mcgehee engineering corp

July 18, 2014

Gary Heaton, P.E.
Alabama Surface Mining Commission
P. O. Box 2390
Jasper, AL 35502-2390

RE: **Best Coal, Inc.**
Narley Mine, P-3850, R-12

Dear Mr. Heaton:

I hereby certify the enclosed modified detailed design plans for Sediment Basin 026 (Phase II) for the above referenced mine are in accordance with the Regulations of the Alabama Surface Mining Commission as adopted by Act 81-435 of December 18, 1981 and as amended to date and that the information used in the enclosed basin design plans is true and correct to the best of my knowledge and belief.
Additional mining area has been added to the permit and these plans address those additions.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

McGehee Engineering Corp.

ALABAMA LICENSED PROFESSIONAL No. 15917 ENGINEER ROBERT W. USHER

Robert W. Usher, P.E.
Alabama Reg. No. 15917

Post Office Box 3431 • 450 19th Street West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • staff@mcgehee.org

SEDIMENT BASIN CONSTRUCTION SPECIFICATIONS

Sediment basins (temporary or permanent) will be designed and constructed using the following as minimum specifications:

1. EMBANKMENT REQUIREMENTS

A) The minimum width of the top of the embankment will under no circumstance be less than twelve (12) feet.

B) The embankment will have a minimum front and back slope no steeper than the slopes listed on the detailed design sheet.

C) The foundation area of the embankment will be cleared and grubbed of all organic matter with no surface slope steeper than 1 horizontal to 1 vertical. The entire wet area, as measured from the upstream toe of the embankment to the normal pool level, will be cleared of trees and large brush.

D) A core will be constructed in a cutoff trench along the centerline of the embankment. The cutoff trench will be of suitable depth and width to attain relatively impervious material.

E) The embankment construction material will be free of sod, roots, stumps, rocks, etc., which exceed six (6") inches in diameter. The embankment material will be placed in layers of twelve (12") inches or less and compacted to ninety five (95%) percent of the standard proctor density, as set forth in ASTM.

F) The embankment, foundation and abutments will be designed and constructed to be stable under normal construction and operating conditions, with a minimum static safety factor of 1.3 at normal pool level with steady seepage saturation conditions.

G) The actual constructed height of the embankment will be a minimum of five (5%) percent higher than the design height to allow for settling over the life of the embankment.

H) The design embankment height for temporary impoundments will be a minimum of one (1) foot above the maximum water level anticipated from a 10 Year - 24 Hour or a 25 Year - 6 Hour precipitation event (whichever is greater). The design embankment height for permanent impoundments will be a minimum of one (1) foot above the maximum water level anticipated from a 10 Year - 24 Hour or a 25 Year - 6 Hour precipitation event (whichever is greater).

I) For embankments constructed as point source discharges, the embankment will be constructed and abutments keyed into undisturbed, virgin, ground if at all possible. In the event that this can not be achieved, additional design and construction specifications will be submitted in the detailed design plans.

J) The embankment and all areas disturbed in the construction of the embankment will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Hay dams, silt fences, rock check dams, etc. will be installed, where deemed necessary, as additional erosion prevention methods.

2. DISCHARGE STRUCTURE REQUIREMENTS

A) The primary spillway will be designed to adequately carry the anticipated peak runoff from a 10 Year - 24 Hour precipitation event. The combination primary and secondary (emergency) spillway system will be designed to safely carry the anticipated peak runoff from a 25 Year - 6 Hour precipitation event. When sediment basins are proposed in the drainage course of a public water supply, the spillway system will be designed and constructed to adequately carry the runoff from a 50 Year - 24 Hour precipitation event.

B) Channel linings, for secondary (emergency) spillways will be a trapezoidal open channel constructed in natural ground and planted with a mixture of both annual and perennial grasses being predominantly fescue and bermuda. In the event that the spillway can not be constructed in natural ground the spillway will be lined with riprap, concrete, asphalt or durable rock (See Detailed Design Plans for Spillway Lining).

C) When consisting of pipe, the primary spillway will be installed according to Class "C" pipe installation for embankment bedding.

D) Sediment basins with a single spillway system, such as a skimmer board, will be a trapezoidal open channel constructed in consolidated, nonerodible material and lined with rip-rap, concrete, asphalt or durable rock (See Detailed Design Plans for Spillway Lining).

E) The primary spillway will be designed and constructed with device to eliminate floating solids from leaving the impoundment. This device will consist of a turned down elbow when using pipe or a skimmer system when using an open channel spillway.

F) When necessary, to prevent erosion of the embankment or discharge area, a splash pad of rip-rap, durable rock, sacrete, etc. will be installed at the discharge end of the primary spillway.

G) The combined spillway systems, for sediment basins constructed in series, will be designed to adequately accommodate the entire drainage area.

3. INSPECTION, MAINTENANCE AND CERTIFICATION REQUIREMENTS

A) Inspections will be conducted regularly during construction of the sediment basin by a qualified registered professional engineer or other qualified person under the direction of a professional engineer. Upon completion of construction, the sediment basin will be certified, by a qualified registered professional engineer, to the Regulatory Authority as having been constructed in accordance with the approved detailed design plans.

B) Sediment basins will be inspected semi-monthly for erosion, instability, etc., with maintenance performed as necessary, until the removal of the structure or until a Phase III Bond Release is granted.

C) Sediment basins will be examined quarterly for structural weakness, instability, erosion, slope failure, or other hazardous conditions with maintenance performed as necessary.

D) Formal inspections will be made annually, by a qualified registered professional engineer or other qualified person under the direction of a professional engineer, including any reports or modifications, in accordance with 880-X- 10C- .20[1(j)] of the Alabama Surface Mining Regulations.

E) Retained sediment will be removed from each sediment basin when the accumulated sediment reaches the maximum allowable sediment volume as set forth in the detailed design plans.

4. BASIN REMOVAL REQUIREMENTS

A) Upon completion of mining, reclamation, restabilization and effluent standards being met, each sediment basin not proposed as a permanent water impoundment will be dewatered in a controlled manner by either pumping or siphoning. Upon successful dewatering, a determination will be made as to the retained sediment level in the basin. After determining the retained sediment level, a channel will be cut into the embankment down to the retained sediment level on the side of the embankment deemed most suitable to reach natural ground without encountering prohibiting rock. The embankment material removed from this newly constructed channel will be spread and compacted over the previous impoundment (wet area) area to prevent erosion and ensure restabilization. The newly constructed channel will be of adequate width (minimum 30 feet) and sloped to a grade (approximately 1% to 3%) which will cause all surface drainage to travel across this area in sheet flow, minimizing the possibility of erosion. Also, where necessary, hay dams will be installed in strategic locations across the width of the channel to retain sediment and slow the water velocity to a favorable rate. Upon removal of the embankment section, all disturbed areas will be graded in such a manner to ensure slope stability, successful restabilization and to minimize erosion. All disturbed areas will be seeded with a mixture of annual and perennial grasses, fertilized and mulched. No slope, existing or created in the removal of the sediment basin, will be left on a grade that will slip or slough.

