2021 USEPA CCR RULE OPERATING RECORD PERIODIC CERTIFICATION REPORT

§257.73(a)(2)-(3), (c), (d[1]), (e) and §257.82

COAL PILE RUNOFF POND

Zimmer Power Plant

Moscow, Ohio

Submitted to

Zimmer Power Company LLC

1781 US Route 52
Moscow, Ohio 45153

Submitted by

Geosyntec consultants

engineers | scientists | innovators

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

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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 the Coal Pile Runoff Pond (CPRP) at the Zimmer Power Plant (ZPP) (also known as Zimmer Power Station), 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 Zimmer Power Company LLC (ZPC) CCR Website ([2], [3], [4], [5], [6], [7]) be updated on a five-year basis.

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

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

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the CPRP meets all requirements for hazard potential classification, history of construction reporting, emergency action plan, 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 iwas not included in the scope of this report. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

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.
Emergency Action Plan						
4	§257.73(a)(3)(iv)	Prepare written Emergency Action Plan	Yes	A written Emergency Action Plan was prepared [3].	Yes	An updated Emergency Action Plan was prepared and is provided in **Attachment C**.
History of Construction						
5	§257.73(c)(1)	Compile a history of construction	Yes	A history of Construction report was prepared for the CPRP, and Coal Pile Runoff Pond [4].	Yes	A letter listing updates to the History of Construction report is provided in **Attachment D**.
Structural Stability Assessment						
6	§257.73(d)(1)(i)	Stable foundations and abutments	Yes	Foundations were found to be stable, CPRP does not have abutments [9].	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 [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of embankment compaction	Yes	Embankment compaction is sufficient for expected ranges in loading conditions [9].	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 is present on exterior and interior slopes and is 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 are adequately designed and constructed and adequately manage flow during 1,000-year flood [9].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manage flow during the 1,000-year flood, after performing updated hydrologic and hydraulic analyses.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	Yes	Hydraulic structures passing through the embankment were inspected and found to maintain structural integrity [9].	Periodic certification of §257.73(d)(1)(vi) was not included in the scope of this report.	
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Yes	Downstream slopes adjacent to the Ohio river are expected to remain stable during inundation [9].	Yes	Downstream slopes inundated by water body were found to be stable after performing updated slope stability analyses including sudden drawdown.
Safety Factor Assessment						
7	§257.73(e)(1)(i)	Maximum storage pool safety factor must be at least 1.50	Yes	Safety factors were calculated to be 2.28 and higher [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.90 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 2.28 and higher [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.90 and higher.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 1.6 and higher [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.38 and higher.
	§257.73(e)(1)(iv)	For embankment construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Embankment soils are not susceptible to liquefaction [6].	Not Applicable	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
8	§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 1000-year, 24-hour Inflow Design Flood [7].	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 is routed through a NPDES-permitted outfall during both (PMP/1000-year), 24-hour Inflow Design Flood conditions [7].	Yes	Discharge from the CCR Unit is routed through a NPDES-permitted outfall during both (PMP/1000-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 Zimmer Power Company, LLC (ZPC) to document the periodic certification of the Coal Pile Runoff Pond (CPRP) at the Zimmer Power Plant (ZPP) (also known as the Zimmer Power Station), located at Cinergy Access Road, Moscow, Ohio, 45153. The location of ZPP is provided in **Figure 1**, and a site plan showing the location of the CPRP, among other open CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

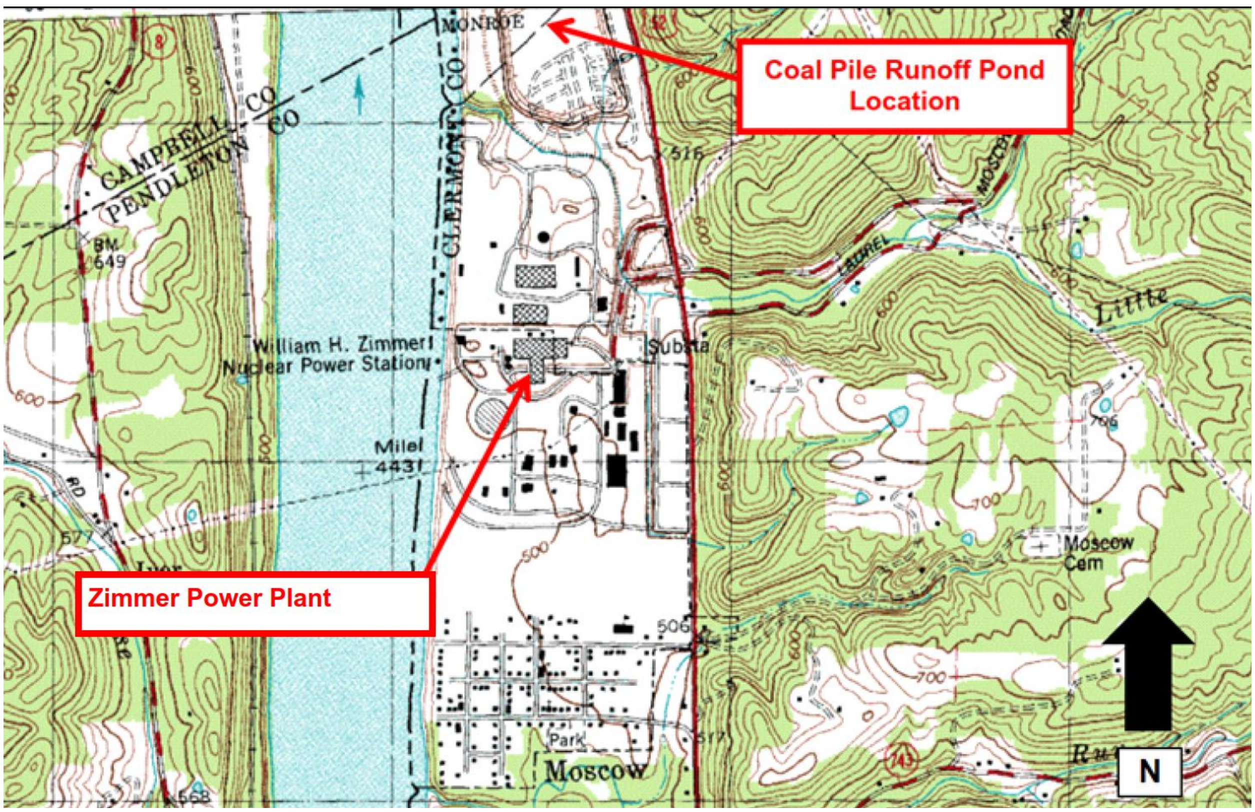


Figure 1 – Site Location Map (from AECOM, 2016 [9]**)**
(note that the U.S.G.S. map incorrectly references the Zimmer Power Plant as a" nuclear power station")

Figure 2 – Site Plan (background aerial from Google Earth)

1.1 CPRP Description

The CPRP is part of the Wastewater Pond Complex. The Wastewater Pond Complex includes two CCR units (the D Basin and the CPRP) and five non-CCR units (the A, B, and C Basins, the Wastewater Pond, and the Clearwater Pond). The non-CCR units are utilized as stormwater storage basins. All of the basins within the Wastewater Pond Complex are surrounded by a continuous shared perimeter embankment with a crest elevation ranging from approximately 509 to 510 feet[1]. This continuous embankment separates the basins in the Wastewater Pond Complex from the surrounding area.

The various CCR and non-CCR units within the Wastewater Pond Complex are separated by interior embankments of varying crest elevation. The interior embankments are located completely

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

within the limits of the shared perimeter embankment and are only used to separate the ponds from one another.

The CPRP is located within the southwest portion of the Wastewater Pond Complex, between the Wastewater Pond and the C Basin non-CCR units, and adjacent to the chemical metal cleaning waste tank. The embankment surrounding the Coal Pile Runoff Pond is made up of the perimeter embankment for the Wastewater Pond Complex on the west and interior embankments on the north, south, and east. Both the perimeter and interior embankments are constructed at a relatively uniform crest elevation, ranging from 509.2 to 509.6 feet.

Outflow from the CPRP is transmitted to the Wastewater Pond via two 15-inch high density polyethylene (HDPE) pipes, with an invert elevation of 507.9 feet. Outflow is then transmitted to the Wastewater Pond, then the Clearwater Pond, and then to the Ohio River via the site's NPDES-permitted outfall. The CPRP receives leachate from the ZPP's on-site landfill, discharge from the chemical metal cleaning waste treatment take, and pumped flows from the D Basin CCR surface impoundment and other non-CCR ponds at the ZPP. Since the D Basin is used to dewater CCR material, discharge from the D Basin into the Coal Pile Runoff Pond may contain minor amounts of CCRs [9].

The CPRP is lined with three feet of compacted clay. The liner system extends up the interior slopes and is present underneath the entire footprint of the pond. The divider embankments and shared perimeter embankment together form a continuous ring embankment structure around the CPRP. The surface area of the CPRP is approximately 3.2 acres, and the continuous ring embankment structure has a length of approximately 1,600 feet and a maximum height above exterior grade of 28 feet. Both the interior and exterior slopes have an orientation of 3H:1V (horizontal to vertical). Embankment crest widths range from approximately 20 to 60 feet, and the crest is covered with a gravel access road. The maximum operating pool elevation is 507.9 feet, as controlled by the invert elevations of the two 15-inch HDPE outlet pipes. However, the pool may be at a lower elevation depending on inflow volumes [9].

Initial certifications for the CPRP 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 ZPC's CCR Website ([9] [7] [6] [5]). 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 ([8]) and for the structural stability assessment, safety factor assessment, and inflow design flood control system plan by AECOM ([7]). These operating record reports were not posted to ZPC's CCR Website.

1.2 <u>Report Objectives</u>

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(a)(3) Emergency Action Plan [3];
  - §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]), Emergency Action Plan [3], Structural Stability Assessment ([5], [9]), Safety Factor Assessment ([6], [9]), and Inflow Design Flood Control System Plan ([7], [9]) reports to determine if updates may be required based on technical considerations.
  - The History of Construction report [4] 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 ZPP, 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.
- If updates are required, they will be performed and documented within this certification report.
- Confirm that the CPRP meets all of the requirements associated with §257.73(a)(2)-(3), (c), (d), (e), and §257.82, or, if the CPRP 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 CPRP 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 CPRP were performed between 2016 and 2020 ([10], [11], [12], [13], [14]) 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 the CPRP between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the CPRP were noted in the inspection reports.

2.3 Review of Instrumentation Data

Two piezometers, P001 and P002, are present at the CPRP and were monitored monthly by ZPC between November 2015 and March 2021. 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 ([9], [6], [5]) and March 2021. Available piezometer readings are plotted in **Attachment A**.

In summary, the peak measured groundwater levels for B-WW-1401, B-WW-1406, and B-WW-1407 were 480 ft, 505 ft, and 486 ft, respectively. These measured levels are about 10 ft higher than the values considered during the initial certification. These changes could impact the results of the factor of safety analyses required for the structural stability and factor of safety certifications ([9], [6], [5]).

2.4 Comparison of Initial to Periodic Surveys

The initial survey of the CPRP, conducted by ESP Associated, P.A. (ESP) in 2014 [15], was compared to the periodic survey of the CPRP, conducted by S&ME/IBI Group (S&ME/IBI) in 2021 [16], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the CPRP 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 [9]. 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 2**.

Table 2 – Initial to Periodic Survey Comparison

Initial Surveyed Pool Elevation (ft)	507.24
Periodic Surveyed Pool Elevation (ft)	508.4
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	507.9
Total Change in CCR Volume (CY)	-1290
Change in CCR Volume Above SWSE (CY)	-131
Change in CCR Volume Below SWSE (CY)	-1165

The comparison indicated that approximately 1,300 cubic yards (CY) of CCR may have been removed from the CPRP. The measured water surface elevation for the periodic survey is higher than the SWSE which was considered for the initial SSA (**Section 6**), initial SFA (**Section 7**), and initial IDF (**Section 8**). No significant changes to embankment geometry appeared to have occurred between the initial and periodic surveys.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the CPRP were prepared from Google Earth [17] imagery dated October 2015 and were compared to periodic aerial photographs prepared from Google Earth [17] imagery dated October 2020 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:

- No notable changes in geometry of the pond's embankment was observed; and
- Some dredging appears to have been performed in the southeast corner.

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to the CPRP 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 June 2, 2021, with Mr. Panos Andonyadis, 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 CPRP to evaluate if the structural stability requirements (§257.73(d)) were still met. The site visit included walking the perimeter of the CPRP, visually observing conditions, recording field notes, and collecting photographs. The site visit is documented in a photographic log provided in **Attachment B**. 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 CPRP downstream breach area shown in the Initial EmAP inundation map [3].
- 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 perimeter embankments appear to have adequate vegetative cover with only isolated locations indicating signs of erosion that are planned for routine maintenance and repair before October 2021.
- No significant changes were observed since the previous certification.

2.7 Interview with Power Plant Staff

An interview with Mr. Sean Behm and Ms. Desiree Loveless of ZPP was conducted by Mr. Panos Andonyadis, P.E. of Geosyntec on June 02, 2021 Mr. Behm was employed at ZPP between 2020 and 2021 and Ms. Loveless was employed by ZPP's parent company between 2015 and 2021. The interview included a discussion of included a discussion of potential changes that that may have occurred at the CPRP since development of the initial certifications ([2], [3], [4], [5], [6], [7]). A summary of the interview is provided below.

- Were any construction projects completed for the CPRP since 2015, and, if so, are design drawings and/or details available?
    - No construction projects completed since 2015.
- Were there any changes to the purpose of the CPRP since 2015?

  - No, the purpose of the pond is unchanged since 2015.

- Were there any changes to the to the instrumentation program and/or physical instruments for the CPRP since 2015?

  - No known changes have occurred.

- Have area-capacity curves for the CPRP been prepared since 2015?

  - No known area-capacity curves have been developed.

- Were there any changes to spillways and/or diversion features for the CPRP completed since 2015?

  - No known changes have occurred.

- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for the CPRP since 2015?

  - Historically the pond was dredged with hydraulic dredging equipment. More recent dredge events were performed with mechanical dredge (excavator) because the dredge volumes were relatively low.

- Were there any instances of embankment and/or structural instability for the CPRP since 2015?

  - No known instances of instability have occurred.

- Are updates required to Initial Emergency Action Plan for the CPRP [3], including, but not limited to, plant and site staff roles/responsibilities, contact information, emergency equipment and material sources, emergency preparedness information, or other portions of the Initial emergency Action Plan?

  - Staff personnel needs updating to reflect personnel changes.

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:

- Performing a visual analysis to evaluate potential hazards associated with a failure of the CPRP perimeter embankment.
- 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 is included within the Initial Emergency Action Plan (Initial EmAP) [3] required by §257.73(a)(3).

The visual analysis indicated that none of the breach scenarios appeared to impact occupied structures, although a breach of the west embankment could impact the Ohio River. 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 Ohio River, thereby causing environmental damage. The Initial HPC therefore recommended a "Significant" hazard potential classification for the CPRP [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [8]), 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.

3.3 Summary of Site Changes Affecting 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 [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 the CPRP, 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

EMERGENCY ACTION PLAN - §257.73(a)(3)

4.1 Overview of Initial EmAP

The Initial EmAP was prepared by Stantec in 2017 [3], following the requirements of §257.73(a)(3). The Initial EmAP included the following information:

- A statement of purpose,
- Site maps showing the location of the CPRP,
- Communication procedures for various response levels,
- A notification flowchart,
- A process decision tree,
- Contact information and roles/responsibilities for ZPP personnel,
- Contact information and roles/responsibilities for both local and state emergency responders,
- A summary of dam safety events and response levels,
- Recommended actions for dam-safety related conditions,
- Tables describing how to procure emergency supplies and equipment,
- A description of the CPRP, and
- A map of the expected breach area.

4.2 Review of Initial EmAP

Geosyntec performed a review of the Initial EmAP [3] in terms of approach, being up-to-date, and completeness. The review included the following tasks:

- Reviewing of appropriateness of event triggers for emergency response,
- Reviewing data in the EmAP for consistency with the HPC,

- Reviewing listed emergency management agencies for appropriateness based on the location of the CPRP, and

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

No significant technical issues were noted within the technical review.

4.3 Summary of Site Changes Affecting the Initial EmAP

Several changes at the site were that occurred after development of the Initial EmAP were identified. These changes required an update to the Initial EmAP. Each change is described below.

- Changes in onsite staff with the responsibility of managing the CPRP and other CCR surface impoundments at ZPP have occurred.

- Contact information for local and state emergency management agencies and sources for equipment and emergency response materials may be outdated.

4.4 Periodic EmAP

The EmAP was updated with updated position titles and personnel contact information. The Periodic EmAP for ZPC is provided in **Attachment C**.

SECTION 5

HISTORY OF CONSTRUCTION REPORT - §257.73(c)

5.1 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 ZPP, including the CPRP, and the Coal Pile Runoff 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 embankment 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,
- Construction 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.

5.2 Summary of Site Changes Affecting the Initial HoC

One material change at the site occurred after development of the initial HoC report was identified. The area-capacity curves and spillway design calculations were revised for the CPRP and prepared as part of the updated periodic Inflow Design Flood Control System Plan, as described in **Section 8.4**. A letter documenting this change to the HoC report is provided in **Attachment D**.

SECTION 6

STRUCTURAL STABILITY ASSESSMENT - §257.73(d)

6.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 ([5], [9]), following the requirements of §257.73(d)(1), and included the following evaluations:

- Stability of embankment foundations, embankment abutments, slope protection, embankment 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 CPRP met all structural stability requirements for §257.73(d)(1)(i)-(v) and (vii).

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)) 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.

Additionally, the Initial SSA included a sudden drawdown slope stability analysis to evaluate the effect of a drawdown event in the adjacent Ohio River from the 100-year flood pool (El. 505 ft) to an empty-pool condition, as required by §257.73(3)(1)(vii) for CCR units where the downstream slopes are inundated by an adjacent water body. The minimum acceptable factor of safety for this loading condition was assumed to be 1.3 based on US Army Corps of Engineers guidance [19].

6.2 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), sufficiency of embankment compaction, per §257.73(d)(1)(iii), and downstream slope stability, per §257.73(d)(1)(vii), in terms of supporting geotechnical investigation and testing data, input parameters, analysis methodology, selection of critical cross-sections, and loading conditions.

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

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 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 8**.

- 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 6.1**. The Initial SSA also utilized sudden drawdown slope stability analyses performed using the same cross-sections and input data as the Initial SFA to demonstrate compliance with downstream slope inundation/stability (§257.73(d)(1)(vii). The Initial SFA slope stability analyses, including the sudden drawdown analyses, were subsequently updated to develop a Periodic SFA, based on site changes, as discussed in Section 7.

6.4 Periodic SSA

The Periodic SFA (**Section 7**) 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), including for static maximums storage pool conditions and post-earthquake (i.e., liquefaction) loading conditions considering seismically-induced strength loss in the foundation soils. Additionally, factors of safety for sudden drawdown loading conditions induced by a drawdown event in the adjacent Ohio River were also found to be acceptable. Therefore, the requirements of §257.73(d)(1)(i), §257.73(d)(1)(iii), and §257.73(d)(1)(vii) are met for the Periodic SSA.

The Periodic IDF (**Section 8**) indicates that spillways are adequately designed and constructed to adequately manage flow during the PMF flood, as the spillways can adequately manage flow during peak discharge from the PMP storm event without overtopping of the embankments. Therefore, the requirements of §257.73(d)(1)(v)(A)-(B) are met for the Periodic SSA.

Inspection and certification of the hydraulic structures per 257.73(d)(1)(vi) was not included in the scope of this certification report.

SECTION 7

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

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

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

7.2 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 Completeness and adequacy of supporting geotechnical investigation and testing data;
- Completeness and approach of liquefaction triggering assessments; and
- Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses.

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

7.3 Summary of Site Changes Affecting the Initial SFA

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

- Changes in groundwater levels at the site were observed after development of the Initial SFA (Section 2.3), and

- The Periodic IDF (Section 8) found that both the normal and flood pool levels for the CPRP reduced relative to the Initial IDF, thereby resulting in less water loading on the embankments relative to the Initial SFA, for each analyzed loading condition.

7.4 Periodic SFA

Geosyntec revised existing slope stability analyses associated with the Initial SFA ([6], [9]) to account for observed higher piezometric levels, as described in **Section 2.3.** In addition, the normal pool and surcharge pool levels in the models were updated based on the Periodic IDF results as described in **Sections 8.2** and **8.3**. This included revising the slope stability analyses evaluating sudden drawdown conditions in the adjacent Ohio River that were utilized as part of the Initial SSA (**Section 6**). The following approach and input data were used to revise the analyses:

- The update of piezometric levels was applicable to cross-section (1), based changes in observed piezometric conditions.

- The Initial SFA utilized the GeoStudio 2007 software package [20]. This software package is no longer supported by GeoStudio, and licensing was unavailable to update the Initial SFA analyses within GeoStudio 2007. Therefore, the analysis was updated to utilize GeoStudio 2012 software [21], for which licensing was available.

- The Initial SFA utilized a finite-element seepage analysis to estimate pore pressures for the slope stability analysis. This finite-element seepage analysis was removed and piezometric conditions were represented with a piezometric line. The location of the piezometric line was based on observed upper end piezometric data collected since 2015.

- Water levels within the CPRP were assumed to be El. 506.9 for the maximum storage pool, seismic, liquefaction (i.e., post-earthquake), and sudden drawdown loading conditions, and El. 508.2 for maximum surcharge pool, in order to be consistent with the Periodic IDF.

- All other input data and settings from the Initial SFA were utilized, including, but not limited to, subsurface stratigraphy and soil strengths, phreatic conditions, ground surface geometry, slip surface search routines and methods, input data for the seismic analyses, and Ohio River pool levels.

Factors of safety from the Periodic SFA and Initial SFA, including factors for safety for loading conditions required by the Initial and Periodic SSA, are summarized in **Table 3**. The factors of safety confirm that the CPRP meets the requirements of §257.73(e)(1). Slope stability analyses associated with the Periodic SFA are provided in **Attachment E**.

Table 3 – Factors of Safety from Periodic SFA

	Structural Stability Assessment (§257.73(d)) and Safety Factor Assessment (§257.73(e))				Structural Stability Assessment (§257.73(d))	
Cross-Section	Maximum Storage Pool §257.73(e)(1)(i) Minimum Required = 1.50	Maximum Surcharge Pool[1] §257.73(e)(1)(ii) Minimum Required = 1.40	Seismic §257.73(e)(1)(iii) Minimum Required = 1.00	Dike Liquefaction §257.73(e)(1)(iv) Minimum Required = 1.20	Foundation Liquefaction §257.73(d)(1)(i) Minimum Required = 1.20	Downstream Slope Sudden Drawdown (§257.73(d)(1)(iv) Minimum Required = 1.1
1	3.93	3.93	2.02	N/A	N/A	3.34*
2	1.90*	1.90*	1.38*	N/A	N/A	N/A
3	3.47	3.41	1.95	N/A	N/A	N/A

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

SECTION 8

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN - §257.82

8.1 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 507.9 ft.

The Initial IDF concluded that the CPRP met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 509.0 ft, relative to a minimum CPRP embankment crest elevation of 509.2 ft. Therefore, overtopping was not expected.

8.2 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; and

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

8.3 Summary of Site Changes Affecting the Initial IDF

One change at the site that occurred after development of the Initial IDF was identified. This change required updates to the Initial IDF as is described below:

- The surveyed water surface elevation (WSE) within the CPRP was 506.9 ft in 2020 [16]; this is one foot lower than the SWSE used in the Initial IDF, thereby the SWSE utilized in the Initial IDF was no longer consistent with conditions observed in 2020.

8.4 Periodic IDF

Geosyntec revised the HydroCAD model associated with the Initial IDF to account for the change in SWSE described in **Section 8.3**. The following approach and input data were used for the revised analyses:

- The drainage area of the CPRP was updated from 2.69 ac to 3.60 ac, Wastewater Pond from 8.68 ac to 9.75 ac, Clearwater Pond from 4.47 ac to 5.42 ac, Metal Tank Area from 1.24 ac to 1.20 ac, and Coal Pile Area from 51.4 ac to 56.6 ac based on the 2021 site survey [16].

- The time of concentration was updated for subcatchments to the CPRP, Wastewater Pond, Clearwater Pond, Metal Tank Area, and Coal Pile Area to meet 6-minute minimum requirement based on TR-20 [22].

- The stage-storage curve for the CPRP was updated based on the 2021 site survey [16].
  - A revised stage-volume curve for the CPRP was prepared based on measuring the storage volume of the CPRP at every one-foot increment of depth from the minimum depth (497 ft) to an elevation of 509 ft. This analysis identified an overall increase of 1,202 CY (0.7 ac-ft) of storage volume at the CPRP from 2015 to 2021.

- The SWSE of the CPRP was updated from 507.9 ft to 506.9 ft to reflect the 2021 site survey and Wastewater Pond from 507.1 ft to 507.0 ft to reflect the spillway crest along the eastern berm. The greater elevation of the invert structure and the surveyed WSE was used as the SWSE to provide conservatism in the model.

- The minimum dike crest elevation of the Wastewater Pond, Clearwater Pond, and Coal Pile Runoff Area were updated from 509.1 ft to 509.0 ft and CPRP from 509.2 ft to 509.0 ft per the 2021 site survey [16].

- The 1,000-year, 24-hour design storm precipitation depth was updated from 9.13 inches to 8.79 inches per current NOAA Atlas 14 precipitation frequency estimates [23].

