PERIODIC RUN-ON AND RUN-OFF CONTROL PLAN
391-3-4-.10(5) and 40 C.F.R. PART 257.81
PLANT MCINTOSH COAL COMBUSTION BY-PRODUCT LANDFILL NO. 4
(LANDFILL 4)
GEORGIA POWER COMPANY

The Federal CCR Rule, and, for Existing CCR Landfills where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill to prepare a run-on and run-off control system plan to document how these control systems have been designed and constructed to meet the applicable requirements of this section of the Rule. *See* 40 C.F.R. § 257.81; Ga. Comp. R. & Regs. r. 391.3-4-.10(5)(a). In addition, the Rules require periodic run-on and run-off control system plans every five years. *See* 40 C.F.R. § 257.81(c)(4); Ga. Comp. R. & Regs. r. 391.3-4-.10(4)(b).

The Plant McIntosh Landfill 4 is located on Plant McIntosh property in Effingham County, east of Rincon, Georgia. Landfill 4 is comprised of Cell 1 and Cell 2A. Cell 1 closure is complete with final cover in place. Cell 2A became operational in 2016. Cell 2A consists of a storage cell, a leachate pond, a sedimentation pond, and a clear pool.

The storm water flows have been calculated using the Natural Resources Conservation Service (NRCS) method, also known as the Soil Conservation Service (SCS method), using 24-hour storm events. The storm water detention system has been designed in accordance with the Georgia Soil and Water Conservation Commission requirements as well as other local, city, and government codes.

Runoff curve number data was determined using 2.1.5-1 from the Georgia Stormwater Management Manual. Appendix B from the TR-55 were used to determine the rainfall distribution methodology. Precipitation values were determined from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the 25-yr, design storm event. The NRCS provides information on soil characteristics and hydrologic groups. The predominate soil types found on the site are Leefield loamy sand and Pelham loamy sand. 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 Hydraflow Hydrographs 2019 and used to generate appropriate

precipitation curves, runoff curve numbers and storm basin runoff values.

Landfill 4 is designed and constructed with perimeter berms and drainage ditches surrounding the cell that prevent storm water run-on during the peak discharge of a 24-hr, 25-yr storm from flowing onto the active portion of the landfill, Cell 2A. Within Cell 2A, the leachate pond collects and controls the anticipated amount of leachate generated from the leachate collection system over a period of 7 to 10 days as well as the quantity of rainfall from a 24-hr, 100-yr storm event that falls directly into the leachate pond. For the purposes of the run-off calculations, the drainage area for the leachate pond is not included. Storm water run-off from Cell 2A is routed through a sedimentation pond designed to handle the run-off from a 24-hr, 25-yr storm. This plan is supported by appropriate engineering calculations, a summary of which is attached.

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

I hereby certify that the run-on and run-off control system plan meets the requirements of 40 C.F.R. Part 257.81.

James C. Pegues, P.E.
Licensed State of Georgia, PE No. 17419

Run-on and Run-off Control System Plan for Landfills:
Calculation Summary

for

Plant McIntosh CCR Landfill No. 4

Prepared by:

Southern Company Services
Technical Services

Originator: Jeremy Brown 10/6/21
Jeremy K. Brown Date

Reviewer: Joshua K Myers 10/8/21
Joshua K. Myers Date

Approval: 10/8/21
James C. Pegues Date

1.0 Purpose of Calculation

The purpose of this report is to demonstrate the run-on and run-off controls of the subject CCR landfill in order to prepare a run-on and run-off control system 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 Environmental Protection Division's (EPD) Georgia CCR Rule (391-3-4-.10).

2.0 Summary of Conclusions

2.1 Site Overview

The Plant McIntosh CCR Landfill No. 4 is located on Plant McIntosh property approximately 9 miles east of Rincon, Georgia and 27 miles north of Savannah, Georgia. The total area occupied by the CCR Landfill No. 4 is 16.03 acres. Runoff from this area is directed through perimeter ditches that are inside the cells perimeter dike. Flow from the perimeter ditches discharge into a pond via three 30" diameter pipes. The pond is connected to a clear pool via two 60" diameter risers and two 42" diameter pipes. Storm water from the clear pool is discharged through a 60" diameter riser and 42" diameter pipe. Discharge from the clear pool goes into a that flows to the east towards a tributary stream of Lockner Creek.

