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Birmingham Coal & Coke Company, Inc.

Gooden Creek #2 Mine

Basin 037 Detailed Design Plan

5.9 Inches, 10 Year - 24 Hour

DRN 58

J. Rich Weaver, P.E.

General Information

Storm Information:

Storm Type:	DRN 58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.900 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	100.000%	100.000%
2.0000	98.000%	92.000%
1.0000	96.000%	78.000%
0.5000	94.000%	54.000%
0.3000	88.000%	43.000%
0.2000	80.000%	34.000%
0.1000	68.000%	22.000%
0.0500	49.000%	15.000%
0.0300	36.000%	9.000%
0.0200	28.000%	5.000%
0.0100	14.000%	4.000%
0.0050	5.000%	3.000%
0.0030	4.000%	2.500%
0.0010	2.000%	2.000%
0.0001	0.001%	0.001%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Basin 037

#1
Pond

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	23.700	23.700	30.19	7.53	2,429.8	359,121	275.05	162.95
	Out			26.17	7.53	89.8	15,589	0.22	0.14

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	92.000%	100.000%
1.0000	78.000%	100.000%
0.5000	54.000%	100.000%
0.3000	43.000%	100.000%
0.2000	34.000%	100.000%
0.1000	22.000%	100.000%
0.0500	15.000%	100.000%
0.0300	9.000%	100.000%
0.0200	5.000%	100.000%
0.0100	4.000%	100.000%
0.0050	3.000%	81.209%
0.0030	2.500%	67.674%
0.0010	2.000%	54.139%
0.0001	0.001%	0.027%

Structure Detail:

Structure #1 (Pond)

Basin 037

Pond Inputs:

Initial Pool Elev:	533.80 ft
Initial Pool:	1.16 ac-ft
*Sediment Storage:	2.34 ac-ft
Dead Space:	20.00 %

**Sediment capacity calculated from 0.100 times disturbed area*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
36.00	165.00	2.00	0.0240	533.80	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
537.20	20.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	536.39 ft
H'graph Detention Time:	0.87 hrs
Pond Model:	CSTRS
Dewater Time:	0.89 days
Trap Efficiency:	96.31 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
530.84	0.348	0.000	0.000		Top of Sed. Storage
531.00	0.353	0.054	0.000		
531.50	0.367	0.234	0.000		
532.00	0.382	0.421	0.000		
532.50	0.396	0.616	0.000		
533.00	0.412	0.818	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
533.50	0.427	1.028	0.000		
533.80	0.436	1.157	0.000		Spillway #1
534.00	0.443	1.245	0.599	8.50	
534.50	0.459	1.470	3.680	6.20	
535.00	0.475	1.704	8.262	5.00	
535.50	0.492	1.946	13.926	0.90	
536.00	0.509	2.196	20.499	0.45	
536.39	0.522	2.396	26.166	0.20	Peak Stage
536.40	0.523	2.402	26.338		
536.50	0.526	2.455	27.874		
537.00	0.544	2.722	35.961		
537.20	0.551	2.832	39.385		Spillway #2
537.50	0.562	2.999	51.075		
538.00	0.580	3.284	70.072		
538.20	0.588	3.401	82.681		
538.50	0.599	3.579	102.823		
539.00	0.617	3.883	145.299		
539.50	0.637	4.196	198.850		
540.00	0.656	4.519	263.031		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
530.84	0.000	0.000	0.000
531.00	0.000	0.000	0.000
531.50	0.000	0.000	0.000
532.00	0.000	0.000	0.000
532.50	0.000	0.000	0.000
533.00	0.000	0.000	0.000
533.50	0.000	0.000	0.000
533.80	0.000	0.000	0.000
534.00	(3)>0.599	0.000	0.599
534.50	(3)>3.680	0.000	3.680
535.00	(3)>8.262	0.000	8.262
535.50	(3)>13.926	0.000	13.926
536.00	(3)>20.499	0.000	20.499
536.40	(3)>26.338	0.000	26.338
536.50	(3)>27.874	0.000	27.874
537.00	(3)>35.961	0.000	35.961

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
537.20	(3)>39.385	0.000	39.385
537.50	(5)>43.633	7.442	51.075
538.00	(5)>50.226	19.846	70.072
538.20	(5)>52.617	30.064	82.681
538.50	(6)>54.177	48.646	102.823
539.00	(6)>56.629	88.671	145.299
539.50	(6)>58.956	139.895	198.850
540.00	(6)>61.196	201.834	263.031

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	23.400	0.033	0.000	0.000	81.000	F	29.73	7.385
	2	0.300	0.001	0.000	0.000	100.000	F	0.46	0.147
	Σ	**23.700**						**30.19**	**7.533**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	22.00	0.9000	1.0000	2	2,429.8	363,908	278.72	165.65
	2	0.001	200.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**2,429.8**	**359,121**	**275.05**	**162.95**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	15.04	40.00	266.00	3.870	0.019
		8. Large gullies, diversions, and low flowing streams	13.75	40.00	291.00	11.120	0.007
		9. Small streams flowing bankfull	9.75	70.00	718.00	28.100	0.007
#1	**1**	**Time of Concentration:**					**0.033**
#1	2	5. Nearly bare and untilled, and alluvial valley fans	2.50	5.00	200.00	1.580	0.035
		8. Large gullies, diversions, and low flowing streams	1.76	15.00	850.00	3.980	0.059
#1	**2**	**Time of Concentration:**					**0.001**