5. PERMANENT WATER IMPOUNDMENT REQUIREMENTS

A) Prior to a request for a Phase II Bond Release, all sediment basins being left as permanent water impoundments will have supplemental data submitted to the Regulatory Authority concerning water quality, water quantity, size, depth, configuration, postmining land use, etc.

B) Final grading slopes of the entire permanent water impoundment area will not exceed a slope of 2 Horizontal to 1 Vertical to provide for safety and access for future water users.

INTRODUCTION

This modification is prepared to show additional area to be added to the permit. This plan addresses an increase of the sediment storage volume. The spillway was evaluated with the additional flow. The increases in depths are 0.25 feet in the control section and 0.06 feet in the tail section. The peak stage of the 25 year-6hour rainfall event increased 0.36 feet. Sufficient freeboard exists for the spillway and top of dam with the additional inflow. Therefore no modifications to the spillway or embankment are necessary.
Once the revision is approved a certification letter will be submitted to the ASMC stating that the basin has been constructed in accordance with this plan.

CONSTRUCTION TIMETABLE

1. The Phase I design of Sediment Basin 026 was constructed and certified to ASMC on November 9, 2012.

2. The pool area is currently being mined through as the mining progresses toward the Southwest. All drainage is being directed to the pit and pumped to Sediment Basin 005.

3. The Phase II pool area adjacent to the embankment is currently being restored. The southern portion cannot be reconstructed due to current mining activities within the pool area. After mining advances 300' south of the Phase II pool area, the pool area will be reconstructed and configured in accordance with the Phase II section of the detailed design plans. At this time a clay liner will be installed in accordance with the plans if the natural hydrologic barrier between the mined pool area and the downstream area is broken.

4. No stability analysis was performed since the embankment specifications did not change from the approved detailed design plans.

BEST COAL, INC.
NARLEY MINE, P-3850

DETAILED DESIGN PLANS
SEDIMENT BASIN 026

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P-3850 BASIN 026 PHASE 2

Elevation-Area-Capacity Table

Elevation (ft)	Area (ac)	Capacity (ac-ft)
390.00	1.260	0.000
390.25	1.273	0.317
390.50	1.287	0.637
390.75	1.301	0.960
391.00	1.314	1.287
391.25	1.328	1.617
391.50	1.342	1.951
391.75	1.356	2.288
392.00	1.370	2.629
392.25	1.385	2.974
392.50	1.400	3.322
392.75	1.414	3.673
393.00	1.429	4.029
393.25	1.444	4.388
393.50	1.460	4.751
393.75	1.475	5.118
394.00	1.490	5.488
394.25	1.506	5.863
394.50	1.522	6.241
394.75	1.538	6.624
395.00	1.554	7.010
395.25	1.571	7.401
395.50	1.587	7.796
395.75	1.603	8.195
396.00	1.620	8.597
396.25	1.635	9.004
396.50	1.650	9.415
396.75	1.664	9.829
397.00	1.679	10.247
397.25	1.694	10.669
397.50	1.710	11.094
397.75	1.725	11.524
398.00	1.740	11.957
398.25	1.756	12.394
398.50	1.772	12.835
398.75	1.788	13.280
399.00	1.804	13.729

Elevation (ft)	Area (ac)	Capacity (ac-ft)
399.25	1.821	14.182
399.50	1.837	14.639
399.75	1.853	15.101
400.00	1.870	15.566
400.25	1.886	16.035
400.50	1.902	16.509
400.75	1.918	16.987
401.00	1.934	17.468
401.25	1.951	17.954
401.50	1.967	18.444
401.75	1.984	18.937
402.00	2.000	19.435
402.25	2.016	19.937
402.50	2.032	20.443
402.75	2.048	20.953
403.00	2.064	21.467
403.25	2.081	21.986
403.50	2.097	22.508
403.75	2.114	23.034
404.00	2.130	23.565
404.25	2.146	24.099
404.50	2.162	24.638
404.75	2.178	25.180
405.00	2.195	25.727
405.25	2.211	26.277
405.50	2.227	26.832
405.75	2.244	27.391
406.00	2.260	27.954
406.25	2.277	28.521
406.50	2.295	29.093
406.75	2.312	29.668
407.00	2.329	30.249
407.25	2.347	30.833
407.50	2.365	31.422
407.75	2.382	32.015
408.00	2.400	32.613
408.25	2.417	33.215
408.50	2.435	33.822
408.75	2.452	34.433
409.00	2.470	35.048
409.25	2.487	35.667
409.50	2.505	36.291

Elevation (ft)	Area (ac)	Capacity (ac-ft)
409.75	2.522	36.920
410.00	2.540	37.553
410.25	2.569	38.191
410.50	2.599	38.837
410.75	2.629	39.491
411.00	2.659	40.152
411.25	2.689	40.820
411.50	2.719	41.496
411.75	2.749	42.180
412.00	2.780	42.871
412.25	2.867	43.577
412.50	2.955	44.304
412.75	3.044	45.054
413.00	3.134	45.826
413.25	3.226	46.621
413.50	3.320	47.439
413.75	3.414	48.281
414.00	3.510	49.147

BEST COAL, INC.
NARLEY MINE, P-3850

SPILLWAY CHANNEL SPECIFICATIONS
SEDIMENT BASIN 026

The entire control section and tail ditch section of the emergency spillway was cut into the compacted fill of the embankment and lined with a minimum of 4 inches of reinforced concrete. All concrete was reinforced with 10 gauge, 6" x 6" welded wire mesh.

The gradient of the control section of the emergency spillway is not less than one half (0.5%) percent. The gradient of the tail ditch section of the emergency spillway is twenty eight (28.0%) percent.

The control section and tail ditch section of the emergency spillway extends from the inner face of the embankment, past the centerline of the embankment and was carried out beyond the downstream slope of the embankment.

The concrete liner of the control section of the emergency spillway is a minimum 4.52 feet as measured vertically, allowing 3.13 feet for the maximum anticipated flow and 1.39 feet of dry freeboard. The concrete liner of the tail ditch section of the emergency spillway is a minimum of 2.43 feet as measured vertically, allowing 0.70 feet for the maximum anticipated flow and 1.73 foot of dry freeboard. There is a transition zone of at least 20 feet in length between the control section and the tail section. The minimum depth at the beginning of the transition is 4.52 feet and 2.43 feet at the end of the transition. The flow line of the spillway was smoothed at the transition to avoid abrupt changes in the flow line slope. These as-built depths are greater than or equal to the depths shown for this modification

See enclosed SEDCAD 4.0 spillway tail ditch section design and attached Plan Sheet cross-section for the minimum and maximum emergency spillway construction requirements.

A floating silt fence (lightweight turbidity curtain) was installed near the entrance to the spillway to accomplish sub-surface withdrawal. The floating silt fence (lightweight turbidity curtain) was set at normal pool and will be anchored at the 10 Year – 24 Hour Event peak stage with steel fence posts.

