INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
PLANT BARRY GYPSUM POND
ALABAMA POWER COMPANY

Section 257.82 of EPA's regulations 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 safely managing flow during and following the peak discharge of the specified inflow design flood. The owner or operator also has to prepare a written plan documenting how the inflow flood control system has been designed and constructed to meet the requirements of this section of the rule.

The existing CCR surface impoundment referred to as the Plant Barry Gypsum Pond is located at Alabama Power Company's Plant Barry. The facility consists of a CCR storage area and a sedimentation pond. The inflow design flood consists solely of the rainfall that falls within the limits of the surface impoundment (process flows into the pond were determined to be negligible during the design storm). Stormwater is temporarily stored within the limits of the surface impoundment and discharged through a 6-foot square concrete riser connected to a 36" HDPE pipe that discharges into the sedimentation pond.

The inflow design flood has been calculated using the Natural Resources Conservation Service method (also known as the Soil Conservation Service (SCS) method) using the 1,000-yr storm event required for a Significant hazard potential facility. 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 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 groups "C" and "D" should be used to best reflect the characteristics of the soils on site in order to determine curve number values. 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.

Calculations indicate the unit can safely store and pass the inflow design storm.

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.

10/17

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Inflow Design Control System Plan:
Hydrologic and Hydraulic Calculation Summary

for

Plant Barry Gypsum Pond

Prepared by:

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Approval: _____ 10/12/16
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).

2.0 Summary of Conclusions

A hydrologic and hydraulic model was developed for the Plant Barry Gypsum Pond to determine the hydraulic capacity of the impoundment. The design storm for the Plant Barry Gypsum Pond 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 Barry Gypsum Pond

Plant Barry	Normal Pool El (ft)	Top of embankment El (ft)	Emergency Spillway Crest El (ft)	Peak Water Surface Elevation (ft	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Gypsum Pond	22.36	30.00	N/A	27.20	2.80	400.85	298.39

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

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The Plant Barry Gypsum Pond is classified as a significant hazard structure. The design storm for a significant hazard structure is a 1000-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 Barry Gypsum Pond Storm Distribution

Hazard Classification	Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
Significant	1000	24	21.6	NOAA Atlas 14	SCS Type III

The drainage area for the Plant Barry Gypsum Pond was delineated based on LiDAR 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 SCS curve number of 86 was used as the pond maintains a low water level, has a covering of

gypsum, and no vegetation. The time of concentration assumed for the basin was 10 minutes. A TR-55 gives a Tc of 13.6 minutes.

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

Table 3—Gypsum Pond Hydrologic Information

Drainage Basin Area (acres)	31.7
Hydrologic Curve Number, CN	86
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	10
Hydrologic Software	Hydraflow Hydrographs

Runoff values were determined by importing the characteristics developed above into a hydrologic model using Hydraflow Hydrographs for Civil 3D.

Process flows from Plant Barry were not considered in the analysis given that the plant would not be likely to discharge gypsum slurry into the pond during a 1000-year rainfall event.

3.2 HYDRAULIC ANALYSES

Storage values for the Gypsum Pond were determined by developing a stage-storage relationship utilizing contour data. The pond discharges directly through 6 - 36” diameter pipes into a sedimentation basin that is design to fully contain a 100-year, 24-hour storm event. Clear water from this pond is then pumped back to the plant for reuse.

