

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
40 C.F.R. PART 257.82
PLANT YATES ASH POND 2 (AP-2)
GEORGIA POWER COMPANY

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities" Final Rule (40 C.F.R. Part 257 and Part 261), §257.82, requires the owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment to design, construct, operate and maintain an inflow design flood control system capable of adequately managing flow during and following the peak discharge of the specified inflow design flood. The owner or operator must prepare an inflow design flood system written plan documenting how the inflow design flood control system has been designed and constructed to meet the requirements of 40 C.F.R. §257.82.

The existing CCR surface impoundment known as AP- 2 is located at Georgia Power Company's Plant Yates. The facility consists of a 63-acre storage area. The inflow design flood consists of the rainfall that falls within the limits of the surface impoundment, runoff from approximately 622 acres of adjoining watershed, and a nominal amount (relative to rainfall) of process flows. Additionally, run-off from Ash Ponds B, B', and 3 are ultimately routed into AP-2. The drainage area for these basins totals an additional 723 acres (total drainage area of 1,408 acres). The pond discharges through an overflow discharge structure located near the northeast corner of the impoundment and includes a channel that leads to a concrete holding tank where pond discharge is pumped through a discharge pipe to the river. There is no active discharge pipe passing through or under the embankment. Additionally, there is an auxiliary spillway constructed primarily of a concrete-filled Gabri-form erosion protection blanket. The spillway entrance is comprised of rip-rap and a concrete control structure and the outfall is constructed with stair-stepping gabion baskets with concrete on the top surface. The outlet bottom is comprised of bedrock, with gabion basket-armored side slopes.

The inflow design flood has been calculated using the Natural Resources Conservation Service (NRCS) method, also known as the Soil Conservation Service (SCS) method, using the 1000-yr storm event required for a significant hazard potential surface impoundment. Runoff curve number data was determined using Table 2-2A from the Urban Hydrology for Small Watersheds (TR-55). Appendix A and B from the TR-55 were used to determine the rainfall distribution methodology. Precipitation values

were determined from National Oceanic and Atmospheric Administration (NOAA)'s Precipitation Frequency Data Server (Atlas-14).

The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that the hydrological group "B" should be used to best reflect the characteristics of the soils on site. This information was placed into Hydrologic Engineering Center - Hydrologic Modeling System and used to generate appropriate precipitation curves, storm basin routing information, and resulting rating curves to evaluate surface impoundment capacity.

Initial inflow design studies indicated a potential for overtopping approximately 5 inches during the design storm. Since the completion of that study, the operating level of the impoundment has been lowered by approximately 12 inches, and will be maintained at or below this level to provide additional storage needed to prevent overtopping.

This assessment is supported by appropriate engineering calculations which are attached.

The facility is operated subject to and in accordance with § 257.3-3 of EPA's regulations.

I hereby certify that the inflow design flood control system plan meets the requirements of 40 C.F.R. Part 257.82.


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**Inflow Design Control System Plan:
Hydrologic and Hydraulic Calculation Summary**

for


Plant Yates Ash Pond 2

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10/11/16
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10/12/16
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1.0 Purpose of Calculation

The purpose of this report is to demonstrate the hydraulic capacity of the subject CCR impoundment in order to prepare an inflow design flood control plan as required by the United States Environmental Protection Agency's (EPA) final rule for Disposal of CCR from Electric Utilities (EPA 40 CFR 257).

2.0 Summary of Conclusions

A hydrologic and hydraulic model was developed for the Plant Yates Ash Pond 2 to determine the hydraulic capacity of the impoundment. The design storm for the Plant Yates Ash Pond 2 is a 1000-year rainfall event. Southern Company has selected a storm duration of 24-hours for all inflow design flood control plans. The results of routing a 1000-year, 24-hour rainfall event through the impoundment are presented in Table 1 below:

Table 1 - Flood Routing Results for Plant Yates Ash Pond 2

Plant Yates	Normal Pool EI (ft)	Top of Embankment EI (ft)	Emergency Spillway Crest EI (ft)	Peak Water Surface Elevation (ft)	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Ash Pond 2	723.2	729.3	725.4	729.7	-0.4	3,990	1,892

*Freeboard is measured from the top of embankment to the peak water surface elevation. Negative freeboard indicates that the dam overtops during the subject storm event.

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The Plant Yates Ash Pond 2 is classified as a significant hazard structure, and is the most downstream of the CCR ash ponds at the Plant Yates site. The Plant Yates Ash Pond 2 is required to safely store and/or pass the runoff resulting from the 24-hour, 1,000 year storm event. A summary of the design storm parameters and rainfall distribution methodology for the calculations is summarized below in Table 2.

