Power Station, Montgomery County, Illinois, Emergency Action Plan (EAP)," Fenton, MO, April 13, 2017.

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

[5] AECOM, "CCR Rule Report: Initial Structural Stability Assessment for Ash Pond No. 1 at Coffeen Power Station," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Safety Factor Assessment For Ash Pond No. 1 at Coffeen Power Station," St. Louis, MO, October 2016.

[7] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan For Ash Pond No. 1 at Coffeen Power Station," St. Louis, MO, October 2016.

[8] Stantec Consulting Services, Inc., "Documentation of Initial Hazard Potential Classification Assessment, Ash Pond No. 1, Coffeen Power Station, Montgomery County, Illinois," October 12, 2016.

[9] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for Ash Pond No. 1 at Coffeen Power Station," St. Louis, MO, October 2016.

[10] V. Modeer, "Ash Pond No. 1 Structural Stability Assessment, Illinois Power Resrouces Generationg, LLC, Coffeen Power Station," Luminant, November 30, 2020.

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

[12] J. Knutelski and J. Cambpbell, *Annual CCR Surface Impoundment Inspection (per 40 CFR 257.83(b)(2)), Coffeen Power Station, Ash Pond No. 1,* January 18, 2017.

[13] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Coffeen Power Station, Ash Pond No. 1,* February 7, 2018.

[14] J. Knutelski, *Inspection by a Qualified Professional Engineer, 40 CFR §257.73(b), Coffeen Power Station, Ash Pond No. 1,* December 28, 2018.

[15] J. Knutelski, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.73(b), Coffeen Power Station, Ash Pond No. 1,* January 8, 2020.

[16] J. Knutelski, *Annual Inspection by a Qualified Professional Engineer, Coffeen Power Station, Ash Pond No. 1,* January 6, 2021.

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

[18] AECOM, "CCR Unit Initial Site Visit Summary, Dynegy CCR Compliance Program, Coffeen Power Station - Ash Pond No. 1," June 18, 2015.

[19] US Army Corps of Engineers, "Hydrologic Modeling System (HEC-HMS), Version 4.0," Hydrologic Engineering Center, 2013.

[20] C. E. D. National Resources Conservation Service, "Urban Hydrology for Small Watersheds (TR-55)," United States Department of Agriculture, 1985.

[21] F. A. Huff and J. R. Angel, "Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois," State Water Survey Division, Department of Energy and Natural Resources, Champaign, Illinois, 1989.

[22] F. Huff, "Time Distributions of Heavy Rainstorms in Illinois," State Water Survey Division, Department of Energy and Natural Resources, Champaign, Illinois, 1990.

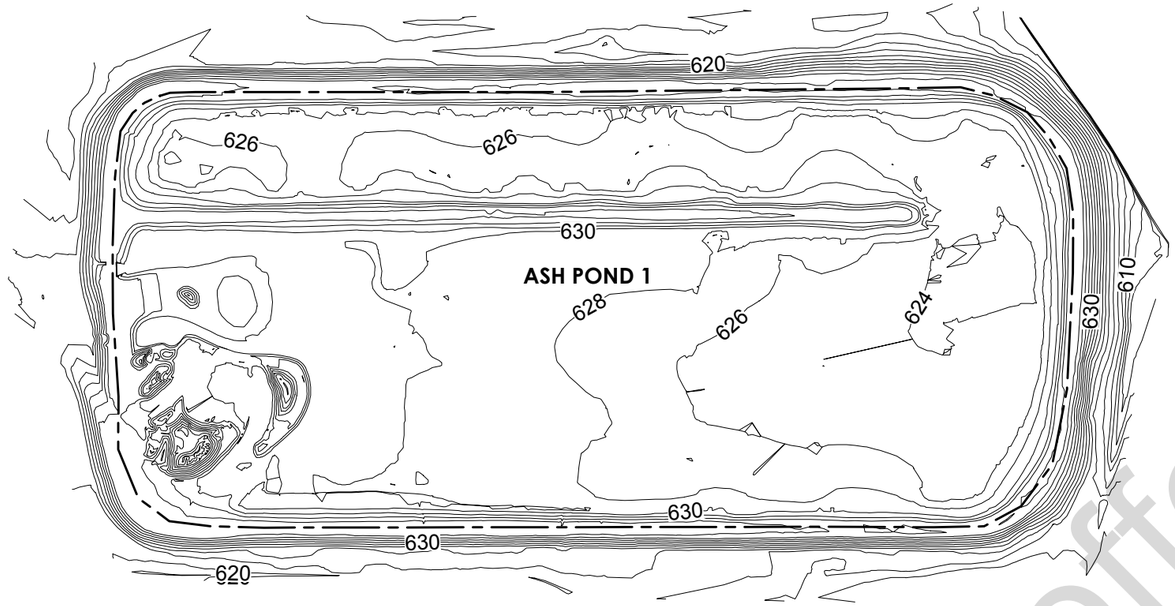
[23] Office of Natural Resources, "Procedural Guidelines for Preparation of Technical Data to be included in Applications for Permits for Construction and Maintenance of Dams," Department of Natural Resoruces, State of Illinois, Springfield, Illinois, Undated.

[24] U. N. R. C. Service, "WinTR-20 Project Formulation Hydrology, Verion 3.20".

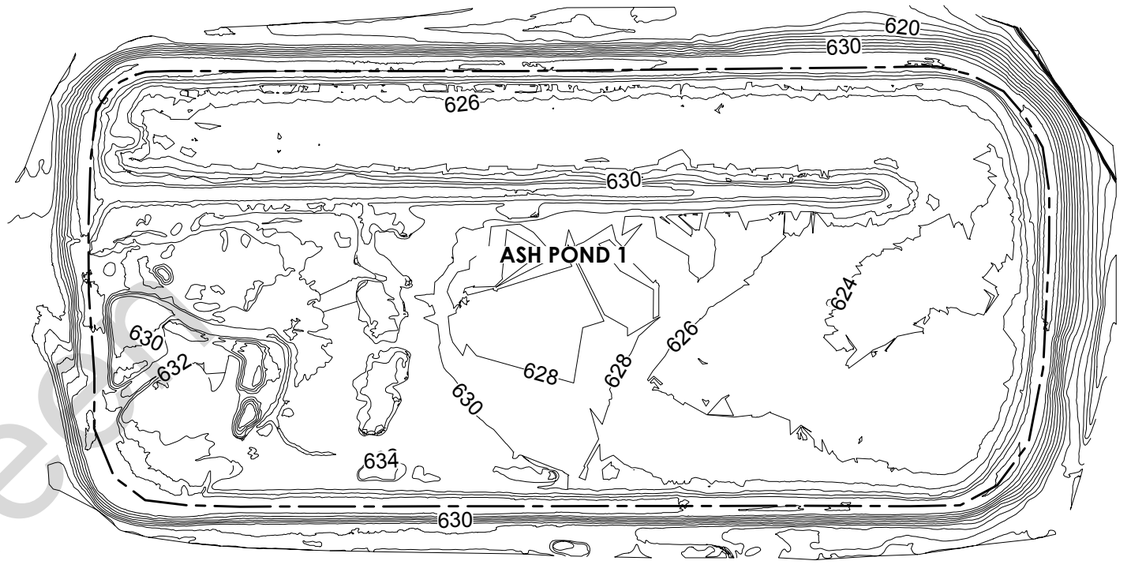
[25] Weaver Consultants Group, *Dynegy Collinsville, IL, 2015 - Coffeen Topography,* December, 2015.

[26] L. HydroCAD Software Solutions, "HydroCADTM Stormwater Modeling System, Version 10," Chocorua, New Hampshire, 2016.

DRAWINGS



INITIAL SURFEY
12-01-2015 TOPOGRAPHY



PERIODIC SURVEY
02-26-2021 TOPOGRAPHY

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - COFFEEN TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER GENERATING COMPANY, COFFEEN POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.

