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Birmingham Coal & Coke Company, Inc.

Old Union No. 2 Mine, P-3962

Re-Evaluation of Basins 010 & 010A (Old Union Mine, P-3888)

5.9 Inches, 10 Year - 24 Hour,

DRN 58

J. David McGehee, PE/LS

General Information

Storm Information:

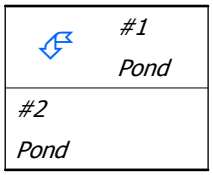
Storm Type:	DRN 58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.900 inches

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	==>	#2	0.001	0.449	Basin 010A
Pond	#2	==>	End	0.000	0.000	Basin 010



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	9. Small streams flowing bankfull	2.78	2.50	90.00	14.99	0.001
#1	**Muskingum K:**					**0.001**

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	166.600	166.600	163.00	41.48	230.8	10,009	7.16	2.94
	Out			137.07	41.48	18.7	555	0.00	0.00
#2	In	62.600	229.200	205.64	60.74	910.5	37,489	28.09	8.54
	Out			134.15	60.74	52.9	1,487	0.02	0.01

Particle Size Distribution(s) at Each Structure

Structure #1 (Basin 010A):

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	100.000%	100.000%
1.0000	97.755%	100.000%
0.5000	92.151%	100.000%
0.3000	89.582%	100.000%
0.2000	83.617%	100.000%
0.1000	54.275%	100.000%
0.0500	37.113%	100.000%
0.0300	22.327%	100.000%
0.0200	12.475%	100.000%
0.0100	9.905%	100.000%
0.0050	7.380%	91.004%
0.0030	6.149%	75.818%
0.0010	4.908%	60.523%
0.0001	0.002%	0.030%

Structure #2:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	94.477%	100.000%
1.0000	80.413%	100.000%
0.5000	56.303%	100.000%
0.3000	45.252%	100.000%
0.2000	36.211%	100.000%
0.1000	24.156%	100.000%
0.0500	17.124%	100.000%
0.0300	11.096%	100.000%
0.0200	7.078%	100.000%
0.0100	6.073%	100.000%
0.0050	4.884%	84.145%
0.0030	4.070%	70.114%

Size (mm)	In	Out
0.0010	3.253%	56.045%
0.0001	0.002%	0.028%

Structure Detail:

Structure #1 (Pond)

Basin 010A

Pond Inputs:

Initial Pool Elev:	551.70 ft
Initial Pool:	5.46 ac-ft
*Sediment Storage:	13.88 ac-ft
Dead Space:	0.20 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
551.70	12.00	2.00:1	2.00:1	8.00

Pond Results:

Peak Elevation:	554.28 ft
H'graph Detention Time:	1.25 hrs
Pond Model:	CSTRS
Dewater Time:	1.07 days
Trap Efficiency:	91.89 %

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)	
549.63	2.452	0.000	0.000		Top of Sed. Storage
550.00	2.530	0.933	0.000		
550.50	2.608	2.218	0.000		
551.00	2.688	3.542	0.000		
551.50	2.768	4.906	0.000		
551.70	2.801	5.463	0.000		Spillway #1
552.00	2.850	6.310	5.767	12.55	
552.50	2.933	7.756	15.379	5.00	
553.00	3.017	9.243	37.806	6.25	
553.50	3.102	10.773	69.383	1.15	
554.00	3.189	12.346	109.602	0.55	
554.28	3.238	13.243	137.075	0.30	Peak Stage

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
554.50	3.276	13.962	159.073	
555.00	3.365	15.622	218.192	
555.50	3.449	17.325	287.375	
556.00	3.534	19.071	367.037	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
549.63	0.000	0.000
550.00	0.000	0.000
550.50	0.000	0.000
551.00	0.000	0.000
551.50	0.000	0.000
551.70	0.000	0.000
552.00	5.767	5.767
552.50	15.379	15.379
553.00	37.806	37.806
553.50	69.383	69.383
554.00	109.602	109.602
554.50	159.073	159.073
555.00	218.192	218.192
555.50	287.375	287.375
556.00	367.037	367.037

Structure #2 (Pond)

Basin 010

Pond Inputs:

Initial Pool Elev:	524.00 ft
Initial Pool:	3.33 ac-ft
*Sediment Storage:	3.30 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
48.00	70.00	2.00	0.0240	524.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
48.00	70.00	2.00	0.0240	524.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
528.50	12.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	528.00 ft
H'graph Detention Time:	1.27 hrs
Pond Model:	CSTRS
Dewater Time:	1.32 days
Trap Efficiency:	94.20 %