- The model was simplified to exclude offsite drainage areas (e.g., nodes representing Little Indian Creek and ditches east of Coal Pile Runoff area dike); 2015 certification indicated that these areas do not influence the CPRP or nearby ponds and no large land disturbances/changes were observed from aerial imagery.

- Base flows were also updated, as described below.

- The CPRP base flow was updated from 4.51 cfs to set to 4.41 cfs (based on Appendix C of the 2016 certification [9]. This appendix references the "Fact Sheet (Revised) Regarding NPDES Permit to Discharge to Water of the State of Ohio for Dynegy Zimmer, LLC – William H. Zimmer Station (Zimmer Station)".
  - Description of flow rate includes 3.0 cfs of leachate from the on-site landfill, 1.0 cfs of pumped stormwater from the coal pile stormwater basins, and 0.41 cfs of discharge from the chemical metal cleaning waste treatment tank.
- The Metal Tank Area base flow was removed. Documentation describing the source of this base flow was not identified. Further, this area appears to be a tank containment area for spill prevention, thus the presence of a base flow within the tank containment area would be atypical of standard operating practices.

- Discharge structures were updated, as described below.
  - Culverts from Metal Tank Area to CPRP were removed and the berm overtopping elevation was updated from 515.0 ft to 513.0 ft based on the 2021 site survey [16]. Changes to this region are based on the 2014 and 2021 site surveys which suggest this is a containment area for spill prevention.
  - Two, 12-inch pipes from CPRP to Wastewater Pond were updated as described below.
    - The diameter was updated from 15 to 12 inches based on 2021 site survey [16].
    - The eastern pipe upstream invert was updated from 507.88 ft to 506.38 ft and the downstream invert was updated from 505.95 ft to 504.41 ft based on 2021 site survey [16].
    - The western pipe upstream invert was updated from 507.99 ft to 506.63 ft and the downstream invert was updated from 505.98 ft to 504.46 ft based on the 2021 site survey [16].
  - The 36-inch pipe from Clearwater Pond to Ohio River was updated as described below:
    - The upstream invert was updated from 492.00 ft to 489.28 ft and the downstream invert was updated from 490.00 ft to 488.95 ft based on the 2021 site survey [16].
    - The length was updated from 160 LF to 158 LF based on the 2021 site survey [16].

- The discharge weir crest at the Clearwater Pond was updated from 501.48 ft to 502.08 ft based on the 2021 site survey [16].

- The discharge structures at Coal Pile Runoff Basins A, B, and C were updated to include intake riser structures as rectangular weirs that the outlet pipes connect to on the upstream end. These intake weirs were assessed based on design drawing number 1-30254-3, "Coal Storage Area Emergency Coal Pile Runoff Settling Basins Plan and Sections" [24]:

  - Weir length of 9.5-ft for each of the three weirs

  - Weir crest elevations of 489.28 ft, 489.13 ft, and 489.44 ft for Basins A, B, and C, respectively.

- The Coal Pile Runoff Basins A, B, and C containment dike overtopping flow was updated to discharge to CPRP in addition to the Ohio River with a crest elevation of 509.0 ft for discharge to CPRP and crest elevation of 508.0 ft instead of 509.0 ft for discharge to the Ohio River.

HydroCAD updates were validated using a similar site model created in the United States Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) [25]. Validation was completed to assess the modeling behavior of flow through weirs while inundated. The Ohio River 100-year flood stage of 506.00 ft exceeds the weir invert elevations of the Clearwater Pond and Coal Pile Runoff Basins A, B, and C. Downstream inundation of weirs prevents discharge in accordance with the weir flow equation. A comparison of the CPRP peak water surface elevation from each model was made. HydroCAD provides a greater peak water surface elevation in comparison to EPASWMM thus HydroCAD results are considered more conservative and are presented herein.

The results of the Periodic IDF are summarized in **Table 4** and confirm that the CPRP meets the requirements of §257.82(a)-(b), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevation. Additionally, all discharge from the CPRP is expected to be routed through the existing spillway structures of the CPRP, Wastewater Pond, and Clearwater Pond and the existing discharge pipe to Little River Creek, respectively, prior to discharge through the NDPES-permitted outfall, during both normal and IDF conditions. Updated area-capacity curves and HydroCAD model output is provided in **Attachment F**.

Table 4 – Water Levels from Updated Periodic IDF

	Coal Pile Runoff Pond		
Analysis	**Starting Water Surface Elevation (ft)**	**Peak Water Surface Elevation (ft)**	**Minimum Dike Crest Elevation (ft)**
Initial IDF	507.9	509.0	509.2
Periodic IDF Update	506.9	508.2	509.0
Initial to Periodic Change[1]	-1.0	-0.8	-0.2

Notes:
[1]Positive change indicates an increase relative to the Initial IDF; negative change indicates a decrease relative to the Initial IDF.

SECTION 9

CONCLUSIONS

The CPRP at ZPP was evaluated relative to the USEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2)),
- Emergency action plan development (§257.73(a)(3)),
- History of Construction reporting (§257.73(d)),
- Structural stability assessment (§257.73(d)), with the exception of §257.73(d)(1)(vi) that was not included in the scope of this report,
- 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 except for §257.73(d)(1)(vi).

At this time, the structural integrity of the hydraulic structures passing through the embankment of the CPRP (§257.73(d)(1)(vi)) cannot be certified because the discharge pipes from the CPRP to the Waste Water Pond was inundated and could not have been fully inspected. In accordance with §257.73(d)(2), Geosyntec recommends performing a visual inspection of the discharge pipes as soon as feasible and updating this assessment once the inspection has been performed.

SECTION 10

CERTIFICATION STATEMENT

CCR Unit: Zimmer Power Company LLC, Zimmer Power Plant, Coal Pile Runoff Pond

I, Panos Andonyadis, being a Registered Professional Engineer in good standing in the State of Ohio, 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, emergency action plan, 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), (a)(3), (c), (d), (e), and §257.82, with the exception of §257.73(d)(1)(vi) that was not included in the scope of this certification.

Panos Andonyadis

October 11, 2021
Date

Exp. 11/30/2021

SECTION 11

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, Coal Pile Runoff Pond, Zimmer Power Station, Clermont County, Ohio," Fenton, MO, October 12, 2016.

[3] Stantec Consulting Services Inc, "Dynegy Midwestern Generation, LLC, Zimmer Power Station, Moscow, Clermont County, OH, Emergency Action Plan, Coal Pile Runoff Pond (NID # OH01393), D Basin (NID # OH01393)," Fenton, MO, April 13, 2017.

[4] AECOM, "History of Construction, USEPA Final CCR Rule, Zimmer Power Station, Moscow, Ohio," October 2016.

[5] AECOM, "CCR Rule Report: Initial Structural Stability Assessment For Coal Pile Runoff Pond At Zimmer Power Station," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Safety Factor Assessment For Coal Pile Runoff Pond At Zimmer Power Station," St. Louis, MO, October 2016.

[7] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan For Coal Pile Runoff Pond At Zimmer Power Station," St. Louis, MO, October 2016.

[8] Stantec Consulting Services, Inc., "Documentation of Initial Hazard Potential Classification Assessment, Coal Pile Runoff Pond, Zimmer Power Station, Moscow, Ohio," 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 Coal Pile Runoff Pond at Zimmer Power Station," St. Louis, MO, October 2016.

[10] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Zimmer Power Station, Coal Pile Runoff Pond,* January 18, 2017.

[11] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Zimmer Power Station, Coal Pile Runoff Pond,* February 7, 2018.

[12] S. Arends, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Zimmer Power Station, Coal Pile Runoff Pond,* January 15, 2019.

[13] J. Knutelski, *Annual Inspection by a Qualified Professional Engineer, 40 CFR 257.83(b), Zimmer Power Station, Coal Pile Runoff Pond,* January 8, 2020.

[14] J. Knutelski, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Zimmer Power Station, Coal Pile Runoff Pond,* January 6, 2021.

[15] ESP Associated, P.A., "Topographic Survey of the Duke Ash Ponds At Zimmer Power Station," Charlotte, NC, September 2014.

[16] S&ME/IBI Group, "Bathymetric and Aerial Topographic Map," Cincinnati, OH, February 11, 2021.

[17] Google, LLC, "Google Earth Pro," 2020.

[18] AECOM, "Draft CCR Unit Initial Site Visit Summary, Dynegy CCR Compliance Program," September 30, 2015.

[19] U.S. Army Corps of Engineers, "Slope Stability, EM 1110-2-1920," October 31, 2003.

[20] GeoSlope International, "GeoStudio 2007, Version 7.23," Calgary, Alberta, Canada, 2007.

[21] GeoSlope International, "GeoSudio 2012, August 2015 Release, Version 8.15.6.13446," Calgary, Alberta, Canada, 2015.

[22] USDA Natural Resources Conservation Service, "WinTR-20 Project Formulation Hydrology, Version 3.20".

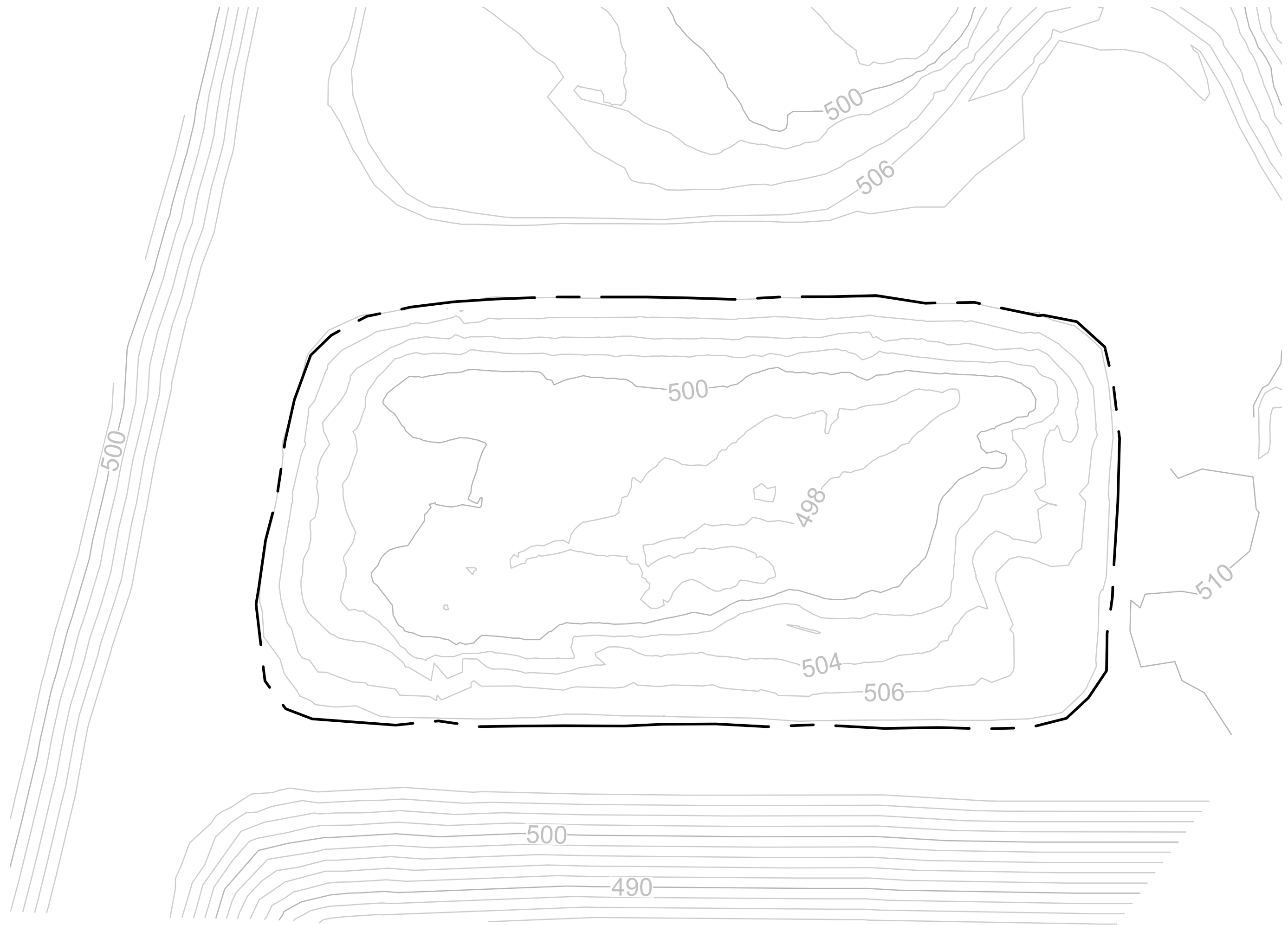
[23] National Oceanic and Atmospheric Adminitration (NOAA) and National Weather Service, "Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, Version 3," Silver Spring, MD, 2006.

[24] 1 Riverside Plaza Associates, Inc., "Dwg. No. 1-30254-3 - Coal Storage Area Emergency Coal Pile Runoff Settline Basins Plan and Sections," February 28, 1986.

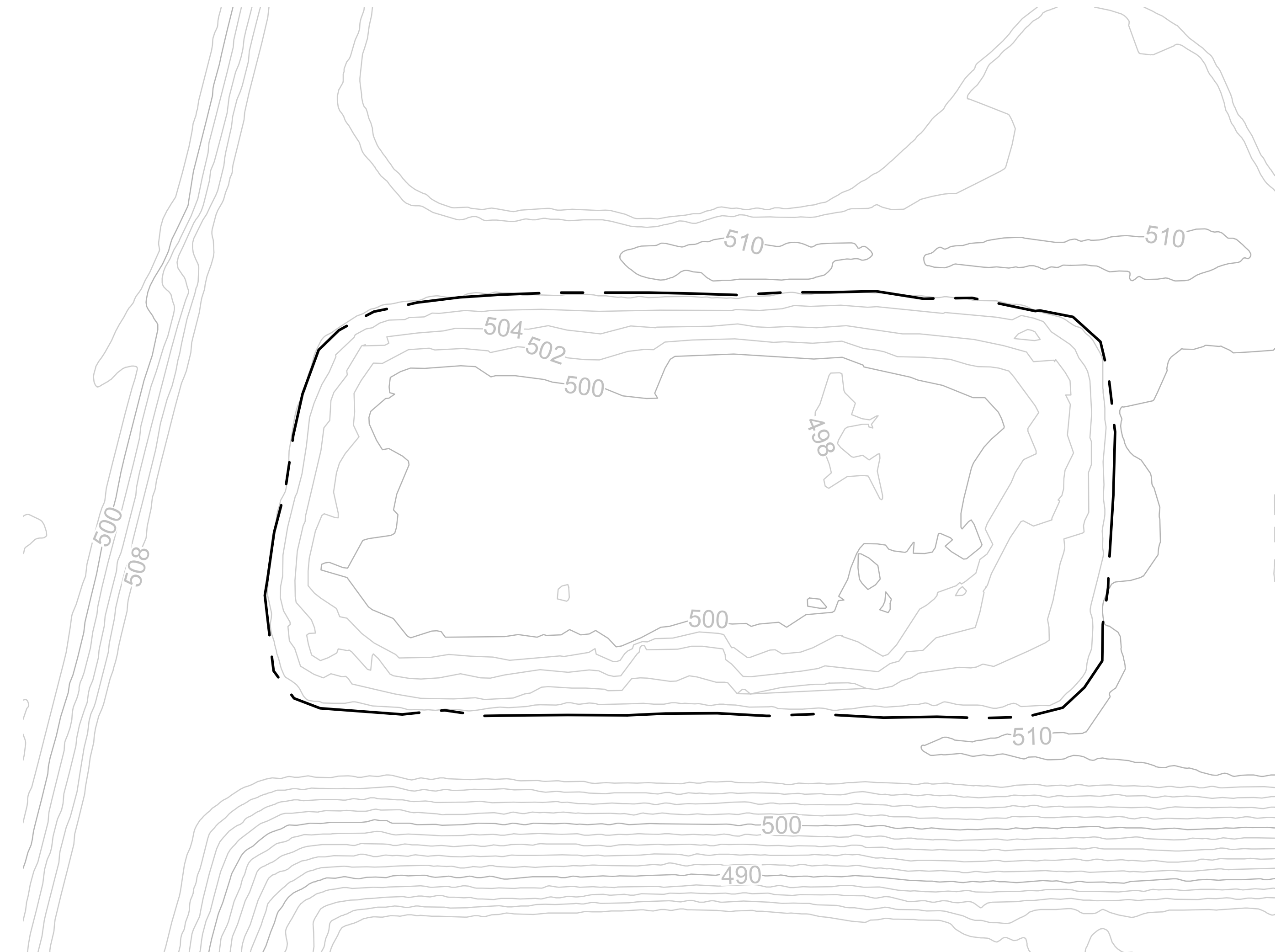
[25] United States Environmental Protection Agency, "Storm Water Management Model, Version 5.1," Revised September 2015.

[26] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for Basin B at Miami Fort Power Station," St. Louis, MO, October 2016.

DRAWINGS



INITIAL SURVEY
09-05-2014 TOPOGRAPHY



PERIODIC SURVEY
02-11-2021 TOPOGRAPHY

0 100
SCALE IN FEET

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING TITLED "TOPOGRAPHIC SURVEY OF THE DUKE ASH PONDS AT THE ZIMMER POWER STATION", PREPARED BY ESP ASSOCIATED, P.A., DATED SEPTEMBER 5, 2014.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "BATHYMETRIC AND AERIAL TOPOGRAPHIC MAP", PREPARED BY S&ME/IBI GROUP, DATED FEBRUARY 11, 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.

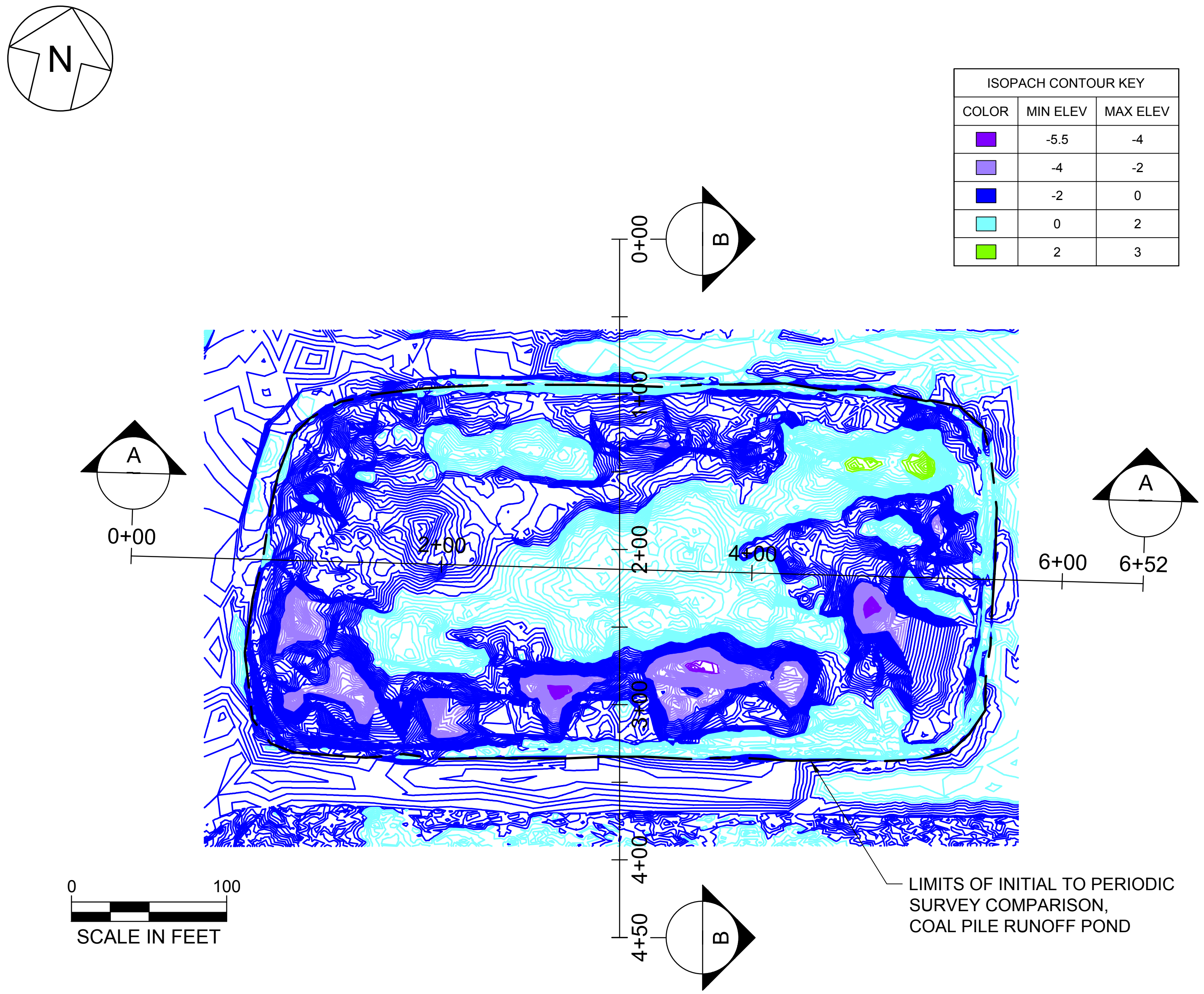
INITIAL TO PERIODIC SURVEY
COMPARISON
COAL PILE RUNOFF POND
ZIMMER POWER PLANT
MOSCOW, OHIO

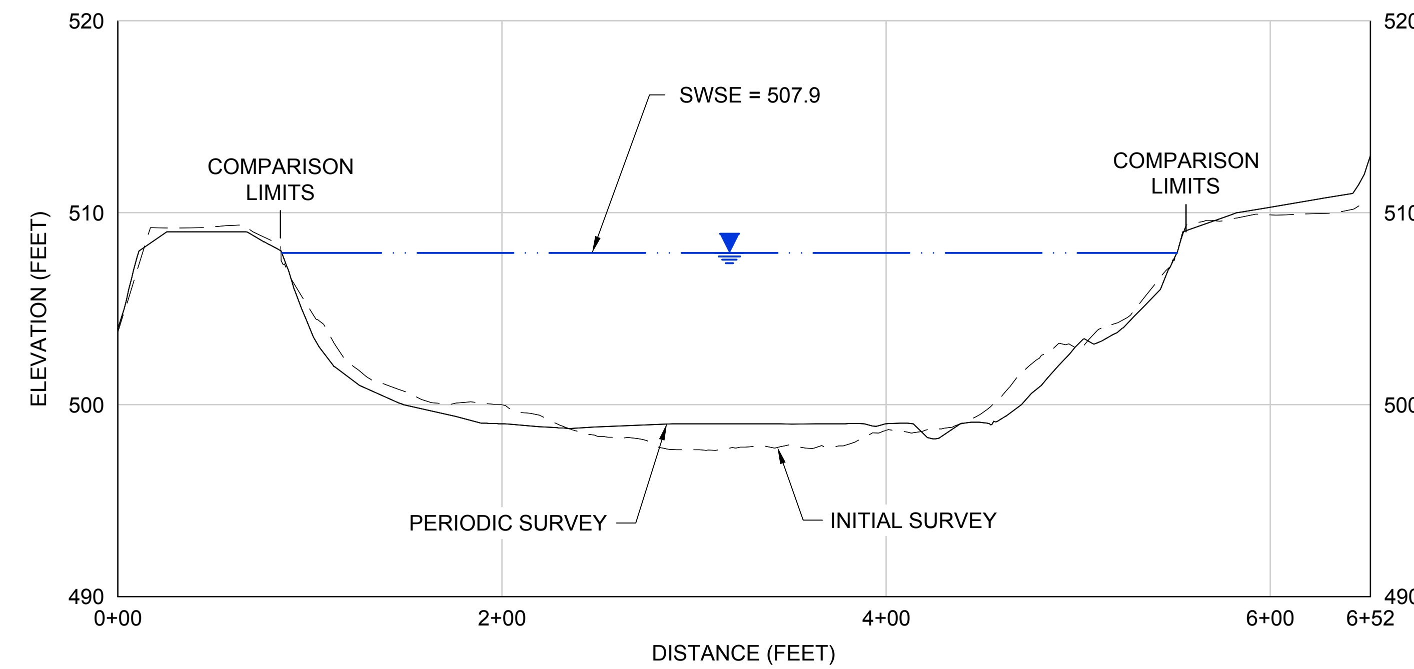
Geosyntec consultants

GLP8027.10	JULY 2021	DRAWING 1

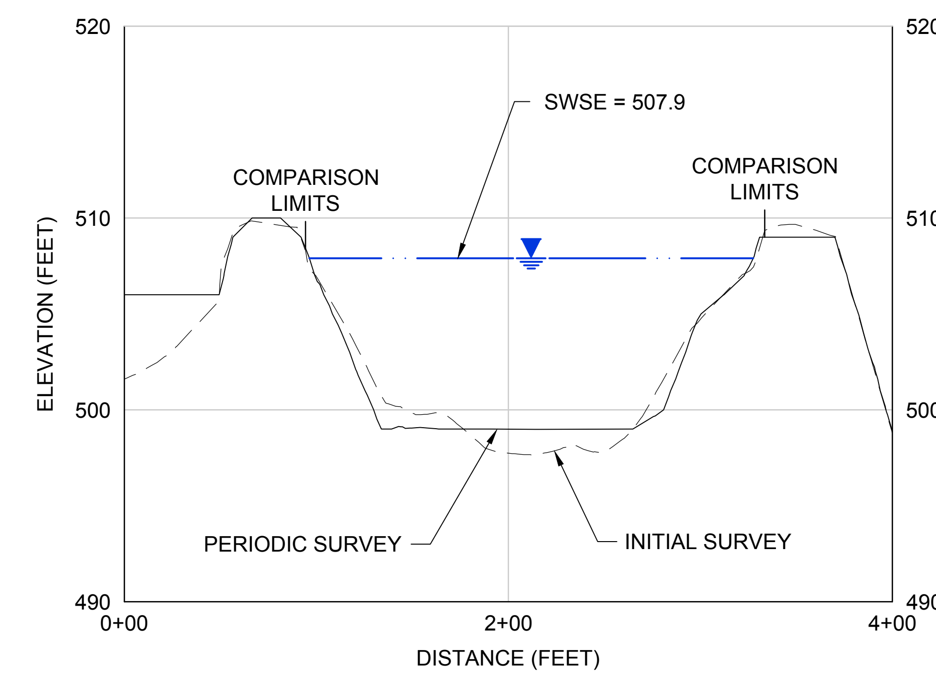
P:\CADD\PROJECTS\V\VISTRA PONDS\ZIMMER\FIGURES\GLP802710F01 - Last Saved by: KHanavec on 7/12/21

ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
(purple)	-5.5	-4
(light purple)	-4	-2
(blue)	-2	0
(cyan)	0	2
(green)	2	3

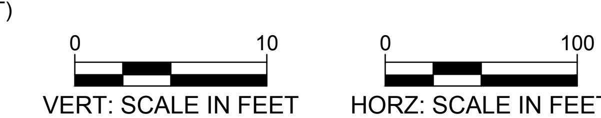




SECTION A



SECTION B



INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
	CUT	FILL	NET (CU. YD.)
COAL PILE YARD RUNOFF POND	2,220	930	1,290 (CUT)
ABOVE SWSE	215	84	131 (CUT)
BELOW SWSE	2,007	842	1,165 (CUT)

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING TITLED "TOPOGRAPHIC SURVEY OF THE DUKE ASH PONDS AT THE ZIMMER POWER STATION", PREPARED BY ESP ASSOCIATED, P.A., DATED SEPTEMBER 5, 2014.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "BATHYMETRIC AND AERIAL TOPOGRAPHIC MAP", PREPARED BY S&ME/IBI GROUP, DATED FEBRUARY 11, 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 STARTING WATER SURFACE ELEVATION OF THE COAL PILE RUNOFF POND IS EL. 507.9 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 COAL PILE RUNOFF POND AT ZIMMER POWER STATION", PREPARED BY AECOM, DATED OCTOBER, 2016.