0 250
SCALE IN FEET

INITIAL TO PERIODIC SURVEY COMPARISON
PLANT ASH POND 1
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

Geosyntec consultants

DRAWING 1

GLP8027.02 | JULY 2021

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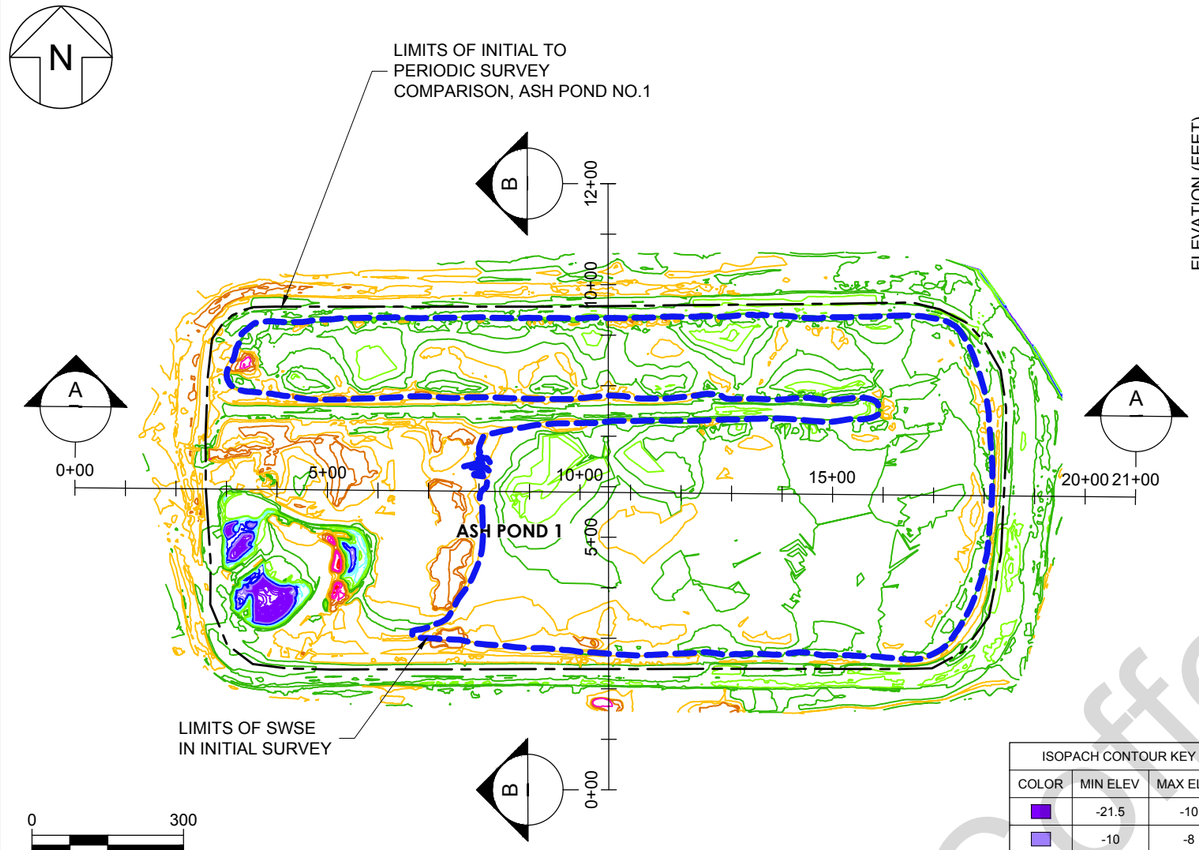
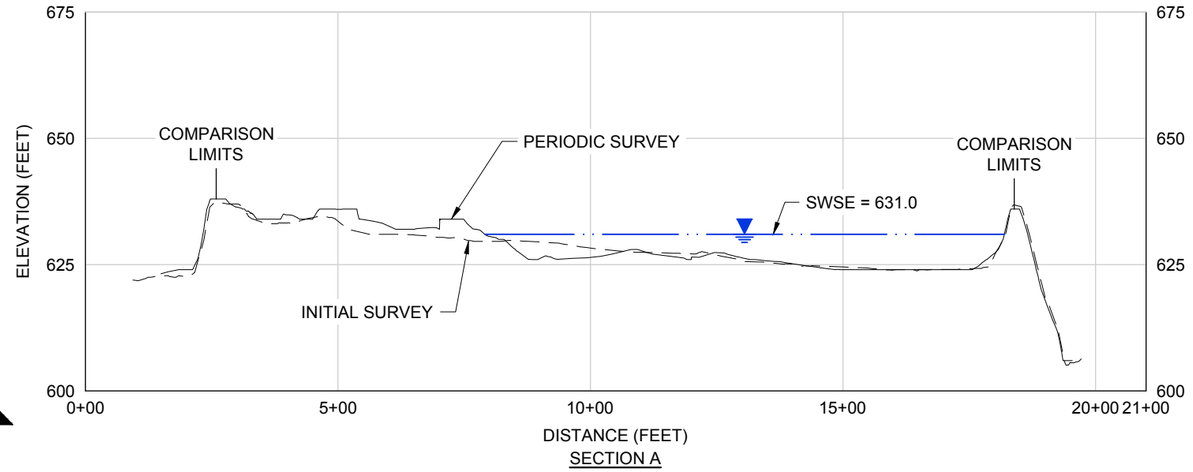
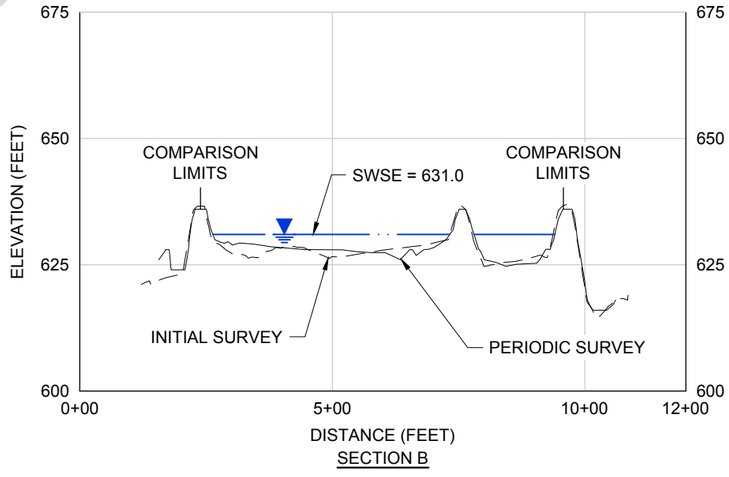




SECTION A



SECTION B

ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
	-21.5	-10
	-10	-8
	-8	-6
	-6	-4
	-4	-2
	-2	0
	0	2
	2	4
	4	6
	6	8

0 30
VERT: SCALE IN FEET

0 300
HORZ: SCALE IN FEET

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - COFFEEN TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER GENERATING COMPANY, COFFEEN POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.
4. THE MAXIMUM OPERATING POOL ELEVATION OF ASH POND NO. 1 IS EL. 631.0 FT, AS NOTED IN THE REPORT TITLED “CCR CERTIFICATION REPORT: INITIAL STRUCTURAL STABILITY ASSESSMENT, INITIAL SAFETY FACTOR ASSESSMENT, AND INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR ASH POND NO. 1 AT COFFEEN POWER STATION”, PREPARED BY AECOM, DATED OCTOBER, 2016.

INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
SURFACE IMPOUNDMENT	CUT	FILL	NET (CU. YD.)
ASH POND 1	20,726	24,277	3,550 (FILL)
ABOVE SWSE	9,611	12,488	2,877 (FILL)
BELOW SWSE	11,118	11,789	673 (FILL)

SURVEY COMPARISION ISOPACH
ASH POND 1
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

Geosyntec consultants

DRAWING
2

GLP8027.02 | MAY 2021

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INITIAL AERIAL
12-01-2015 IMAGERY

PERIODIC AERIAL
02-26-2021 IMAGERY

0 300
SCALE IN FEET

NOTES:

1. THE INITIAL IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - COFFEEN TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER GENERATING COMPANY, COFFEEN POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.

