INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
40 C.F.R. Part 257.82
PLANT MCINTOSH ASH POND 1
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 §257.82.

The existing CCR surface impoundment known as McIntosh AP-1 is located in Effingham County, east of Rincon, Georgia on Plant McIntosh property. AP-1 is subdivided into four cells, known as Cells A, B, C, and D. Cells A, B, and C serve as storage cells on an alternating basis and Cell D serves as a clear pond for the management of CCR from Plant McIntosh. The inflow design flood consists primarily of the rainfall that falls within the limits of AP-1, along with a nominal amount (relative to rainfall) of process flows. Stormwater is temporarily stored within the limits of AP-1, returned to the Plant via pumps located in Cell D, or discharged through a 7-foot by 7-foot weir controlled concrete riser connected to a 48-inch discharge pipe.

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 100-yr storm event required for a low 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) Precipitation Frequency Data Server (Atlas-14).

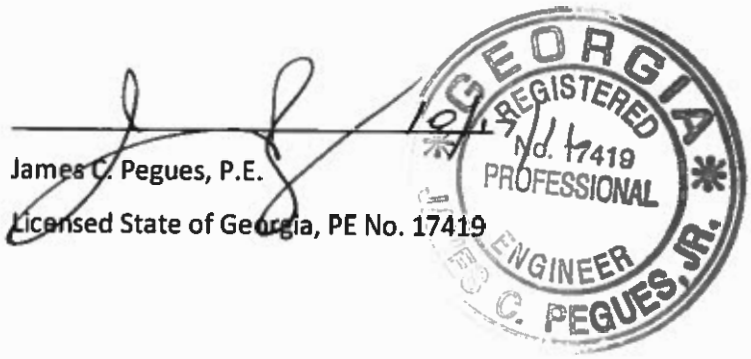
The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that the hydrological group "A/D" should be used to best reflect the characteristics of the soils on site. This information was placed into Hydraflow Hydrographs and used to generate

appropriate precipitation curves, storm basin routing information, and resulting rating curves to evaluate surface impoundment capacity.

Resulting calculations indicate AP-1 can safely store and pass the inflow design storm. This plan 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 McIntosh Ash Pond

Prepared by:

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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 Plant McIntosh Ash Pond 1 to determine the hydraulic capacity of the impoundment. The design storm for Plant McIntosh Ash Pond 1 is a 100-year rainfall event. Southern Company has selected a storm length of 24-hours for all inflow design flood control plans. The results of routing a 100-year, 24-hour rainfall event through the impoundment are presented in Table 1 below:

Table 1-Flood Routing Results for Plant McIntosh Ash Pond 1

Plant McIntosh	Normal Pool El (ft)	Top of embankment El (ft)	Emergency Spillway Crest El (ft)	Peak Water Surface El (ft)	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Ash Pond	59.0	**61.6 - 63.25 (El. Varies)**	60.5	60.35	1.25	229.79	0.00

*Freeboard is measured from the top of embankment to the peak water surface elevation

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

Plant McIntosh Ash Pond 1 is classified as a low hazard structure. The design storm for a low hazard structure is a 100-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 2.

Table 2. Plant McIntosh Ash Pond Storm Distribution

Hazard Classification	Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
Low	100	24	10.1	NOAA Atlas 14	SCS Type III

The drainage area for Plant McIntosh Ash Pond 1 was delineated based on topographic survey data acquired for the Plant in 2016. 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. Soil types were obtained from the National Resource Conservation Services online soils database. Land use areas were delineated based on aerial photography. Time of

Concentration calculations were developed based on the overland flow method as described in the National Engineering Handbook Part 630, Chapter 15.

A table of the pertinent basin characteristics of Ash Pond1 is provided below in Table 3.

Table 3—Ash Pond 1 Hydrologic Information

Drainage Basin Area (acres)	26.3
Hydrologic Curve Number, CN	98
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	6
Lag Time (minutes)	Not applicable
Hydrologic Software	Autodesk Hydraflow Hydrographs

Run-off values were determined by importing the characteristics developed above into a hydrologic model with the Autodesk Hydraflow Hydrographs program.

Process flows from Plant McIntosh were considered in this analysis. Based on normal plant operations, Ash Pond 1 receives an additional 2.5 MGD (3.86 cfs) of process inflow from the Plant.