Table 2 - Plant Yates Ash Pond 2 Storm Distribution

Hazard Classification	Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
Significant	1000	24	11.0	NOAA Atlas 14	SCS Type II

The drainage area of Ash Pond 2 includes the basins contributing runoff to Ash Pond B, Ash Pond B' and Ash Pond 3. The Ash Pond 2 sub-basin was analyzed independently of the other structures, and the discharges from the other Ash Ponds resulting from the

1,000-year storm event were added to the inflow hydrograph of the Ash Pond 2 sub-basin. Stormwater discharges from Ash Pond 2 are conveyed directly into the Chattahoochee River. Runoff characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. An overall SCS curve number for the drainage area was developed based on the National Engineering Handbook, Part 630, Chapter 9 which provides a breakdown of curve numbers for each soil type and land use combination. The NRCS web-soil survey of the watershed was utilized to estimate the run-off potential of the basin. A table of the pertinent basin characteristics of Ash Pond 2 is provided in Table 3.

Table 3 – Ash Pond 2 Drainage Basin Characteristics

Drainage Basin Area, mi ²	1.07*
Hydrologic Curve Number, CN	75
Hydrologic Methodology	SCS
Time of Concentration (minutes)	54
Lag Time (minutes)	32

*Ash Pond 2 Sub-Basin Only. Total drainage area is 2.2 square miles when areas from Ash Pond B, Ash Pond B', and Ash Pond 3 are included.

Runoff values were determined by importing the characteristics developed above into a hydrologic model with the US Army Corps of Engineers HEC-HMS program.

3.2 HYDRAULIC ANALYSES

Storage values for the Ash Pond were determined by developing a stage-storage relationship utilizing contour data. The current spillway system for Plant Yates Ash Pond 2 consists of a concrete lined earthen channel primary spillway. The spillway has a control section on the order of 50 feet wide at approximate elevation 725.4 feet. Flows through the spillway are discharged directly to the Chattahoochee River. A table of the pertinent hydraulic characteristics of Ash Pond 2 is provided in Table 4.

Table 4 – Ash Pond 2 Hydraulic Characteristics

	Material / Size	US Invert, ft	DS Invert, ft	Length, ft
Primary Spillway	Concrete Lined Channel, 50 ft wide	725.4	-	-

Based on the spillway attributes listed above, a rating curve was developed and inserted into HEC-HMS to determine the pond performance during the design storm. Results are shown in Table 1.

4.0 SUPPORTING INFORMATION

4.1 CURVE NUMBER

Hydrologic Soil Group	Cover Description (Cover type, treatment, and hydrologic description; % impervious; connected or unconnected, etc)	CN	Area (Acres)	Product (CN*Area)
B	Industrial / Roads	88	92.9	8176.7
B	Open Space - Fair Cover	69	140.4	9684.8
B	Residential - 2 Acre	65	11.2	731.1
B	Ash	96	110.9	10651.0
B	Woods - Fair Cover*	60	281.2	16871.6
W	Water	100	46.3	4633.7

ARC II Composite CN:

75

4.2 STAGE-STORAGE TABLE

ASH POND DAMS - PLANT YATES

POND 2

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STAGE STORAGE - AVERAGE END AREA METHOD

EL (ft)	Area (ft ²)	Area (ac)	Inc. Volume (ac-ft)	Cum. Volume (ac-ft)
724.3	2028908	46.6	0.0	0.0
725	2210170	50.7	34.1	34.1
726	2347074	53.9	52.3	86.4
727	2455726	56.4	55.1	141.5
728	2610255	59.9	58.1	199.6
729	2762022	63.4	61.7	261.3
730	4251456	97.6	80.5	341.8

4.3 RATING CURVE

Elev.	Head 1	Weir 1	Orifice	Full Flow Pipe	P/S Total	E/S	Top of Dam Discharge	Total Discharge
723.18	0.00	0.00	0.00	0.00	0.00	0	0.0	0
724.00	0.82	0.00	0.00	0.00	0.00	0	0.0	0
725.40	2.22	0.00	0.00	0.00	0.00	0	0.0	0
726.00	2.82	0.00	0.00	0.00	0.00	65	0.0	65
726.50	3.32	0.00	0.00	0.00	0.00	162	0.0	162
727.00	3.82	0.00	0.00	0.00	0.00	283	0.0	283
727.50	4.32	0.00	0.00	0.00	0.00	426	0.0	426
728.00	4.82	0.00	0.00	0.00	0.00	587	0.0	587
728.50	5.32	0.00	0.00	0.00	0.00	764	0.0	764
729.00	5.82	0.00	0.00	0.00	0.00	956	0.0	956
729.30	6.12	0.00	0.00	0.00	0.00	1078	0.0	1078

730.00	6.82	0.00	0.00	0.00	0.00	1381	983.9	2365
731.00	7.82	0.00	0.00	0.00	0.00	1855	3723.8	5579

4.4 DRAINAGE BASIN