An overview of Cell 2A is provided in Table 1 below.

Table 1 - Landfill site characteristics

Description	Cell 2A	Sedimentation Pond	Clear Pool
Size (Acres)	12.18	2.57	1.28
Outlet Type	Three 30" pipes	Two 60" Risers connected to two 42" pipes	60" Riser connected to a 42" pipe
Outlets To	Leachate Pond	Clear Pool	Ditch

2.2 Run-on Control System Plan

There is no stormwater run-on into the facility because it is contained within earthen berms that prevent stormwater from the surrounding area to enter the CCR facility.

2.3 Run-off Control System Plan

A hydrologic and hydraulic model was developed for the Plant McIntosh CCR Landfill to determine the hydraulic capacity of Landfill No. 4. The design storm for the purposes of run-off control system plans is the 24-hour, 25-year rainfall event. The results of routing the design storm event through the landfill are presented in Table 2 below:

Table 2 - Flood Routing Results for Plant McIntosh CCR Landfill Cell 2A

Plant McIntosh	Normal Pool El (ft)	Top of Embankment El (ft)	Peak Water Surface El (ft)	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Cell 2A	36.00	45.0	40.21	4.79	85.20	0.00**

*Freeboard is measured from the top of embankment to the peak water surface elevation
**The peak outflow is negligible because the riser is perforated with 0.5" holes that are covered by filter stone which drains the clear pool slowly. The elevation of the clear pool does not reach the elevation of the primary spillway during the design storm.

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The design storm for all run-on/run-off analyses is a 24-hour, 25-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 3.

Table 3 - Plant McIntosh CCR Landfill Cell 2A Design Storm Distribution

Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
25	24	8.10	NOAA Atlas 14	SCS Type III

The drainage area for the Plant McIntosh CCR Landfill No. 4 was delineated based on LiDAR data acquired for the Plant in 2020. 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 methods prescribed in TR-55. Soil types were obtained from the Natural Resources Conservation Service. Land use areas were delineated based on aerial photography. Time of Concentration and Lag Time calculations were also developed based on methodologies prescribed in TR-55.

A table of the pertinent basin characteristics of the landfill is provided below in Table 4.

Table 4 - Landfill Hydrologic Information (Cell 2A)

Drainage Basin Area (acres)	16.03
Hydrologic Curve Number, CN	85
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	15.82
Hydrologic Software	Hydraflow Hydrographs

Runoff 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 landfill were determined by developing a stage-storage relationship utilizing contour data. The spillway system at the Plant McIntosh CCR Landfill No. 4 consists of a primary spillway and an auxiliary spillway. The primary spillway consists of a sharp crested riser weir of 15.71

foot length which conveys flow to an hdpe pipe. The top of the riser weir is at elevation of 41.00 feet. The pipe is 42-inches in diameter and has a length of approximately 80 feet. The auxiliary spillway is a concrete trapezoidal weir that is 20' wide with 6:1 side slopes sloped at 1% with a crest elevation of 42.5. A summary of spillway information is presented below in Table 5.

Table 5 - Spillway Attribute Table

Spillway Component	US Invert El (ft)	DS Invert El (ft)	Dimension (ft)	Slope (ft/ft)	Length (ft)	Spillway Capacity (cfs)
Auxiliary	42.5	42.25	20' span 2.5' rise	1.0%	25	541.8

Based on the spillway attributes listed above, the data was inserted into Hydraflow Hydrographs to determine the pond performance during the design storm. Results are shown in Table 2.

4.0 SUPPORTING INFORMATION

4.1 CURVE NUMBER

Terrain Type	Area	Curve Number
Grass	5.37	61
Gravel	0.89	85
HDPE	9.77	98

4.2 STAGE-STORAGE TABLE

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	35.00	16,459	0	0
1.00	36.00	60,066	38,496	38,496
2.00	37.00	69,794	67,915	106,411
3.00	38.00	73,759	71,760	178,171
4.00	39.00	77,815	75,770	253,942
5.00	40.00	82,441	80,109	334,050
6.00	41.00	87,167	84,785	418,835
7.00	42.00	91,957	89,542	508,377
7.50	42.50	94,087	46,505	554,883