P-3850 Basin 026 Spillway Control Section

Material: Concrete, Rubble

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	0.5	0.0220	1.00		

	w/o Freeboard	w/ Freeboard
Design Discharge:	244.94 cfs	
Depth:	2.22 ft	3.22 ft
Top Width:	20.87 ft	24.87 ft
Velocity:	6.72 fps	
X-Section Area:	36.44 sq ft	
Hydraulic Radius:	1.663 ft	
Froude Number:	0.90	

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P-3850 Basin 026 Spillway Control Section

Material: Concrete, Rubble

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	28.0	0.0220	1.00		

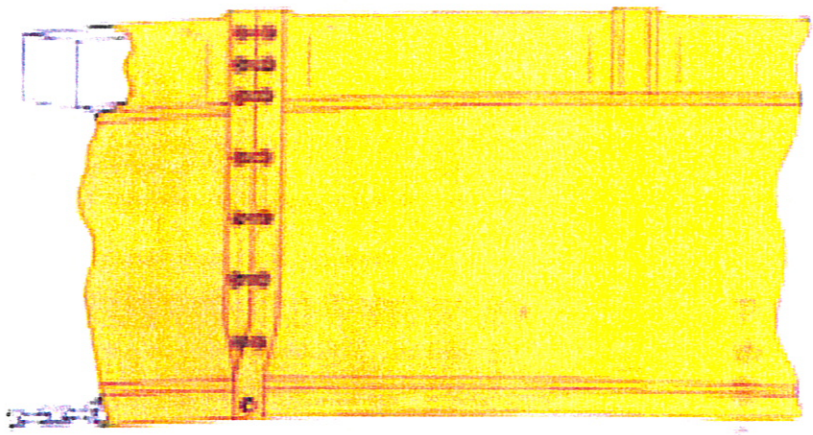
	w/o Freeboard	w/ Freeboard
Design Discharge:	244.94 cfs	
Depth:	0.70 ft	1.70 ft
Top Width:	14.80 ft	18.80 ft
Velocity:	26.08 fps	
X-Section Area:	9.39 sq ft	
Hydraulic Radius:	0.621 ft	
Froude Number:	5.77	

BEST COAL, INC.
NARLEY MINE, P-3850

SUBSURFACE WITHDRAWAL DEVICE AND FLOATING SILT BOOM

Lightweight Turbidity Curtain

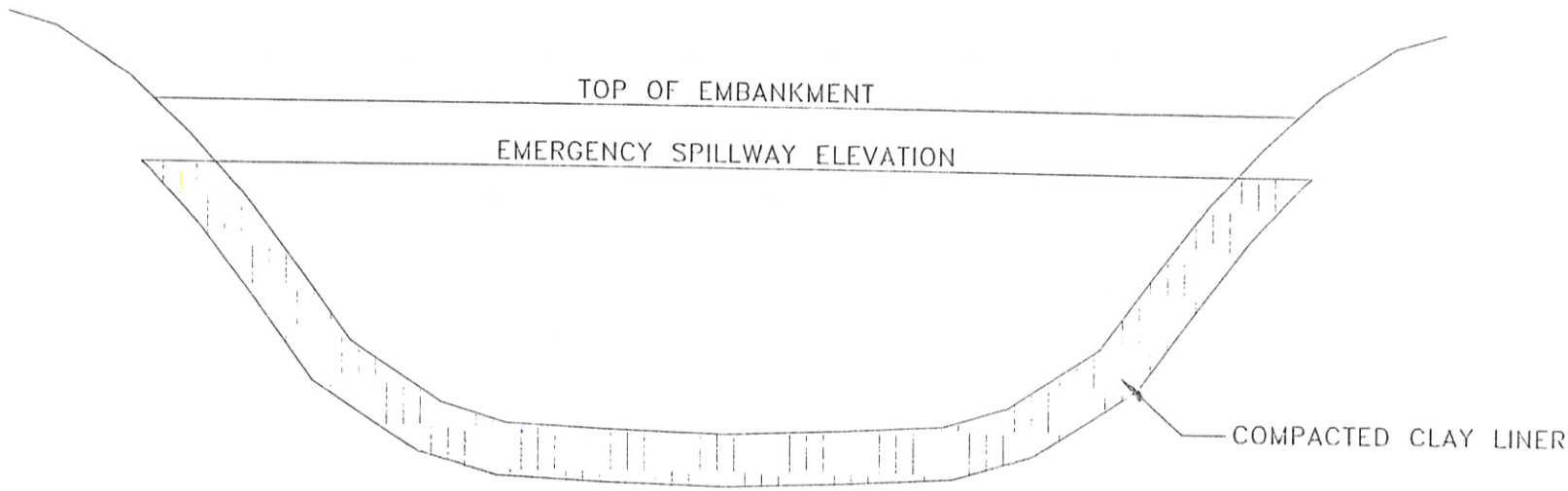
Application: Calm waters with little current, such as lakes, ponds, canals and shoreline areas.



Specifications

- Curtain to be anchored at the maximum anticipated peak stage elevation (10 Year – 24 Hour Precipitation Event).
- PVC coated floatations - ultraviolet resistant
- Geotextile fabric screens
- Chain ballast with connectors
- Double sewn seams with grommets
- Depths per requirements ' 50' sections = Minimum 24" deep
- Fabric - Polyester reinforced vinyl high visibility yellow
- Connector - Sections are laced together through grommets and load lines are bolted together.
- Flotation - 6" expanded polystyrene over 9 lbs./ft. buoyancy.
- Ballast - 1/4" galvanized chain (.7 lbs/ft).

TYPICAL IMPOUNDMENT PROFILE
CLAY LINER CROSS-SECTION



In the event that a sediment basin must be constructed in spoil material, the interior or wet area of the basin will be lined with a minimum of one (1') foot of clay material with a permeability no greater than 0.000001 cm./sec. up to the emergency spillway elevation. The clay liner material will be placed in lifts no greater than six (6") inches and compacted to ninety-five (95) percent of the standard proctor density.

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BEST COAL, INC.
NARLEY MINE, P-3850

Phase II

HYDROLOGY AND SEDIMENTOLOGY PREDICTION
10 YEAR - 24 HOUR PRECIPITATION EVENT
SEDIMENT BASIN 026

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Best Coal, Inc
Narley Mine, R-12
Basin 026 Phase 2

10 Year - 24 Hour Precipitation Event

Robert Usher, P.E.

General Information

Storm Information:

Storm Type:	DRN 58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	6.000 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	97.000%	98.000%
2.0000	93.000%	97.000%
1.0000	82.000%	85.000%
0.5000	63.000%	70.000%
0.3000	52.000%	46.000%
0.2000	44.000%	37.000%
0.1000	34.000%	26.000%
0.0500	22.000%	15.000%
0.0300	18.000%	12.000%
0.0200	10.000%	9.000%
0.0100	7.000%	6.000%
0.0050	5.000%	4.000%
0.0030	3.000%	2.000%
0.0010	2.000%	1.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Sediment Basin 026 Phase 2

#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	281.000	281.000	227.74	61.61	8,808.7	193,759	144.01	74.21
	Out			205.82	61.56	563.2	11,582	0.48	0.31

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Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	100.000%	100.000%
1.0000	88.724%	100.000%
0.5000	73.047%	100.000%
0.3000	48.074%	100.000%
0.2000	38.683%	100.000%
0.1000	27.203%	100.000%
0.0500	15.710%	100.000%
0.0300	12.571%	100.000%
0.0200	9.405%	100.000%
0.0100	6.272%	98.089%
0.0050	4.184%	65.428%
0.0030	2.095%	32.767%
0.0010	1.051%	16.436%
0.0001	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Sediment Basin 026 Phase 2