3.2 HYDRAULIC ANALYSES

Storage values for Ash Pond 1 were determined by developing a stage-storage relationship utilizing contour data. The spillway system at Ash Pond 1 consists of a series of risers and culverts from Cells A, B, & C that discharge into D. D has the primary discharge spillway and culvert that discharges outside of Ash Pond 1's containments. The series of risers and culverts from A, B, & C either discharge to D or feed water back to the plant via series of pumps. The hydraulic analyses assume conditions of the pond receiving a 100 year, 24-hour storm event at normal pool (El. 59.0), process flows from the plant but pond water is not being pumped back to the plant. The analyses also assume that D's primary riser and culvert is the only flow path for pond discharge as Ash Pond 1 does not have an emergency spillway of any type.

The primary spillway is composed of a 7 ft x 7 ft concrete riser with a top rectangular weir, internal adjustable stop logs, and adjustable flap valves (which under normal operation conditions remain closed unless need for periodic pond maintenance). The rectangular weir invert elevation is 60.5 ft. while the top of the riser structure elevation is 62.5 ft. The receiving culvert from the riser is a 48-in diameter concrete pipe on 0.09% slope. A summary of spillway information is presented below in Table 4.

Table 4—Spillway Attribute Table

Spillway Component	US Invert El (feet)	DS Invert El (feet)	Dimension (ft)	Slope (%)	Length (ft)	Spillway Capacity (cfs)
Ash Pond Riser	62.50	29.50	7 ft x 7 ft (rectangle) 33 ft (height)	0.00	N/A	N/A
Ash Pond Culvert	29.50	29.20	4	0.09%	320	171.29

Based on the spillway attributes listed above, a rating curve was developed and employed by Autodesk 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

A conservative curve number of 98 was assumed for Plant McIntosh Ash Pond 1 as the pond drainage basin (26.3 acres) consists of the pond's gravel perimeter road and the pond containment itself.

4.2 STAGE-STORAGE TABLE

Pond No. 1 - McIntosh Ash Pond

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 43.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	43.00	173,621	0	0
1.00	44.00	305,804	239,713	239,713
2.00	45.00	371,852	338,828	578,541
3.00	46.00	424,134	397,993	976,534
4.00	47.00	468,385	446,260	1,422,793
5.00	48.00	505,113	486,749	1,909,542
6.00	49.00	539,880	522,497	2,432,039
7.00	50.00	575,371	557,625	2,989,664
8.00	51.00	612,855	594,113	3,583,777
9.00	52.00	649,198	631,027	4,214,804
10.00	53.00	682,504	665,851	4,880,655
11.00	54.00	714,227	698,365	5,579,020
12.00	55.00	744,332	729,280	6,308,300
13.00	56.00	774,043	759,187	7,067,487
14.00	57.00	803,398	788,721	7,856,208
15.00	58.00	832,256	817,826	8,674,034
16.00	59.00	860,534	846,395	9,520,429
17.00	60.00	910,544	885,541	10,405,970
18.00	61.00	990,265	950,400	11,356,370
19.00	62.00	1,070,000	1,030,130	12,386,500

4.3 TIME OF CONCENTRATION

A time of concentration of 6 minutes was assumed as the Ash Pond has no contributory basin other than its own containment and the water therein. There is no offsite storm water impacting the ash pond basin.

4.4 RATING CURVE

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	43.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	239,713	44.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
2.00	578,541	45.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
3.00	976,534	46.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
4.00	1,422,793	47.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
5.00	1,909,542	48.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
6.00	2,432,039	49.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
7.00	2,989,664	50.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
8.00	3,583,777	51.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
9.00	4,214,804	52.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
10.00	4,880,655	53.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
11.00	5,579,020	54.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
12.00	6,308,300	55.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
13.00	7,067,487	56.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
14.00	7,856,208	57.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
15.00	8,674,034	58.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
16.00	9,520,429	59.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
17.00	10,405,968	60.00	32.07 oc	---	---	---	0.00	---	---	---	---	---	0.000
18.00	11,356,372	61.00	33.00 oc	---	---	---	32.97	---	---	---	---	---	32.97
19.00	12,386,504	62.00	171.29 oc	---	---	---	171.29	---	---	---	---	---	171.29

4.5 DRAINAGE BASIN