INITIAL TO PERIODIC AERIAL IMAGERY
COMPARISON
ASH POND 1
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

Geosyntec consultants

DRAWING 3

GLP8027.02 | MAY 2021

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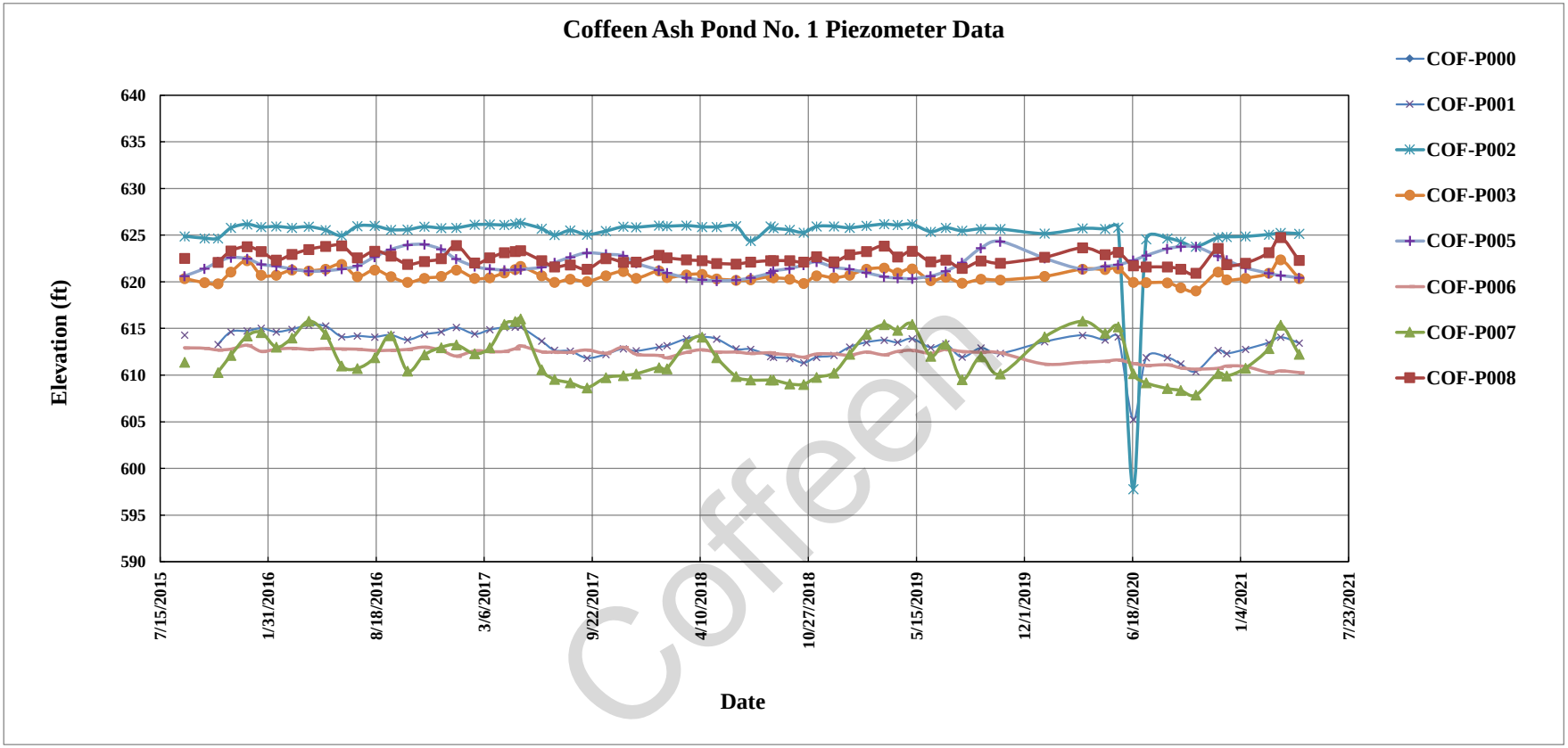
ATTACHMENTS

Attachment A

AP1 Piezometer Data Plots



NOTES:

1. The average of preceding and following readings was applied in this graph for specific missed measurments on 5/2/2017, 8/18/2018 and 8/23/2018.
2. Piezometer data was taken from the spreadsheet titled "2021 Coffeen Piezo Measurements", provided by the Coffeen Power Station.

PIEZOMETER DATA PERIODIC CERTIFICATION, ASH POND NO.1 COFFEEN POWER PLANT COFFEEN, ILLINOIS		
Geosyntec consultants		Figure A-1
GLP8027	5/18/2021	

Attachment B

AP1 Site Visit Photolog

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) **Site:** Coffeen Power Plant

Photo: 01 **Date:** 05/28/2021 **Direction Facing:** E **Comments:** Bottom ash berm installed around the recycle intake structure (primary spillway) inlet.	
Photo: 02 **Date:** 05/28/2021 **Direction Facing:** NW **Comments:** Recycle pipe penetration through the berm.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) **Site:** Coffeen Power Plant

Photo: 03

Date: 05/28/2021

Direction Facing: Down

Comments: Interior of recycle intake structure.

Photo: 04

Date: 05/28/2021

Direction Facing: E

Comments: North AP1 embankment overview

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) **Site:** Coffeen Power Plant

Photo: 05

Date: 05/28/2021

Direction Facing: E

Comments: North interior slope of AP1. Slope coverings included bottom ash, gravel, and vegetation in some areas.

Photo: 06

Date: 05/28/2021

Direction Facing: N

Comments: Wet area at north embankment toe, as noted in previous site visit reports by others.

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) **Site:** Coffeen Power Plant

Photo: 07

Date: 05/28/2021

Direction Facing: NE

Comments: North embankment overview

Photo: 08

Date: 05/28/2021

Direction Facing: SE

Comments: North interior embankment overview

GEOSYNTEC CONSULTANTS	
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 09 **Date:** 05/28/2021 **Direction Facing:** SE **Comments:** Northeast embankment exterior overview	

Photo: 10 **Date:** 05/28/2021 **Direction Facing:** E **Comments:** Crest of northeast embankment sheet pile wall. Note growth of small trees. Geosyntec recommended cutting of the trees as part of routine site maintenance.	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Generating Company **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) **Site:** Coffeen Power Plant

Photo: 11

Date: 05/28/2021

Direction Facing: S

Comments: East embankment toe overview. Some seepage was noted on the embankment face. Geosyntec recommended observing the seepage as part of routine inspections.

Photo: 12

Date: 05/28/2021

Direction Facing: W

Comments: Sheet pile wall overview at northeast embankment toe. Note tree growth. Geosyntec recommended cutting of the trees as part of routine site maintenance

GEOSYNTEC CONSULTANTS	
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 13 **Date:** 05/28/2021 **Direction Facing:** S **Comments:** East embankment interior overview	

Photo: 14 **Date:** 05/28/2021 **Direction Facing:** SW **Comments:** Southeast Ash Pond 1 interior overview	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 15 **Date:** 05/28/2021 **Direction Facing:** W **Comments:** South embankment exterior overview. The embankment toe is reportedly always wet in this area.	

Photo: 16 **Date:** 05/28/2021 **Direction Facing:** W **Comments:** South embankment interior overview.	

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 17 **Date:** 05/28/2021 **Direction Facing:** W **Comments:** South embankment exterior overview	

Photo: 18 **Date:** 05/28/2021 **Direction Facing:** SW **Comments:** Exterior toe of the south embankment. Note wet conditions, which are typical per previous site visit reports.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company | **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) | **Site:** Coffeen Power Plant

Photo: 19 **Date:** 05/28/2021 **Direction Facing:** N **Comments:** Exterior toe of the south embankment. Note wet conditions, which are typical per pervious site visit reports.	
Photo: 20 **Date:** 05/28/2021 **Direction Facing:** NW **Comments:** AP1 sluice line discharge location.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company | **Project Number:** GLP8027

CCR Unit: Ash Pond #1 (AP#1) | **Site:** Coffeen Power Plant

Photo: 21 **Date:** 05/28/2021 **Direction Facing:** NW **Comments:** Southwest embankment exterior overview	
Photo: 22 **Date:** 05/28/2021 **Direction Facing:** NW **Comments:** Sluice pipe penetrations through the embankment.	

GEOSYNTEC CONSULTANTS	
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 23 **Date:** 05/28/2021 **Direction Facing:** Down **Comments:** Culvert under the crest access road.	

Photo: 24 **Date:** 05/28/2021 **Direction Facing:** N **Comments:** West exterior embankment overview	

GEOSYNTEC CONSULTANTS Photographic Record	
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Ash Pond #1 (AP#1)	**Site:** Coffeen Power Plant

Photo: 25	
Date: 05/28/2021	
Direction Facing: SE	
Comments: Overview of sheet pile wall from AP2. Note l tree growth. Geosyntec recommended cutting trees as part of routine site maintenance.	

Attachment C

Periodic History of Construction Report Update Letter

Geosyntec consultants

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

October 11, 2021

Illinois Power Generating Company
134 Cips Lane
Coffeen, Illinois 62017

Subject: Periodic History of Construction Report Update Letter
USEPA Final CCR Rule, 40 CFR §257.73(c)
Coffeen Power Plant
Coffeen Illinois

At the request of Illinois Power Resources Generation Company (IPRG), Geosyntec Consultants (Geosyntec) has prepared this Letter to documents updates to the Initial History of Construction (HoC) report for the Coffeen Power Plant (CPP), also known as the Coffeen Power Station (COF). The Initial HoC report was prepared by AECOM in October of 2016 [1] in accordance with 40 Code of Federal Regulations (CFR) §257.73(c) of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule, known as the CCR Rule [2]. This letter also includes information required by Section 845.220(a)(1)(B) (Design and Construction Plans) of the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 CCR Rule [3] that is not expressly required by §257.73(c).