Pond Inputs:

Initial Pool Elev:	409.20 ft
Initial Pool:	19.04 ac-ft
*Sediment Storage:	16.50 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
409.20	20.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	412.04 ft
H'graph Detention Time:	0.97 hrs
Pond Model:	CSTRS
Dewater Time:	1.61 days
Trap Efficiency:	93.61 %

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)	
400.50	1.902	0.000	0.000		Top of Sed. Storage
400.50	1.902	0.009	0.000		
400.75	1.918	0.487	0.000		
401.00	1.934	0.968	0.000		
401.25	1.951	1.454	0.000		
401.50	1.967	1.944	0.000		
401.75	1.984	2.437	0.000		
402.00	2.000	2.935	0.000		
402.25	2.016	3.437	0.000		
402.50	2.032	3.943	0.000		
402.75	2.048	4.453	0.000		
403.00	2.064	4.967	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
403.25	2.081	5.486	0.000		
403.50	2.097	6.008	0.000		
403.75	2.114	6.534	0.000		
404.00	2.130	7.065	0.000		
404.25	2.146	7.599	0.000		
404.50	2.162	8.138	0.000		
404.75	2.178	8.680	0.000		
405.00	2.195	9.227	0.000		
405.25	2.211	9.777	0.000		
405.50	2.227	10.332	0.000		
405.75	2.244	10.891	0.000		
406.00	2.260	11.454	0.000		
406.25	2.277	12.021	0.000		
406.50	2.295	12.593	0.000		
406.75	2.312	13.168	0.000		
407.00	2.329	13.749	0.000		
407.25	2.347	14.333	0.000		
407.50	2.365	14.922	0.000		
407.75	2.382	15.516	0.000		
408.00	2.400	16.113	0.000		
408.25	2.417	16.715	0.000		
408.50	2.435	17.322	0.000		
408.75	2.452	17.933	0.000		
409.00	2.470	18.548	0.000		
409.20	2.484	19.043	0.000		Spillway #1
409.25	2.487	19.168	0.199	7.55*	
409.50	2.505	19.791	1.194	13.60	
409.75	2.522	20.420	2.189	4.60	
410.00	2.540	21.053	19.846	1.20	
410.25	2.569	21.691	30.064	4.75	
410.50	2.599	22.337	48.646	4.40	
410.75	2.629	22.991	63.036	0.85	
411.00	2.659	23.652	88.671	0.65	
411.25	2.689	24.320	107.884	0.30	
411.50	2.719	24.996	139.895	0.25	
411.75	2.749	25.680	163.374	0.20	
412.00	2.780	26.371	201.834	0.25	
412.04	2.816	26.472	205.820	0.10	Peak Stage
412.25	2.867	27.077	229.657		
412.50	2.955	27.804	274.710		
412.75	3.044	28.554	306.985		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
413.00	3.134	29.326	358.807	
413.25	3.226	30.121	395.659	
413.50	3.320	30.940	454.443	
413.75	3.414	31.781	496.003	
414.00	3.510	32.647	561.950	

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

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
400.50	0.000	0.000
400.50	0.000	0.000
400.75	0.000	0.000
401.00	0.000	0.000
401.25	0.000	0.000
401.50	0.000	0.000
401.75	0.000	0.000
402.00	0.000	0.000
402.25	0.000	0.000
402.50	0.000	0.000
402.75	0.000	0.000
403.00	0.000	0.000
403.25	0.000	0.000
403.50	0.000	0.000
403.75	0.000	0.000
404.00	0.000	0.000
404.25	0.000	0.000
404.50	0.000	0.000
404.75	0.000	0.000
405.00	0.000	0.000
405.25	0.000	0.000
405.50	0.000	0.000
405.75	0.000	0.000
406.00	0.000	0.000
406.25	0.000	0.000
406.50	0.000	0.000
406.75	0.000	0.000
407.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
407.25	0.000	0.000
407.50	0.000	0.000
407.75	0.000	0.000
408.00	0.000	0.000
408.25	0.000	0.000
408.50	0.000	0.000
408.75	0.000	0.000
409.00	0.000	0.000
409.20	0.000	0.000
409.25	0.199	0.199
409.50	1.194	1.194
409.75	2.189	2.189
410.00	19.846	19.846
410.25	30.064	30.064
410.50	48.646	48.646
410.75	63.036	63.036
411.00	88.671	88.671
411.25	107.884	107.884
411.50	139.895	139.895
411.75	163.374	163.374
412.00	201.834	201.834
412.25	229.657	229.657
412.50	274.710	274.710
412.75	306.985	306.985
413.00	358.807	358.807
413.25	395.659	395.659
413.50	454.443	454.443
413.75	496.003	496.003
414.00	561.950	561.950

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	167.400	0.400	0.061	0.331	66.000	M	101.06	27.197
	2	66.600	0.230	0.045	0.259	81.000	F	80.10	20.494
	3	26.000	0.180	0.000	0.000	79.000	F	30.56	7.654
	4	18.000	0.100	0.000	0.000	74.000	F	20.16	4.770
	5	3.000	0.001	0.000	0.000	100.000	F	4.72	1.498
	$\sum$	**281.000**						**227.74**	**61.614**

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	0.320	200.00	21.00	0.0030	1.0000	1	47.8	2,215	1.60	0.93
	2	0.240	200.00	23.33	0.9000	1.0000	2	8,224.2	431,172	320.49	191.92
	3	0.240	200.00	24.00	0.1400	1.0000	2	440.8	72,695	54.07	30.85
	4	0.240	200.00	25.00	0.0500	1.0000	2	97.9	26,441	19.72	11.17
	5	0.001	400.00	0.01	0.0001	1.0000	2	0.0	0	0.00	0.00
	$\sum$							**8,808.7**	**193,759**	**144.01**	**74.21**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	7. Paved area and small upland gullies	2.73	20.00	733.00	3.320	0.061
#1	**1**	**Muskingum K:**					**0.061**
#1	2	5. Nearly bare and untilled, and alluvial valley fans	3.33	10.00	300.00	1.820	0.045
#1	**2**	**Muskingum K:**					**0.045**

BEST COAL, INC.
NARLEY MINE, P-3850

Phase II

HYDROLOGY AND SEDIMENTOLOGY PREDICTION
25 YEAR - 6 HOUR PRECIPITATION EVENT
SEDIMENT BASIN 026

Copyright 1998 -2010 Pamela L Schwab

Best Coal, Inc
Narley Mine, R-12
Basin 026 Phase 2

25 Year - 6 Hour Precipitation Event

Robert Usher, P.E.

