INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
PLANT MCMANUS ASH POND A (AP-1)
40 CFR 257.82

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 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 §257.82.

The CCR surface impoundment known as the Plant McManus Ash Pond (AP-1), is located on Plant McManus property, just west of Brunswick, Georgia. Plant McManus is owned and operated by Georgia Power Company. The facility consists of a 93.4 acre CCR storage area. The inflow design flood consists of the rainfall that falls within the limits of the surface impoundment and runoff from 68.1 acres of adjoining watershed. Stormwater is temporarily stored within the limits of AP-1 and discharged through a primary spillway. The primary spillway is a 4-foot-tall x 8-foot-wide rectangular concrete channel with a 120° "V"-notch spillway. The primary spillway channel discharges into Burnette Creek, a brackish water tributary to the Turtle River. The pond incorporates an auxiliary spillway that is not engaged until rainfall exceeds the 1,000 year design storm.

The Plant McManus AP-1 is in the process of being closed through removal of the CCR from the CCR unit. As of March 2018, approximately 60% of the CCR has been removed. AP-1 is dewatered as required to facilitate excavation of ash for removal. All CCR is being excavated, transported, and disposed of in an offsite Solid Waste permitted landfill. Closure is anticipated to be completed 4th Quarter 2018. The pond dike and primary spillway are intact and continue to impound water. During ash pond closure, accumulated water is managed by a temporary water treatment system in accordance with a dewatering plan approved by the Georgia Environmental Protection Division. The treated water is then discharged via the NPDES permitted outfall located at the westernmost corner of AP-1. When discharged, the treated water is sampled and monitored in accordance with the approved dewatering plan.

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 year – 24-hour storm event required for a "significant" hazard potential surface impoundment. Runoff curve number was calculated 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 the National Oceanic and Atmospheric Administration (NOAA)'s National Weather Service Hydrometeorological Report No. 51 (HMR-51).

The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that hydrological group "D" should be used to best reflect the characteristics of the soils on the site. This information was placed into AutoCAD Storm and Sanitary Analysis 2016 hydrologic modeling system and used to generate appropriate precipitation curves, storm basin routing information, and resulting rating curves to evaluate surface impoundment capacity.

Resulting calculations indicate that the Plant McManus Ash Pond 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 the 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.

4/17/18

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Inflow Design Control System Plan:

Hydrologic and Hydraulic Calculation Summary

for

Plant McManus Ash Pond

Prepared by:

Southern Company Services

Technical Services

Originator: _____ 4/16/18

Thomas H. Bordelon Date

Reviewer: _____ 4/16/18

Jason S. Wilson Date

Approval: _____ 4/16/18

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 257.82).

2.0 Summary of Conclusions

A hydrologic and hydraulic model was developed for Plant McManus Ash Pond 1 to determine the hydraulic capacity of the impoundment. The design storm for Plant McManus Ash Pond 1 is a 1000-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 1000-year, 24-hour rainfall event through the impoundment are presented in Table 1 below:

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

Plant McManus	Normal Pool El (ft)	Top of embankment El (ft)	Primary Spillway Crest El (ft)	Peak Water Surface El (ft)	Freeboard * (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Ash Pond	3.00	**6.00 – 9.00 (El. Varies)**	4.56	5.88	0.12	1,717.31	4.88

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

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

Plant McManus Ash Pond 1 is classified as an "exempt" structure by the Georgia Safe Dams program and a "significant" hazard under the EPA's CCR Rule (EPA 40 CFR 257). The design storm chosen for the ash pond is a 1000-year rainfall event given the potential environmental impacts. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 2.

Table 2. Plant McManus Ash Pond Storm Distribution

Hazard Classification	Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
Significant	1000	24	17.60	NOAA Atlas 14	SCS Type III

The drainage area for Plant McManus Ash Pond 1 was delineated based on topographic survey data and USGS topo acquired for the Plant in January 2018. 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 Natural Resources Conservation Service's online soils database. Land use areas were delineated based on aerial photography. Time of Concentration calculations were developed using the Technical Paper 55 Urban Hydrology for Small Watersheds (TR-55) method for computation of travel time and time of concentration.

A table of the pertinent basin characteristics of Ash Pond 1 is provided below in Table 3.

Table 3—Ash Pond 1 Hydrologic Information

Drainage Basin Area (acres)	161.47
Hydrologic Curve Number, CN	82.5
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	23.4
Lag Time (minutes)	Not applicable
Hydrologic Software	Autodesk Storm and Sanitary Analysis 2016

Runoff values were determined by importing the characteristics developed above into a hydrologic model with the Autodesk Storm and Sanitary Analysis 2016 program.

Process flows from Plant McManus were not considered in this analysis as Ash Pond 1 does not receive any type of process inflows 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 rectangular concrete channel with a "V"-notch weir installed at the midpoint. This primary discharge spillway and weir discharges outside of Ash Pond 1's containments and into Burnette Creek, a tributary of the Turtle River. The hydraulic analyses assume conditions of the pond receiving a 1000 year, 24-hour storm event at normal pool (El. 3.00). The analyses also assume that the primary spillway is the only flow path for pond discharge (an emergency spillway exists but is supplementary to this evaluation).

