SEDIMENT BASIN
SB 001
SPILLWAY DESIGN

Seven Hills Mine

Permit S-357

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	3.800 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	SB 001

#1
Pond

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	142.000	142.000	222.52	19.23
	Out			85.17	19.23

Structure Detail:

Structure #1 (Pond)

SB 001

Pond Inputs:

Initial Pool Elev:	378.00 ft
Initial Pool:	26.19 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
378.00	20.00	3.00:1	3.00:1	13.00

Pond Results:

Peak Elevation:	379.57 ft
Dewater Time:	0.78 days

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)	
372.00	3.760	0.000	0.000		
373.00	3.955	3.857	0.000		
374.00	4.154	7.911	0.000		
375.00	4.358	12.167	0.000		
376.00	4.567	16.629	0.000		
377.00	4.781	21.303	0.000		
378.00	5.000	26.193	0.000		Spillway #1
379.00	5.200	31.293	33.646	16.80	
379.57	5.316	34.291	85.165	1.80	Peak Stage
380.00	5.404	36.594	124.724		
381.00	5.611	42.101	272.835		
382.00	5.823	47.818	480.743		
383.00	6.038	53.748	753.192		
384.00	6.257	59.895	1,094.864		
385.00	6.480	66.263	1,510.219		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
372.00	0.000	0.000
373.00	0.000	0.000
374.00	0.000	0.000
375.00	0.000	0.000
376.00	0.000	0.000
377.00	0.000	0.000
378.00	0.000	0.000
379.00	33.646	33.646
380.00	124.724	124.724
381.00	272.835	272.835
382.00	480.743	480.743
383.00	753.192	753.192
384.00	1,094.864	1,094.864
385.00	1,510.219	1,510.219

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	142.000	0.414	0.000	0.000	82.000	M	222.52	19.231
	Σ	**142.000**						**222.52**	**19.231**

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	3.20	16.00	500.00	1.430	0.097
		8. Large gullies, diversions, and low flowing streams	1.29	50.00	3,881.00	3.400	0.317
#1	**1**	**Time of Concentration:**					**0.414**

Sediment Basin Design Summary

24-Aug-17

I. General Information

Mine:	Seven Hills Mine, Permit #357
Basin:	SB 001
Basin Type:	Incised
Examination Exempt:	Yes

II. Design Parameters:

Design Storm Event : (10yr/24hr)	R=	4.50	
Runoff Area (RA) (Treatment and Detention)	RA =	142.00	
Runoff Curve Number:	CN =	80	
Unitless number	S = ((1000)/Cn)-10 =	2.50	
Runoff (Q) - Watershed Inches	Q = ((P-0.2S)^2)/(P+0.8S) =	2.46	
Runoff Coefficient (RC)	RC = Q / R =	0.55	0.547008547

III. Runoff Calculation:

RV = Q (in / 24hr) * 1ft/12 in * Runoff Area (ac) * 43,560 sq ft /ac

Where: RV = runoff volume (cubic ft/24hr)
Q = runoff design event (inches/24hr)

RV = 1,268,825 cubic ft /24hr 29.13 acre ft

IV. Treatment Volume Calculation:

Detention Time: DT	10	hours	
Sediment Volume: SV	127927	cubic ft	
Pit Pumpage Volume: PV	1000	gpm	
Design Sediment Storage: SV (see USLE Calculations attached)	127927	cubic ft	2.94 acre ft

MCV = RV cf / 24hr * 1day/24hr * DT hr + PV gpm * 1440 min/day * 1day/24hr *0.1337 cf/gal * DT hr + SV cf

Minimum Compliance volume= 736,824 cubic ft **16.92 acre ft**

Basin Freeboard:	2.0 ft minimum at pool	
Basin Surface area:	5.00 acres	217800 sq ft
Basin Minimum Average depth	3.38 ft	

Sediment Basin Design:
Universal Soil Loss Calculation:

24-Aug-17

Mine: Seven Hills Mine, Permit #357 **Basin:** SB 001

Soil Loss per Unit Area:

A= R * K * LS*CP A = 54.05 tons/acre

where: A = Soil loss per acre (tons/acre)

R = Rainfall-Erosivity Factor	200
K = Soil Erodibility Factor	0.43
LS = Length Slope Factor	1.98
CP = Cropping Practice Factor	0.32

LS Factor Calculation

LS = (FSL/72.6)^m * ((430x^2 + 30x + 0.43) / 6.613)) 1.98

where: FSL = Field Slope Length 730.00

x = Field Slope Ratio 0.0641

m = slope factor 0.5

slope < 3% m=0.3 , = 4% m=0.4, >5% m=0.5

CP Weighted Factor Calculation

Ground Cover Description	CP Value	Area (ac)	CP*ac	
Active Disturbed area	0.90	40.00	36.00	
Reclaimed or Undisturbed	0.09	102.00	9.18	Weighted CP
		142.00	45.18	0.32

Sediment Delivery Ratio:

D = Da * Dv * Dc * Dp D= 0.25

where: D = sediment delivery ratio

Da = area delivery ratio	0.50
Dv = Vegetation trapping factor	1.00
Dc = Channelization factor	0.50
Dp = pit deposition factor	1.00

Sediment Yield From Design Watershed:

Y = A * D Y= 13.51 tons/acre

where: Y = Watershed Sediment Yield (Tons / Acre)

A = Soil loss per area (Tons / Acre)

D = Sediment Delivery Ratio

Life of Basin 3.0 years

Sediment Yield Conversion Ac ft / ac year:

Y2 (ac ft/ ac yr) =(Y t/ac * 2000 lb/t) / (90 lb/cubic ft * 43560 sq ft / ac)

Y2= 0.00689 ac ft / ac yr

Sediment Storage Calculation:

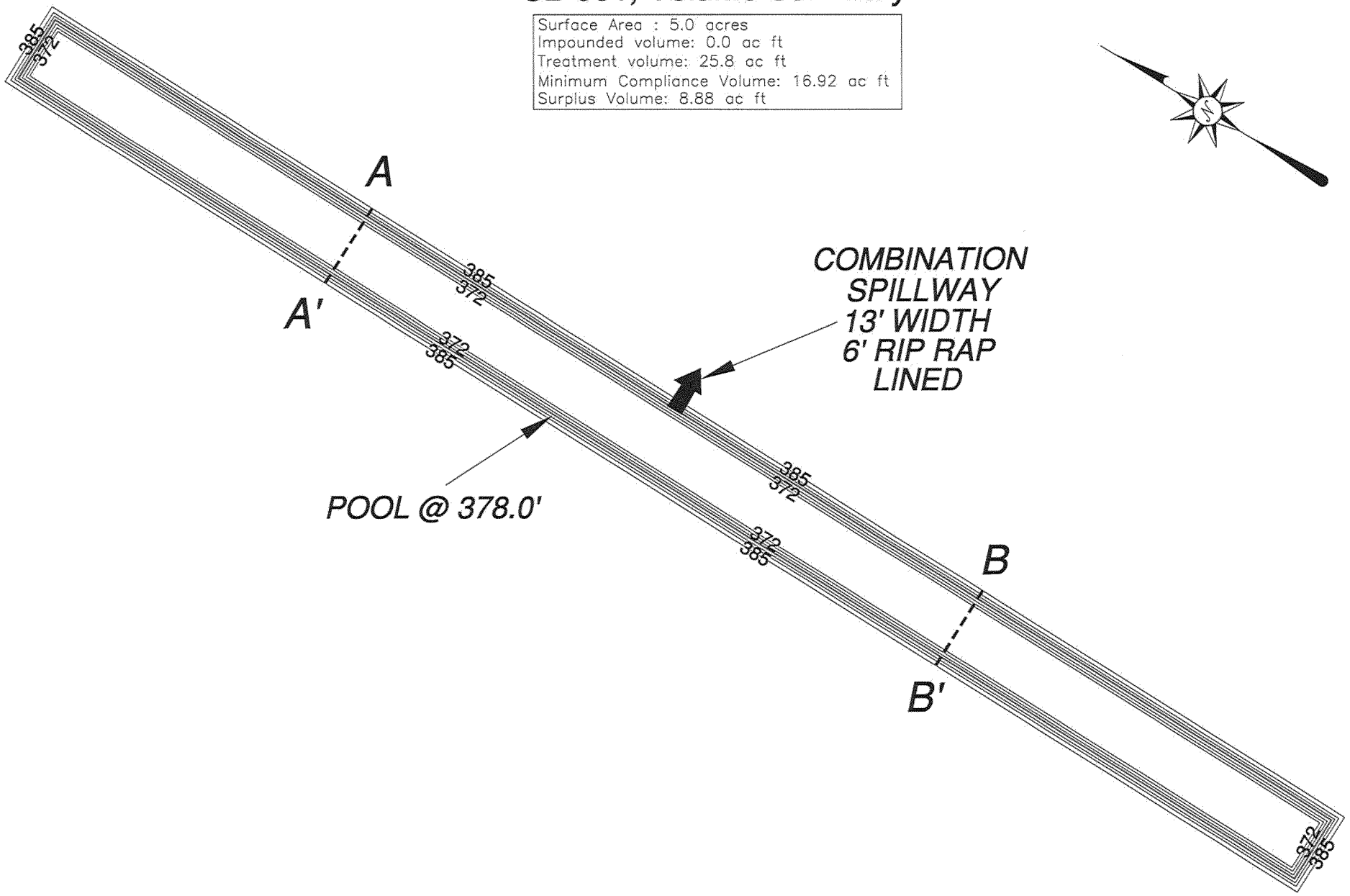
SL = RA * Y2 * YR * 43560 **Design Sediment Storage =** 127927 cubic ft