4.3 TIME OF CONCENTRATION

TR55 Tc Worksheet

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

Hyd. No. 1

Cell 2A

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 256.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.34		0.00		0.00		
Land slope (%)	= 10.55		0.00		0.00		
Travel Time (min)	**= 9.18**	**+**	**0.00**	**+**	**0.00**	**=**	**9.18**
Shallow Concentrated Flow							
Flow length (ft)	= 39.00		0.00		0.00		
Watercourse slope (%)	= 12.82		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=5.78		0.00		0.00		
Travel Time (min)	**= 0.11**	**+**	**0.00**	**+**	**0.00**	**=**	**0.11**
Channel Flow							
X sectional flow area (sqft)	= 9.42		2.27		0.00		
Wetted perimeter (ft)	= 10.22		3.77		0.00		
Channel slope (%)	= 0.81		0.52		0.00		
Manning's n-value	= 0.030		0.013		0.015		
Velocity (ft/s)	=4.23						
			5.88				
					0.00		
Flow length (ft)	({0})1628.0		44.0		0.0		
Travel Time (min)	**= 6.41**	**+**	**0.12**	**+**	**0.00**	**=**	**6.54**

Total Travel Time, Tc ..... 15.82 min

4.4 RESULTS

Hydrograph Report

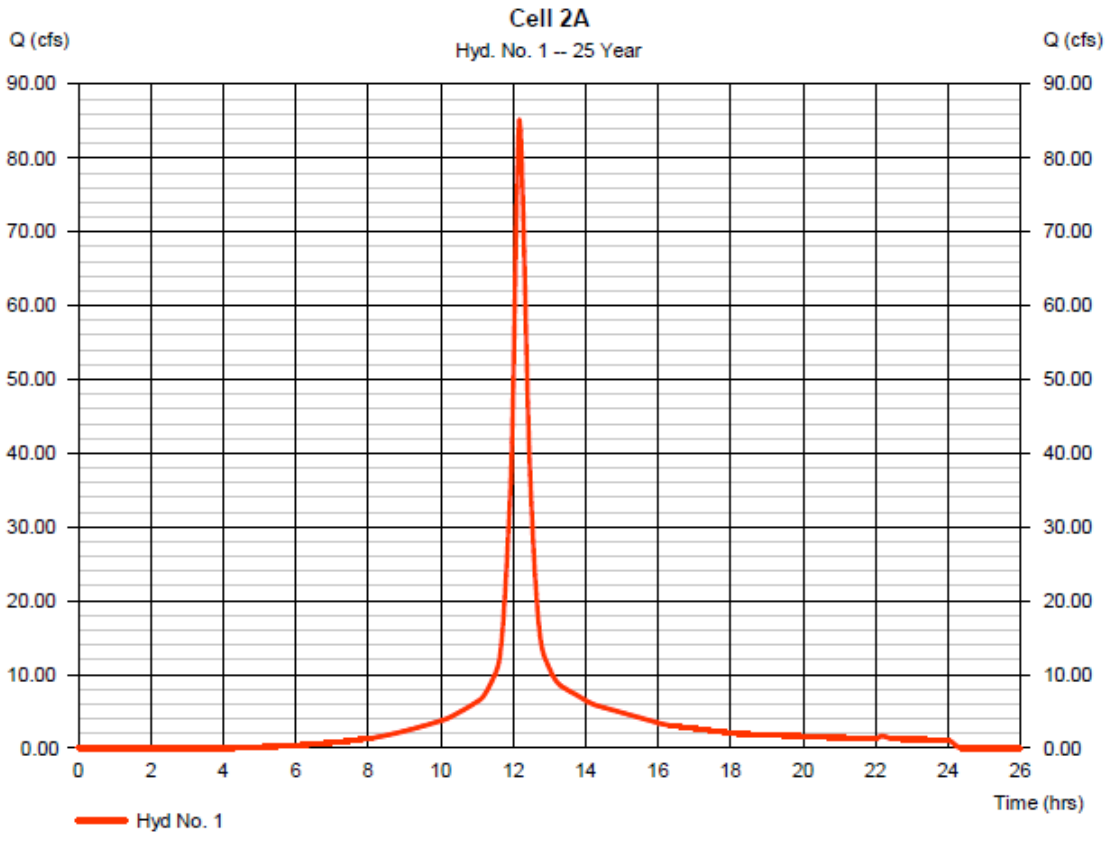
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12 — Thursday, 06 / 3 / 2021