The primary spillway is composed of a 4 ft tall x 8 ft wide rectangular concrete channel with a “V”-notch weir. The V-notch weir invert elevation is 4.56 ft. while the top of the channel wall is 6.33 ft. The receiving channel from the V-notch weir has the same dimensions as the upstream rectangular concrete channel. 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)
Concrete Channel	2.12	2.10	4 ft x 8 ft (rectangle)	0.00	28	N/A
Weir	4.56	4.56	120° “V”, 6.25 ft (top width) and 1.77 ft (depth)	0.00	0.07	18.34

Based on the spillway attributes listed above, a rating curve was developed and employed by Autodesk Storm and Sanitary Analysis 2016 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 82.5 was calculated for Plant McManus Ash Pond 1 as the pond drainage basin consists of the pond’s gravel perimeter road and the pond containment itself.

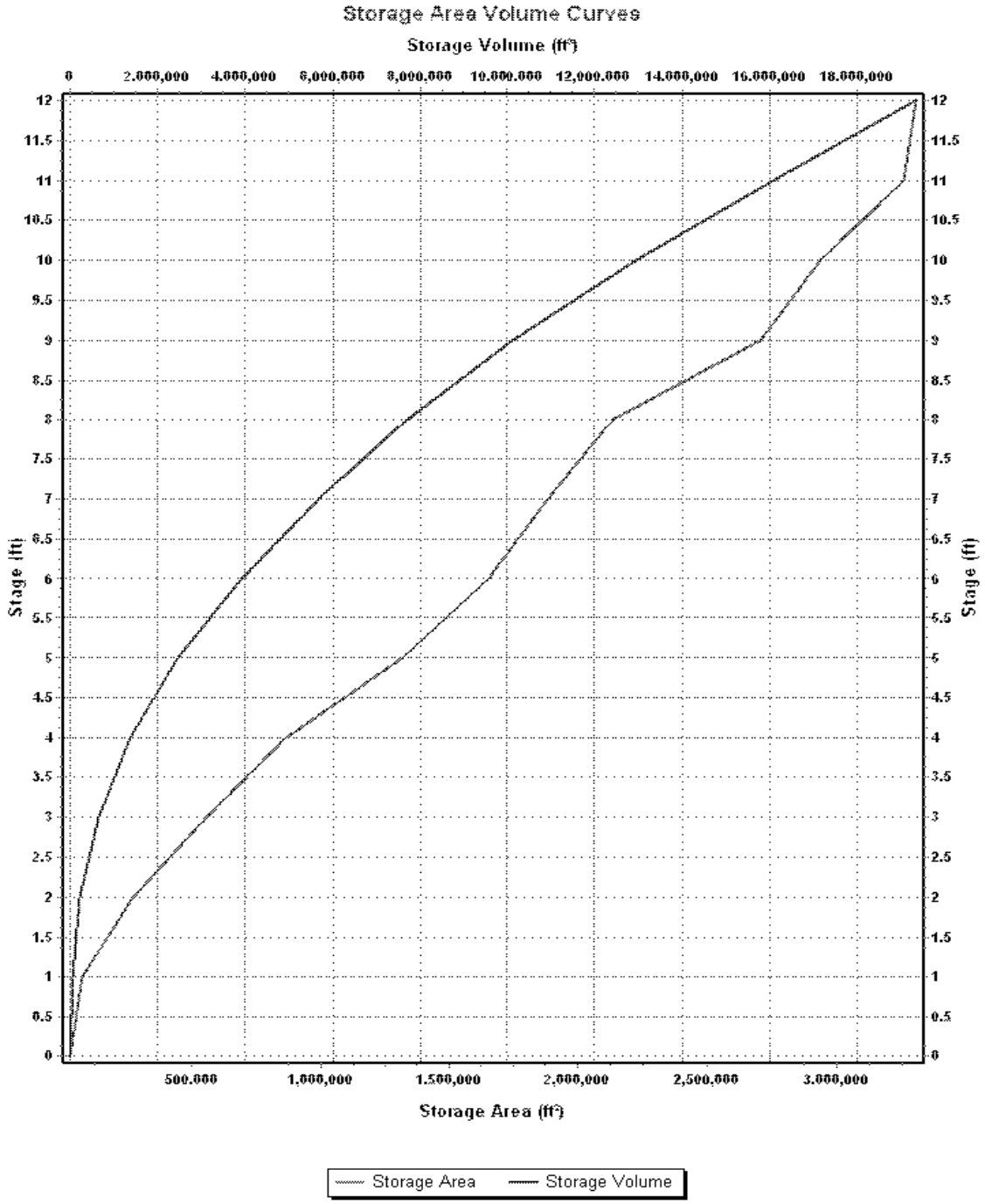
4.2 STAGE-STORAGE TABLE

Stage (ft)	Elevation (ft-MSL)	Contour Area (sq. feet)	Incremental Storage (cu. ft)	Total Storage (cu. ft)
0	-6	30,755	0	0
1	-5	79,085	53,059	53,059
2	-4	272,429	166,082	219,142
3	-3	556,653	406,127	625,268
4	-2	865,497	705,348	1,330,616
5	-1	1,319,457	1,084,422	2,415,038
6	0	1,650,124	1,481,565	3,896,603
7	1	1,884,670	1,765,922	5,662,525
8	2	2,133,683	2,007,689	7,670,213
9	3	2,705,971	2,413,926	10,084,139
10	4	2,937,690	2,820,889	12,905,028
11	5	3,259,251	3,096,906	16,001,934
12	6	3,307,096	3,282,816	19,284,750

4.3 TIME OF CONCENTRATION

A time of concentration (Tc) of 23.4 minutes was calculated for the Ash Pond. The Tc was calculated using the overland flow path that begins and travels through the adjacent residential neighborhood and eventually drains into the ash pond basin.

4.4 RATING CURVE



4.5 DRAINAGE BASIN