General Information

Storm Information:

Storm Type:	SCS 6 Hour
Design Storm:	25 yr - 6 hr
Rainfall Depth:	4.800 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	97.000%	98.000%
2.0000	93.000%	97.000%
1.0000	82.000%	85.000%
0.5000	63.000%	70.000%
0.3000	52.000%	46.000%
0.2000	44.000%	37.000%
0.1000	34.000%	26.000%
0.0500	22.000%	15.000%
0.0300	18.000%	12.000%
0.0200	10.000%	9.000%
0.0100	7.000%	6.000%
0.0050	5.000%	4.000%
0.0030	3.000%	2.000%
0.0010	2.000%	1.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Sediment Basin 026 Phase 2

#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	281.000	281.000	326.38	42.53	10,434.0	341,842	252.40	121.89
	Out			244.94	42.53	787.5	17,801	1.67	1.34

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	100.000%	100.000%
1.0000	96.263%	100.000%
0.5000	79.345%	100.000%
0.3000	52.210%	100.000%
0.2000	42.009%	100.000%
0.1000	29.540%	100.000%
0.0500	17.058%	100.000%
0.0300	13.649%	100.000%
0.0200	10.214%	100.000%
0.0100	6.811%	90.252%
0.0050	4.543%	60.197%
0.0030	2.275%	30.141%
0.0010	1.141%	15.114%
0.0001	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Sediment Basin 026 Phase 2

Pond Inputs:

Initial Pool Elev:	409.20 ft
Initial Pool:	19.04 ac-ft
*Sediment Storage:	16.50 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
409.20	20.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	412.33 ft
H'graph Detention Time:	0.82 hrs
Pond Model:	CSTRS
Dewater Time:	1.27 days
Trap Efficiency:	92.45 %

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)	
400.50	1.902	0.000	0.000		Top of Sed. Storage
400.50	1.902	0.009	0.000		
400.75	1.918	0.487	0.000		
401.00	1.934	0.968	0.000		
401.25	1.951	1.454	0.000		
401.50	1.967	1.944	0.000		
401.75	1.984	2.437	0.000		
402.00	2.000	2.935	0.000		
402.25	2.016	3.437	0.000		
402.50	2.032	3.943	0.000		
402.75	2.048	4.453	0.000		
403.00	2.064	4.967	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
403.25	2.081	5.486	0.000		
403.50	2.097	6.008	0.000		
403.75	2.114	6.534	0.000		
404.00	2.130	7.065	0.000		
404.25	2.146	7.599	0.000		
404.50	2.162	8.138	0.000		
404.75	2.178	8.680	0.000		
405.00	2.195	9.227	0.000		
405.25	2.211	9.777	0.000		
405.50	2.227	10.332	0.000		
405.75	2.244	10.891	0.000		
406.00	2.260	11.454	0.000		
406.25	2.277	12.021	0.000		
406.50	2.295	12.593	0.000		
406.75	2.312	13.168	0.000		
407.00	2.329	13.749	0.000		
407.25	2.347	14.333	0.000		
407.50	2.365	14.922	0.000		
407.75	2.382	15.516	0.000		
408.00	2.400	16.113	0.000		
408.25	2.417	16.715	0.000		
408.50	2.435	17.322	0.000		
408.75	2.452	17.933	0.000		
409.00	2.470	18.548	0.000		
409.20	2.484	19.043	0.000		Spillway #1
409.25	2.487	19.168	0.199	7.55*	
409.50	2.505	19.791	1.194	13.60	
409.75	2.522	20.420	2.189	4.60	
410.00	2.540	21.053	19.846	1.00	
410.25	2.569	21.691	30.064	0.40	
410.50	2.599	22.337	48.646	0.25	
410.75	2.629	22.991	63.036	0.25	
411.00	2.659	23.652	88.671	0.80	
411.25	2.689	24.320	107.884	0.70	
411.50	2.719	24.996	139.895	0.45	
411.75	2.749	25.680	163.374	0.40	
412.00	2.780	26.371	201.834	0.25	
412.25	2.867	27.077	229.657	0.20	
412.33	2.897	27.323	244.939	0.10	Peak Stage
412.50	2.955	27.804	274.710		
412.75	3.044	28.554	306.985		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
413.00	3.134	29.326	358.807	
413.25	3.226	30.121	395.659	
413.50	3.320	30.940	454.443	
413.75	3.414	31.781	496.003	
414.00	3.510	32.647	561.950	

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

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
400.50	0.000	0.000
400.50	0.000	0.000
400.75	0.000	0.000
401.00	0.000	0.000
401.25	0.000	0.000
401.50	0.000	0.000
401.75	0.000	0.000
402.00	0.000	0.000
402.25	0.000	0.000
402.50	0.000	0.000
402.75	0.000	0.000
403.00	0.000	0.000
403.25	0.000	0.000
403.50	0.000	0.000
403.75	0.000	0.000
404.00	0.000	0.000
404.25	0.000	0.000
404.50	0.000	0.000
404.75	0.000	0.000
405.00	0.000	0.000
405.25	0.000	0.000
405.50	0.000	0.000
405.75	0.000	0.000
406.00	0.000	0.000
406.25	0.000	0.000
406.50	0.000	0.000
406.75	0.000	0.000
407.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
407.25	0.000	0.000
407.50	0.000	0.000
407.75	0.000	0.000
408.00	0.000	0.000
408.25	0.000	0.000
408.50	0.000	0.000
408.75	0.000	0.000
409.00	0.000	0.000
409.20	0.000	0.000
409.25	0.199	0.199
409.50	1.194	1.194
409.75	2.189	2.189
410.00	19.846	19.846
410.25	30.064	30.064
410.50	48.646	48.646
410.75	63.036	63.036
411.00	88.671	88.671
411.25	107.884	107.884
411.50	139.895	139.895
411.75	163.374	163.374
412.00	201.834	201.834
412.25	229.657	229.657
412.50	274.710	274.710
412.75	306.985	306.985
413.00	358.807	358.807
413.25	395.659	395.659
413.50	454.443	454.443
413.75	496.003	496.003
414.00	561.950	561.950

Subwatershed Hydrology Detail:

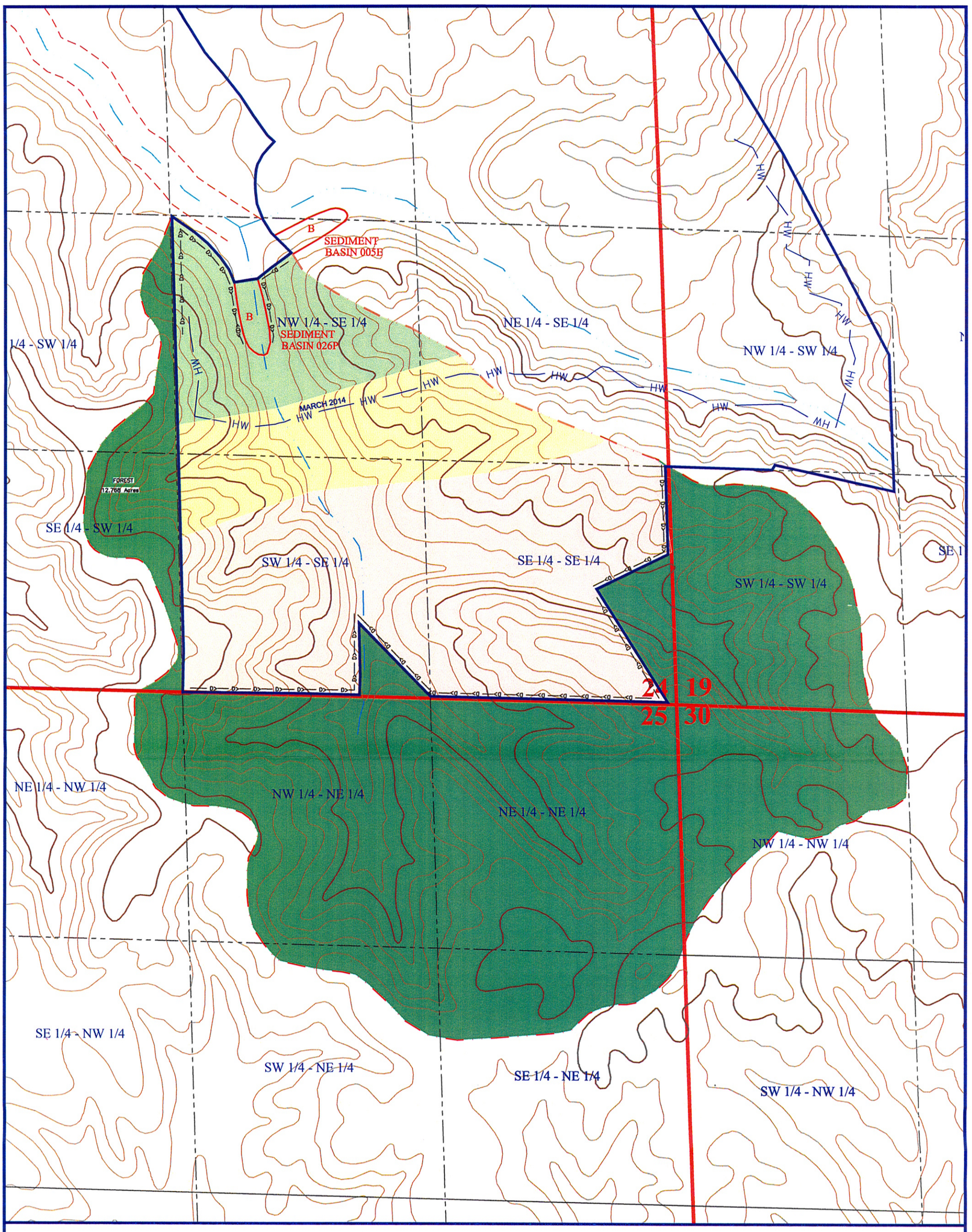
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	167.400	0.400	0.061	0.331	66.000	M	131.57	17.753
	2	66.600	0.230	0.045	0.259	81.000	F	156.35	14.825
	3	26.000	0.180	0.000	0.000	79.000	F	59.89	5.471
	4	18.000	0.100	0.000	0.000	74.000	F	41.65	3.287
	5	3.000	0.001	0.000	0.000	100.000	F	11.17	1.195
	$\sum$	**281.000**						**326.38**	**42.532**

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	0.320	200.00	21.00	0.0030	1.0000	1	43.6	2,572	1.81	1.27
	2	0.240	200.00	23.33	0.9000	1.0000	2	9,977.1	590,280	436.66	299.94
	3	0.240	200.00	24.00	0.1400	1.0000	2	532.4	107,821	79.88	51.34
	4	0.240	200.00	25.00	0.0500	1.0000	2	119.6	42,725	31.86	19.71
	5	0.001	400.00	0.01	0.0001	1.0000	2	0.0	0	0.00	0.00
	$\sum$							**10,434.0**	**341,842**	**252.40**	**121.89**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	7. Paved area and small upland gullies	2.73	20.00	733.00	3.320	0.061
#1	**1**	**Muskingum K:**					**0.061**
#1	2	5. Nearly bare and untilled, and alluvial valley fans	3.33	10.00	300.00	1.820	0.045
#1	**2**	**Muskingum K:**					**0.045**



N
W E
S

Best Coal, Inc.

NARLEY MINE
ASMC PERMIT NO. P-3850, R-12
WATERSHED MAP
SCALE: 1" = 500'

SEDIMENT BASIN 026 PHASE 2

mcgehee engineering corp
post office box 3431
jasper, alabama 35502-3431
telephone: (205) 221-0686 fax: 221-7721
email: cw@mcgehee.org

MAP LEGEND

- PERMIT BOUNDARY
- FOREST, CN 66
- REVEG. 0-2 MONTHS, C.N. 79
- REVEG. 2-12 MONTHS, CN 74
- GRADED & BARE, C.N. 81
- B SEDIMENT BASIN, C.N. 100
- DRAINAGE DIVIDE
- 100' SETBACK OFFSET
- DIVERSION DITCH