Hyd. No. 1

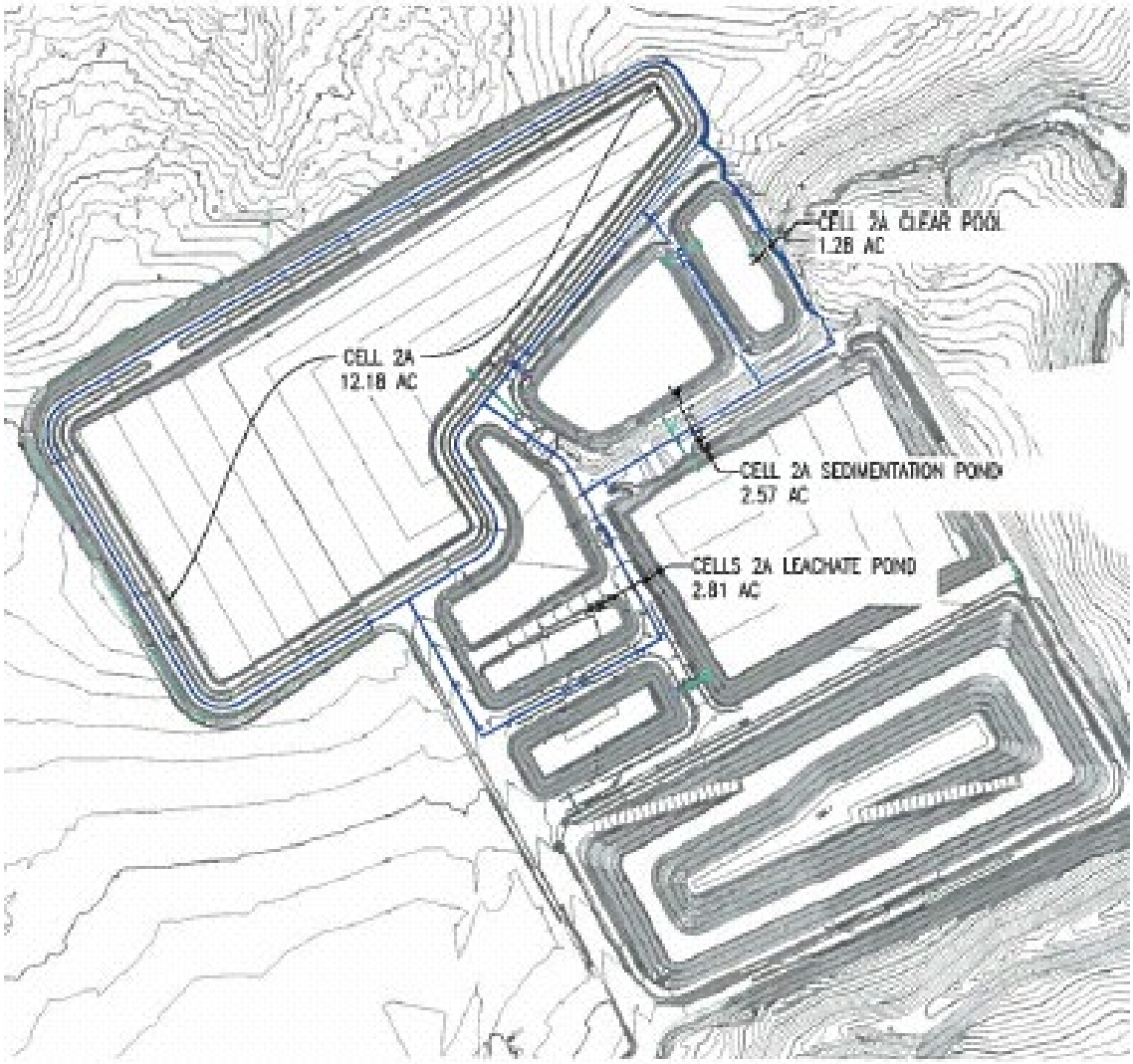
Cell 2A

Hydrograph type	= SCS Runoff	Peak discharge	= 85.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 357,979 cuft
Drainage area	= 16.030 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.80 min
Total precip.	= 8.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.370 x 61) + (0.890 x 85) + (9.770 x 98)] / 16.030



4.5 DRAINAGE BASIN



Note: The image above is for shown for reference of the delinated drainage areas only and does not reflect the final grades in Cell 2A.