BACKGROUND

The CCR Rule required that, by October 17, 2016, Initial HoC reports to be compiled for existing CCR surface impoundments with: (1) a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) a height of 20 feet or more. The Initial HoC report was required to contain, to the extent feasible, the information specified in 40 CFR §257.73(c)(1)(i)-(xii). The Initial HoC report for CPP, which included four existing CCR surface impoundments, Ash Pond No. 1 (AP1), Ash Pond No. 2 (AP2), the GMF Gypsum Stack Pond (GMF GSP, also known as the GMF Pond), and the GMF Recycle Pond (GMF RP), was prepared and subsequently posted to IPGC's CCR Website prior to October 17, 2016.

The CCR Rule requires that Initial HoC to be updated if there is a significant change to any information complied in the Initial HoC report, as listed below:

§ 257.73(c)(2): If there is a significant change to any information complied under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9).

IPRG retained Geosyntec to review the Initial HoC report, review reasonably and readily available information for AP1, AP2, the GMF GSP, and the GMF RP generated since the Initial HoC report was prepared, and perform a site visit to CPP to evaluate if significant changes may have occurred since the Initial HoC report was prepared. This Letter contains the results of Geosyntec's evaluation and documents significant changes that have occurred at AP1, AP2, the GMF GSP, and the GMF RP, as they pertain the requirements of §257.73(c)(1)(i)-(xii).

UPDATES TO HISTORY OF CONSTRUCTION REPORT

Geosyntec's evaluation for the CPP AP1, AP2, GMF GSP, and GMF RP determined that no known significant changes requiring updates to the information in the Initial HoC report pertaining to §257.73(c)(1)(ii), (iv), (v), (vi), (vii), (xi), and (xii) of the CCR Rule had occurred since the Initial HoC report was developed.

However, Geosyntec's evaluation determined that significant changes at the CPP AP1, AP2, GMF GSP, and GMF RP, pertaining to §257.73(c)(1)(i), (iii), (viii), (ix), and (x) of the CCR Rule had occurred since the Initial HoC report had been developed. Additionally, information how long the CCR surface impoundments have been operating and the types of CCR in the surface impoundments, as required by Section 845.220(a)(1)(B) of the Part 845 Rule were not included in the Initial HoC report, as this information is not required by the CCR Rule. Each change and the subsequent updates to the Initial HoC report is described within this section.

Section 845.220(a)(1)(B): A statement of … how long the CCR surface impoundment has been in operation, and the types of CCR that have been placed in the surface impoundment.

Ash Pond No. 1

The AP1 was in operation from 1964 until CPP was retired in 2019 and received CCR for approximately 55 years. As of the date of this report, the AP1 has been present for approximately 57 years [4].

CCR placed in the AP1 included bottom ash [4].

Ash Pond No. 2

The AP2 was in operation from 1971 to 1984, for a total of approximately 13 years. The AP2 was closed in 1984-1985 by installing a clay cover and has not since been active or

received CCR. As of the date of this report, AP2 has been present for approximately 50 years. [4].

CCR placed in the AP2 was used to store and dispose of fly ash and bottom ash [4].

GMF Gypsum Pond

The GMF GSP was in operation from 2010 until CPP was retired in 2019 and received CCR for approximately 9 years. As of the date of this report, the GMF GSP has been present for a total of approximately 11 years [4].

CCR placed in GMF GSP included gypsum [4].

GMF Recycle Pond

The GMF RP was in operation from 2010 until CPP was retired in 2019, for a total of 9 years [4]. As of the date of this report, the GMF RP has been present for approximately 11 years.

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

State identification numbers (IDs) for AP1, AP2, the GMF GSP, and the GMF RP have been assigned by the Illinois Environmental Protection Agency (IEPA). Each ID is listed in **Table 1**.

Table 1 – IEPA ID Numbers

CCR Surface Impoundment	State ID
Ash Pond No. 1 (AP1)	W1350150004-01
Ash Pond No. 2 (AP2)	W1350150004-02
GMF Gypsum Stack Pond (GMF GSP)	W1350150004-03
GMF Recycle Pond (GMF RP)	W1350150004-04

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

AP2 was closed in 2020, in substantial compliance with the written closure plan posted to IPRG's CCR Website [5], and as documented by a certified Notification of Completion of Closures posted to DMG's CCR Website [6].

The CPP was retired in December of 2019, with the generation of electricity ceased at that time. Therefore, AP1, the GMF GSP, and the GMF RP are no longer being used to store and dispose of new CCR that is actively generated by CPP, as CCR generation as ceased. All three impoundments still contain CCR and liquids that was present at the time of plant

retirement. The GMF RP also previously received dewatering discharge from AP2; this inflow was ceased after AP2 was closed in 202.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Instrumentation monitoring at AP2 is no longer required as the CCR surface impoundment was closed in accordance with §257.102 [6], and the instrumentation network was modified at that time. Therefore, the instrumentation locations shown in Appendix C of the Initial HoC report are no longer applicable to AP2.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

Updated area-capacity curves were prepared for AP1, the GMF GSP, and the GMF RP in 2021 and are provided in **Figures 1**, **2**, and **3**, respectively.

