RUN-ON AND RUN-OFF CONTROL PLAN
PLANT CRIST ASH LANDFILL 1
GULF POWER COMPANY

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities" Final Rule (40 C.F.R. Part 257 and Part 261) subsection §257.81 requires 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. Each plan is to be supported by appropriate engineering calculations.

Ash Landfill 1 is located at Gulf Power Company's Plant Crist. The facility consists of a dry CCR storage cell and a sedimentation pond. The sedimentation pond is shared between Ash Landfill 1 and Ash Landfill 2.

The storm water flows have been calculated using the National Resources Conservations Service method (also known as the Soil Conservation Service (SCS) method) using 24-hour storm events. 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 Technical Paper No. 40, Rainfall Frequency Atlas of the United States.

The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that the hydrological group "A" should be used to best reflect the characteristics of the soils on site. This information was placed into Hydraflow Hydrographs 2011 and used to generate appropriate precipitation curves, runoff curve numbers and storm basin runoff values.

Ash Landfill 1 is designed and constructed such that the active portion of the landfill is higher than the surrounding area, and is surrounded by perimeter ditches, which prevents run-on to the landfill. Run-on is diverted through the perimeter ditches to the sedimentation pond. Run-off from the landfill is directed to a collection area at the low end of the cell via interior ditches or sheet flow where it is then diverted to the sedimentation pond. The water level in the sedimentation pond is controlled by a dual pump system. During a 25-year, 24-hour storm event, the discharge into the sedimentation pond results in a water level rise to approximately EL 107.99. This is below the crest elevation of the

sedimentation pond dike of EL 109, leaving additional storage capacity available, if needed, for larger storm events.

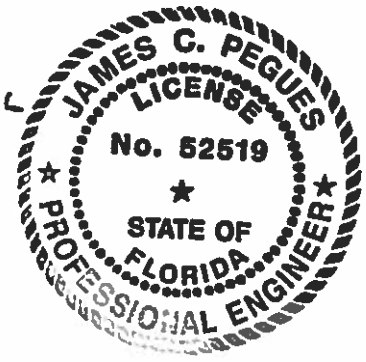
The facility is operated subject to and in accordance with § 257.3-3 of EPA's regulations.

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

10/17/16

James C. Pegues, P.E.

Licensed State of Florida, PE No. 52519



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

for

Plant Crist Ash Landfill

Prepared by:

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Approval: _____ 10/12/16
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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).

2.0 Summary of Conclusions

2.1 Site Overview

The Plant Crist Ash Landfill is located in northeast Pensacola, Florida on Gulf Power Company property. The total area occupied by the active landfill is roughly 82 acres and includes a fly ash landfill (Landfill 1) and bottom ash landfill (Landfill 2) (collectively, Landfill 1 and Landfill 2 are referred to herein as the "Plant Crist Ash Landfill"). Runoff from these areas is directed into a sedimentation pond via perimeter ditches and culverts. The sedimentation pond also holds runoff from the closed interim landfill and a neighboring parking lot located just south of Landfill 1. Runoff from the parking lot is carried through large ditches following the west side of Landfill 1. These areas combined contribute roughly an additional 35 acres of runoff to the sedimentation pond. Water from the sedimentation pond is pumped to the cooling tower canal.

An overview of the facility is provided in Table 1 below.

Table 1. Landfill site characteristics

Description	Landfill 1	Landfill 2	Sedimentation Pond
Size (Acres)	60	18	4
Outlet Type	48" CMP riser pipe	36" CMP riser pipe	Two alternating 1,000 gpm pumped lines
Outlets To	Sedimentation pond	Sedimentation pond	Pumped to the cooling tower canal

2.2 Run-on Control System Plan

There is no stormwater run-on into the facility because the active portion of both Landfill 1 and Landfill 2 is higher than the surrounding area and therefore prevents any stormwater run-on onto the exposed ash.

2.3 Run-off Control System Plan

A hydrologic and hydraulic model was developed for the Plant Crist ash landfill to determine the hydraulic capacity of the sedimentation pond. 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 the following table:

Table 2. Flood Routing Results

Plant Crist	Normal Pool El (ft)	Top of embankment El (ft)	Peak Water Surface El (ft)	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
Sed. pond	96.5	109.0	107.99	1.01	387.67	2.23

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

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. Design Storm Distribution

Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
25	24	9.02	NOAA Atlas 14	SCS Type III

The drainage area for the Plant Crist ash landfill was delineated based on LiDAR data acquired for the plant in 2013. 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 and design data. Time of Concentration was also developed based on methodologies prescribed in TR-55.

A table of the pertinent basin characteristics of the landfill is provided below in Tables 4a through 4d.