SURVEY COMPARISON
ISOPACH
COAL PILE RUNOFF POND
ZIMMER POWER PLANT
MOSCOW, OHIO

Geosyntec consultants

GLP8027.10 | JULY 2021

DRAWING 2

INITIAL AERIAL
10-2015 IMAGERY

PERIODIC AERIAL
10-2020 IMAGERY

0 100
SCALE IN FEET

NOTES:

1. THE INITIAL IMAGERY WAS TAKEN FROM GOOGLE EARTH, IMAGE DATED OCTOBER 2015, DOWNLOADED 12 JULY 2021.
2. THE PERIODIC IMAGERY WAS TAKEN FROM GOOGLE EARTH, IMAGE DATED OCTOBER 2020, DOWNLOADED 12 JULY 2021.

INITIAL TO PERIODIC AERIAL IMAGERY COMPARISON
COAL PILE RUNOFF POND
ZIMMER POWER PLANT
MOSCOW, OHIO

Geosyntec consultants

GLP8027.10 | JULY 2021

DRAWING 3

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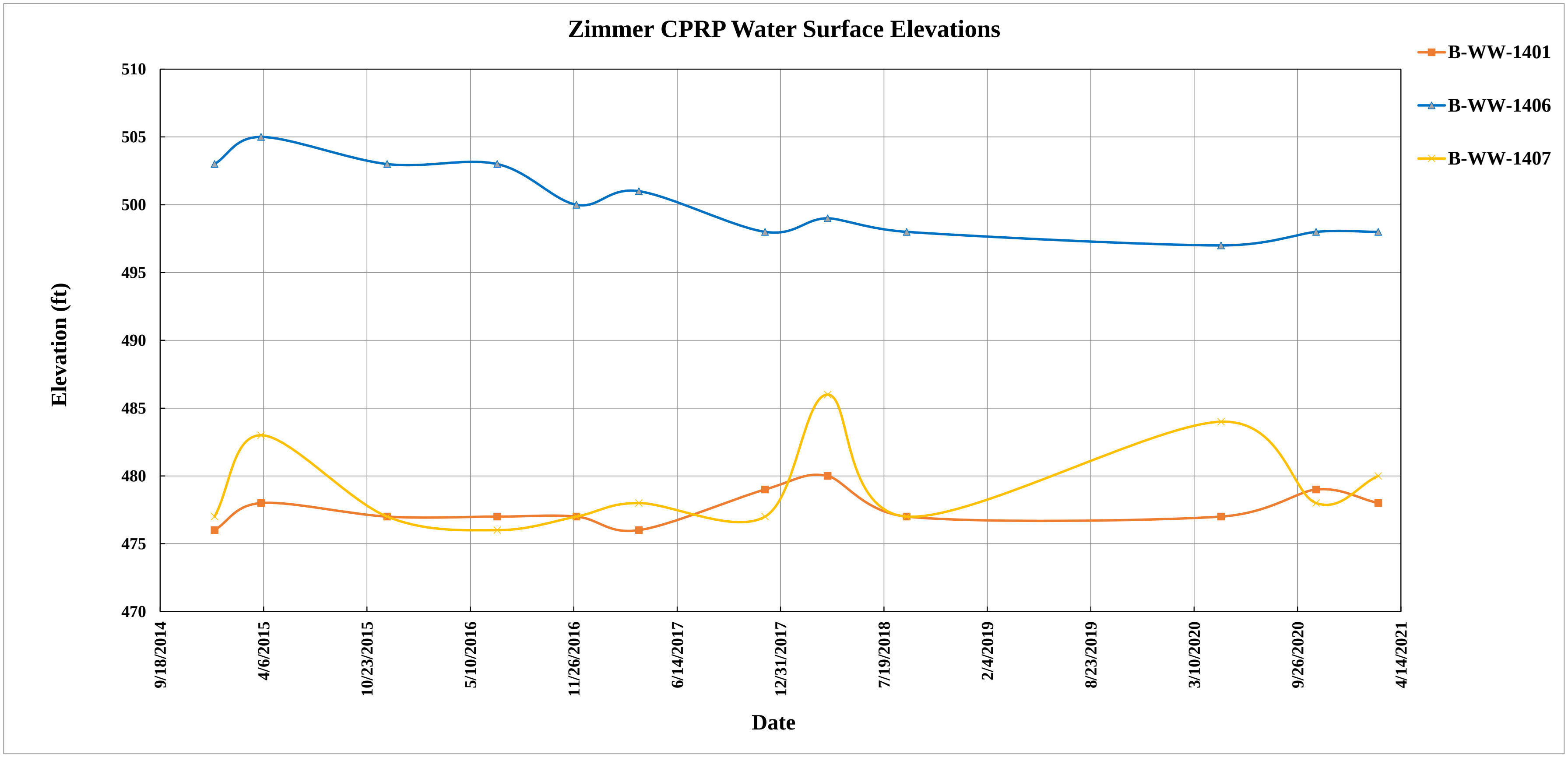
ATTACHMENTS

Attachment A

CPRP Piezometer Data Plots



NOTES:

1. Piezometer data was extracted from the monitoring PDF files , provided by the Zimmer Power Plant.

PIEZOMETER DATA PERIODIC CERTIFICATION, CPRP ZIMMER POWER PLANT MOSCOW, OHIO		
Geosyntec consultants		Figure 1
GLP8027	7/12/2021	

Attachment B

CPRP Site Visit Photolog

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Zimmer Power Company, LLC	**Project Number:** GLP8027
CCR Unit: Coal Pile Runoff Pond	**Site:** Zimmer Power Plant

Photo: 01

Date: 06/02/2021

Direction Facing: NE

Comments: Photo taken from the west embankment. Example of vegetative coverage along the upstream sides of the pond's embankments.

Photo: 02

Date: 06/02/2021

Direction Facing: SW

Comments: Photo taken from the northeast corner of the pond. Upstream slopes protected with stone. No signs of erosion.

Attachment C

Periodic Emergency Action Plan for Zimmer Power Plant

Zimmer Power Company LLC

ZIMMER POWER PLANT
MOSCOW, CLERMONT COUNTY, OHIO

Emergency Action Plan (EAP)

40 CFR § 257.73(a)(3)
Coal Combustion Residual (CCR) Impoundments
& Related Facilities

- Coal Pile Runoff Pond (NID # OH01393)
- D Basin (NID # OH01393)

Revision Date: September 28, 2021

ZIMMER POWER PLANT
EMERGENCY ACTION PLAN
CCR IMPOUNDMENTS & RELATED FACILITIES

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ZIMMER POWER PLANT
EMERGENCY ACTION PLAN
CCR IMPOUNDMENTS & RELATED FACILITIES

1 STATEMENT OF PURPOSE

The Zimmer Power Plant (Plant) is located near Moscow in Clermont County, Ohio. The location is shown in Figure 1-1. The Plant is a coal-fired electricity producing power plant operated Zimmer Power Company LLC, a subsidiary of Luminant. This Emergency Action Plan (EAP) was prepared in accordance with 40 CFR § 257.73(a)(3) and covers the following Coal Combustion Residual (CCR) surface impoundments located at the site:

- Coal Pile Runoff Pond
- D Basin

The locations of these impoundments are shown in Figure 1-2. Section 6 of this EAP includes a description of each impoundment.

The purpose of this Emergency Action Plan (EAP) is to:

1. Safeguard the lives, as well as to reduce property damage, of citizens living within potential downstream flood inundation areas of CCR impoundments and related facilities at the Zimmer Power Plant.
2. Define the events or circumstances involving the CCR impoundments and related facilities at the Zimmer Power Plant that represent atypical operating conditions that pose a safety hazard or emergency and how to identify those conditions.
3. Define responsible persons, their responsibilities, and notification procedures in the event of a safety emergency.
4. Provide contact information of emergency responders.
5. Identify emergency actions in the event of a potential or imminent failure of the impoundments.
6. Identify the downstream area that would be affected by failure of the impoundments.
7. Provide for effective facility surveillance, prompt notification to local Emergency Management Agencies, citizen warning and notification responses, and preparation should an emergency occur.

Information provided by Luminant was utilized and relied upon in preparation of this report.

Figure 1-1. Zimmer Power Plant Location Map

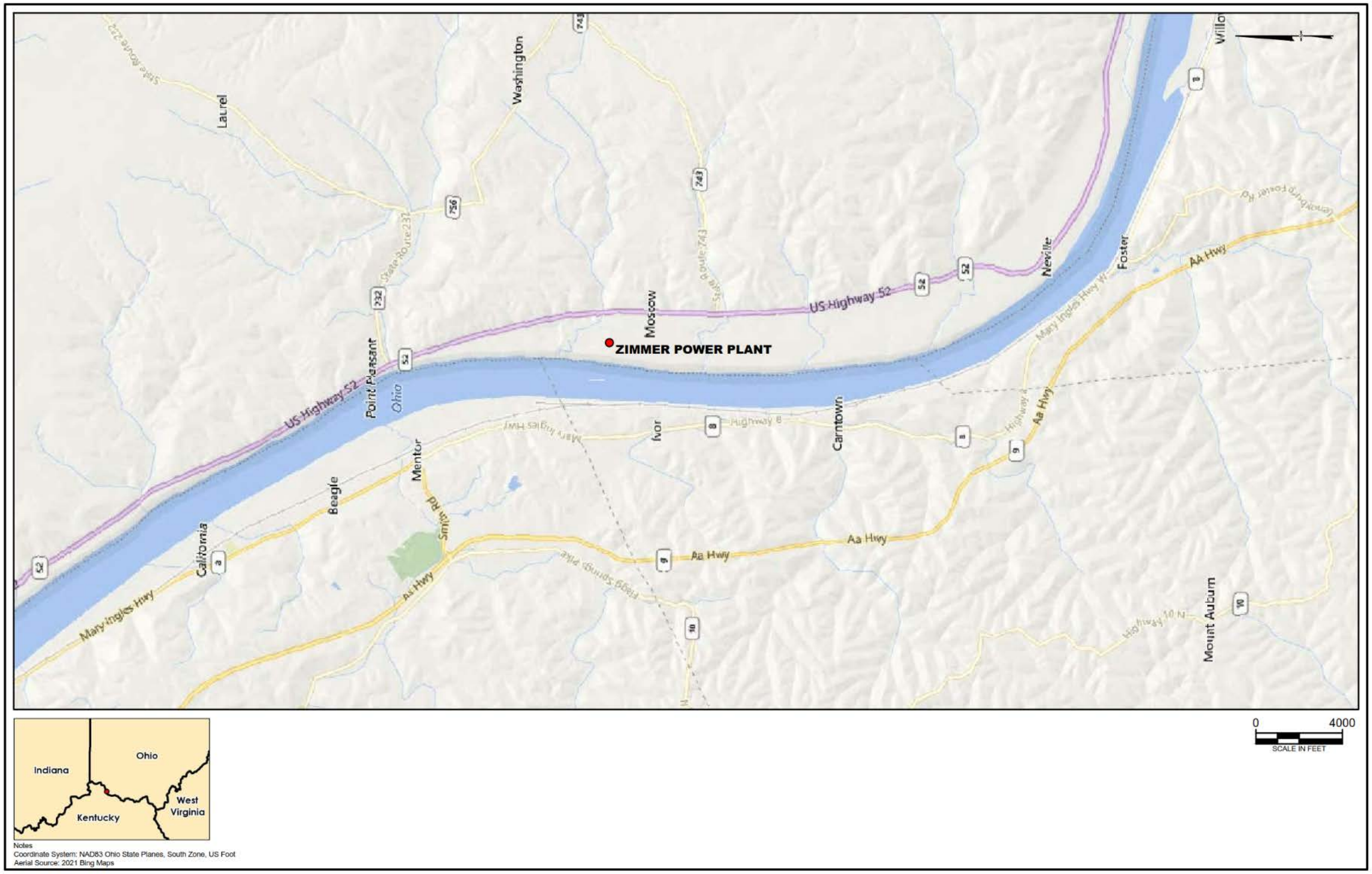
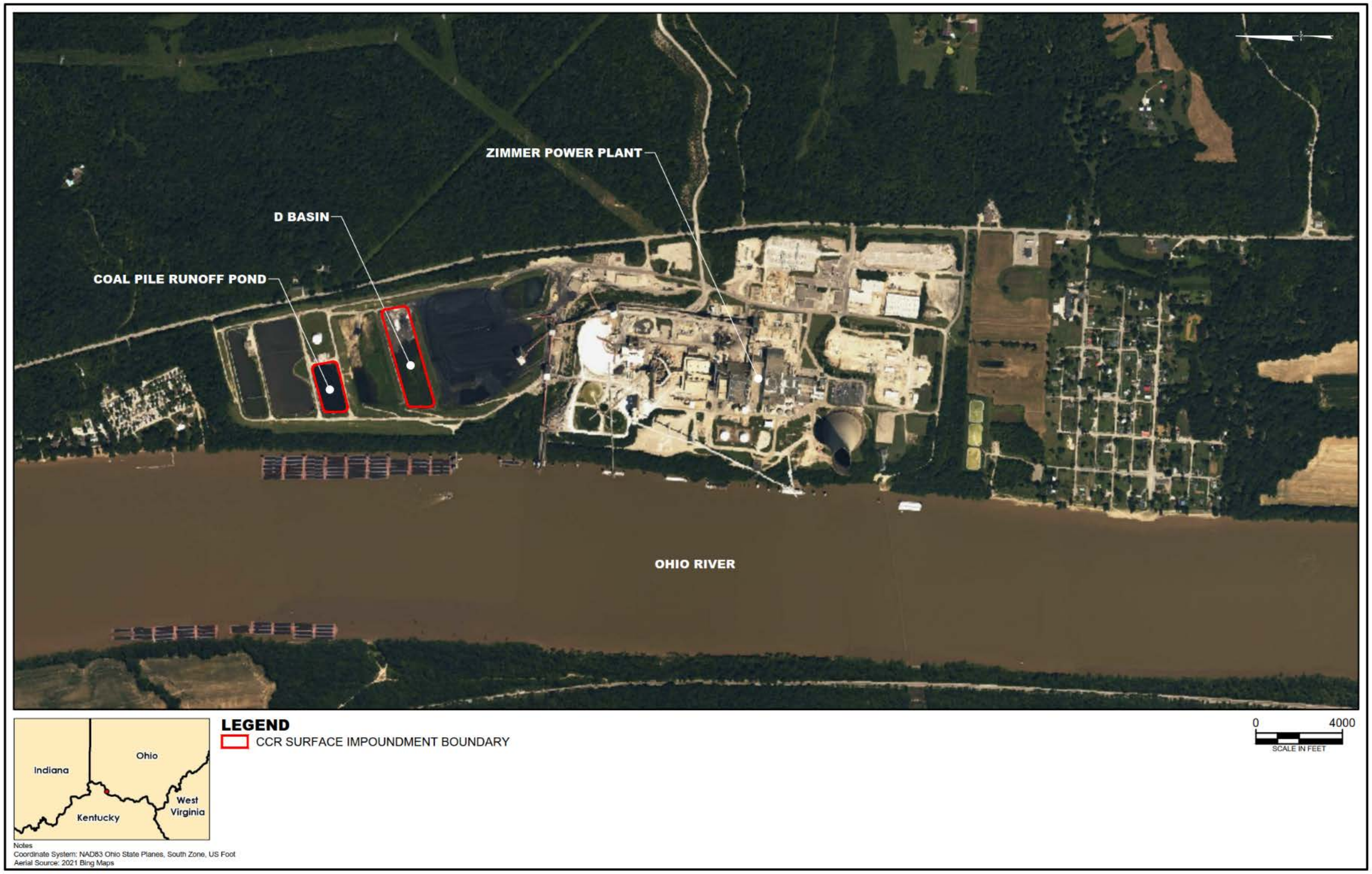


Figure 1-2. Zimmer Power Plant CCR Impoundments & Related Facilities



2 COMMUNICATION

To facilitate understanding among everyone involved in implementing this EAP, four response levels are used to identify the condition of an impoundment. These are:

Response Levels:

- **Level 0:** Normal conditions and routine operations, including surveillance and initial investigation of unusual conditions and effects of storm events.
- **Level 1:** Potentially hazardous condition exists, requiring investigation and possible corrective action.
- **Level 2:** Potential failure situation is developing; possible mode of failure is being assessed; corrective measures are underway.
- **Level 3:** Failure is occurring or is imminent, public protective actions are required.

The 4-Step Incident Response Process is outlined in Figure 2-1. This should be used in conjunction with the Notification Flowchart (Figure 2-2) and EAP Decision Tree (Figure 2-3). Section 4 provides guidance tables for determining Response Levels and a table providing emergency actions to be taken given various situations. Table 2-1 lists contact information for the emergency responders.

Figure 2-1. Summary/Sequence of Tasks 4-Step Incident Response Process

Step 1: Detection, Evaluation, and Response Level Determination

Sequence of Tasks:

- Notify EAP Coordinator, Plant Manager, and Dam Safety Manager of unusual condition detected and confer on next steps needed.
- Conduct technical evaluation of conditions as needed.
- Determine Response Level based on evaluation. **(Table 4-1)**
- Reset Response Level as revised evaluations warrant.

Step 2: Notification

Sequence of Tasks:

- Notify authorities, designated personnel, and external response partners of change in Response Level, using the Notification Flowchart. **(Figure 2-2)**
- *Re-notify authorities, designated personnel, and external response partners as Response Level is changed.*

Step 3: Emergency Actions

Sequence of Tasks:

- Perform emergency actions with goal of saving the impoundment and minimizing impacts to life, property, and environment. **(Table 4-3)**
- Take continuous actions to include situation assessment, information sharing, remediation, and public safety advisories or warnings, as warranted.
- *Revise action plan as changes in conditions warrant.*

Step 4: Follow-up

Sequence of Tasks:

- Document conditions and decisions in the Emergency Incident Log.
- Notify authorities, designated personnel, and external response partners that condition is stabilized; limit incident termination declarations to conditions at the site.
- Conduct and document after-action review of incident and response.

Figure 2-2. Notification Flowchart

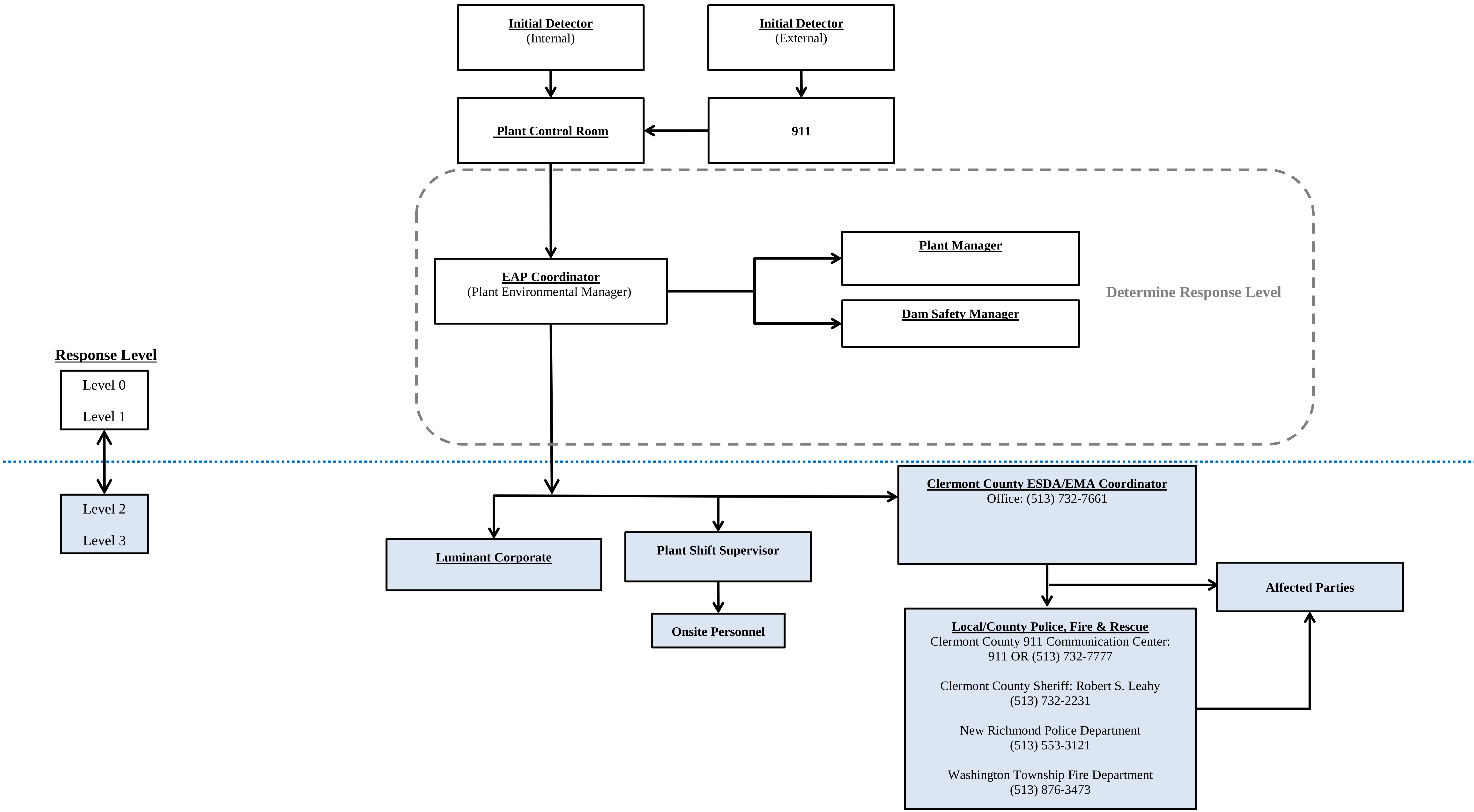


Figure 2-3. EAP Response Process Decision Tree

Note: At any given below, if failure is imminent or actively occurring **CALL 911 IMMEDIATELY** to notify emergency responders and then continue with process afterwards.

