PERIODIC INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
391-3-4-.10(5) and 40 C.F.R. PART 257.82
PLANT YATES ASH POND 2 (AP-2)
GEORGIA POWER COMPANY

The Federal CCR Rule, and, for Existing Surface Impoundments where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator 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. *See* 40 C.F.R. § 257.82; Ga. Comp. R. & Regs. r. 391.3-4-.10(5)(b). In addition, the Rules require periodic inflow design flood control system plans within 5 years of development of the previous plan. *See* 40 C.F.R. § 257.82(c)(4); Ga. Comp. R. & Regs. r. 391.3-4-.10(5)(b).

The existing CCR surface impoundment known as AP- 2 is located at Georgia Power Company's Plant Yates. The facility consists of an approximate 63-acre storage area. The Notification of Intent to Initiate Closure was placed in the Operating Record on 04/17/2019 and closure has been designed to have no negative impacts on the inflow design flood control plan. A temporary cofferdam has been constructed in AP-2 that bisects the impoundment into two distinct areas commonly referred to as AP-2 West and AP-2 East. Currently, AP-2 West, nearest the surface impoundment embankment, has been dewatered and all ash substantially removed. AP-2 East has had its water level lowered and ash removal is underway.

The inflow design flood consists of the rainfall that falls within the limits of the surface impoundment and runoff from approximately 622 acres of adjoining watershed. 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 Fabriform erosion protection blanket. The spillway entrance is comprised of riprap 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 1,000-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).

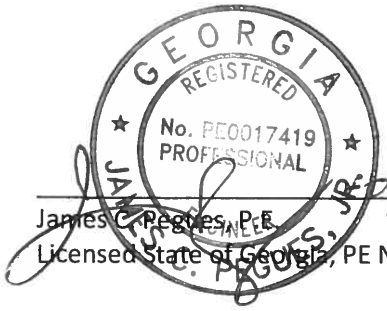
The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that the hydrological group "B" should be used to best reflect the characteristics of the soils on site. This information was placed into Hydrologic Engineering Center - Hydrologic Modeling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

Dewatering and ash removal activities resulted in only temporary water levels after rain events that are readily maintained at or below a level to provide sufficient storage needed to prevent overtopping. The spillways are designed, constructed, operated and maintained to adequately manage flow during and following the peak discharge from a 1,000-year, 24-hour storm.

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. § 257.82.



10/15/2021

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Inflow Design Control System Plan:
Hydrologic and Hydraulic Calculation Summary

for

Plant Yates Ash Pond 2

Prepared by:

Southern Company T&PS Environmental Solutions

Originator: Ashley C. Grissom 10/06/2021
Ashley C. Grissom Date

Reviewer: Stacey H. Simpson 10/11/2021
Stacey H. Simpson Date

Approval: 10/12/2021
James C. Pegues Date

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) and the Georgia CCR Rule (391-3-4-.10).

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 El (ft)	Top of Embankment El (ft)	Auxiliary Spillway Crest El (ft)	Peak Water Surface Elevation (ft	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Ash Pond 2	715.0	729.3	725.4	717.57	7.83	3,990	0

*Freeboard is measured from the spillway crest to the peak water surface elevation.

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The Plant Yates Ash Pond 2 is classified as a significant hazard structure. The Plant Yates Ash Pond 2 is required to safely store and/or pass the run-off 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	1,000	24	11.0	NOAA Atlas 14	SCS Type II

The drainage basin for Ash Pond 2 includes approximately 1,400 acres, mostly located to the north and east of the ash pond and includes run-off from the surrounding area as well as acreage to the east of Dyer Road. The drainage basin was divided into three sub-basins, and the discharges from the three areas resulting from the 1,000-year storm event were combined to calculate the total run-off. Traditionally, stormwater discharge from Ash Pond 2 is directed to the NPDES outlet structure. However, during ash excavation, water from Ash Pond 2 is pumped to the water treatment system before being discharged to the Chattahoochee River. Run-off 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

	Area 1	Area 2	Area 3
Drainage Basin Area, mi^2	0.94	0.43	0.56
Hydrologic Curve Number, CN	65	72	69
Hydrologic Methodology	SCS	SCS	SCS
Time of Concentration (minutes)	61.7	19.0	50.5
Hydrologic Software	Hydraflow Hydrographs		

Run-off values were determined by importing the characteristics developed above into a hydrologic model with the Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2019.