Table 4a. Landfill Hydrologic Information (Landfill 2)

Drainage Basin Area (acres)	17.76
Hydrologic Curve Number, CN	64
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	25.1
Hydrologic Software	Hydraflow Hydrographs

Table 4b. Landfill Hydrologic Information (Landfill 1)

Drainage Basin Area (acres)	53.68
Hydrologic Curve Number, CN	63
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	48.9
Hydrologic Software	Hydraflow Hydrographs

Table 4c. Landfill Hydrologic Information (West ditch and parking lot)

Drainage Basin Area (acres)	20.75
Hydrologic Curve Number, CN	48
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	19.1
Hydrologic Software	Hydraflow Hydrographs

Table 4d. Landfill Hydrologic Information (Closed interim landfill)

Drainage Basin Area (acres)	25.02
Hydrologic Curve Number, CN	59
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	48.1
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 2013.

3.2 HYDRAULIC ANALYSES

Storage values for the sedimentation pond were determined by developing a stage-storage relationship utilizing contour data. The discharge system at the Plant Crist ash landfill consists of two pumps, each rated for 1,000 gpm, with only one pump running at a time. Based on the pump information provided, 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

4.1.1 LANDFILL 2

Terrain Type	Area (ac)	Curve Number
Water/HDPE	0.85	100
Bare Bottom Ash	11.91	72
Good grass cover	5.00	39

4.1.2 LANDFILL 1

Terrain Type	Area (ac)	Curve Number
Water/HDPE	1.0	100
Good grass cover	40.3	60
Poor grass cover	12.38	68

4.1.3 WEST DITCH AND PARKING LOT

Terrain Type	Area (ac)	Curve Number
Water/HDPE	1.0	100
Gravel	4.4	76

Woods, fair ground cover	15.35	36

4.1.4 CLOSED INTERIM LANDFILL AND SEDIMENTATION POND

Terrain Type	Area (ac)	Curve Number
Water/HDPE	3.63	100
Woods, poor ground cover	7.53	45
Fair grass cover	13.86	55

4.2 STAGE-STORAGE TABLE OF SEDIMENTATION POND

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	93.00	19,471	0	0
1.00	94.00	21,292	20,382	20,382
2.00	95.00	23,759	22,526	42,907
3.00	96.00	26,251	25,005	67,912
3.50	96.50	114,211	35,116	103,028
4.00	97.00	118,810	58,255	161,283
5.00	98.00	129,916	124,363	285,646
6.00	99.00	156,339	143,128	428,773
7.00	100.00	168,392	162,366	591,139
8.00	101.00	177,618	173,005	764,144
9.00	102.00	229,878	203,748	967,892
10.00	103.00	241,401	235,639	1,203,531
11.00	104.00	252,452	246,927	1,450,458
12.00	105.00	263,550	258,001	1,708,459
13.00	106.00	274,361	268,955	1,977,414
14.00	107.00	285,684	280,023	2,257,437
15.00	108.00	229,070	257,377	2,514,814
16.00	109.00	237,432	233,251	2,748,065

4.3 TIME OF CONCENTRATION

4.3.1 LANDFILL 2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.170		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	5.89		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**19.22**	**+**	**0.00**	**+**	**0.00**	**=**	**19.22**
Shallow Concentrated Flow								
Flow length (ft)	=	800.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	2.28		0.00		0.00		
Travel Time (min)	**=**	**5.84**	**+**	**0.00**	**+**	**0.00**	**=**	**5.84**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00						
				0.00				
						0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc								**25.10 min**

4.3.2 LANDFILL 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.200		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 5.89		0.00		0.00		
Land slope (%)	= 0.50		0.00		0.00		
Travel Time (min)	**= 38.12**	**+**	**0.00**	**+**	**0.00**	**=**	**38.12**
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 10.33**	**+**	**0.00**	**+**	**0.00**	**=**	**10.33**
Channel Flow							
X sectional flow area (sqft)	= 92.50		0.00		0.00		
Wetted perimeter (ft)	= 32.00		0.00		0.00		
Channel slope (%)	= 4.00		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=20.23						
			0.00				
					0.00		
Flow length (ft)	({0})500.0		0.0		0.0		
Travel Time (min)	**= 0.41**	**+**	**0.00**	**+**	**0.00**	**=**	**0.41**
Total Travel Time, Tc							**48.90 min**

4.3.3 WEST DITCH AND PARKING LOT

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 5.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 1.83**	**+**	**0.00**	**+**	**0.00**	**=**	**1.83**
Shallow Concentrated Flow							
Flow length (ft)	= 430.00		0.00		0.00		
Watercourse slope (%)	= 3.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.79		0.00		0.00		
Travel Time (min)	**= 2.56**	**+**	**0.00**	**+**	**0.00**	**=**	**2.56**
Channel Flow							
X sectional flow area (sqft)	= 120.00		0.00		0.00		
Wetted perimeter (ft)	= 40.00		0.00		0.00		
Channel slope (%)	= 0.30		0.00		0.00		
Manning's n-value	= 0.060		0.015		0.015		
Velocity (ft/s)	=2.84						
			0.00				
					0.00		
Flow length (ft)	({0})2500.0		0.0		0.0		
Travel Time (min)	**= 14.67**	**+**	**0.00**	**+**	**0.00**	**=**	**14.67**
Total Travel Time, Tc							**19.10 min**