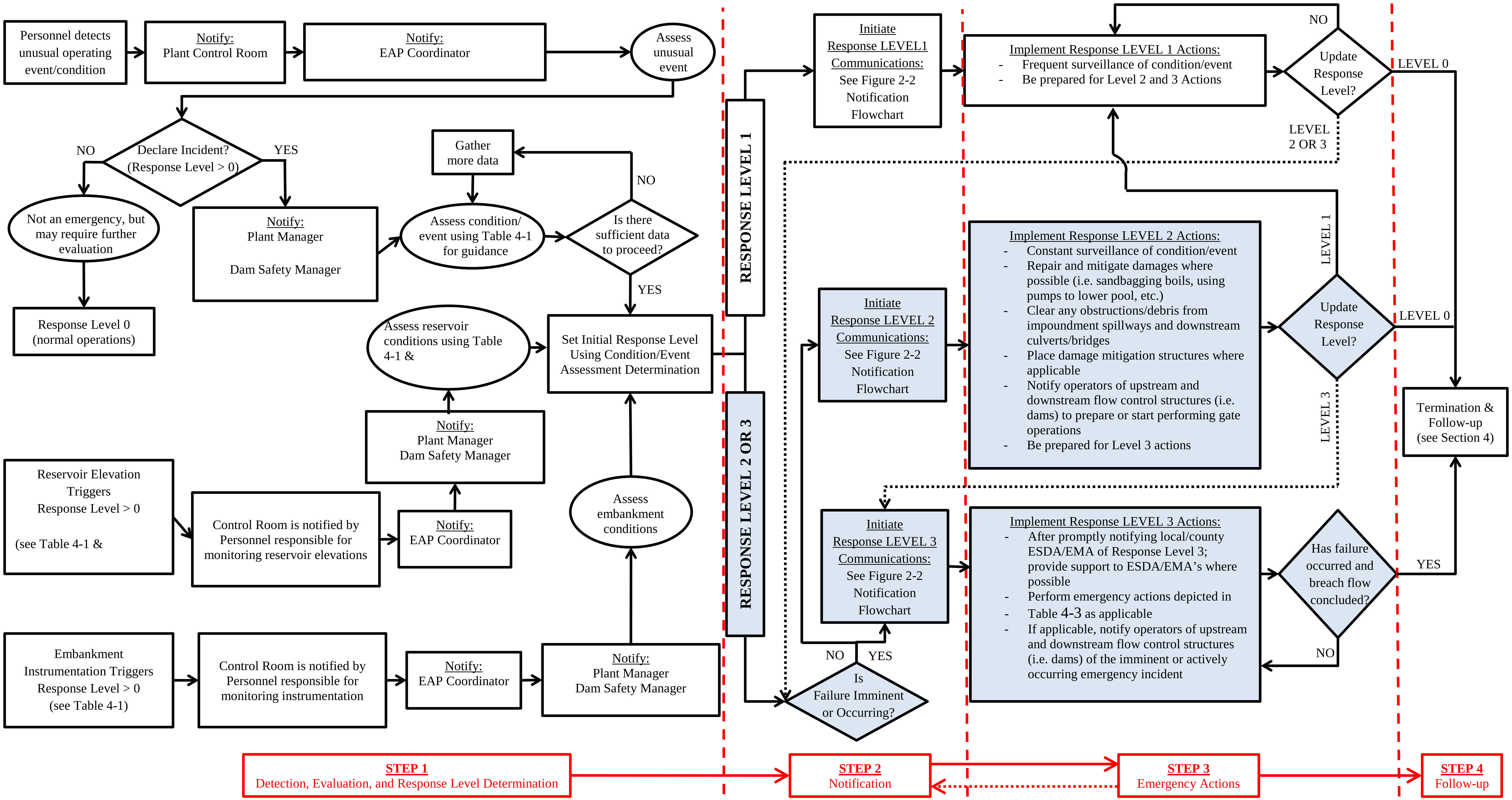


Table 2-1. EAP Emergency Responders

Position / Entity	Contact Information		
Internal Contacts			
Zimmer Power Plant	**Contact**		
Plant Manager	Chris Osterbrink	(513) 312-4500	
Environmental Manager (EAP Coordinator)	Sean Behm	(937) 750-3182	
Control Room		(513) 467-5205	
Luminant Corporate Operations	**Contact**		
Dam Safety Manager	Jason Campbell	(618) 792-8488	
External Contacts			
Local/County ESDA/EMA, Police, & Fire	**Contact**	**Phone #**	**Alternate Phone #**
Clermont County 911 Emergency Communication Center		911	(513) 732-7777
Clermont County – ESDA/EMA	Clermont County EMA	(513) 732-7661	
New Richmond – Police Department	Chief Mike Couch	(513) 553-3121	
Clermont County – Sheriff Department	Sheriff Robert S. Leahy	(513) 732-2231	(513) 732-7500
Washington Township – Fire Department	Chief Danny Jones	(513) 876-3473	(513) 876-3740
State Emergency Management Agencies & Organizations	**Contact**	**Phone #**	**Alternate Phone #**
Ohio Department of Natural Resources - Wildlife		(800) 945-3543	(614) 265-6314

3 EAP ROLES AND RESPONSIBILITIES

Table 3-1 provides a summary of the EAP roles during an emergency event.

Table 3-1. Summary of EAP Roles

Entity	Role Description
Luminant Emergency Response Team (ERT)	**ERT:** Luminant personnel responsible for EAP implementation, distribution, updates/maintenance, and training activities. The *ERT* is comprised of the following roles; 1. **Luminant Corporate:** Luminant corporate entity, committee, team, or position with relevant responsibility for a given generating plant. 2. **Plant Management:** Personnel responsible for day-to-day operation and management of the Plant. 3. **Dam Safety Manager:** Personnel that is most knowledgeable about the design and technical operation of facilities at a given Plant. 4. **EAP Coordinator:** Personnel responsible for implementing the EAP and associated activities. **Emergency Event – EAP Responsibilities** 1. Respond to emergencies at the Plant. 2. Verify and assess emergency conditions. 3. Notify and coordinate as appropriate with participating emergency services disaster agencies or emergency management agencies (ESDA/EMA’s), emergency responders, regulatory agencies, and all other entities involved or affected by this EAP. 4. Take corrective action at the Plant. 5. Declare termination of emergencies at the Plant.
Clermont County ESDA/EMA	1. Receive Response Level reports from *Luminant Corporate* through *EAP Coordinator*. 2. Coordinate emergency response activities with local authorities: police, fire and rescue, etc. 3. Coordinate notification of public as necessary through established channels, which may include door-to-door contact. 4. Coordinate notification activities to affected parties within inundation areas. 5. Evaluate risk to areas beyond the inundation areas, communicate needs to *Luminant Corporate* and/or *EAP Coordinator*, and coordinate aid as appropriate. 6. Responsible for declaring termination of an emergency condition off-site upon receiving notification of an emergency status termination from *Luminant Corporate*. 7. If necessary, coordinate with *State ESDA/EMA*.
New Richmond Police, Washington Township Fire, and Rescue	1. Receive alert status reports from the *ERT* or the *County ESDA/EMA*. 2. If necessary, notify affected parties and general public within inundation areas (see Section 7). 3. Render assistance to Clermont ESDA/EMA, as necessary. 4. Render assistance to *Luminant Corporate* and *Plant Management*, as necessary.
Clermont County Police, Fire and Rescue, and Emergency Services	1. Receive alert status reports from the *ERT* or the *County ESDA/EMA*. 2. If necessary, notify affected parties within the inundation area. 3. Provide mutual aid to other affected areas, if requested and able.

4 EAP RESPONSE

The 4-Step Incident Response Process is shown in Figure 2-1. The Decision Tree shown in Figure 2-3 provides a flowchart for the various elements of the response process. Upon reaching Step 4 of the response process (termination and follow-up), the EAP Coordinator is responsible for notifying the ESDA/EMA's that the condition of the dam/impoundment has been stabilized. The purpose of this section is to provide specific information that can be used during a response. This information is provided in the following tables:

- Table 4-1 provides guidance for determining the response level.
- Table 4-2 provides impoundment pool level trigger elevations.
-
- Table 4-3 lists emergency actions to be taken depending on the situation.

Table 4-1. Guidance for Determining the Response Level

Event	Situation	Response Level
Spillway flow (see Table 4-2 for relevant elevations)	Primary spillway flow is not causing active erosion and impoundment water surface elevation is below auxiliary spillway crest elevation (if equipped).	Level 0
	Impoundment water surface elevation is at or above auxiliary spillway crest elevation (if equipped). No active erosion caused by spillway flow.	Level 1
	Spillway flow actively causing minor erosion that is not threatening the control section or dam/impoundment stability.	Level 2
	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise.	Level 2
	Abnormal operation of the spillway system due to blockage or damage that could lead to flooding.	Level 2
	Spillway flow actively eroding the soil around the spillway that is threatening the control section (e.g. undermining) or dam/impoundment stability.	Level 3
	Spillway flow that is flooding people downstream.	Level 3
Embankment overtopping (see Table 4-2 for relevant elevations)	Impoundment water surface elevation at or below typical normal pool fluctuation elevation.	Level 0
	Impoundment water surface elevation above typical normal pool fluctuation elevation.	Level 1
	Impoundment water surface elevation above high normal pool fluctuation elevation.	Level 2
	Impoundment water surface elevation at or above embankment crest elevation.	Level 3
Seepage	New seepage areas in or near the dam/impoundment with clear flow.	Level 1
	New seepage areas with cloudy discharge or increasing flow rate.	Level 2
	Heavy seepage with active erosion, muddy flow, and/or sand boils.	Level 3
Sinkholes	Observation of new sinkhole in impoundment area or on embankment.	Level 2
	Rapidly enlarging sinkhole and/or whirlpool in the impoundment.	Level 3
Embankment cracking	New cracks in the embankment greater than ¼ inch wide without seepage.	Level 1
	Any crack in the embankment with seepage.	Level 2

Table 4-1. Guidance for Determining the Response Level

Event	Situation	Response Level
	Enlarging cracks with muddy seepage.	Level 3
Embankment movement	Visual signs of movement/slippage of the embankment slope.	Level 1
	Detectable active movement/slippage of the embankment slope or other related effects (tension cracking, bulges/heaves, etc.) that could threaten the integrity of the embankment.	Level 2
	Sudden or rapidly proceeding slides of the embankment slopes.	Level 3
Embankment Monitoring Equipment (piezometers, inclinometers, surface displacement mounts, etc.)	Instrumentation readings beyond historic normal.	Level 1
	Instrumentation readings indicate the embankment is susceptible to failure.	Level 2
	Instrumentation readings indicate embankment is at threshold of failure or is currently failing.	Level 3
Earthquake or other event	Measurable earthquake felt or reported on or within 100 miles of the impoundment.	Level 1
	Earthquake or other event resulting in visible damage to the impoundment or appurtenances.	Level 2
	Earthquake or other event resulting in uncontrolled release of water or materials from the impoundment.	Level 3
Security threat	Verified bomb threat or other physical threat that, if carried out, could result in damage to the impoundment.	Level 2
	Detonated bomb or other physical damage that has resulted in damage to the impoundment or appurtenances.	Level 3
Sabotage/ vandalism	Damage to impoundment or appurtenance with no impact to the functioning of the impoundment.	Level 1
	Modification to the impoundment or appurtenances that could adversely impact the functioning of the impoundment. This would include unauthorized operation of spillway facilities.	Level 2
	Damage to impoundment or appurtenances that has resulted in seepage flow.	Level 2
	Damage to impoundment or appurtenances that has resulted in uncontrolled water release.	Level 3

Table 4-2. Impoundment Trigger Elevations

Impoundment	Embankment Crest Elevation	Auxiliary Spillway Crest Elevation	Normal Pool Fluctuation	
			Typical	High
Coal Pile Runoff Pond	509 ft.	Not Applicable	506.9 ft.	507.5 ft.
D Basin	510 ft.	Not Applicable	None	None

Notes:

- Survey Data obtained from (Bathymetric and Aerial Topographic Map prepared for William H. Zimmer Power Station, prepared by S&ME and IBI Group – February, 2021)

Table 4-3. Step 3: Emergency Actions

Condition	Description of Condition	Action to be Taken
High Water Level/ Large Spillway Release	See Table 4-1 and Table 4-2 for elevations and triggering water levels associated with the impoundments and spillways covered by this EAP.	1. Assess cause of increased reservoir stage, especially during fair weather conditions. 2. Determine Response Level. 3. Make proper notifications as outlined in the Figure 2-2 Notification Flowchart. 4. Perform additional tasks as determined through consultation with the ERT. 5. Make notifications if condition worsens such that downstream flooding is imminent. **Response Level 0**: require enhanced surveillance 3 times per day **Response Level 1**: contact internal chain of command and external response partners as necessary; inspect impoundment minimum 1 time per hour **Response Level 2**: contact internal chain of command; notify ESDA/EMA's and notify external response partners. ESDA/EMA's notify affected parties. **Response Level 3**: contact internal chain of command; notify ESDA/EMA's and notify external response partners. ESDA/EMA's notify affected parties of emergency incident.

Table 4-3. Step 3: Emergency Actions

Condition	Description of Condition	Action to be Taken
Seepage	Localized new seepage or boil(s) observed along downstream face / toe of earthen embankment with muddy discharge and increasing but controllable discharge of water.	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes. 2. Determine Response Level. 3. Make proper notifications as outlined in the Figure 2-2 Notification Flowchart. 4. ERT (with Dam Safety Manager as lead) to determine mitigation actions. The following actions may apply: a) Place a ring of sand bags with a weir at the top towards the natural drainage path to monitor flow rate. If boil becomes too large to sand bag, place a blanket filter over the area using non-woven filter fabric and pea gravel. Attempt to contain flow in such a manner (without performing any excavations) that flow rates can be measured. Stockpile gravel and sand fill for later use, if necessary. b) Inspect the embankment and collect piezometer, water level and seepage flow data daily unless otherwise instructed by the Dam Safety Manager. Record any changes of conditions. Carefully observe embankment for signs of depressions, seepage, sinkholes, cracking or movement. c) Maintain continuous monitoring of feature. Record measured flow rate and any changes of condition, including presence or absence of muddy discharge. 5. Make notifications as outlined in the lower portion of the Notification Flowchart (Figure 2-2) if condition worsens such that failure is imminent.
Sabotage and Miscellaneous Other Issues	Criminal action with significant damage to embankment or structures where significant repairs are required and the integrity of the facility is compromised—condition appears stable with time.	1. Contact law enforcement authorities and restrict all access (except emergency responders) to impoundment. Restrict traffic on embankment crest to essential emergency operations only. 2. Determine Response Level. 3. Make internal notifications as outlined in the upper portion of the Notification Flowchart (Figure 2-2). 4. In conjunction with the Dam Safety Manager, assess extent of damage and visually inspect entire embankment and ancillary structures for additional less obvious damage. Based on inspection results, confirm if extent of damage to various components of the impoundment warrants a revised Response Level and additional notifications. 5. Perform additional tasks as directed by the ERT. 6. Make notifications if conditions worsen.

Table 4-3. Step 3: Emergency Actions

Condition	Description of Condition	Action to be Taken
Embankment Deformation	**Cracks:** New longitudinal (along the embankment) or transverse (across the embankment) cracks more than 6 inches deep or more than 3 inches wide or increasing with time. New concave cracks on or near the embankment crest associated with slope movement.	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes. 2. Restrict traffic on embankment crest to essential emergency operations only. 3. Determine Response Level. 4. Make notifications as outlined in the Figure 2-2 Notification Flowchart 5. ERT (with Dam Safety Manager as lead) to determine mitigation actions. The following actions may apply: a) Place buttress fill against base of slope immediately below surface feature. Stock pile additional fill. b) Place sand bags as necessary around crack area to divert any storm water runoff from flowing into crack(s). 6. As directed by the Dam Safety Manager, additional inspection and monitoring of the dam may be required. Items may include; inspect the dam on a schedule determined by the engineers; collect piezometer and water level data; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement. 7. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent.
Embankment Deformation (cont.)	**Slides / Erosion:** Deep slide / erosion (greater than 2 feet deep) on the embankment that may also extend beyond the embankment toe but does not encroach onto the embankment crest and appears stable with time.	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection report. 2. Restrict traffic on embankment crest to essential emergency operations only. 3. Determine the Response Level. 4. Make notifications as outlined in the Figure 2-2 Notification Flowchart. 5. ERT (with Dam Safety Manager as lead) to determine mitigation actions. Additional actions may include the following items. a) Place sand bags as necessary around slide area to divert any storm water runoff from flowing into slide(s). b) Increase inspections of the dam; collect piezometer and water level data; and record any changes of condition. During inspections,

Table 4-3. Step 3: Emergency Actions

Condition	Description of Condition	Action to be Taken
		carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement. 6. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent.
	Sinkholes: Small depression observed on the embankment or within 50 feet of the embankment toe that is less than 5 feet deep and 30 feet wide or which is increasing with time.	1. Slowly open drain gates to lower pool elevation. 2. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes. 3. Restrict traffic on embankment crest to essential emergency operations only. 4. Determine Response Level. 5. Make notifications as outlined in the Figure 2-2 Notification Flowchart. 6. ERT (with Dam Safety Manager as lead) to determine mitigation actions. Additional actions may include the following items: a) Backfill the depression with relatively clean earth fill (free of organic materials) generally even with surrounding grade and slightly mounded (6 to 12 inches higher) in the center in order to shed storm water away from the depression. Stock pile additional fill. b) Increase inspections of the dam; collect piezometer and water level data daily unless otherwise instructed by Dam Safety Manager; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement. 7. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent.

5 PREPAREDNESS

The intent of this section is to provide information that will be utilized during a response. Established emergency supplies and locations, suppliers, and equipment are provided in Table 5-1. Supplier contact information is listed in Table 5-2.

A coordination meeting shall be conducted annually between representatives of Zimmer Power Company LLC and local emergency responders. This meeting may be in the form of a face-to-face meeting, tabletop exercise, or additional training regarding the EAP.

Table 5-1. Emergency Supplies and Equipment

Item	On-site (Yes/No/Occasionally)	Remarks
Flashlights	Yes	At Zimmer Power Plant Maintenance Facility, contact Operations Shift Supervisor for location(s).
Generator		
Extension Cords		
Fire extinguishers		
Floodlights		
Backhoe	No	Contact the Nelson Stark Company, Utter Construction (see Table 5-2) and/or other nearby large equipment rental providers for additional large equipment as necessary.
Dozer	Yes	One CAT D8T and one CAT D6N. Contact Operations Shift Supervisor for location(s).
Large Equipment (Rental – including excavating equipment, pumps, lighting)	Yes	One Hyundai 290 Long Reach Excavator, one CAT 980H Rubber Tire Loader and one CAT IT28G Rubber Tire Loader, two 4000 gallon capacity water trucks, two 637G Motor Scrapers, one Chevy crew cab pickup truck, one New Holland LS125 Skid Steer, one Bobcat 463 Skid Steer, one POSI TRAK RC60 Skid Steer, one 84-inch hamm smooth drum roller, one 500 gallon fuel/lube wagon, three light plants, two industrial vacuum trucks, one John Boat, and an MV Pleasant. Contact Art's Rental, Utter Construction (see Table 5-2) and/or other nearby large equipment rental providers for additional large equipment as necessary.
Dump Truck	Yes	Six 35-ton Mountain Mack dump trucks. Contact Environmental Manager for location(s).
Pump and Hoses	Yes	Three Portable Water Pumps. Contact Shift Supervisor for availability and location(s). Contact Shift Supervisor for location(s). Contact Allied Technical Services or Art's Rental for high capacity portable pumps (see Table 5-2).
Sandbags and Sand	Yes	Soil stockpiled on-site. Contact Shift Supervisor for location(s). Contact Dayton Bag & Burlap or Max Katz Bag Company, Inc for additional sandbags (see Table 5-2).
Fill (Stone, aggregate, sand)	Yes	Medium sized aggregate available on-site. Contact Shift Supervisor for location(s). Contact listed suppliers in Table 5-2 for gravel, sand, and riprap fill as necessary.
Concrete/grout	No	Contact Ernst Concrete and/or City Wide Ready Mix for concrete/grout (see Table 5-2).
Geotextile Filter Fabric	No	
Plastic Sheeting	No	
Rope	No	
Personal Flotation Devices	Yes	Contact Operations Shift Supervisor for location(s) and availability.

Table 5-2. Supplier Addresses

Supply/Rental Item(s)	Supplier Contact Information	Distance from Site (miles)	Address
Backhoe, Large Equipment (Rental – including excavating equipment, pumps, lighting)	**Art's Rental** (513) 753-3957	18.2	3781 Bach-Buxton Road Amelia, OH 45102
	Utter Construction (513) 876-8616	11.1	1302 OH-133 Bethel, OH 45106
Pump and Hoses	**Allied Technical Services** (513) 793-0499	37.5	3460 Mustafa Drive Cincinnati, OH 45241
	Art's Rental (513)-753-3957	18.2	3781 Bach-Buxton Road Amelia, OH 45102
Fill (Stone, aggregate, sand)	**Hilltop Companies Kellogg Terminal** (513) 232-1755	17.6	6777 Kellogg Avenue Cincinnati, OH 45230
	Arch Materials LLC (513) 724-7625	24.5	4438 OH-276 Batavia, OH 45103
Sandbags and Sand	**Dayton Bag & Burlap** (937) 253-1726	76.4	322 Davis Avenue Dayton, OH 45403
	Max Katz Bag Company, Inc. (317) 635-9561	133	235 S La Salle Street Indianapolis, IN 46201
Concrete/grout	**Ernst Concrete** (513) 402-5001	23.8	4212 Curliss Lane Batavia, OH 45103
	City Wide Ready Mix (513) 533-1111	24.2	5623 Wooster Pike Cincinnati, OH 45226

6 FACILITY/IMPOUNDMENT DESCRIPTION

The impoundments included in this EAP are described as follows and illustrated in Figure 1-2. Table 6-1 contains additional geometric details for each impoundment.

Zimmer Power Plant is located to the north of the Village of Moscow in Monroe Township and Washington Township, Clermont County, Ohio. The plant is bounded to the west by the Ohio River, to the east by US 52, and to the south by the village of Moscow, approximately 22 miles to the southeast of downtown Cincinnati.

The Coal Pile Runoff Pond is part of the Wastewater Pond Complex and is located about 3,000 feet north of the power house. The Coal Pile Runoff Pond is a diked impoundment constructed from native soils excavated from the site (primarily clayey soils with low permeability) and sand dredged from the Ohio River. The pond was constructed in the late 1980s when the Zimmer Power Plant was converted into a coal fired operation facility. Including the embankment, the footprint of the Coal Pile Runoff Pond is approximately 4 acres. The total storage capacity of the Coal Pile Runoff Pond is approximately 18 acre-feet with a bottom elevation of approximately 498 feet. A normal pool within the Coal Pile Runoff Pond is maintained around 507 feet per a Topographic Survey conducted in 2021 (stored water volume of approximately 12.9 acre-feet).

The main inflow to the Coal Pile Runoff Pond is precipitation which is either falls directly on the pond or runs off the embankment. Additionally, flow from D Basin (runoff from the coal pile) is pumped from a sump located at an elevation of 482 feet along the west dike through two 6-inch diameter high density polyethylene (HDPE) pipes into the Coal Pile Runoff Pond. The Wastewater Pond Complex discharge to the Ohio River is permitted as Outfall 005 under OEPA Permit #1IB00011*JD and NPDES permit #OH0048836.

D Basin is a diked impoundment. Drawing files indicate that D Basin was constructed after 2002 as a dewatering basin. Including the embankment, the footprint of D Basin is approximately 9 acres. A normal pool within the D Basin is maintained around 489 feet per a Topographic Survey conducted in 2021 The lowest crest elevation of the impoundment is approximately 508 feet per the 2021 Topographic Survey. The crest is approximately 53 feet above the normal pool elevation of the Ohio River. Flow from D Basin is pumped along the west dike through a 6-inch diameter pipe into the Coal Pile Runoff Pond to the north.

Table 6-1. Plant Impoundment Characteristics

Feature/Parameter	Coal Pile Runoff Pond	D Basin
Maximum Embankment Height	15 ft.	7 ft.
Length of Dam	1,600 ft.	2,600 ft.
Crest Width	20 ft to 60 ft.	20 ft.
Crest Elevation	509 ft.	510 ft.
Reservoir Area at Top of Dam	2.6 acres	5.2 acres
Storage Capacity at Top of Dam	18 acre-ft.	4 acre-ft.
Primary Spillway Type	2 x 12” Pipes	Sump Pump to 6-inch Pipe
Primary Spillway Crest Elevation	Approximately 506.4 and 506.6 ft. for each 12” pipe, respectively	Not Applicable
Storage Capacity at Primary Spillway Elevation	Approximately 12 acre-ft.	Not Applicable
Reservoir Area at Normal Water Surface Elevation	2.3 acres	Not Applicable
Auxiliary Spillway Type	Not Applicable	Not Applicable
Auxiliary Spillway Crest Elevation	Not Applicable	Not Applicable

Notes:

- Survey Data obtained from (Bathymetric and Aerial Topographic Map prepared for William H. Zimmer Power Station, prepared by S&ME and IBI Group – February, 2021)
- 2.5-Feet Resolution LiDAR DEM - Downloaded from http://ogrip.oit.ohio.gov/ (January, 2016)
- Elevations are in reference to Mean Sea Level (MSL), NAVD88.

7 BREACH INUNDATION MAPS AND POTENTIAL IMPACTS

Inundation maps for the Coal Pile Runoff Pond and D Basin potential breach scenarios are provided in this section. It is the Clermont County ESDA/EMA's responsibility to keep a current list of affected parties/properties to contact in the case of emergencies that result in Response Level 2 or 3. This list should encompass all properties within and adjacent to the probable inundation extents shown in the provided maps.

The methodology used to identify probable inundation extents for potential breach scenarios varied as a function of the impoundment size, location, surrounding topography, and surrounding structures/facilities/waterbodies.

A visual analysis was performed for the Coal Pile Runoff Pond and D Basin to determine possible inundation limits for each breach scenario. The inundation limits were mapped using a combination of digital elevation data from the topographic survey prepared by ESP Associates, P.A. – September, 2014 and DEM data downloaded from the Ohio OGRIP website. Stage-storage capacity was considered when the impoundment could breach into an adjacent basin.

Approximate inundation areas are illustrated in Figure 7-1 and Figure 7-2.