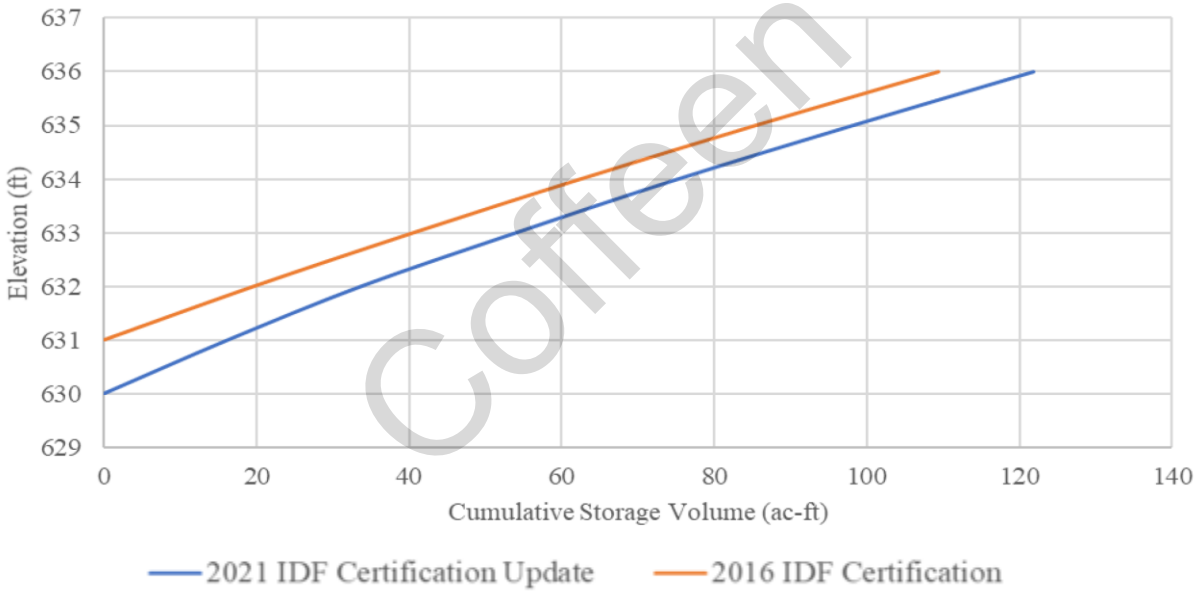


Figure 1 – Area-Capacity Curve for AP1

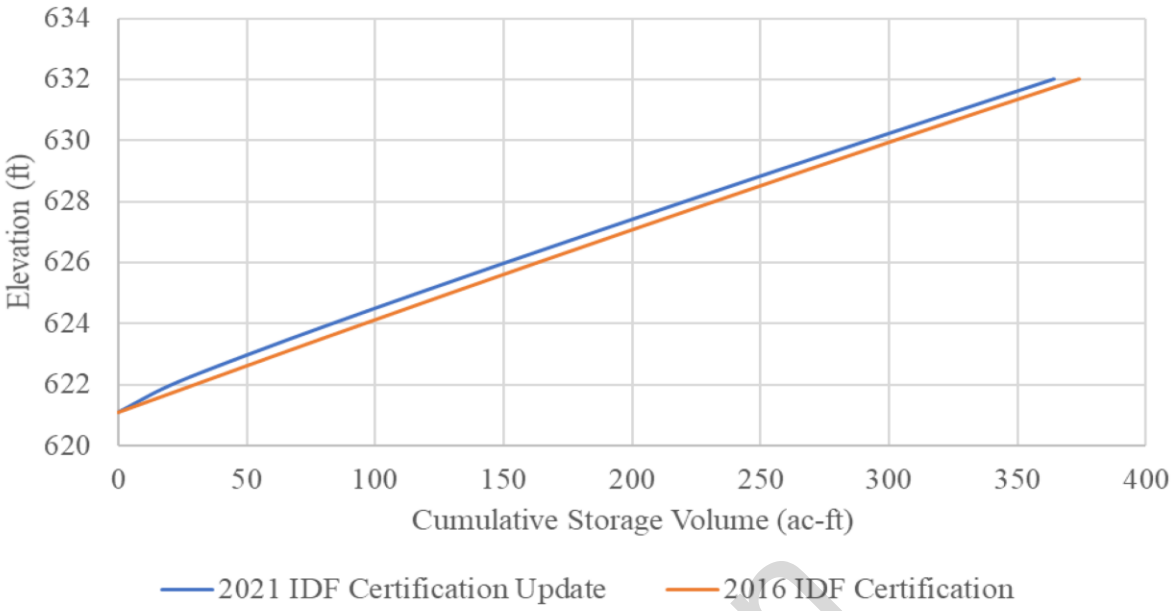


Figure 2 – Area-Capacity Curve for GMF GSP

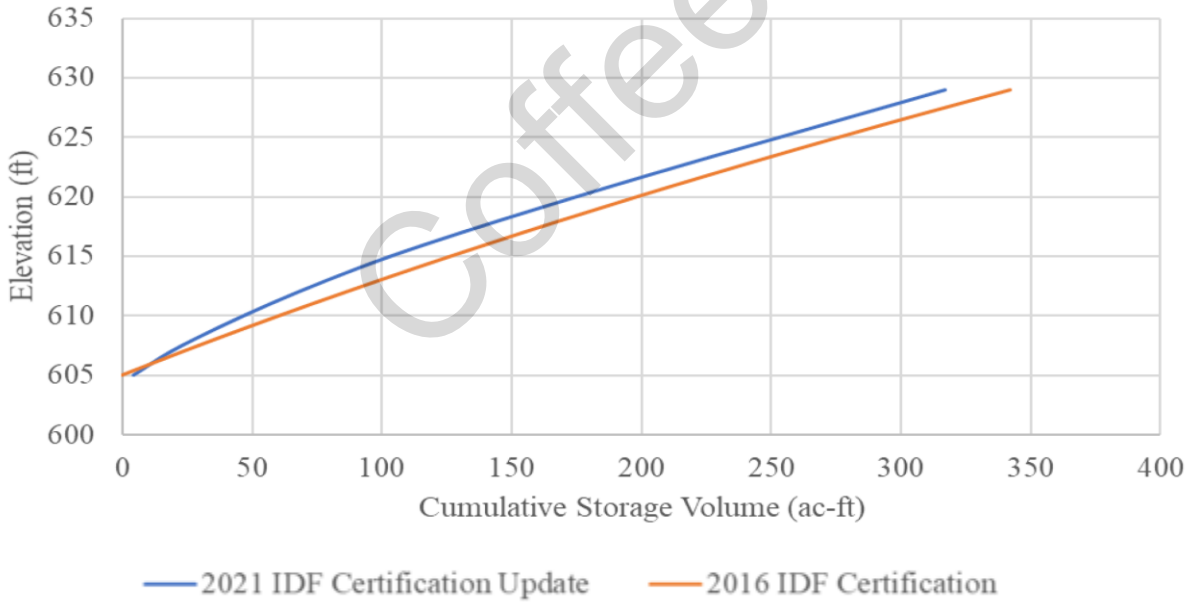


Figure 3 – Area-Capacity Curve for GMF RP

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

The primary spillway structure for AP1 was modified in 2020 by constructing a berm of bottom ash around the entrance to the spillway, to reduce the potential for freezing around the spillway during post-CPP closure conditions, with a berm crest elevation of

approximately 630 ft. Design drawings for the bottom ash berm are not reasonably or readily available.

The transfer channel between the GMF GSP and the GMF RP was modified in 2020 by constructing a geomembrane-lined berm, in order to allow the normal pool level of the GMF GSP to be increased. Design drawings for the berm are not reasonably or readily available. However, survey data [3] indicates the berm has an elevation of approximately 628 ft, a top width (perpendicular to the flow direction) of approximately 75 ft, a total length (parallel to the flow direction) of 25 ft, and side slopes of approximately 4 horizontal to 1 vertical.

Valves were installed on the intake pipes for the GMF RP after the CPP was closed and plant process water intake pumping was ceased. Design drawings for these valves are not reasonably or readily available.

Updated discharge capacity calculations for the existing spillways of AP1, the GMF GSP, and the GMF RP were prepared in 2021 using HydroCAD 10 modeling software. The calculations indicate that the AP1 and the GMF RP have sufficient storage capacity and will not overtop the embankments during the 1,000-year, 24-hour, storm event. The calculations also indicate that the GMF GSP has sufficient storage capacity and will not overtop the embankments during the Probable Maximum Precipitation (PMP), 24-hour storm event. The results of the calculations are provided in **Table 2**.

Table 2 – Results of Updated Discharge Capacity Calculations

	AP1	GMF GSP	GMF RP
Approximate Berm Minimum Elevation[1], ft	636.0	632.0	629.0
Approximate Emergency Spillway Elevation[1], ft	Not Present	Not Present	624.0
Starting Water Surface Elevation[1] (SWSE), ft	630.2	625.2	622.1
Peak Water Surface Elevation[1] (PWSE), ft	631.4	626.7	623.9
Time to Peak, hr	No Discharge	10.6	No Discharge
Surface Area[2], ac	18.1	34.8	16.1
Storage[3], ac-ft	19.5	52.9	29.0

Notes:
[1]Elevations are based on the NAVD88 datum
[2]Surface area is defined as the water surface area at the PWSE
[3]Storage is defined as the volume between the SWSE and PWSE

AP2 no longer retains free water as the CCR surface impoundments was closed in 2020 [6]. Therefore, the spillways are no longer present and the information regarding these structures, as presented in the Initial HoC report, is no longer applicable to AP2.

CLOSING

This letter has been prepared to document Geosyntec's evaluation of changes that have occurred at AP1, AP2, the GMF GSP, and the GMF RP since the Initial HoC was developed, based on reasonably and readily available information provided by IPRG, observed by Geosyntec during the site visit, or generated by Geosyntec as part of subsequent calculations.

Sincerely,

Lucas P. Carr, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

REFERENCES

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

[2] United Stated 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," 2015.

[3] Illinois Environmental Protection Agency, "35 Ill. Adm. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments," Springfield, IL, 2021.

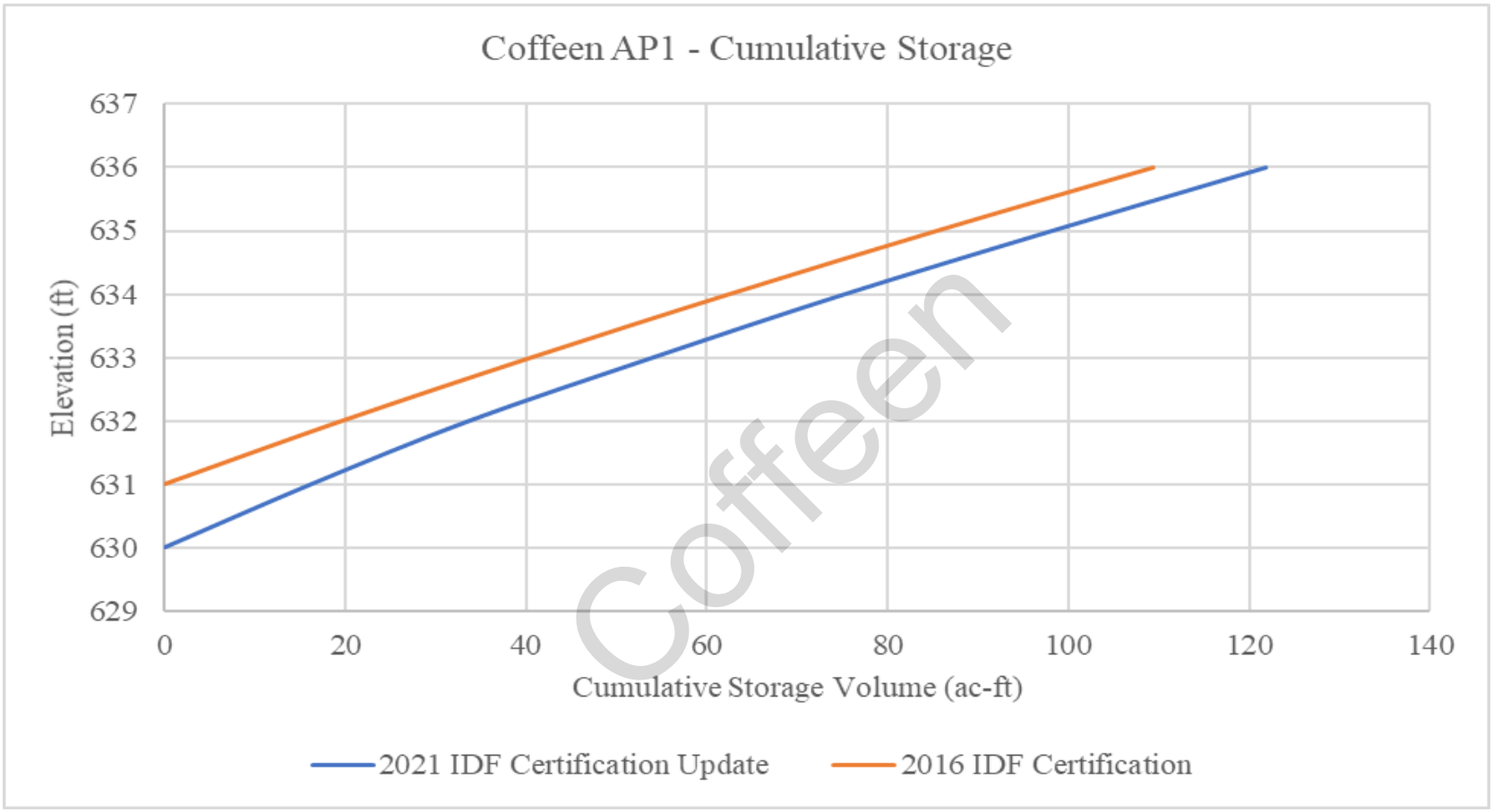
[4] AECOM, "History of Construction, USEPA Final CCR Rule, 40 CFR § 257.73(c), Hennepin Power Station, Hennepin, Illinois," October 2016.