4.3.4 CLOSED INTERIM LANDFILL

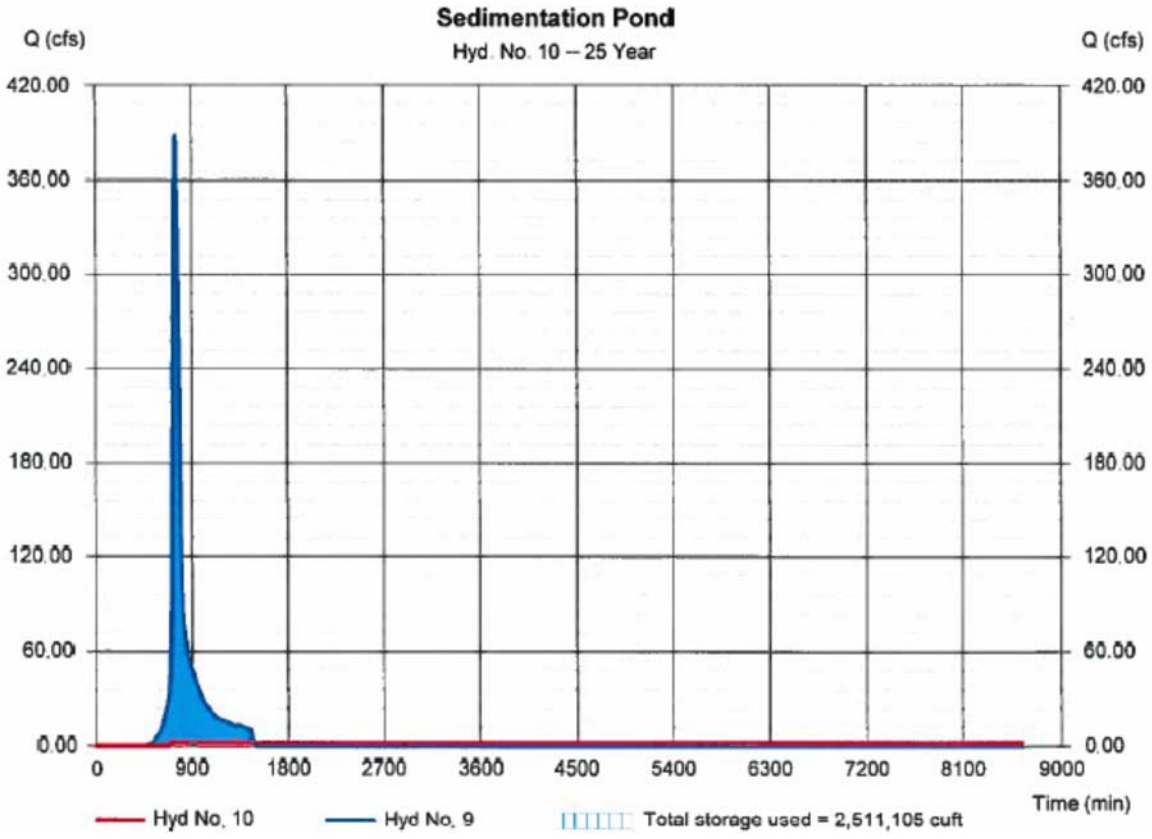
Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 5.89		0.00		0.00		
Land slope (%)	= 0.20		0.00		0.00		
Travel Time (min)	**= 43.69**	**+**	**0.00**	**+**	**0.00**	**=**	**43.69**
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 12.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=5.59		0.00		0.00		
Travel Time (min)	**= 2.98**	**+**	**0.00**	**+**	**0.00**	**=**	**2.98**
Channel Flow							
X sectional flow area (sqft)	= 52.00		0.00		0.00		
Wetted perimeter (ft)	= 23.00		0.00		0.00		
Channel slope (%)	= 0.30		0.00		0.00		
Manning's n-value	= 0.060		0.015		0.015		
Velocity (ft/s)	=2.35						
			0.00				
					0.00		
Flow length (ft)	({0})200.0		0.0		0.0		
Travel Time (min)	**= 1.42**	**+**	**0.00**	**+**	**0.00**	**=**	**1.42**
Total Travel Time, Tc							**48.10 min**

4.4 RESULTS

Sedimentation Pond

Hydrograph type	= Reservoir	Peak discharge	= 2.228 cfs
Storm frequency	= 25 yrs	Time to peak	= 702 min
Time interval	= 3 min	Hyd. volume	= 1,063,040 cuft
Inflow hyd. No.	= 9 - TOTAL all landfills	Max. Elevation	= 107.99 ft
Reservoir name	= COMBINED above water	Max. Storage	= 2,511,105 cuft

Storage Indication method used.



4.5 SITE LAYOUT