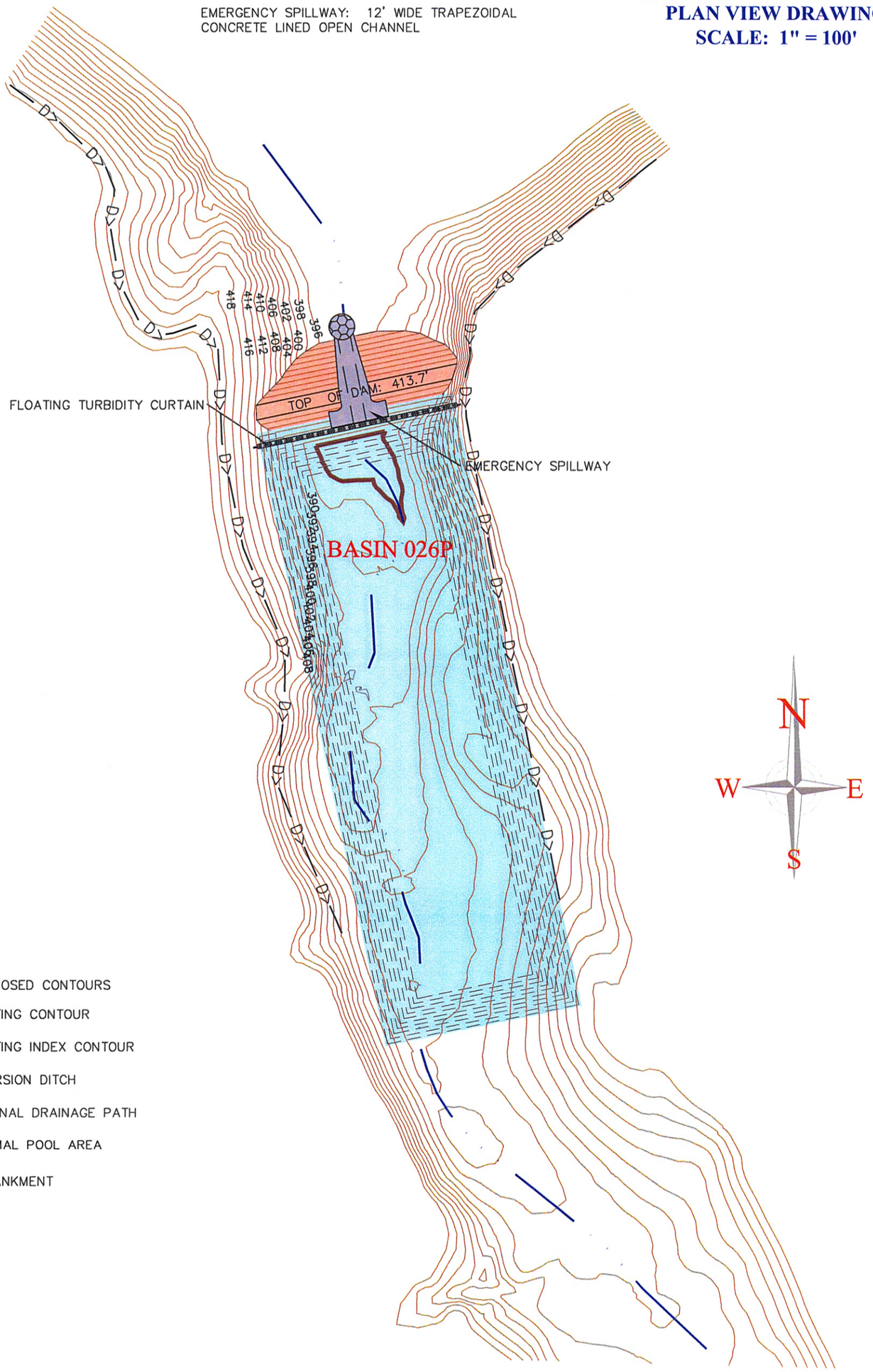
SEDIMENT BASIN 026

INCISED TOE ELEV.: 390.0'
UPSTREAM TOE ELEV.: 400.0'
SEDIMENT REMOVAL ELEV.: 400.5'
PRIMARY SPILLWAY ELEV.: 409.20'
EMERGENCY SPILLWAY ELEV.: 409.20'
**MAXIMUM WATER ELEV.: 412.33'
TOP OF DAM ELEV.: 413.33' DESIGN
TOP OF DAM ELEV.: 413.70' CONSTRUCT.

EMERGENCY SPILLWAY: 12' WIDE TRAPEZOIDAL
CONCRETE LINED OPEN CHANNEL

Best Coal, Inc.

NARLEY MINE
ASMC PERMIT NO. P-3850
REVISION NO. 12
SEDIMENT BASIN 026 PHASE 2
PLAN VIEW DRAWING
SCALE: 1" = 100'



PROPOSED CONTOURS
EXISTING CONTOUR
EXISTING INDEX CONTOUR
D> DIVERSION DITCH
ORIGINAL DRAINAGE PATH
NORMAL POOL AREA
EMBANKMENT

mcgehee engineering corp
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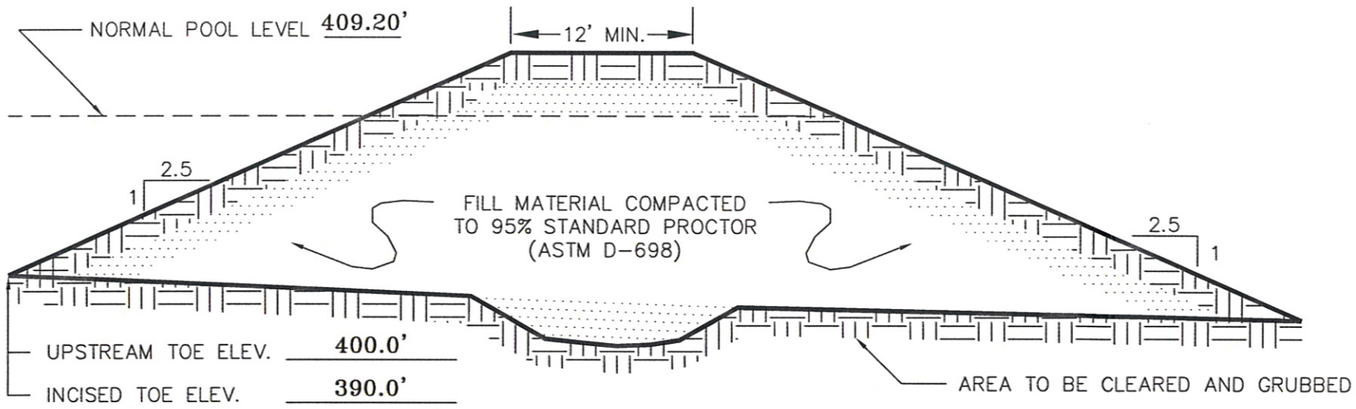
ENERGY DISSIPATER (CLASS II SANDSTONE RIPRAP)

** 25 YEAR – 6 HOUR PRECIPITATION EVENT.

EMBANKMENT CROSS-SECTION



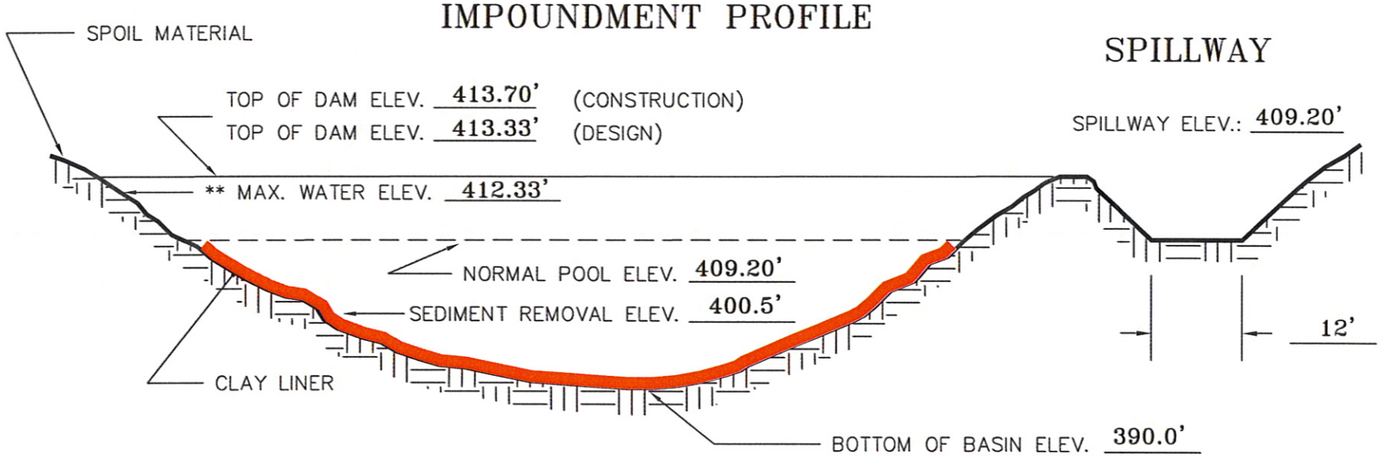
COMPANY: BEST COAL, INC.