Figure 7-1. Coal Pile Runoff Pond Inundation Map

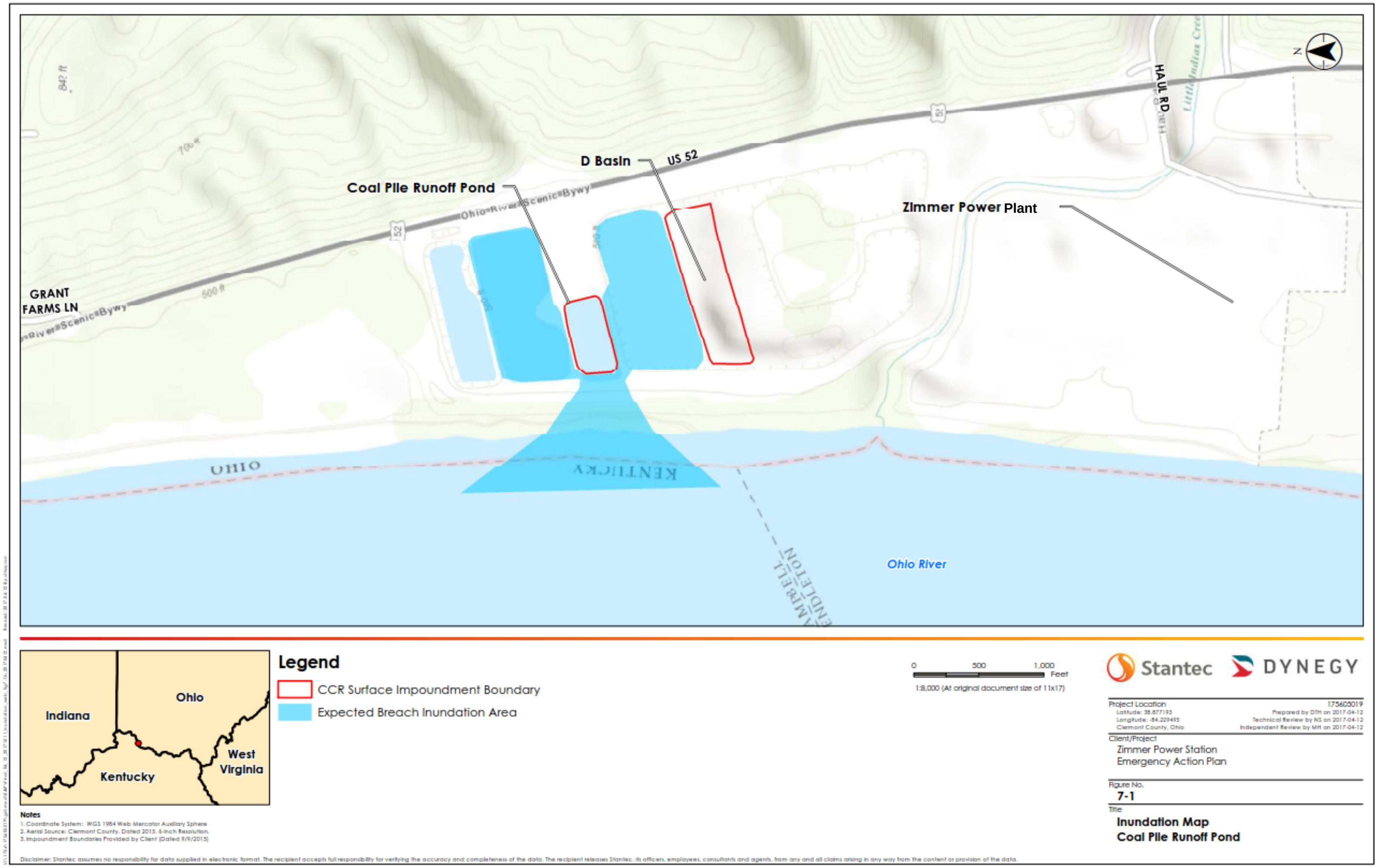
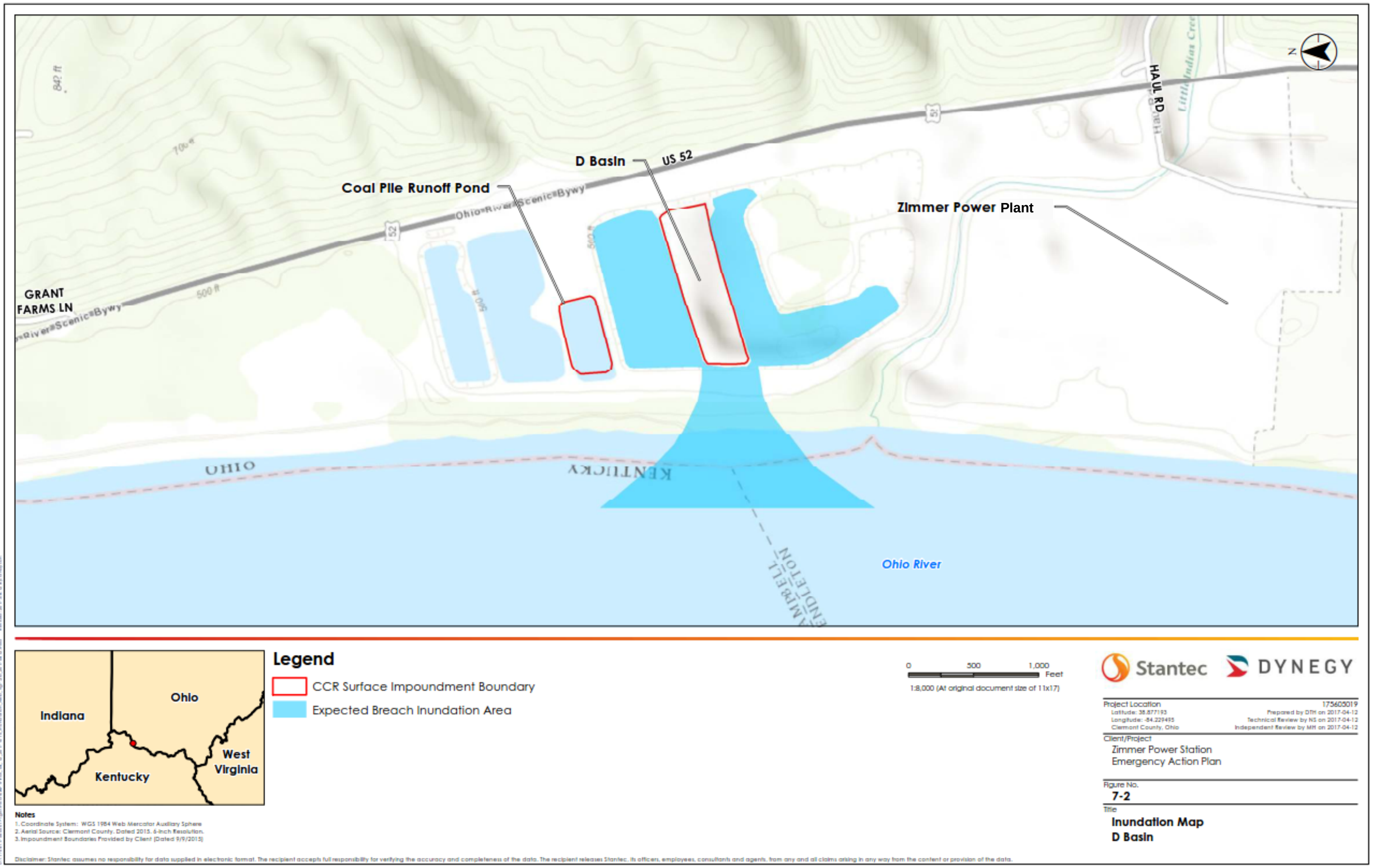


Figure 7-2. D Basin Inundation Map



Attachment D

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

September 2021

Zimmer Power Company LLC
1781 US Route 52
Moscow, Ohio 45153

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

At the request of Zimmer Power Company LLC (ZPC), Geosyntec Consultants (Geosyntec) has prepared this Letter to documents updates to the Initial History of Construction (HoC) report for the Zimmer Power Plant (ZPP), also known as the Zimmer Power Station (ZIM). 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].

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 ZPP, which included the existing CCR surface impoundment, the Coal Pile Runoff Pond (CPRP), was prepared and subsequently posted to ZPC'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).

ZPC retained Geosyntec to review the Initial HoC report, review reasonably and readily available information for the CPRP generated since the Initial HoC report was prepared, and perform a site visit to ZPP 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 the CPRP and ZPP, as they pertain the requirements of §257.73(c)(1)(i)-(xii).

UPDATES TO HISTORY OF CONSTRUCTION REPORT

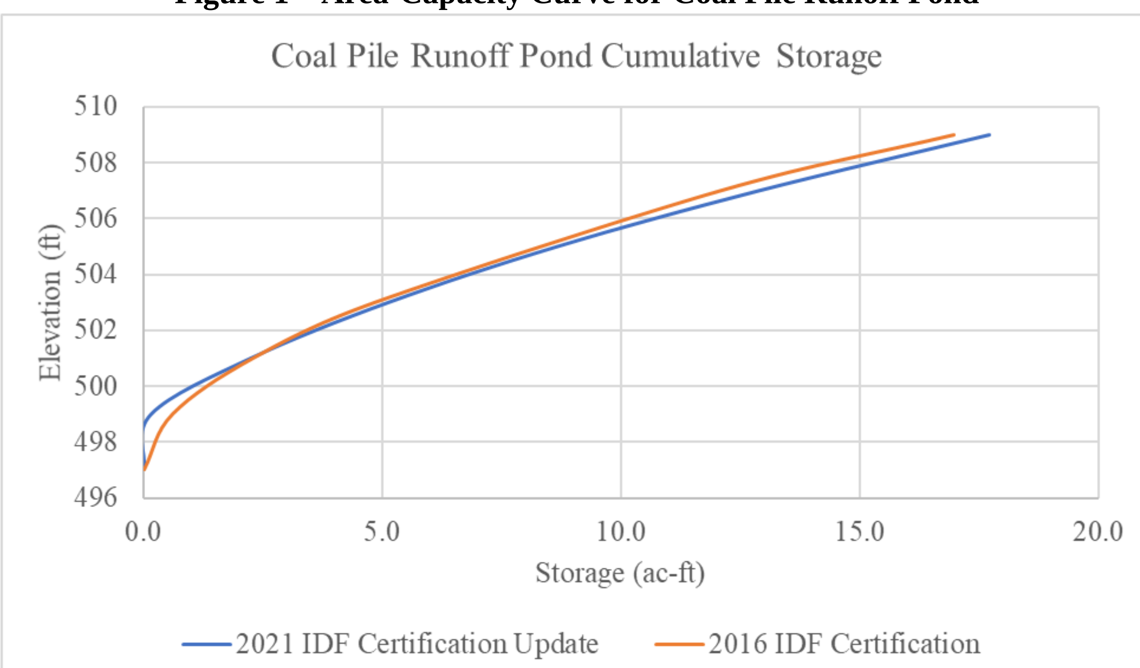
Geosyntec's evaluation for the ZPP CPRP determined that no known significant changes requiring updates to the information in the Initial HoC report pertaining to §257.73(c)(1)(i)-(viii) and (x)-(xii) of the CCR Rule had occurred since the Initial HoC report was developed.

However, Geosyntec's evaluation determined that significant changes at the ZPP CPRP pertaining to §257.73(c)(1)(ix) of the CCR Rule had occurred since the Initial HoC report had been developed. The change and the subsequent updates to the Initial HoC report is described within this section.

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

Updated area-capacity curves were prepared for the north and south sub-basins of the CPRP in 2021. These curves are provided in **Figures 1** and **2**.

Figure 1 – Area-Capacity Curve for Coal Pile Runoff Pond



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

Updated discharge capacity calculations for the existing spillways were prepared in 2021 using HydroCAD 10 modeling software. The calculations indicate that the CPRP 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 1**.

Table 1 – Results of Updated Discharge Capacity Calculations

	Coal Pile Runoff Pond
Approximate Berm Minimum Elevation[1], ft	509.0
Approximate Emergency Spillway Elevation[1], ft	Not Applicable
Starting Water Surface Elevation[1] (SWSE), ft	506.9
Peak Water Surface Elevation[1] (PWSE), ft	508.2
Time to Peak, hr	14.0
Surface Area[2], ac	2.5
Storage[3], ac-ft	3.1

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

CLOSING

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

Sincerely,

Panos Andonyadis, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

REFERENCES

[1] AECOM, "History of Construction, USEPA 40 CFR § 257.73(c), Zimmer Power Station, Moscow, Ohio," October 2016.

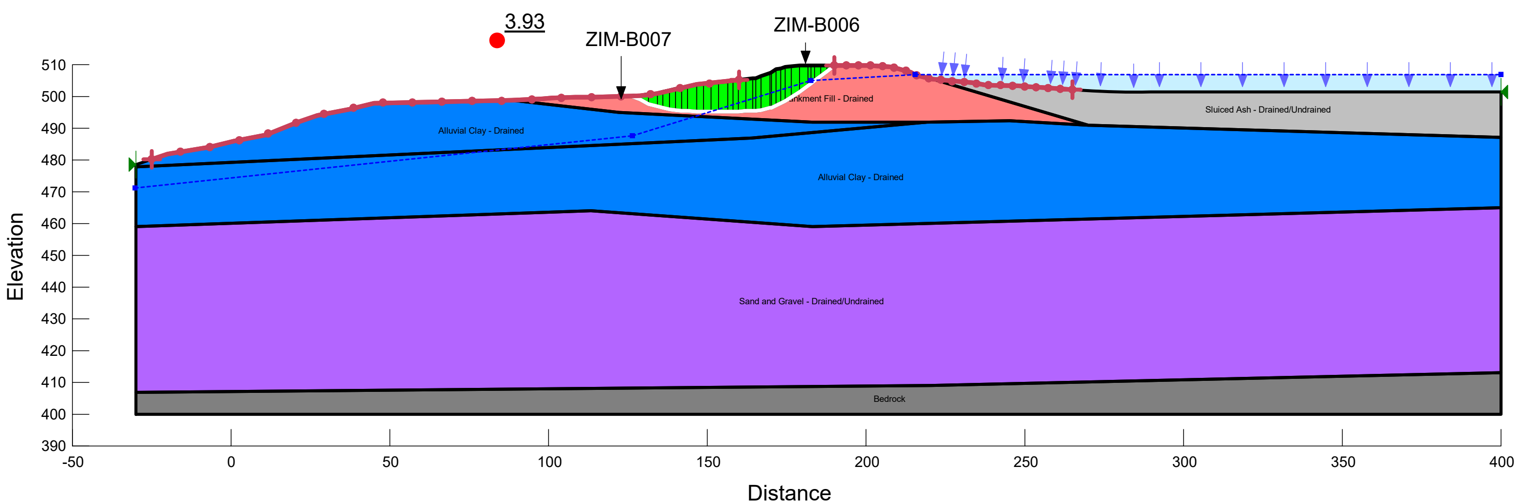
[2] United Stated Environmental Protection Agency, "40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 2015," 2015.

Attachment E

Periodic Structural Stability and Safety Factor Assessment Analyses

Zimmer Power Plant
Moscow, Ohio

Static Global (Drained Strengths)
Cross-Section 1
Coal Pile Runoff Pond, West Embankment



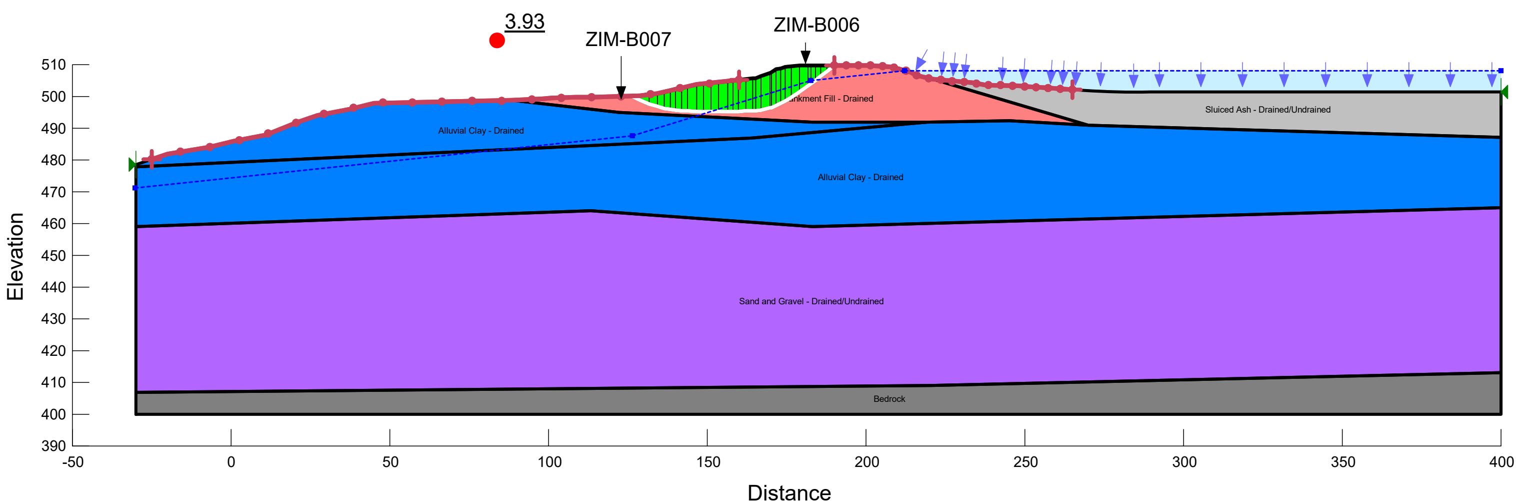
Material Properties

Name: Embankment Fill - Drained Unit Weight: 128 pcf Cohesion': 50 psf Phi': 30 ° Piezometric Line: 1
Name: Alluvial Clay - Drained Unit Weight: 128 pcf Cohesion': 200 psf Phi': 30 ° Piezometric Line: 1
Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1
Name: Bedrock Piezometric Line: 1
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Piezometric Line: 1

\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\510_ZIM\510d_Full_Cert_Rpt\CPRP Report\FinalDraft\Attachments\Revised SFA\Re-runs 2021\CPRP\Section 1\ Section 1West Dike CPRP_09232021_PK.gsz

Zimmer Power Plant
Moscow, Ohio

Maximum Surcharge Pool (Drained Strengths)
Cross-Section 1
Coal Pile Runoff Pond, West Embankment



Material Properties

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Name: Alluvial Clay - Drained Unit Weight: 128 pcf Cohesion': 200 psf Phi': 30 °
Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °

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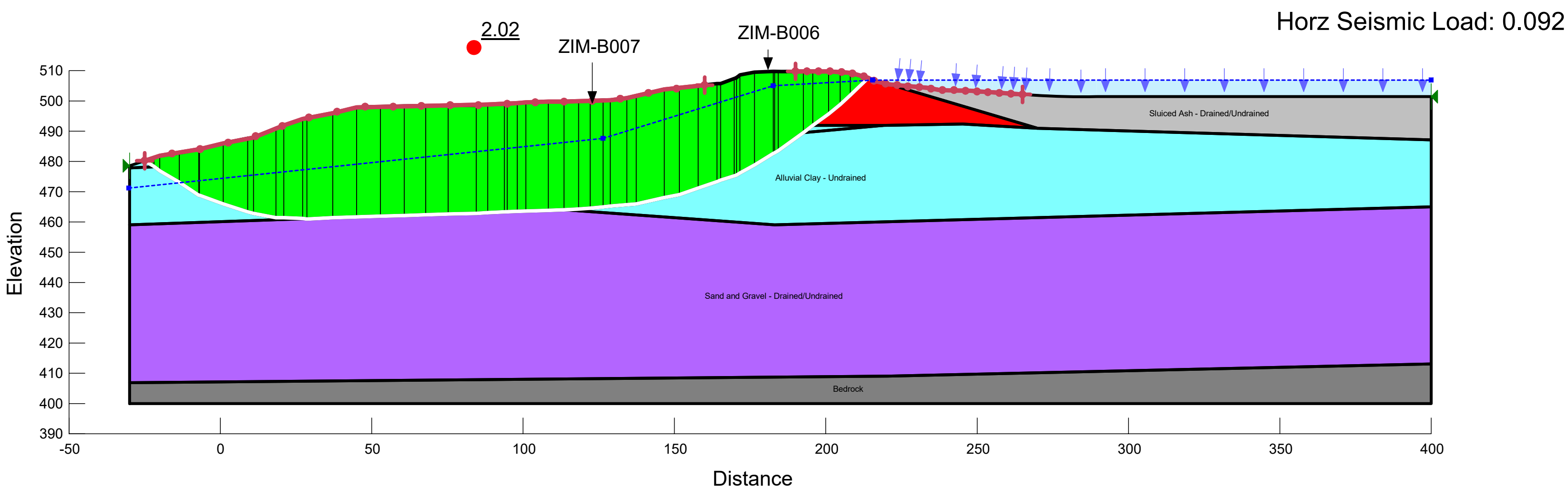
Zimmer Power Plant
Moscow, Ohio

Pseudo Static (Peak Undrained Strengths)
Cross-Section 1
Coal Pile Runoff Pond, West Embankment



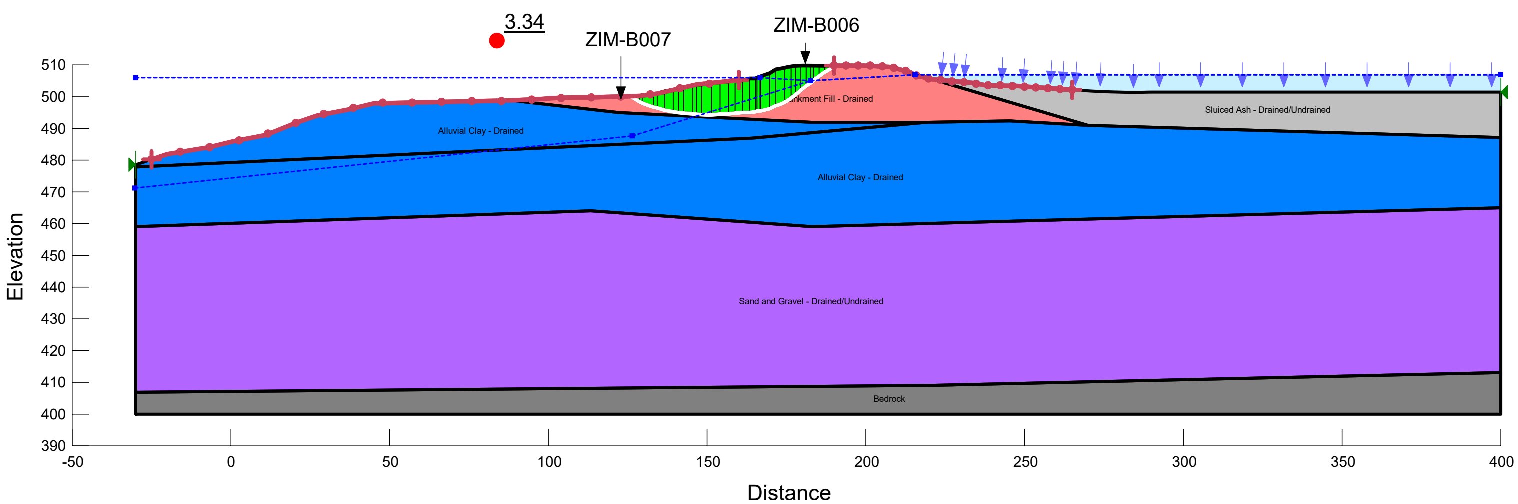
Material Properties

Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1
Name: Bedrock Piezometric Line: 1
Name: Alluvial Clay - Undrained Unit Weight: 128 pcf Cohesion': 600 psf Phi': 16 ° Piezometric Line: 1
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Piezometric Line: 1
Name: Embankment Fill - Undrained Unit Weight: 128 pcf Cohesion': 225 psf Phi': 20 ° Piezometric Line: 1

\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\510_ZIM\510d_Full_Cert_Rpt\CPRP Report\FinalDraft\Attachments\Revised SFA\Re-runs 2021\CPRP\Section 1\ Section 1West Dike CPRP_09232021_PK.gsz

Zimmer Power Plant
Moscow, Ohio

Sudden Drawdown (Drained Strengths)
Cross-Section 1
Coal Pile Runoff Pond, West Embankment



Material Properties

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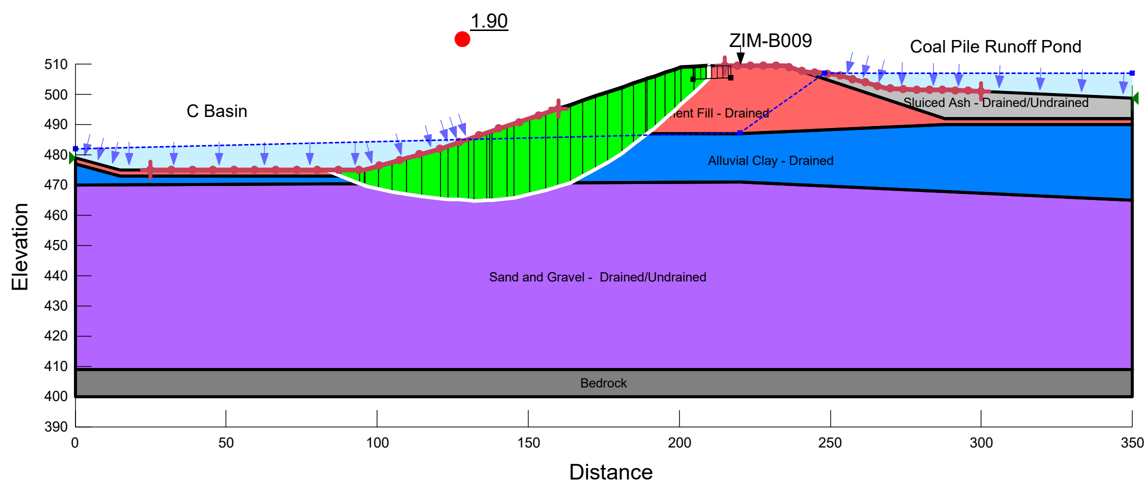
Name: Alluvial Clay - Drained Unit Weight: 128 pcf Cohesion': 200 psf Phi': 30 ° Cohesion R: 600 psf Phi R: 16 °
Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 0 psf Phi R: 31 °
Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Cohesion R: 0 psf Phi R: 28 °