[5] V. Modeer, "Closure Plan for Existing CCR Surface Impoundment, Coffeen Power Station, Illinois Power Generating Company, Ash Pond No. 2," October 17, 2016.

[6] D. Tickner, "Coffeen Power Station; Ash Pond No. 2; Notification of Completion of Closure," December 17, 2020.

Attachment D

Periodic Inflow Design Flood Control System Plan Analyses

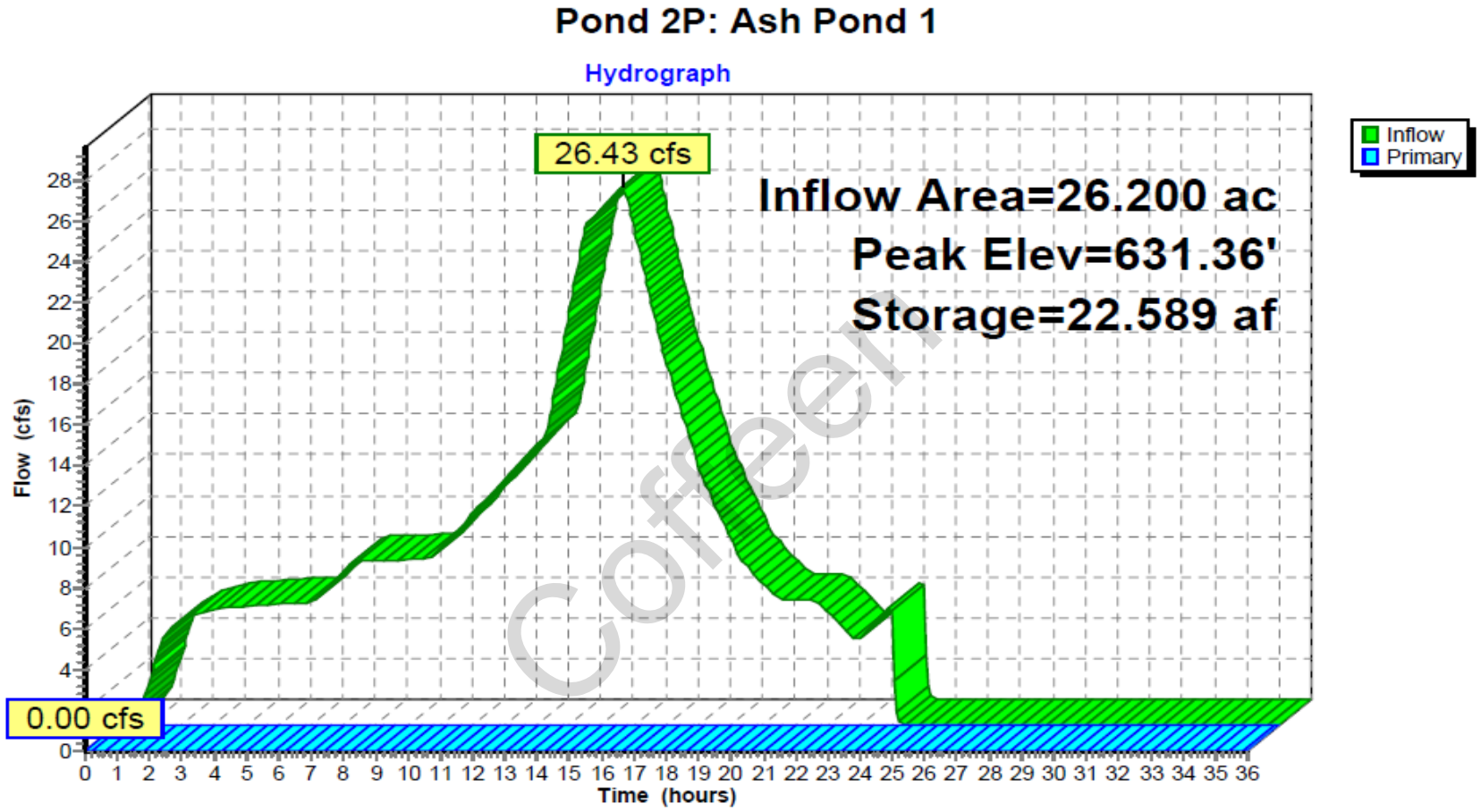


COFFEEN AP1 CUMULATIVE STORAGE
PERIODIC CERTIFICATION
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

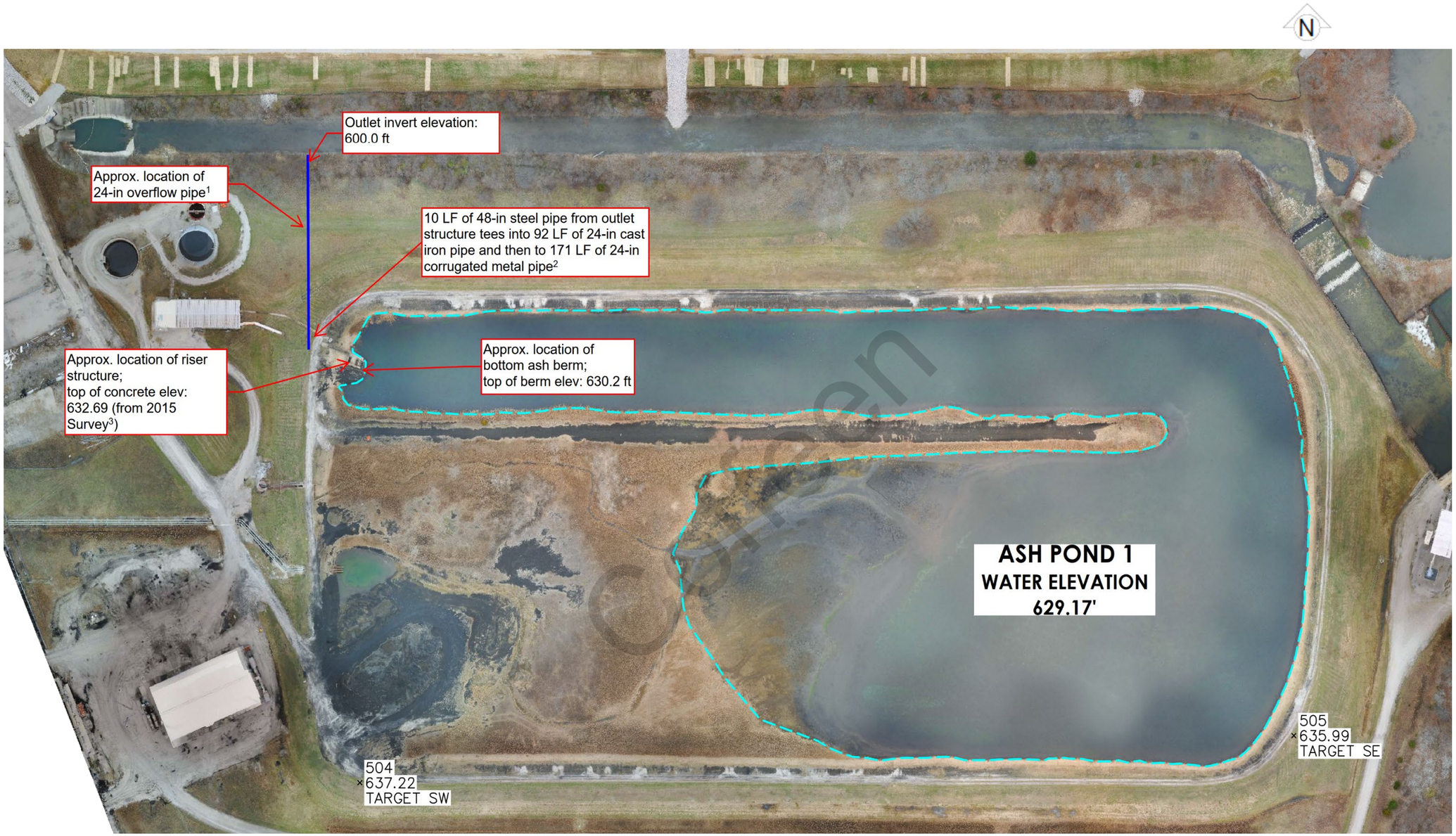
Geosyntec consultants

Figure D-1

GLP8027 | 9/10/2021



AP1 IDF HYDROGRAPH PERIODIC CERTIFICATION COFFEEN POWER PLANT COFFEEN, ILLINOIS		
Geosyntec consultants		Figure D-2
GLP8027	9/10/2021	



[1]Outlet pipe configuration provided by site personnel on 29 June 2021
[2]Emergency Overflow Assessment (2011); see Figure D-4
[3]Weaver Consultants Group, "Dynegy, Collinsville, IL, 2015 - Coffeen Topography," December 1, 2015.

Figure based on IngenAE 2020 Site Topo

NOT TO SCALE

Coffeen Power Plant
Ash Pond 1
Hydrologic Workmap

Geosyntec consultants

GLP8027	September 2021	Figure D-3

BODINE
SERVICES OF EVANSVILLE LLC
