Birmingham Coal & Coke Company, Inc.
Old Union #2 Mine, P-3962
Detailed Design Plan Basin 138

5.9 Inches, 10 Year - 24 Hour,

DRN 58

J. David McGehee, PE/LS

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 138

#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	10.831	10.831	12.39	3.00	63.3	26,347	20.17	11.81
	Out			2.80	3.00	1.3	364	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	92.014%	100.000%
1.0000	78.041%	100.000%
0.5000	54.092%	100.000%
0.3000	43.103%	100.000%
0.2000	34.105%	100.000%
0.1000	22.105%	100.000%
0.0500	15.078%	100.000%
0.0300	9.062%	100.000%
0.0200	5.053%	100.000%
0.0100	4.023%	100.000%
0.0050	3.005%	100.000%
0.0030	2.503%	100.000%
0.0010	2.000%	97.953%
0.0001	0.001%	0.049%

Structure Detail:

Structure #1 (Pond)

Basin 138

Pond Inputs:

Initial Pool Elev:	635.10 ft
Initial Pool:	0.90 ac-ft
*Sediment Storage:	0.33 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)
12.00	140.00	2.00	0.0240	635.10	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
636.90	20.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	636.70 ft
H'graph Detention Time:	4.81 hrs
Pond Model:	CSTRS
Dewater Time:	0.77 days
Trap Efficiency:	97.96 %

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)	
633.07	0.269	0.000	0.000		Top of Sed. Storage
633.50	0.335	0.131	0.000		
634.00	0.422	0.320	0.000		
634.50	0.520	0.555	0.000		
635.00	0.626	0.841	0.000		
635.10	0.641	0.904	0.000		Spillway #1

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
635.50	0.700	1.172	0.594	5.46*	
635.70	0.730	1.315	1.466	1.80	
636.00	0.777	1.541	1.586	2.80	
636.50	0.859	1.950	2.690	6.05	
636.70	0.893	2.129	2.804	2.45	Peak Stage
636.80	0.910	2.215	2.860		
636.90	0.927	2.307	2.917		Spillway #2
637.00	0.944	2.401	4.932		
637.50	1.033	2.895	14.950		
638.00	1.127	3.435	39.225		
638.50	1.224	4.022	74.705		
639.00	1.325	4.660	121.838		
639.50	1.431	5.348	179.623		
640.00	1.540	6.091	248.246		
640.50	1.649	6.888	327.963		
641.00	1.761	7.740	419.080		
641.50	1.876	8.649	521.934		
642.00	1.996	9.617	636.861		
642.50	2.119	10.646	764.188		
643.00	2.246	11.737	904.262		
643.50	2.376	12.892	1,057.424		
644.00	2.511	14.114	1,224.004		
644.50	2.649	15.403	1,404.327		
645.00	2.790	16.763	1,598.713		
645.50	2.901	18.186	1,807.471		
646.00	3.015	19.665	2,030.909		
646.50	3.130	21.201	2,269.323		
647.00	3.248	22.795	2,522.991		
647.50	3.368	24.449	2,792.215		
648.00	3.490	26.163	3,077.274		
648.50	3.614	27.939	3,378.444		
649.00	3.741	29.778	3,695.990		
649.50	3.869	31.680	4,030.176		
650.00	4.000	33.648	4,381.257		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
633.07	0.000	0.000	0.000
633.50	0.000	0.000	0.000
634.00	0.000	0.000	0.000
634.50	0.000	0.000	0.000
635.00	0.000	0.000	0.000
635.10	0.000	0.000	0.000
635.50	(3)>0.594	0.000	0.594
635.70	(1)>1.466	0.000	1.466
636.00	(1)>1.586	0.000	1.586
636.50	(2)>2.690	0.000	2.690
636.80	(4)>2.860	0.000	2.860
636.90	(4)>2.917	0.000	2.917
637.00	(5)>2.974	1.958	4.932
637.50	(6)>3.198	11.753	14.950
638.00	(6)>3.374	35.852	39.225
638.50	(6)>3.550	71.155	74.705
639.00	(6)>3.710	118.128	121.838
639.50	(6)>3.863	175.760	179.623
640.00	(6)>4.016	244.230	248.246
640.50	(6)>4.161	323.802	327.963
641.00	(6)>4.297	414.783	419.080
641.50	(6)>4.432	517.501	521.934
642.00	(6)>4.568	632.293	636.861
642.50	(6)>4.688	759.499	764.188
643.00	(6)>4.804	899.458	904.262
643.50	(6)>4.920	1,052.504	1,057.424
644.00	(6)>5.035	1,218.969	1,224.004
644.50	(6)>5.151	1,399.176	1,404.327
645.00	(6)>5.267	1,593.446	1,598.713
645.50	(6)>5.382	1,802.089	1,807.471
646.00	(6)>5.498	2,025.411	2,030.909
646.50	(6)>5.611	2,263.712	2,269.323
647.00	(6)>5.708	2,517.282	2,522.991
647.50	(6)>5.805	2,786.410	2,792.215
648.00	(6)>5.902	3,071.373	3,077.274
648.50	(6)>5.998	3,372.445	3,378.444
649.00	(6)>6.095	3,689.895	3,695.990
649.50	(6)>6.192	4,023.984	4,030.176
650.00	(6)>6.288	4,374.969	4,381.257

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	3.281	0.075	0.000	0.000	81.000	F	4.17	1.035
	2	2.524	0.105	0.022	0.409	70.000	M	2.48	0.572
	3	4.767	0.083	0.000	0.000	75.000	M	5.34	1.268
	4	0.259	0.001	0.000	0.000	100.000	F	0.40	0.127
	Σ	**10.831**						**12.39**	**3.003**

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	7.88	0.9000	1.0000	2	62.8	76,153	58.32	33.43
	2	0.320	200.00	7.60	0.0030	1.0000	1	0.1	331	0.22	0.13
	3	0.240	200.00	8.50	0.0030	1.0000	2	0.3	308	0.24	0.13
	4	0.001	20.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**63.3**	**26,347**	**20.17**	**11.81**

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	7.88	60.00	761.00	2.800	0.075
#1	**1**	**Time of Concentration:**					**0.075**
#1	2	1. Forest with heavy ground litter	7.60	20.00	263.00	0.690	0.105
#1	**2**	**Time of Concentration:**					**0.105**
#1	3	1. Forest with heavy ground litter	10.00	20.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	7.32	30.00	410.00	8.110	0.014
#1	**3**	**Time of Concentration:**					**0.083**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	6.49	40.00	616.80	7.630	0.022
#1	**2**	**Muskingum K:**					**0.022**