\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\510_ZIM\510d_Full_Cert_Rpt\CPRP Report\FinalDraft\Attachments\Revised SFA\Re-runs 2021\CPRP\Section 1\ Section 1West Dike CPRP_09232021_PK.gsz

Zimmer Power Plant
Moscow, Ohio

Static Global (Drained Strengths)
Cross-Section 2
Coal Pile Runoff Pond, South Embankment



Material Properties

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Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °

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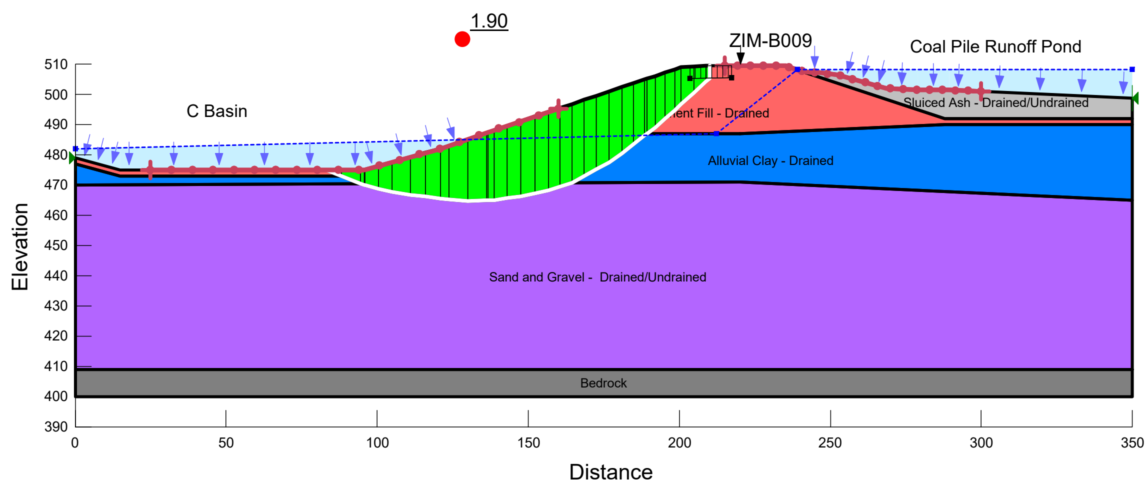
Zimmer Power Plant
Moscow, Ohio

Maximum Surcharge Pool (Drained Strengths)
Cross-Section 2
Coal Pile Runoff Pond, South Embankment



Material Properties

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Name: Alluvial Clay - Drained Unit Weight: 128 pcf Cohesion': 200 psf Phi': 30 °
Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °

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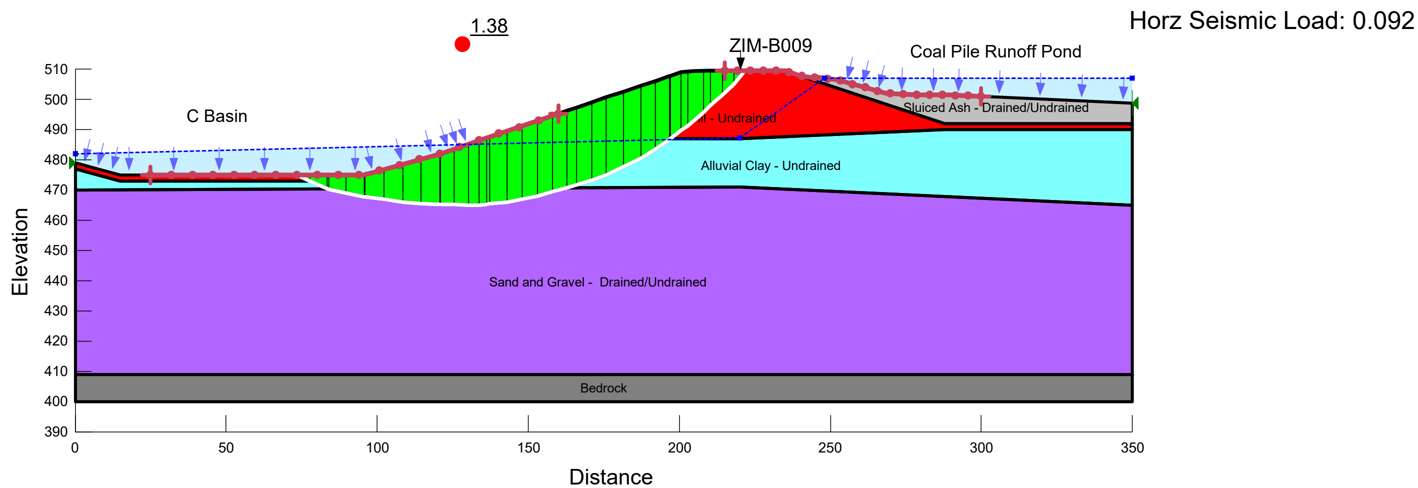
Zimmer Power Plant
Moscow, Ohio

Pseudo Static (Peak Undrained Strengths)
Cross-Section 2
Coal Pile Runoff Pond, South Embankment



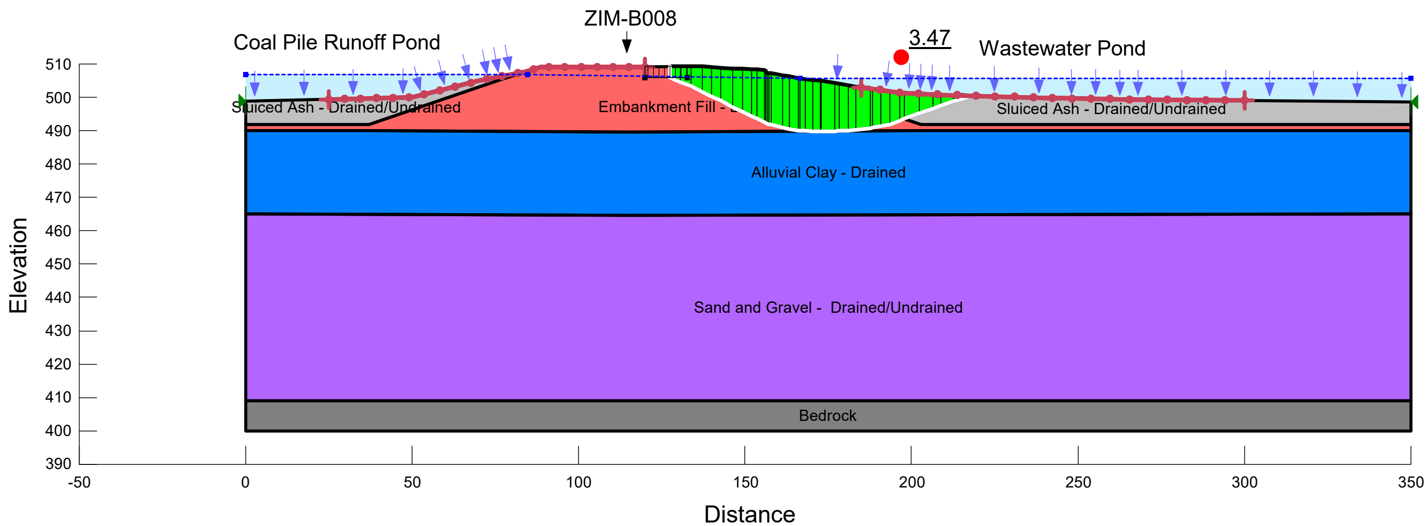
Material Properties

Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Alluvial Clay - Undrained Unit Weight: 128 pcf Cohesion': 600 psf Phi': 16 °
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °
Name: Embankment Fill - Undrained Unit Weight: 128 pcf Cohesion': 225 psf Phi': 20 °

\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\510_ZIM\510d_Full_Cert_Rpt\CPRP Report\FinalDraft\Attachments\Revised SFA\Re-runs 2021\CPRP\Section 2\ Section 2 South Dike CPRP_09232021_PK.gs

Zimmer Power Plant
Moscow, Ohio

Static Global (Drained Strengths)
Cross-Section 3
Coal Pile Runoff Pond, North Divider Dike



Material Properties

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Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °

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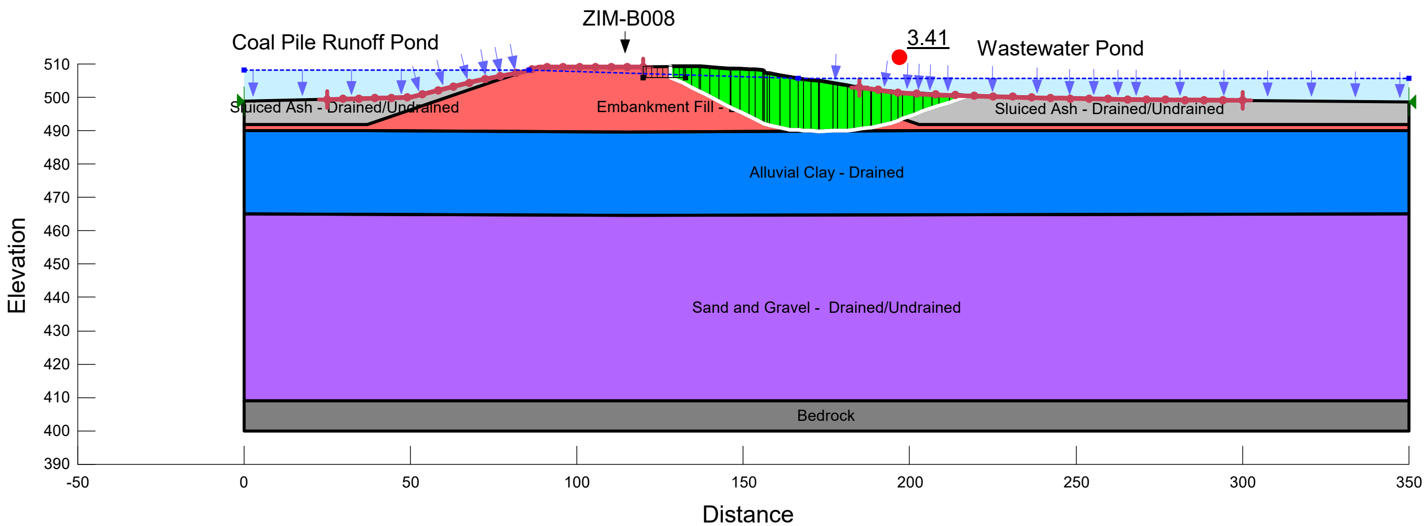
Zimmer Power Plant
Moscow, Ohio

Maximum Surcharge Pool (Drained Strengths)
Cross-Section 3
Coal Pile Runoff Pond, North Divider Dike



Material Properties

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Name: Alluvial Clay - Drained Unit Weight: 128 pcf Cohesion': 200 psf Phi': 30 °
Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °

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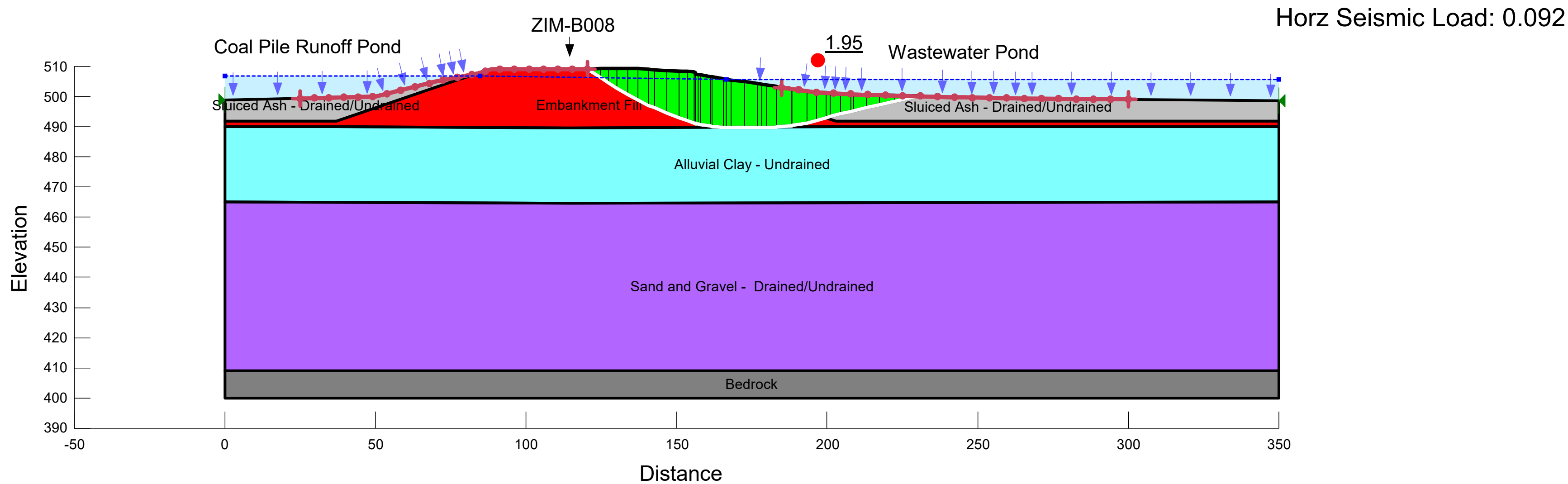
Zimmer Power Plant
Moscow, Ohio

Pseudo Static (Peak Undrained Strengths)
Cross-Section 3
Coal Pile Runoff Pond, North Divider Dike



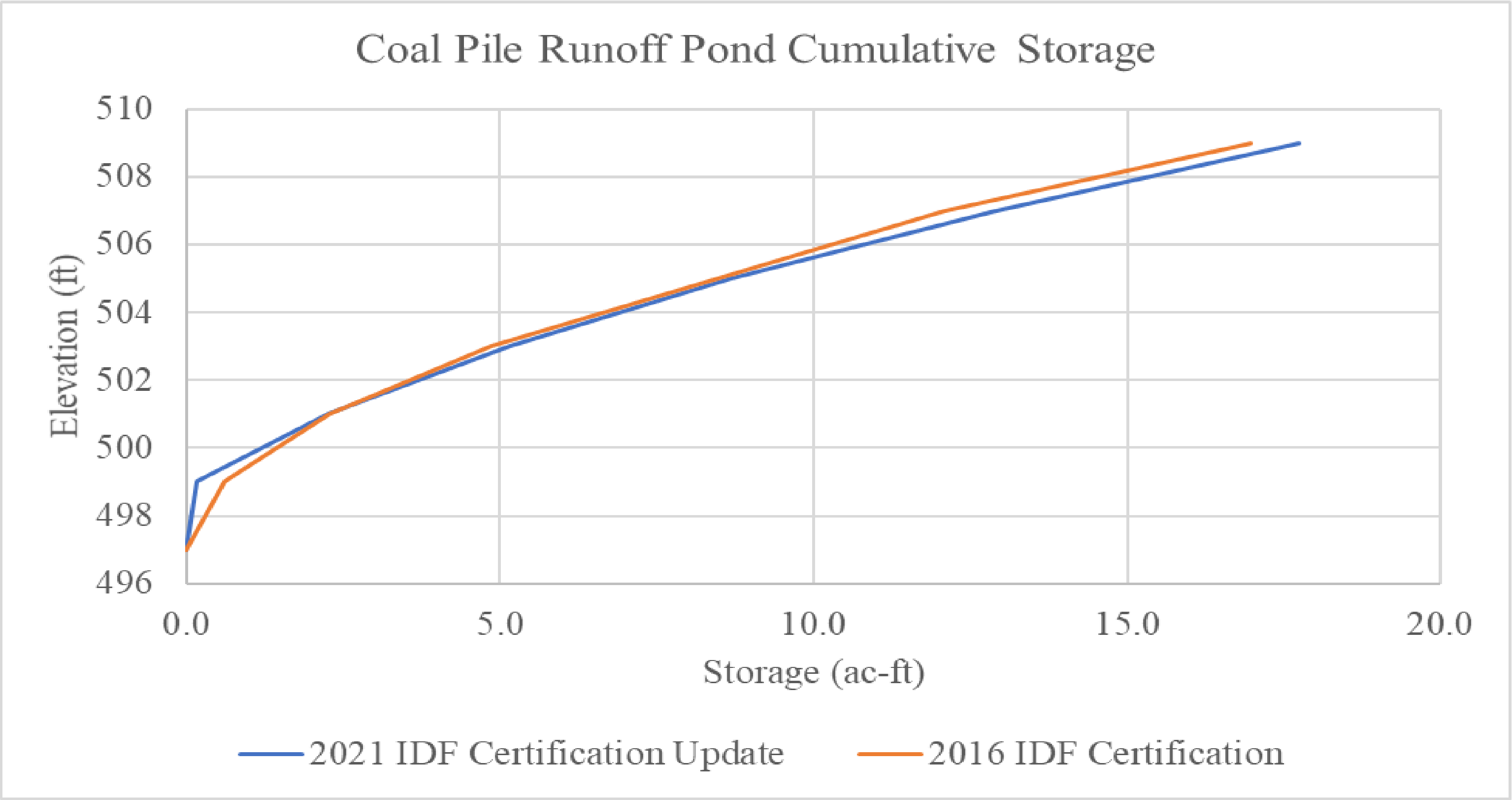
Material Properties

Name: Sand and Gravel - Drained/Undrained Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 °
Name: Bedrock
Name: Alluvial Clay - Undrained Unit Weight: 128 pcf Cohesion': 600 psf Phi': 16 °
Name: Sluiced Ash - Drained/Undrained Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 °
Name: Embankment Fill - Undrained Unit Weight: 128 pcf Cohesion': 225 psf Phi': 20 °

\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\510_ZIM\510d_Full_Cert_Rpt\CPRP Report\FinalDraft\Attachments\Revised SFA\Re-runs 2021\CPRP\Section 3\ Section 3_3' North Dike CPRP_09232(

Attachment F

Periodic Inflow Design Flood Control System Plan Analyses

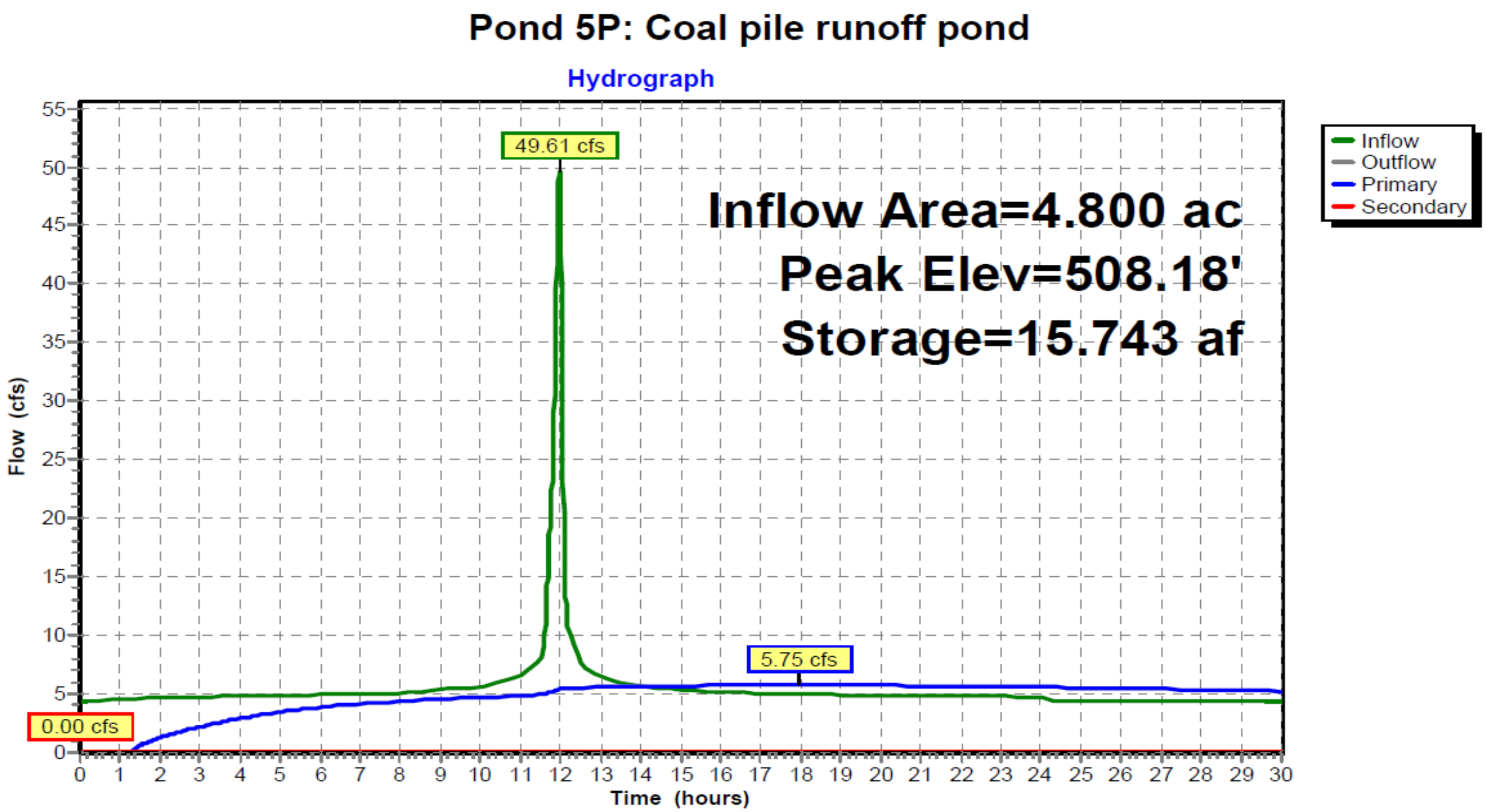


COAL PILE RUNOFF POND CUMULATIVE STORAGE
PERIODIC CERTIFICATION
ZIMMER POWER STATION
MOSCOW, OHIO

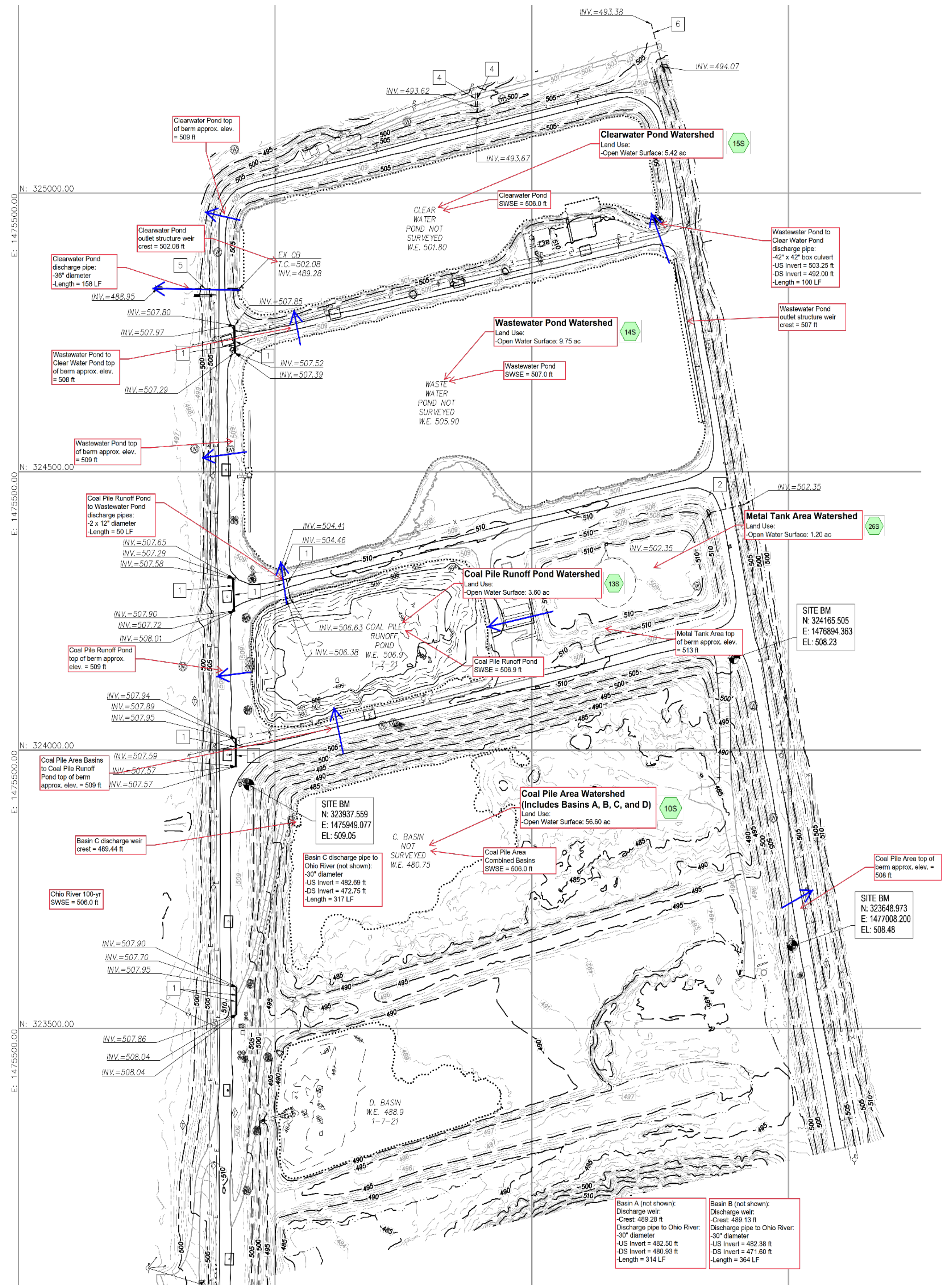
Geosyntec consultants

Figure

F-1



COAL PILE RUNOFF POND IDF HYDROGRAPH PERIODIC CERTIFICATION ZIMMER POWER STATION MOSCOW, OHIO		
Geosyntec consultants		Figure F-2
GLP8027	9/24/2021	