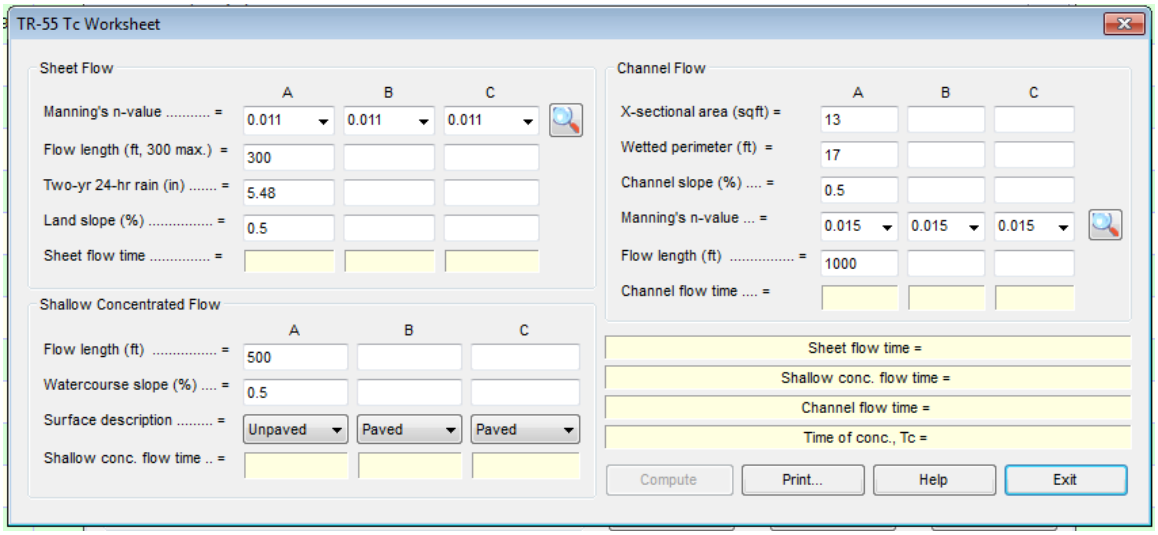
Table 4—Spillway Attribute Table

Spillway Component	US Invert El (feet)	DS Invert El (feet)	Dimension	Grade (%)	Length (ft)	Capacity (cfs)
36” Pipes	23	22.56	6 - 36” Diameter	0.5	88	282

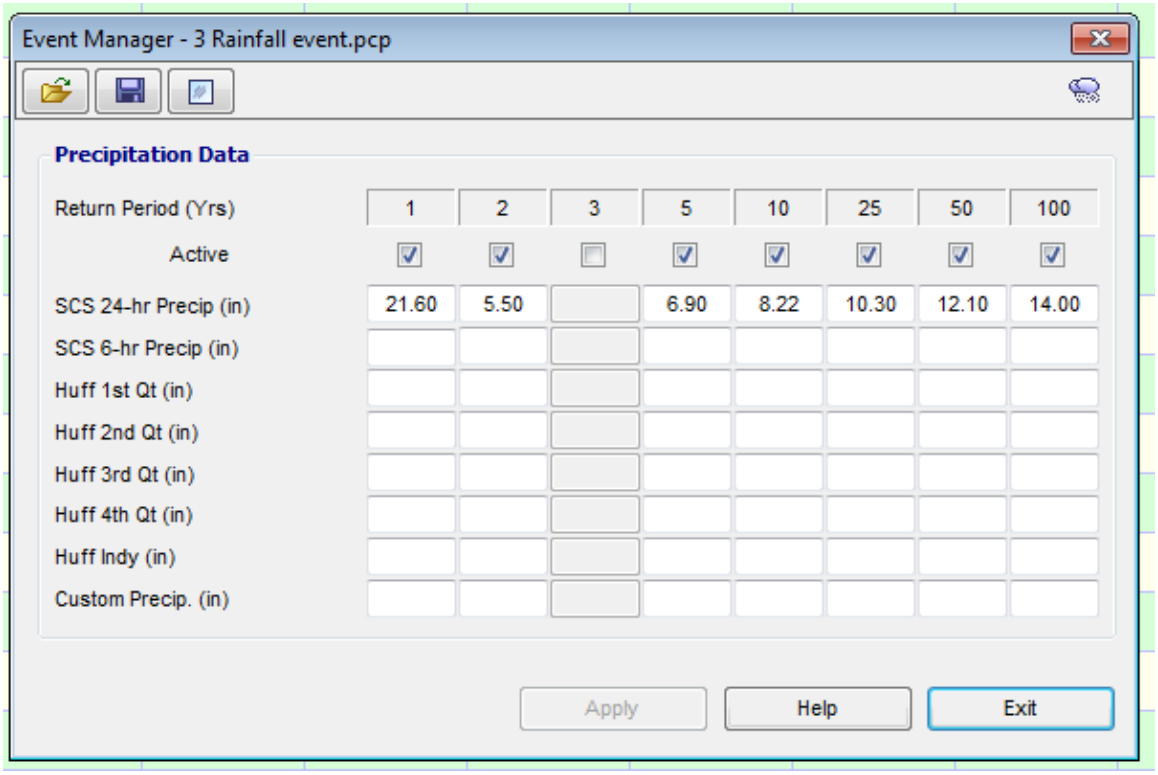
4.0 SUPPORTING INFORMATION

DRAINAGE BASIN

TIME OF CONCENTRATION



RAINFALL DATA



4.2 POND PERFORMANCE

STAGE/STORAGE/DISCHARGE

Stage	Elevation	Contour Area	Incremental Storage	Total Storage	Total Discharge
(ft)	(ft)	(sqft)	(cuft)	(cuft)	(cfs)
0.00	23.00	21,276	0.000	0.000	0.000
1.00	24.00	33,364	27,092	27,092	42.18
2.00	25.00	43,053	38,102	65,194	112.69
3.00	26.00	63,384	52,887	118,080	154.58
4.00	27.00	73,791	68,515	186,595	279.65
5.00	28.00	85,180	79,409	266,004	364.02
7.00	30.00	878,701	824,894	1,090,898	478.86
8.00	31.00	895,104	886,801	1,977,699	520.57

ELEVATION/TIME