3322 Tower Drive Newburgh, IN 47720 Phone 812 423-5106 Fax 812 422-1996

WORK FORM

DATE _____ SHEET NO. 1 of 1

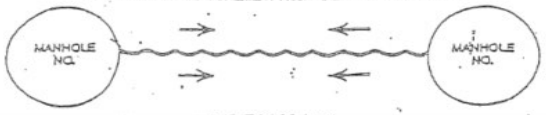
SECTION OR AREA Emergency Overflow Line TO River

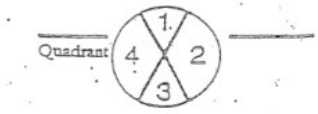
FROM MANHOLE NO. Visual inspection TO MANHOLE NO. _____

DIRECTION River TO Plant PIPE SIZE apx 24" PIPE TYPE Corrugated & cast pipe

Distance Reading	Quadrant 1 2 3 4	Observations	% Infiltration/ Inflow GPD	Recommended Correction Action	Photo No.
7 ft		Light buildup Bottom of pipe			
7 ft		Joint in pipe			
13 ft		Light buildup on Bottom of pipe			
27 ft		Joint in pipe			
48 ft		Joint in pipe & Light build in bottom of pipe			
68 ft		" in pipe			
73 ft		Possible infiltration could be small Roots			
95 ft		Joint in pipe			
109 ft		Small buildup in bottom & Joint in pipe			
130 ft		Joint in pipe & small buildup			
150 ft		Joint in pipe			
171 ft		end of Corrugated pipe			
		Light build up in pipe 171 - 263 ft			
263 ft		End of Run			

DIRECTION OF MEASUREMENT FROM CENTER OF MANHOLE



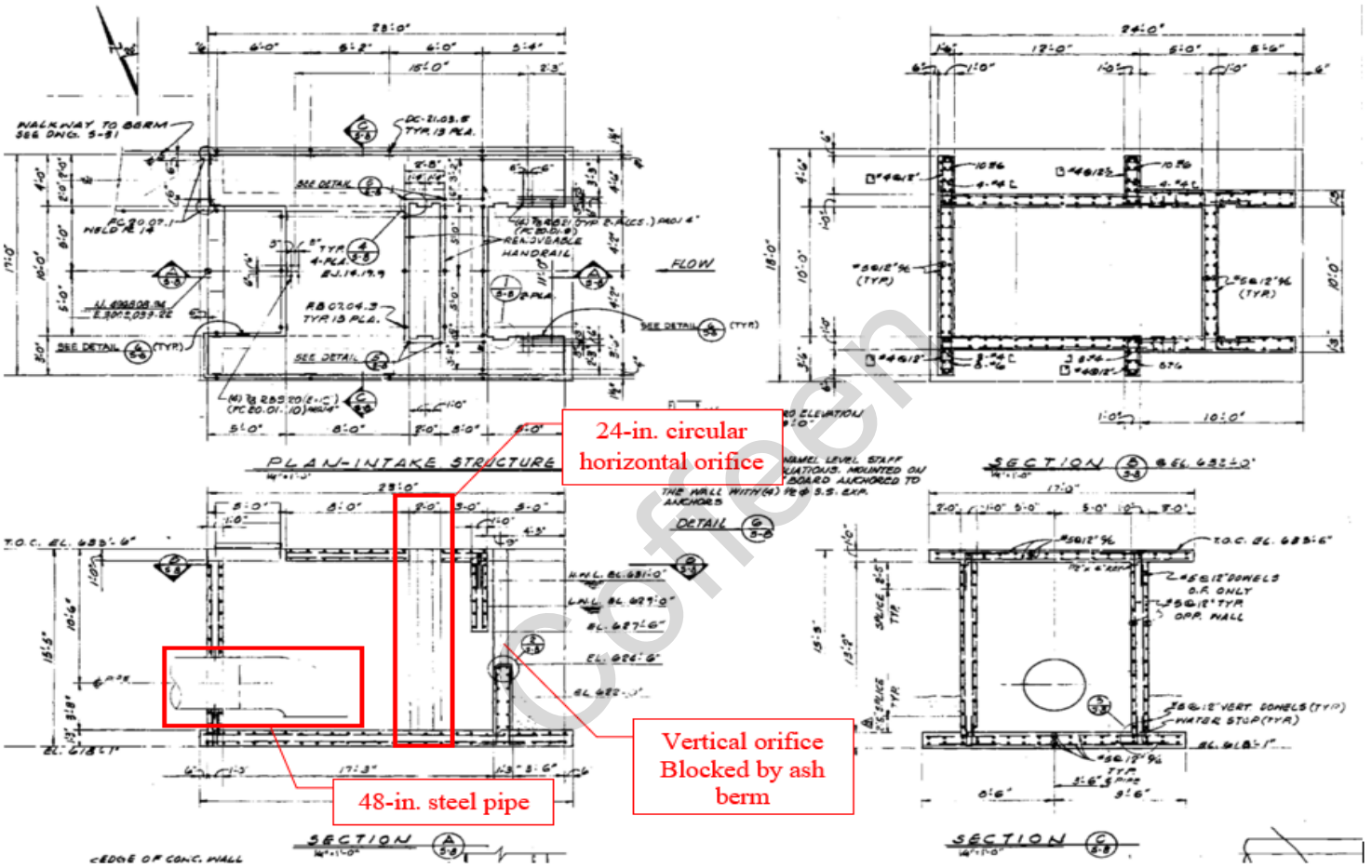


2011 EMERGENCY OVERFLOW ASSESSMENT (BY OTHERS)
PERIODIC CERTIFICATION
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