N

→ Sub-catchment discharge location (approximate)

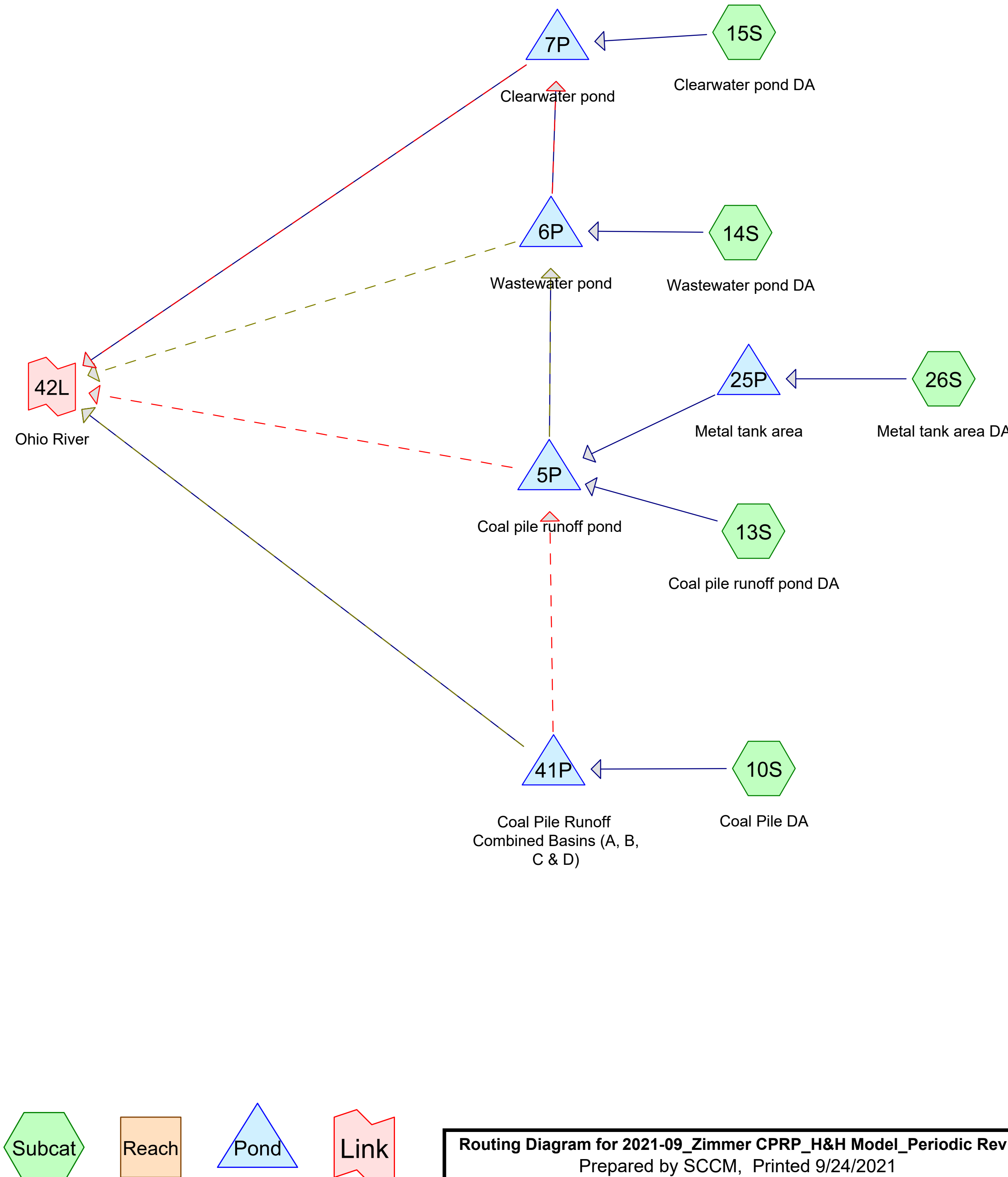
Note:

Basins A, B, C and D were modeled as a single node with outlet structures corresponding to each basin. This is an approximation of the system; however, the combined system does not impact the CPRP during the IDF.

Figure based on S&ME and IBI Group 2021 Site Topo

NOT FOR CONSTRUCITON - NOT TO SCALE

Zimmer Power Station Coal Pile Runoff Pond Hydrologic Workmap	
Geosyntec consultants	**Figure**
GLP8026	September 2021
	F-3



Routing Diagram for 2021-09_Zimmer CPRP_H&H Model_Periodic Review

Prepared by SCCM, Printed 9/24/2021

HydroCAD® 10.00-26 s/n 00928 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
56.600	98	(10S)
19.970	98	Water Surface, HSG C (13S, 14S, 15S, 26S)
76.570	**98**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
19.970	HSG C	13S, 14S, 15S, 26S
0.000	HSG D	
56.600	Other	10S
76.570		**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	56.600	56.600		10S
0.000	0.000	19.970	0.000	0.000	19.970	Water Surface	13S, 14S, 15S, 26S
0.000	**0.000**	**19.970**	**0.000**	**56.600**	**76.570**	**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	5P	506.38	504.41	50.0	0.0394	0.010	12.0	0.0	0.0
2	5P	506.63	504.46	50.0	0.0434	0.010	12.0	0.0	0.0
3	6P	503.25	492.00	100.0	0.1125	0.012	42.0	42.0	0.0
4	7P	489.28	488.95	158.0	0.0021	0.012	36.0	0.0	0.0
5	41P	482.50	480.93	314.0	0.0050	0.025	30.0	0.0	0.0
6	41P	482.38	471.60	364.0	0.0296	0.025	30.0	0.0	0.0
7	41P	482.69	472.75	317.0	0.0314	0.025	30.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Coal Pile DA Runoff Area=56.600 ac 100.00% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=98 Runoff=710.60 cfs 40.326 af

Subcatchment 13S: Coal pile runoff pond Runoff Area=3.600 ac 100.00% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=98 Runoff=45.20 cfs 2.565 af

Subcatchment 14S: Wastewater pond DA Runoff Area=9.750 ac 100.00% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=98 Runoff=122.41 cfs 6.947 af

Subcatchment 15S: Clearwater pond DA Runoff Area=5.420 ac 100.00% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=98 Runoff=68.05 cfs 3.862 af

Subcatchment 26S: Metal tank area DA Runoff Area=1.200 ac 100.00% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=98 Runoff=15.07 cfs 0.855 af

Pond 5P: Coal pile runoff pond Peak Elev=508.18' Storage=15.743 af Inflow=49.61 cfs 13.502 af
Primary=5.75 cfs 11.529 af Secondary=0.00 cfs 0.000 af Outflow=5.75 cfs 11.529 af

Pond 6P: Wastewater pond Peak Elev=507.63' Storage=60.902 af Inflow=153.04 cfs 80.976 af
Primary=35.51 cfs 78.989 af Secondary=0.00 cfs 0.000 af Tertiary=0.00 cfs 0.000 af Outflow=35.51 cfs 78.989 af

Pond 7P: Clearwater pond Peak Elev=507.28' Storage=36.159 af Inflow=99.71 cfs 82.850 af
Primary=38.57 cfs 79.670 af Secondary=0.00 cfs 0.000 af Outflow=38.57 cfs 79.670 af

Pond 25P: Metal tank area Peak Elev=508.54' Storage=0.855 af Inflow=15.07 cfs 0.855 af
Outflow=0.00 cfs 0.000 af

Pond 41P: Coal Pile Runoff Combined Peak Elev=506.81' Storage=443.717 af Inflow=710.60 cfs 40.326 af
Primary=29.68 cfs 38.237 af Secondary=0.00 cfs 0.000 af Tertiary=0.00 cfs 0.000 af Outflow=29.68 cfs 38.237 af

Link 42L: Ohio River Inflow=68.15 cfs 117.907 af
Primary=68.15 cfs 117.907 af

Total Runoff Area = 76.570 ac Runoff Volume = 54.555 af Average Runoff Depth = 8.55"
0.00% Pervious = 0.000 ac 100.00% Impervious = 76.570 ac

Summary for Subcatchment 10S: Coal Pile DA

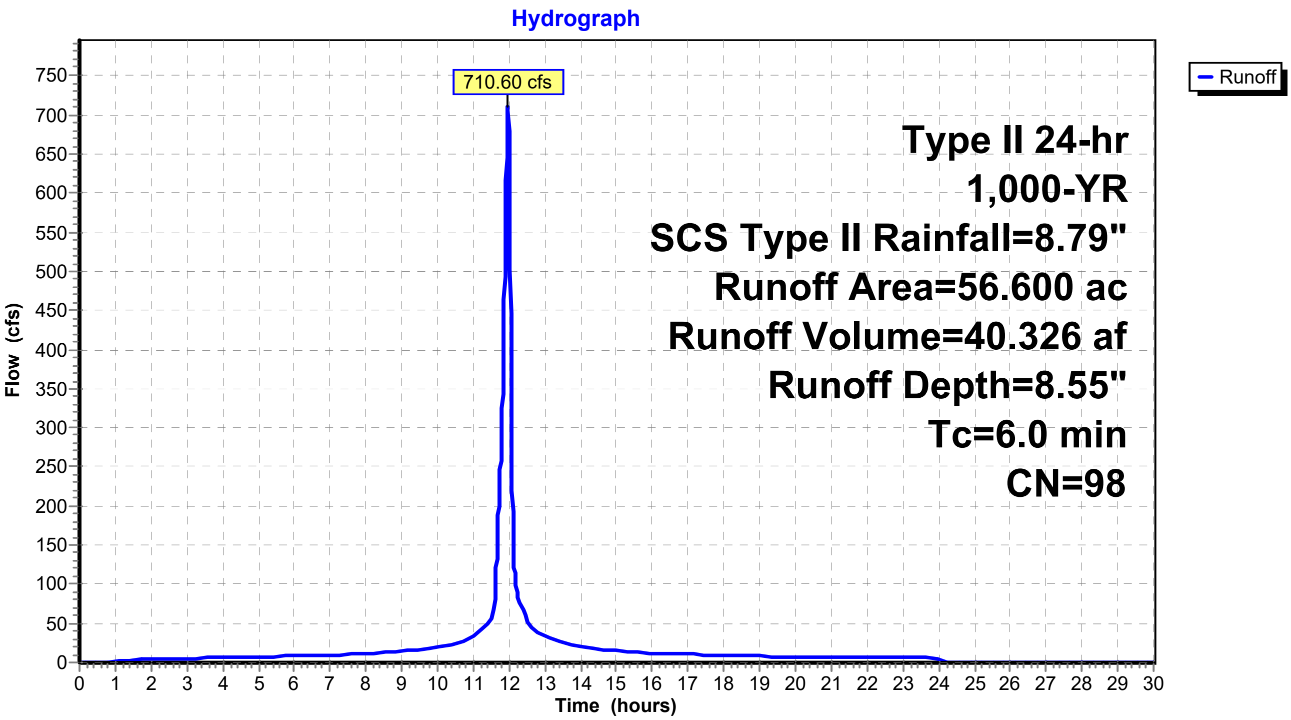
Runoff = 710.60 cfs @ 11.97 hrs, Volume= 40.326 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1,000-YR, SCS Type II Rainfall=8.79"

	Area (ac)	CN	Description
*	56.600	98	
	56.600		100.00% Impervious Area

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

Subcatchment 10S: Coal Pile DA



Summary for Subcatchment 13S: Coal pile runoff pond DA

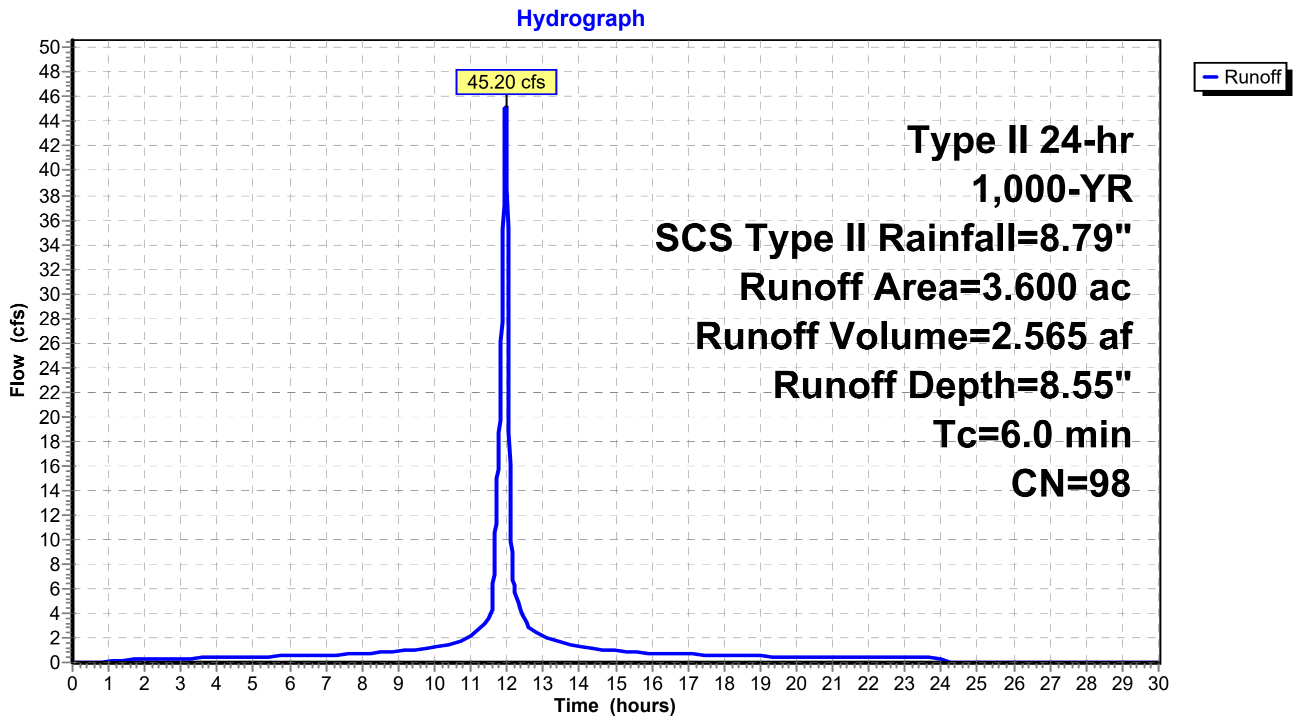
Runoff = 45.20 cfs @ 11.97 hrs, Volume= 2.565 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1,000-YR, SCS Type II Rainfall=8.79"

Area (ac)	CN	Description
3.600	98	Water Surface, HSG C
3.600		100.00% Impervious Area

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

Subcatchment 13S: Coal pile runoff pond DA



Summary for Subcatchment 14S: Wastewater pond DA

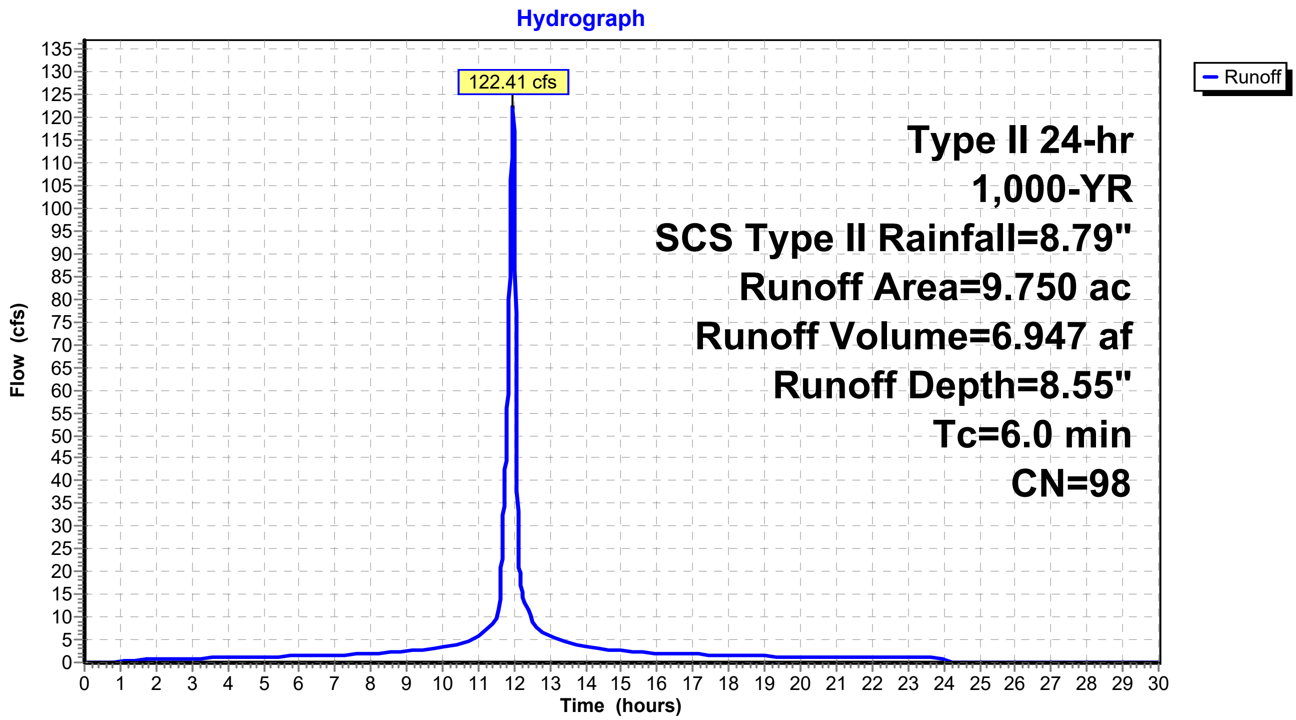
Runoff = 122.41 cfs @ 11.97 hrs, Volume= 6.947 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1,000-YR, SCS Type II Rainfall=8.79"

Area (ac)	CN	Description
9.750	98	Water Surface, HSG C
9.750		100.00% Impervious Area

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

Subcatchment 14S: Wastewater pond DA



Summary for Subcatchment 15S: Clearwater pond DA

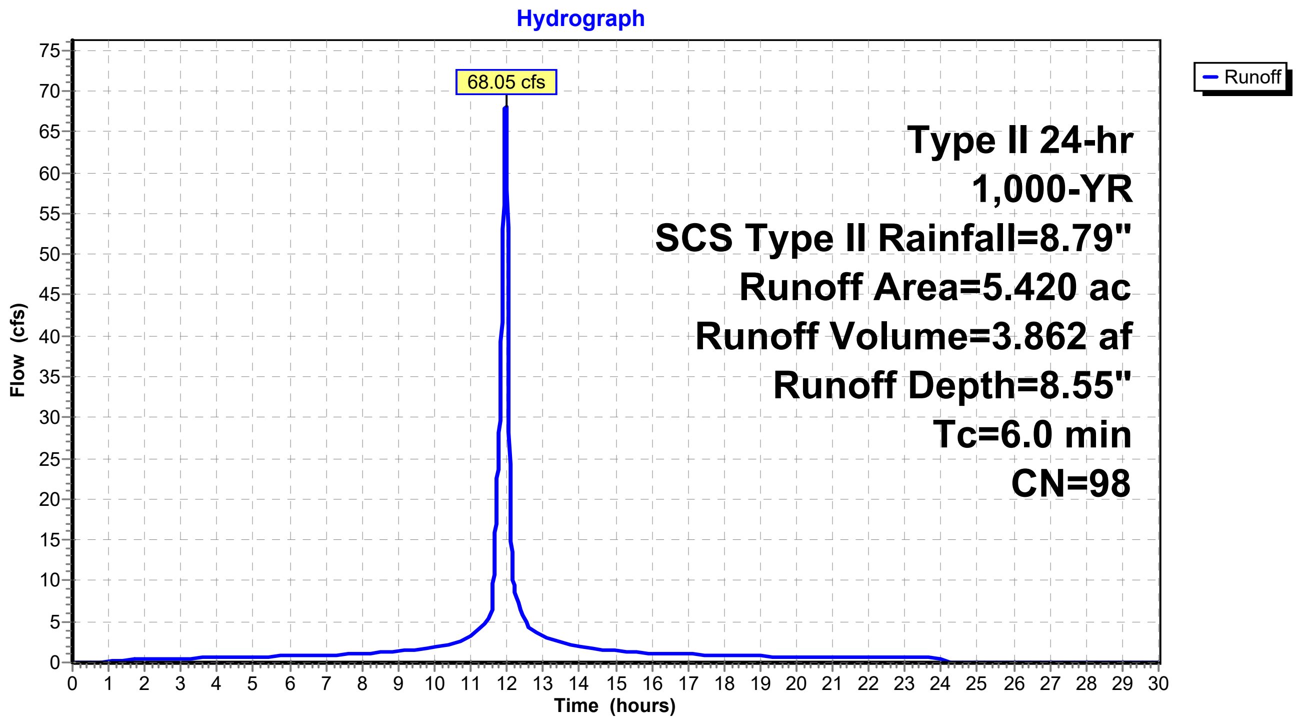
Runoff = 68.05 cfs @ 11.97 hrs, Volume= 3.862 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1,000-YR, SCS Type II Rainfall=8.79"

Area (ac)	CN	Description
5.420	98	Water Surface, HSG C
5.420		100.00% Impervious Area

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

Subcatchment 15S: Clearwater pond DA



Summary for Subcatchment 26S: Metal tank area DA

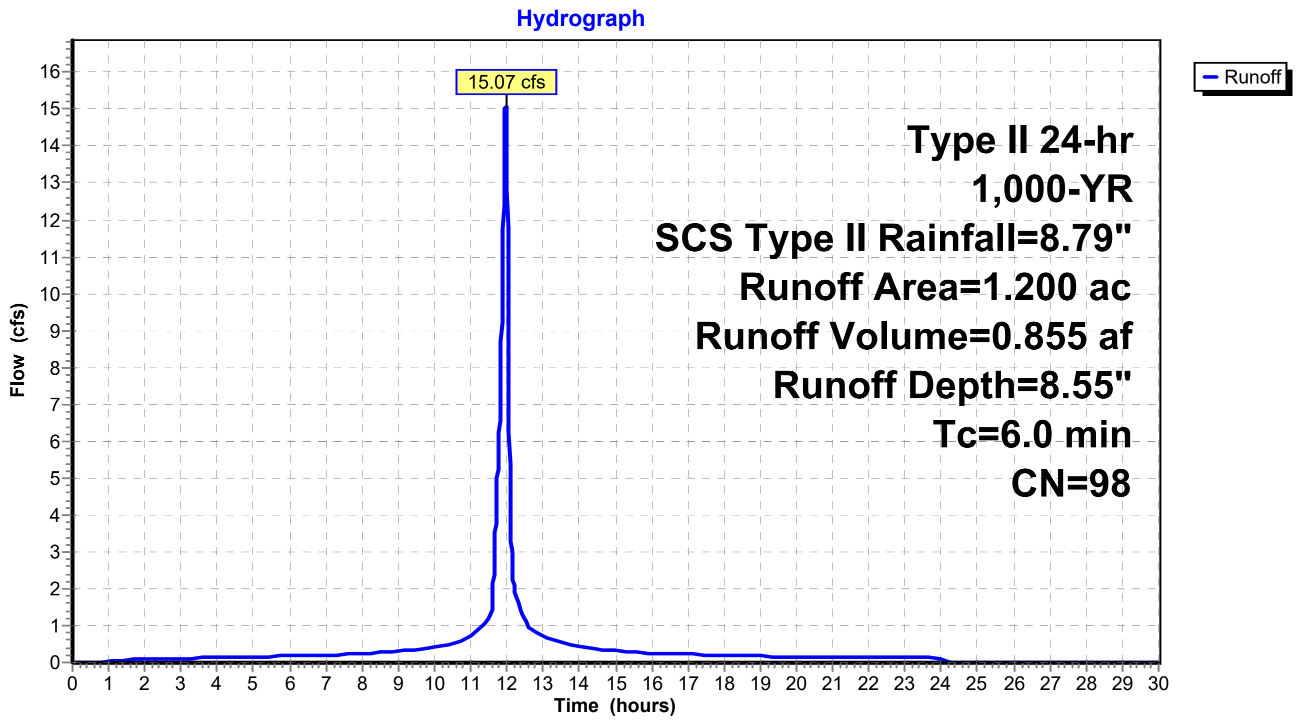
Runoff = 15.07 cfs @ 11.97 hrs, Volume= 0.855 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1,000-YR, SCS Type II Rainfall=8.79"

Area (ac)	CN	Description
1.200	98	Water Surface, HSG C
1.200		100.00% Impervious Area

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

Subcatchment 26S: Metal tank area DA



Summary for Pond 5P: Coal pile runoff pond

Estimated flow to CPRP = 4.41 cfs
3 cfs max from Landfill
1 cfs max from Coal Pile Basins
0.41 cfs max chemical metal cleaning waste treatment tank