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)	
521.96	1.277	0.000	0.000		Top of Sed. Storage
522.00	1.289	0.051	0.000		
522.50	1.455	0.737	0.000		
523.00	1.631	1.508	0.000		
523.50	1.817	2.370	0.000		
524.00	2.014	3.327	0.000		Spillway #1 Spillway #2
524.50	2.220	4.385	5.928	17.30	
525.00	2.436	5.549	16.758	2.70	
525.50	2.578	6.802	30.793	6.60	
526.00	2.724	8.128	47.392	1.90	
526.50	2.875	9.527	66.220	1.25	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
527.00	3.029	11.003	87.046	0.70	
527.50	3.187	12.557	109.683	0.60	
528.00	3.350	14.191	134.007		
528.00	3.352	14.200	134.147	0.75	Peak Stage
528.30	3.449	15.210	149.360		
528.50	3.516	15.907	159.906		Spillway #3
529.00	3.686	17.707	185.043		
529.50	3.860	19.593	242.746		
530.00	4.038	21.568	305.333		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
521.96	0.000	0.000	0.000	0.000
522.00	0.000	0.000	0.000	0.000
522.50	0.000	0.000	0.000	0.000
523.00	0.000	0.000	0.000	0.000
523.50	0.000	0.000	0.000	0.000
524.00	0.000	0.000	0.000	0.000
524.50	(3)>2.964	(3)>2.964	0.000	5.928
525.00	(3)>8.379	(3)>8.379	0.000	16.758
525.50	(3)>15.397	(3)>15.397	0.000	30.793
526.00	(3)>23.696	(3)>23.696	0.000	47.392
526.50	(3)>33.110	(3)>33.110	0.000	66.220
527.00	(3)>43.523	(3)>43.523	0.000	87.046
527.50	(3)>54.842	(3)>54.842	0.000	109.683
528.00	(3)>67.004	(3)>67.004	0.000	134.007
528.30	(3)>74.680	(3)>74.680	0.000	149.360
528.50	(3)>79.953	(3)>79.953	0.000	159.906
529.00	(5)>91.008	(5)>91.008	3.027	185.043
529.50	(5)>101.177	(5)>101.177	40.393	242.746
530.00	(5)>110.423	(5)>110.423	84.486	305.333

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	146.700	0.164	0.000	0.000	79.000	M	141.56	35.669
	2	9.200	0.051	0.171	0.383	70.000	M	9.05	2.086
	3	8.700	0.012	0.101	0.378	81.000	F	11.05	2.746
	4	2.000	0.001	0.000	0.000	100.000	F	3.09	0.982
	Σ	**166.600**						**163.00**	**41.483**
#2	1	10.000	0.086	0.040	0.408	81.000	F	12.71	3.156
	2	50.600	0.065	0.000	0.000	79.000	M	61.83	15.118
	3	2.000	0.000	0.000	0.000	100.000	F	3.09	0.982
	Σ	**229.200**						**205.64**	**60.739**

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	20.00	0.0030	1.0000	2	47.2	1,724	1.31	0.74
	2	0.240	200.00	22.00	0.0030	1.0000	1	2.1	1,279	0.87	0.49
	3	0.240	200.00	15.00	0.9000	1.0000	2	510.4	219,075	167.79	98.09
	4	0.001	200.00	0.01	0.0010	1.0000	1	0.0	0	0.00	0.00
	Σ							**230.8**	**10,009**	**7.16**	**2.94**
#2	1	0.240	200.00	21.20	0.9000	1.0000	2	899.4	321,459	246.20	145.51
	2	0.240	200.00	18.90	0.0030	1.0000	2	15.3	1,313	1.01	0.57
	3	0.001	200.00	0.01	0.0010	1.0000	1	0.0	0	0.00	0.00
	Σ							**910.5**	**37,489**	**28.09**	**8.54**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	9.09	10.00	110.00	2.410	0.012
		8. Large gullies, diversions, and low flowing streams	4.36	150.00	3,443.00	6.260	0.152
#1	**1**	**Time of Concentration:**					**0.164**
#1	2	1. Forest with heavy ground litter	8.00	10.00	125.00	0.710	0.048
		8. Large gullies, diversions, and low flowing streams	10.71	15.00	140.00	9.810	0.003

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	**2**	**Time of Concentration:**					**0.051**
#1	3	5. Nearly bare and untilled, and alluvial valley fans	17.39	20.00	115.00	4.170	0.007
		8. Large gullies, diversions, and low flowing streams	18.18	50.00	275.00	12.790	0.005
#1	**3**	**Time of Concentration:**					**0.012**
#2	1	1. Forest with heavy ground litter	7.50	15.00	199.99	0.690	0.080
		8. Large gullies, diversions, and low flowing streams	11.11	25.00	225.00	9.990	0.006
#2	**1**	**Time of Concentration:**					**0.086**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	10.00	20.00	200.00	3.160	0.017
		8. Large gullies, diversions, and low flowing streams	7.14	100.00	1,400.00	8.010	0.048
#2	**2**	**Time of Concentration:**					**0.065**

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	3.48	120.00	3,450.06	5.590	0.171
#1	**2**	**Muskingum K:**					**0.171**
#2	1	8. Large gullies, diversions, and low flowing streams	6.36	70.00	1,100.00	7.560	0.040
#2	**1**	**Muskingum K:**					**0.040**