MINE NAME: NARLEY MINE

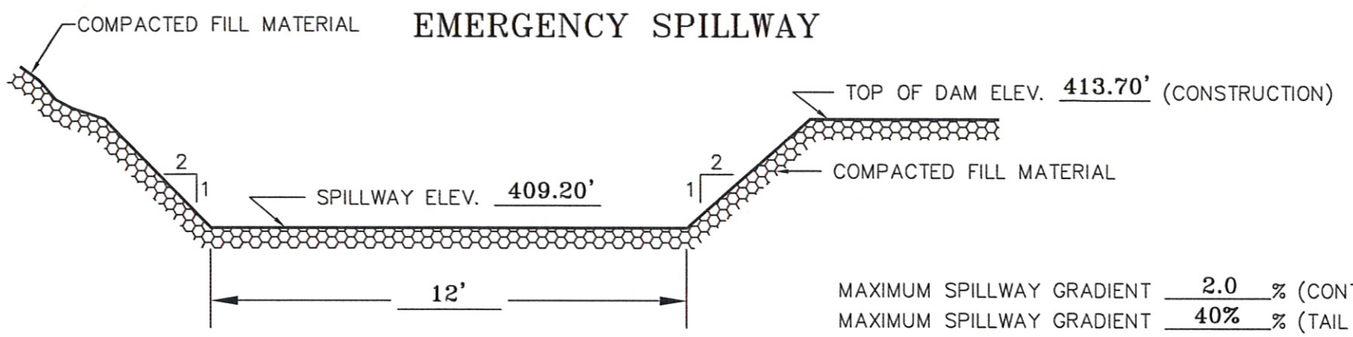
PERMIT #: P-3850, Revision No. 12

BASIN I.D. #: SEDIMENT BASIN 026 PHASE II

IMPOUNDMENT PROFILE



EMERGENCY SPILLWAY



MAXIMUM SPILLWAY GRADIENT 2.0 % (CONTROL SECTION)

MAXIMUM SPILLWAY GRADIENT 40% % (TAIL DITCH SECTION)

KEY BASIN PARAMETERS

DRAINAGE AREA	281.0	ACRES
DISTURBED AREA	113.6	ACRES
SEDIMENT STORAGE	16.5	AC.FT.
DETENTION STORAGE	19.04	AC.FT.
*** PERMANENT POOL CAPACITY	35.54	AC.FT.
* TOTAL BASIN STORAGE CAPACITY	42.97	AC.FT.
** PEAK INFLOW	326.38	C.F.S.
** PEAK OUTFLOW	244.94	C.F.S.

* 10 YEAR – 24 HOUR PRECIPITATION EVENT.

** 25 YEAR – 6 HOUR PRECIPITATION EVENT.

*** 15.56 AC-FT IS INCISED BELOW NATURAL UPSTREAM TOE.

SEE SPILLWAY CONTROL SECTION AND TAIL DITCH DESIGN FOR CHANNEL LINING REQUIREMENTS.

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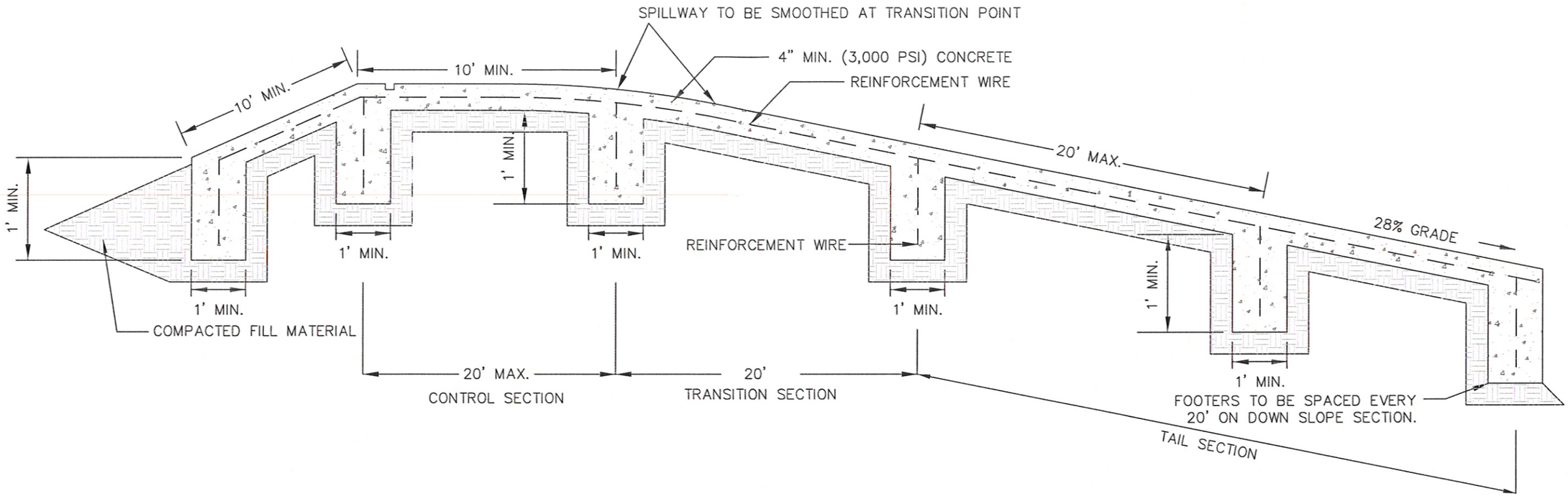
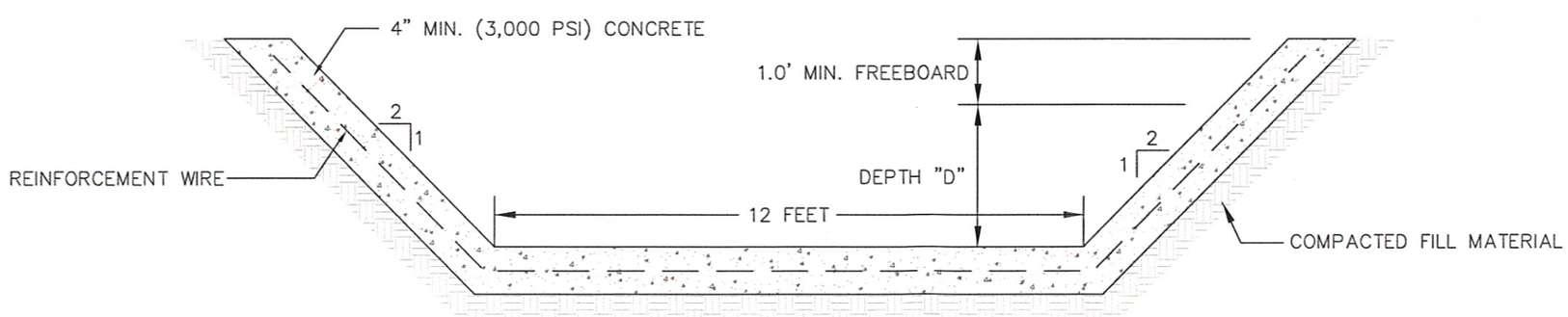
SEDIMENT BASIN 026 SPILLWAY PROFILE MODIFICATION FOR REVISION 12



TYPICAL SPILLWAY CROSS-SECTION



SPILLWAY FLOW DEPTH "D" = 3.13 FEET (CONTROL SECTION)

SPILLWAY FLOW DEPTH "D" = 0.70 FEET (TAIL DITCH SECTION)

TOTAL SPILLWAY DEPTH "D+1" = 4.13 FEET MINIMUM (CONTROL SECTION)

TOTAL SPILLWAY DEPTH "D+1" = 1.7 FEET MIMIMUM (TAIL DITCH SECTION)

NOTE: TOTAL SPILLWAY DEPTH IN TRANSITION SECTION VARIES FROM 4.13 FEET TO 1.7 FEET

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