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[92] Warning: Device #3 is above defined storage

Inflow Area = 4.800 ac,100.00% Impervious, Inflow Depth > 33.76" for 1,000-YR, SCS Type II event
Inflow = 49.61 cfs @ 11.97 hrs, Volume= 13.502 af, Incl. 4.41 cfs Base Flow
Outflow = 5.75 cfs @ 17.96 hrs, Volume= 11.529 af, Atten= 88%, Lag= 359.6 min
Primary = 5.75 cfs @ 17.96 hrs, Volume= 11.529 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Starting Elev= 506.90' Surf.Area= 0.000 ac Storage= 12.687 af
Peak Elev= 508.18' @ 14.03 hrs Surf.Area= 0.000 ac Storage= 15.743 af (3.056 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 164.1 min (1,032.9 - 868.8)

Volume	Invert	Avail.Storage	Storage Description
#1	497.00'	17.725 af	**Custom Stage Data** Listed below

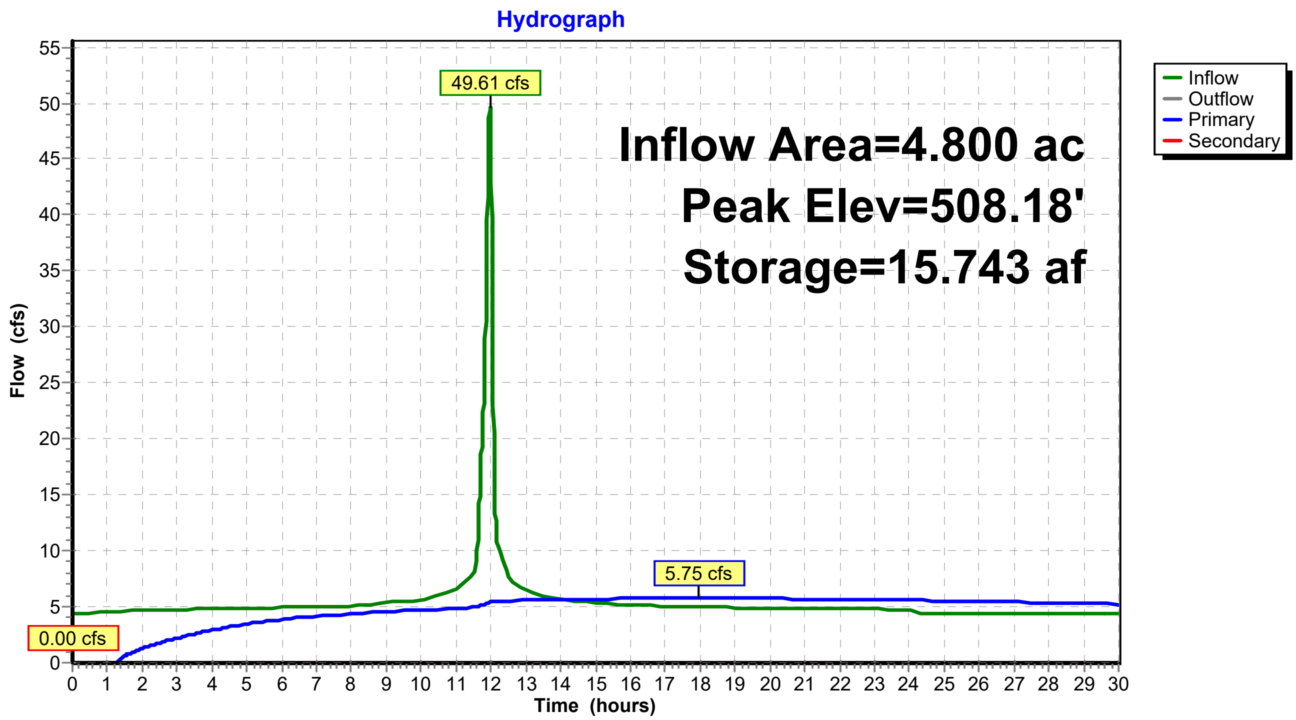
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
497.00	0.000	0.000
499.00	0.161	0.161
501.00	2.092	2.253
503.00	2.890	5.143
505.00	3.532	8.675
507.00	4.223	12.898
509.00	4.827	17.725

Device	Routing	Invert	Outlet Devices
#1	Primary	506.38'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 506.38' / 504.41' S= 0.0394 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Primary	506.63'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 506.63' / 504.46' S= 0.0434 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Secondary	509.00'	**150.0' long x 20.0' breadth Top of Berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.75 cfs @ 17.96 hrs HW=508.11' TW=507.53' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.88 cfs @ 3.66 fps)
2=Culvert (Inlet Controls 2.88 cfs @ 3.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=506.90' TW=506.00' (Dynamic Tailwater)
3=Top of Berm (Controls 0.00 cfs)

Pond 5P: Coal pile runoff pond



Summary for Pond 6P: Wastewater pond

Baseflow from NPDES Wastewater Flow Diagram
Process WW
Sluice
Cooling Tower
Total= MGD=25.2 cfs

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[80] Warning: Exceeded Pond 5P by 0.11' @ 0.25 hrs (1.03 cfs 0.094 af)

Inflow Area = 14.550 ac,100.00% Impervious, Inflow Depth > 66.78" for 1,000-YR, SCS Type II event
Inflow = 153.04 cfs @ 11.97 hrs, Volume= 80.976 af, Incl. 25.20 cfs Base Flow
Outflow = 35.51 cfs @ 14.76 hrs, Volume= 78.989 af, Atten= 77%, Lag= 167.7 min
Primary = 35.51 cfs @ 14.76 hrs, Volume= 78.989 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Starting Elev= 507.00' Surf.Area= 0.000 ac Storage= 55.800 af
Peak Elev= 507.63' @ 13.47 hrs Surf.Area= 0.000 ac Storage= 60.902 af (5.102 af above start)

Plug-Flow detention time= 1,245.8 min calculated for 23.178 af (29% of inflow)
Center-of-Mass det. time= 38.4 min (943.2 - 904.8)

Volume	Invert	Avail.Storage	Storage Description
#1	496.00'	90.000 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
496.00	0.000
497.00	1.000
499.00	6.830
501.00	16.300
503.00	27.740
507.00	55.800
509.00	72.070
511.00	90.000

Device	Routing	Invert	Outlet Devices
#1	Primary	503.25'	**42.0" W x 42.0" H Box Culvert** L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 503.25' / 492.00' S= 0.1125 '/' Cc= 0.900 n= 0.012, Flow Area= 12.25 sf
#2	Device 1	507.00'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Secondary	508.00'	**40.0' long x 20.0' breadth Dike Top to Clearwater Pond** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#4	Tertiary	509.00'	**500.0' long x 15.0' breadth Dike Top To River**

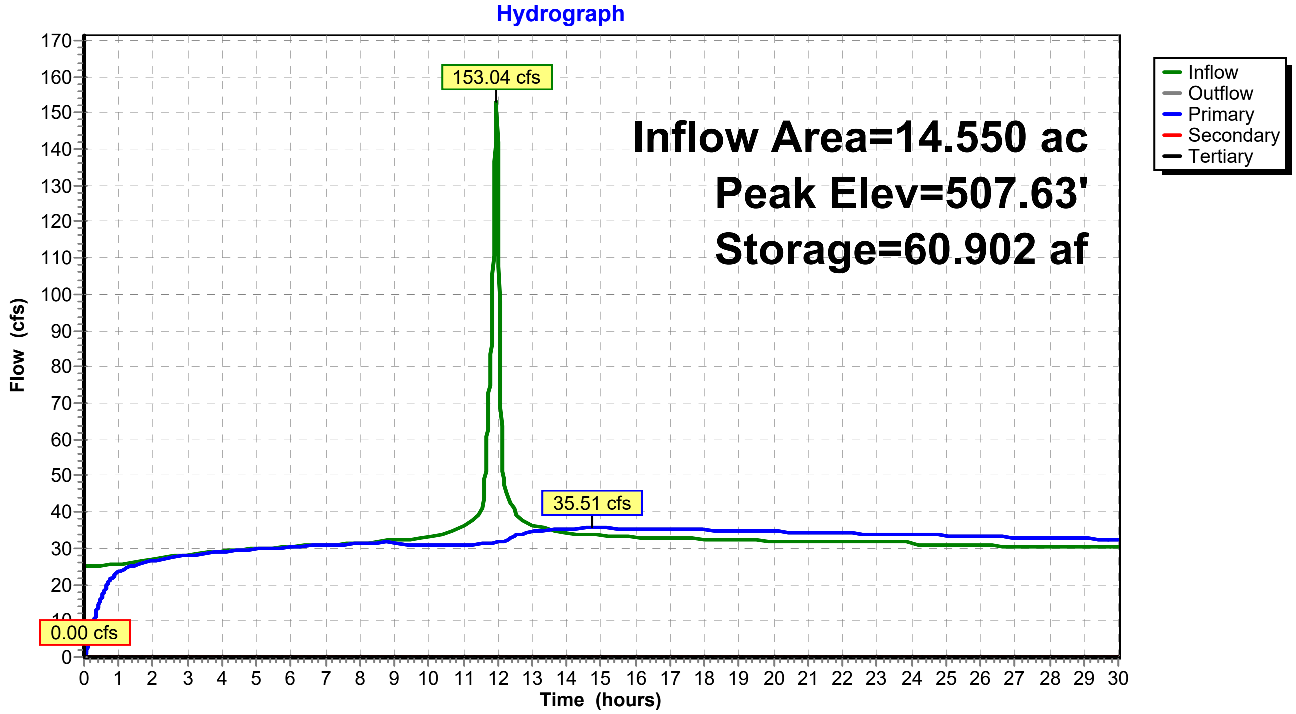
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=35.52 cfs @ 14.76 hrs HW=507.61' TW=507.25' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 35.52 cfs @ 2.90 fps)
  └─**2=Broad-Crested Rectangular Weir** (Passes 35.52 cfs of 277.72 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=507.00' TW=506.00' (Dynamic Tailwater)
└─**3=Dike Top to Clearwater Pond** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=507.00' TW=506.00' (Dynamic Tailwater)
└─**4=Dike Top To River** (Controls 0.00 cfs)

Pond 6P: Wastewater pond



Summary for Pond 7P: Clearwater pond

Pond inundated by Ohio River 100-yr WSE; starting elevation set to 506.0 to match river.

Inflow Area = 19.970 ac,100.00% Impervious, Inflow Depth > 49.78" for 1,000-YR, SCS Type II event
Inflow = 99.71 cfs @ 11.97 hrs, Volume= 82.850 af
Outflow = 38.57 cfs @ 12.50 hrs, Volume= 79.670 af, Atten= 61%, Lag= 31.8 min
Primary = 38.57 cfs @ 12.50 hrs, Volume= 79.670 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Starting Elev= 506.00' Surf.Area= 0.000 ac Storage= 31.565 af
Peak Elev= 507.28' @ 12.50 hrs Surf.Area= 0.000 ac Storage= 36.159 af (4.594 af above start)

Plug-Flow detention time= 719.4 min calculated for 48.089 af (58% of inflow)
Center-of-Mass det. time= 37.9 min (971.4 - 933.6)

Volume	Invert	Avail.Storage	Storage Description
#1	496.00'	53.000 af	**Custom Stage Data** Listed below

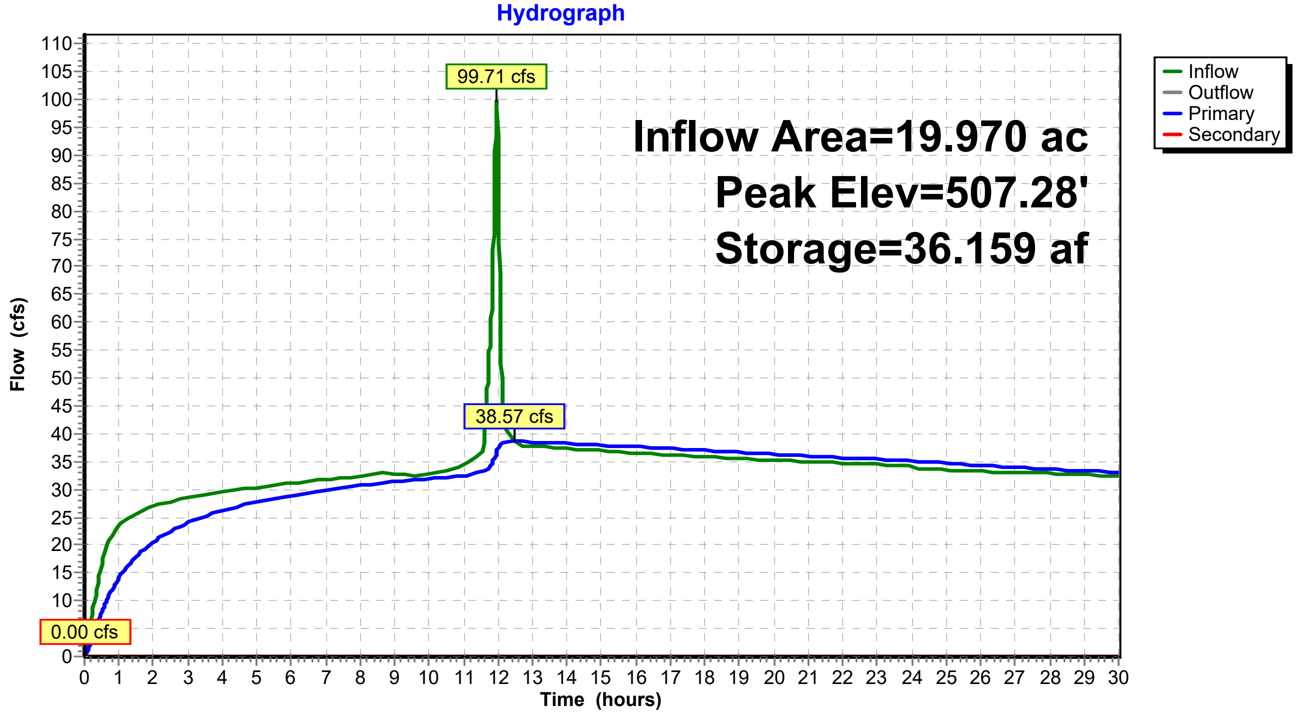
Elevation (feet)	Cum.Store (acre-feet)
496.00	0.000
497.00	2.190
499.00	6.620
501.00	12.640
503.00	21.440
507.00	34.940
509.00	43.500
511.00	53.000

Device	Routing	Invert	Outlet Devices
#1	Primary	489.28'	**36.0" Round 36" Culvert** L= 158.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 489.28' / 488.95' S= 0.0021 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 7.07 sf
#2	Device 1	502.08'	**100.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) 6.5' Crest Height
#3	Secondary	509.00'	**300.0' long x 15.0' breadth Dike Top** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=38.58 cfs @ 12.50 hrs HW=507.28' TW=506.00' (Dynamic Tailwater)
└─**1=36" Culvert** (Inlet Controls 38.58 cfs @ 5.46 fps)
  └─**2=Sharp-Crested Rectangular Weir** (Passes 38.58 cfs of 2,834.47 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=506.00' TW=506.00' (Dynamic Tailwater)
└─**3=Dike Top** (Controls 0.00 cfs)

Pond 7P: Clearwater pond



Summary for Pond 25P: Metal tank area

Inflow Area = 1.200 ac,100.00% Impervious, Inflow Depth = 8.55" for 1,000-YR, SCS Type II event
Inflow = 15.07 cfs @ 11.97 hrs, Volume= 0.855 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 Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 508.54' @ 24.34 hrs Surf.Area= 0.000 ac Storage= 0.855 af

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

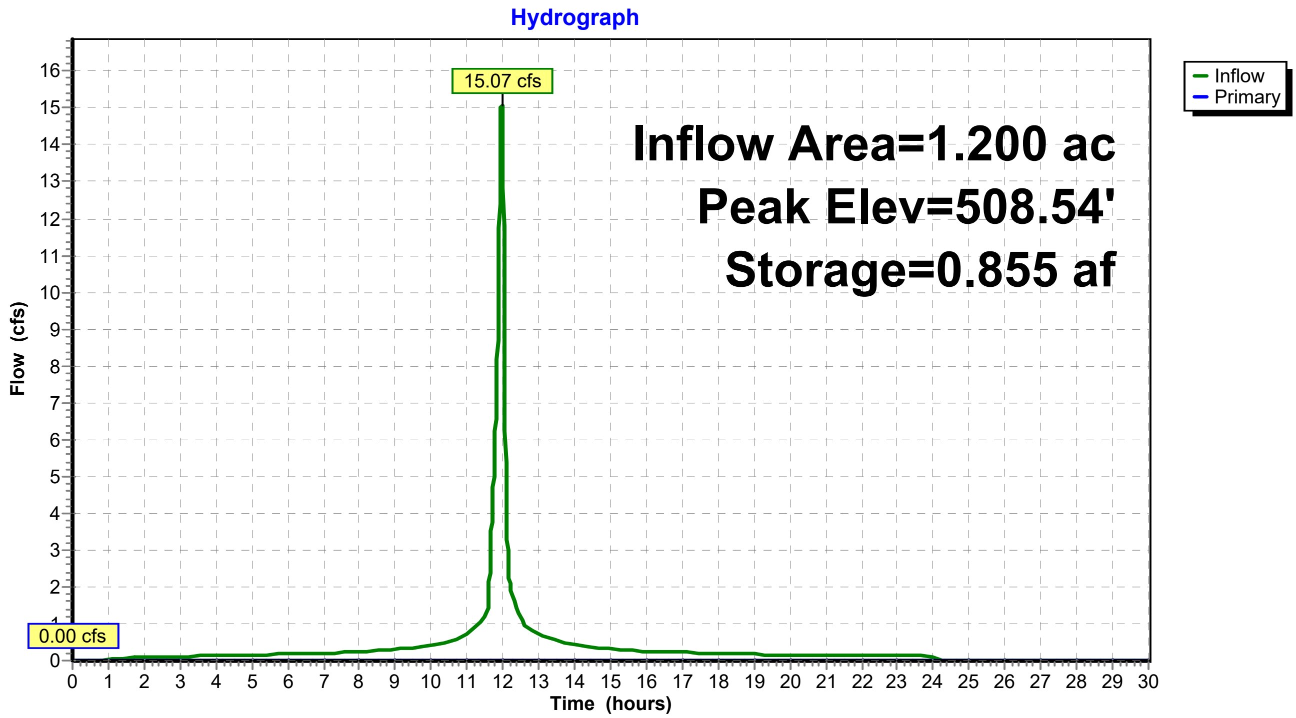
Volume	Invert	Avail.Storage	Storage Description
#1	507.70'	7.466 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
507.70	0.000
515.00	7.466

Device	Routing	Invert	Outlet Devices
#1	Primary	513.00'	**100.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=507.70' TW=506.90' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Metal tank area



Summary for Pond 41P: Coal Pile Runoff Combined Basins (A, B, C & D)

Combined Ponds A-D
No baseflow

[92] Warning: Device #7 is above defined storage

Inflow Area = 56.600 ac,100.00% Impervious, Inflow Depth = 8.55" for 1,000-YR, SCS Type II event
Inflow = 710.60 cfs @ 11.97 hrs, Volume= 40.326 af
Outflow = 29.68 cfs @ 13.16 hrs, Volume= 38.237 af, Atten= 96%, Lag= 71.5 min
Primary = 29.68 cfs @ 13.16 hrs, Volume= 38.237 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Starting Elev= 506.00' Surf.Area= 0.000 ac Storage= 421.570 af
Peak Elev= 506.81' @ 13.16 hrs Surf.Area= 0.000 ac Storage= 443.717 af (22.147 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 327.2 min (1,063.0 - 735.8)

Volume	Invert	Avail.Storage	Storage Description
#1	482.00'	504.430 af	**Custom Stage Data - Combined Ponds** Listed below

Elevation (feet)	Cum.Store (acre-feet)
482.00	0.000
483.00	4.540
485.00	10.140
487.00	20.750
489.00	39.200
491.00	64.590
493.00	97.520
495.00	136.640
497.00	184.950
499.00	236.660
500.00	262.700
501.00	288.850
502.00	315.100
503.00	341.450
504.00	367.900
505.00	394.570
506.00	421.570
507.00	448.870
508.00	476.470
509.00	504.430

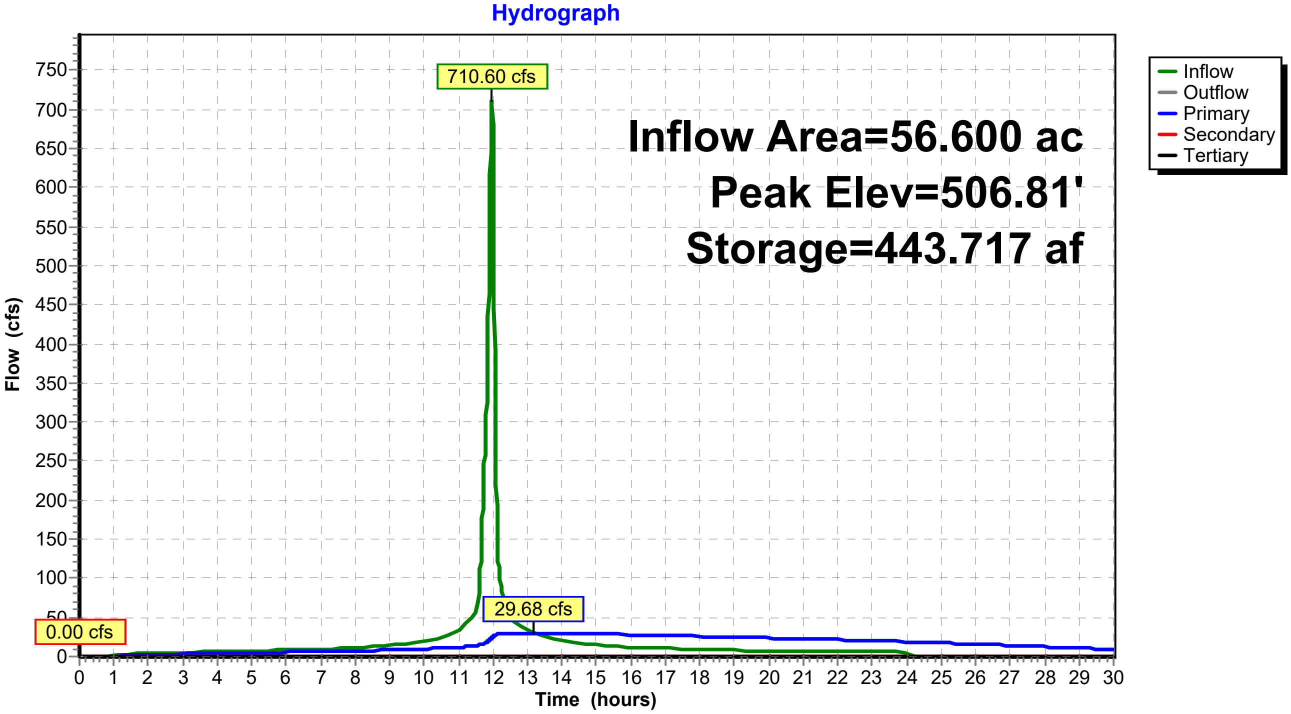
Device	Routing	Invert	Outlet Devices
#1	Primary	482.50'	**30.0" Round Culvert Basin A**
			L= 314.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 482.50' / 480.93' S= 0.0050 '/' Cc= 0.900
			n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#2	Device 1	489.28'	**9.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	482.38'	**30.0" Round Culvert Basin B**
			L= 364.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 482.38' / 471.60' S= 0.0296 '/' Cc= 0.900
			n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#4	Device 3	489.13'	**9.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Primary	482.69'	**30.0" Round Culvert Basin C**
			L= 317.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 482.69' / 472.75' S= 0.0314 '/' Cc= 0.900
			n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#6	Device 5	489.44'	**9.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#7	Secondary	509.00'	**500.0' long x 15.0' breadth Broad-Crested Weir - Top of Dike (To CPRP)**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#8	Tertiary	508.00'	**150.0' long x 15.0' breadth Broad-Crested Weir - Top of Dike (D Basin to Ohi**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=29.73 cfs @ 13.16 hrs HW=506.81' TW=506.00' (Dynamic Tailwater)
- **1=Culvert Basin A** (Outlet Controls 10.14 cfs @ 2.07 fps)
  - **2=Sharp-Crested Rectangular Weir** (Passes 10.14 cfs of 512.81 cfs potential flow)
- **3=Culvert Basin B** (Outlet Controls 9.50 cfs @ 1.93 fps)
  - **4=Sharp-Crested Rectangular Weir** (Passes 9.50 cfs of 515.13 cfs potential flow)
- **5=Culvert Basin C** (Outlet Controls 10.10 cfs @ 2.06 fps)
  - **6=Sharp-Crested Rectangular Weir** (Passes 10.10 cfs of 510.28 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=506.00' TW=506.90' (Dynamic Tailwater)
- **7=Broad-Crested Weir - Top of Dike (To CPRP)** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=506.00' TW=506.00' (Dynamic Tailwater)
- **8=Broad-Crested Weir - Top of Dike (D Basin to Ohio River)** (Controls 0.00 cfs)

Pond 41P: Coal Pile Runoff Combined Basins (A, B, C & D)



Summary for Link 42L: Ohio River

Inflow Area = 76.570 ac,100.00% Impervious, Inflow Depth > 18.48" for 1,000-YR, SCS Type II event
Inflow = 68.15 cfs @ 13.00 hrs, Volume= 117.907 af
Primary = 68.15 cfs @ 13.00 hrs, Volume= 117.907 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 506.00'