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 principal 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, tt**	**DS Invert, ft**	**Length, ft**
Principal Spillway	Concrete Lined Channel, 50 ft wide	725.4	-	-

Based on the spillway attributes listed previously, the data was inserted into Hydraflow Hydrographs to determine the pond performance during the design storm. Results are shown in Table 1.

4.0 SUPPORTING INFORMATION

4.1 CURVE NUMBER

Terrain Type	Area (ac)	Curve Number
Water	126	100
Pavement	15	98
Bare Dirt/Ash	156	79
Woods, poor	178	66
Woods, fair	760	60
Gravel	5	87

4.2 STAGE-STORAGE TABLE

East Pond:

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	715.00	n/a	0	0
12.00	727.00	n/a	15,887,770	15,887,770

West Pond:

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	680.00	280	0	0
5.00	685.00	17,300	32,965	32,965
10.00	690.00	242,822	541,505	574,470
15.00	695.00	350,044	1,473,871	2,048,341
20.00	700.00	442,005	1,975,461	4,023,802
30.00	710.00	666,387	5,503,160	9,526,962
36.00	716.00	803,830	4,403,768	13,930,730
40.00	720.00	888,386	3,382,690	17,313,420
45.00	725.00	993,839	4,737,048	22,050,468

4.3 TIME OF CONCENTRATION

Area 1:

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Area 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.600		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.90		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 49.10**	**+**	**0.00**	**+**	**0.00**	**=**	**49.10**
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 3.20		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.89		0.00		0.00		
Travel Time (min)	**= 5.77**	**+**	**0.00**	**+**	**0.00**	**=**	**5.77**
Channel Flow							
X sectional flow area (sqft)	= 168.00		0.00		0.00		
Wetted perimeter (ft)	= 47.00		0.00		0.00		
Channel slope (%)	= 2.80		0.00		0.00		
Manning's n-value	= 0.100		0.015		0.015		
Velocity (ft/s)	=5.85						
			0.00				
					0.00		
Flow length (ft)	({0})2400.0		0.0		0.0		
Travel Time (min)	**= 6.83**	**+**	**0.00**	**+**	**0.00**	**=**	**6.83**

Total Travel Time, Tc ..... 61.70 min

Area 2:

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Area 2: Area draining to R6/AP-3 ditch

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.050		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.90		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.55**	**+**	**0.00**	**+**	**0.00**	**=**	**7.55**
Shallow Concentrated Flow							
Flow length (ft)	= 690.00		0.00		0.00		
Watercourse slope (%)	= 33.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=9.27		0.00		0.00		
Travel Time (min)	**= 1.24**	**+**	**0.00**	**+**	**0.00**	**=**	**1.24**
Channel Flow							
X sectional flow area (sqft)	= 168.00		0.00		0.00		
Wetted perimeter (ft)	= 47.00		0.00		0.00		
Channel slope (%)	= 0.67		0.00		0.00		
Manning's n-value	= 0.050		0.015		0.015		
Velocity (ft/s)	=5.71						
			0.00				
					0.00		
Flow length (ft)	({0})3500.0		0.0		0.0		
Travel Time (min)	**= 10.21**	**+**	**0.00**	**+**	**0.00**	**=**	**10.21**
Total Travel Time, Tc							**19.00 min**

Area 3:

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 3

Area 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.600		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.90		0.00		0.00		
Land slope (%)	= 10.00		0.00		0.00		
Travel Time (min)	= 34.04	+	0.00	+	0.00	=	34.04
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 8.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.56		0.00		0.00		
Travel Time (min)	= 3.65	+	0.00	+	0.00	=	3.65
Channel Flow							
X sectional flow area (sqft)	= 168.00		0.00		0.00		
Wetted perimeter (ft)	= 47.00		0.00		0.00		
Channel slope (%)	= 1.70		0.00		0.00		
Manning's n-value	= 0.100		0.015		0.015		
Velocity (ft/s)	=4.56						
			0.00				
					0.00		
Flow length (ft)	({0})3500.0		0.0		0.0		
Travel Time (min)	= 12.79	+	0.00	+	0.00	=	12.79
Total Travel Time, Tc							50.50 min

4.4 DRAINAGE BASIN