Geosyntec consultants

Figure D-4

GLP8027 | 9/10/2021



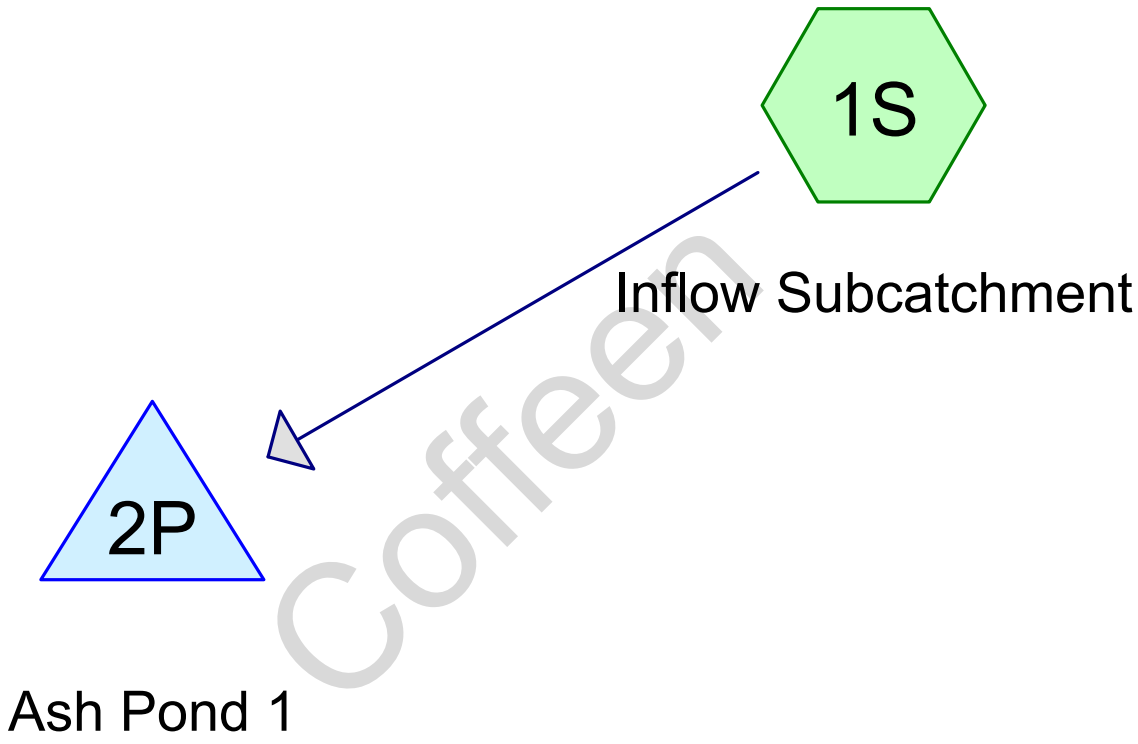
From Stearns-Roger, Inc., Drawing C-2000 - "Concrete Recycle Pump House - Intake Structure and Miscellaneous Foundations" (revised 13 April 1979)

ORIGINAL RISER STRUCTURE DESIGN DRAWING (BY OTHERS)
PERIODIC CERTIFICATION
COFFEEN POWER PLANT
COFFEEN, ILLINOIS

Geosyntec consultants

Figure D-5

GLP8027 | 9/10/2021



Subcat Reach Pond Link

Routing Diagram for 2021-09_Coffeen_AP1_H&H_Periodic Review
Prepared by SCCM, Printed 9/8/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
26.200	98	Water Surface and Ash (1S)
26.200	**98**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
26.200	Other	1S
26.200		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	26.200	26.200	Water Surface and Ash	1S
0.000	**0.000**	**0.000**	**0.000**	**26.200**	**26.200**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2P	614.50	600.00	171.0	0.0848	0.025	24.0	0.0	0.0
2	2P	622.30	614.50	92.0	0.0848	0.013	24.0	0.0	0.0
3	2P	624.00	622.30	10.0	0.1700	0.012	48.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Inflow Subcatchment Runoff Area=26.200 ac 100.00% Impervious Runoff Depth=8.93"
Tc=6.0 min CN=98 Runoff=26.43 cfs 19.502 af

Pond 2P: Ash Pond 1 Peak Elev=631.36' Storage=22.589 af Inflow=26.43 cfs 19.502 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 26.200 ac Runoff Volume = 19.502 af Average Runoff Depth = 8.93"
0.00% Pervious = 0.000 ac 100.00% Impervious = 26.200 ac

Summary for Subcatchment 1S: Inflow Subcatchment

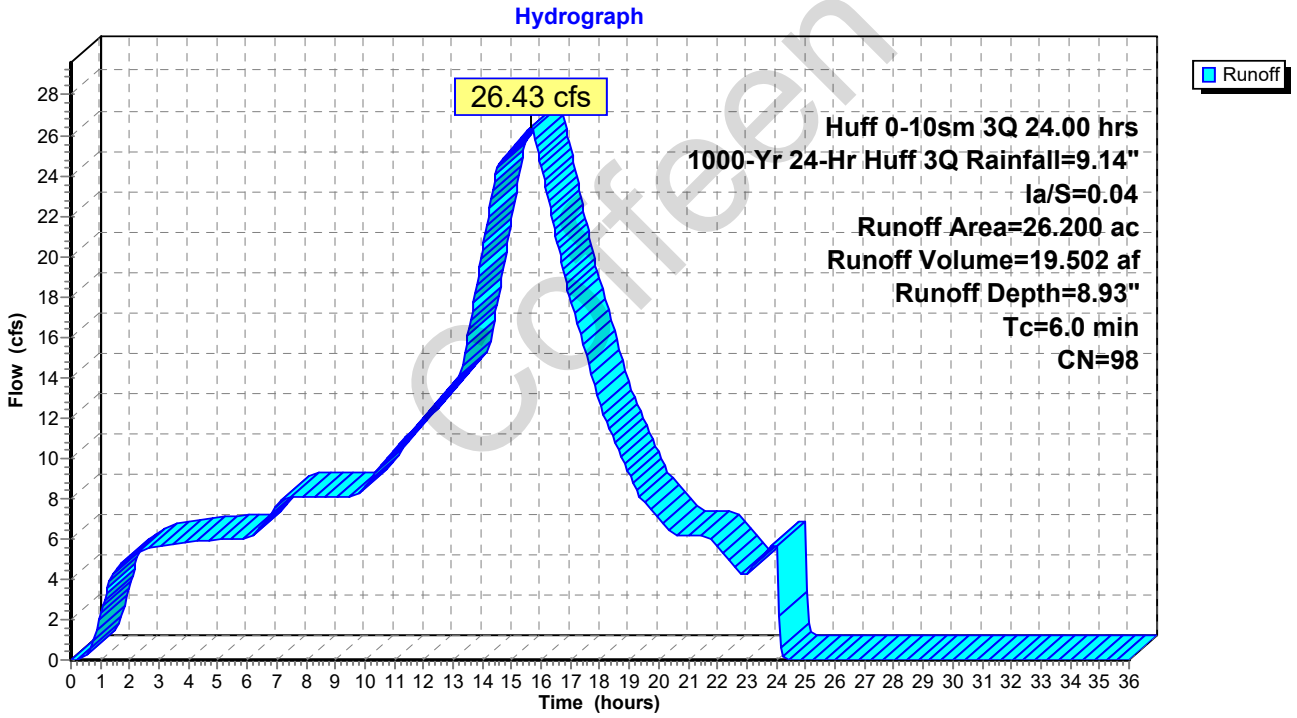
Runoff = 26.43 cfs @ 15.65 hrs, Volume= 19.502 af, Depth= 8.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q 24.00 hrs 1000-Yr 24-Hr Huff 3Q Rainfall=9.14", Ia/S=0.04

	Area (ac)	CN	Description
*	26.200	98	Water Surface and Ash
	26.200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimal - Direct Entry into Impoundment**

Subcatchment 1S: Inflow Subcatchment



Summary for Pond 2P: Ash Pond 1

Inflow Area = 26.200 ac,100.00% Impervious, Inflow Depth = 8.93" for 1000-Yr 24-Hr Huff 3Q event
Inflow = 26.43 cfs @ 15.65 hrs, Volume= 19.502 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 630.19' Surf.Area= 0.000 ac Storage= 3.087 af
Peak Elev= 631.36' @ 24.40 hrs Surf.Area= 0.000 ac Storage= 22.589 af (19.502 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	121.815 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
630.00	0.000
631.00	16.248
632.00	33.722
633.00	54.038
634.00	75.240
635.00	98.174
636.00	121.815

Device	Routing	Invert	Outlet Devices
#1	Primary	614.50'	**24.0" Round Culvert - 24" CMP** L= 171.0' Ke= 1.000 Inlet / Outlet Invert= 614.50' / 600.00' S= 0.0848 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Device 1	622.30'	**24.0" Round Culvert - 24" Cast Iron** L= 92.0' Ke= 1.000 Inlet / Outlet Invert= 622.30' / 614.50' S= 0.0848 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 3.14 sf
#3	Device 2	624.00'	**48.0" Round Culvert - 48" Steel** L= 10.0' Ke= 1.000 Inlet / Outlet Invert= 624.00' / 622.30' S= 0.1700 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf
#4	Device 3	632.69'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.19' (Free Discharge)
└**1=Culvert - 24" CMP** (Passes 0.00 cfs of 42.58 cfs potential flow)
└**2=Culvert - 24" Cast Iron** (Passes 0.00 cfs of 29.78 cfs potential flow)
└**3=Culvert - 48" Steel** (Passes 0.00 cfs of 92.89 cfs potential flow)
└**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: Ash Pond 1