2.94 Ac/ft

EPA-R5-2018-005656000033

SB 001, Volume Summary

Surface Area : 5.0 acres
Impounded volume: 0.0 ac ft
Treatment volume: 25.8 ac ft
Minimum Compliance Volume: 16.92 ac ft
Surplus Volume: 8.88 ac ft



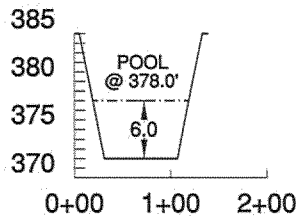
HOR. 1" = 200'

UMI LLC 566 Dickeyville Road, Lynnville IN	DATE: 8-16-2017	REVISION NO.: DATE:
Sediment Control Basin SB 001 Plan View Seven Hills Mine, Permit S-357	SCALE: 1 in = 200 ft SHEET 1 OF 2	NOTES:

EPA-R5-2018-0056560000033

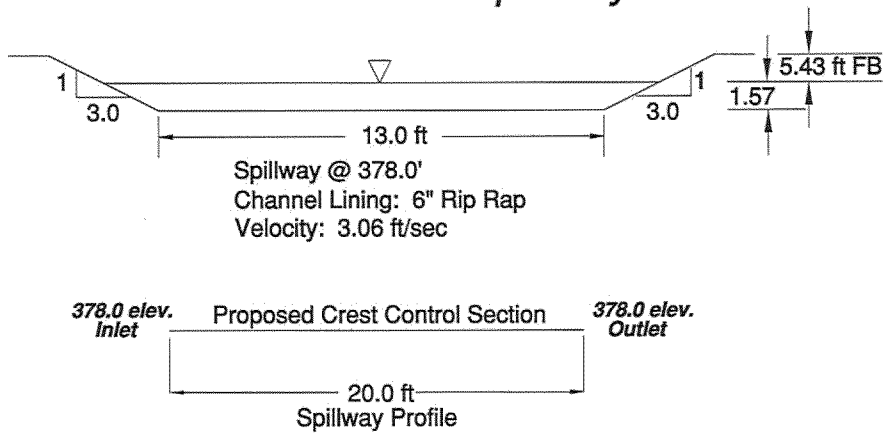
SB 001

Cross-section A - A'

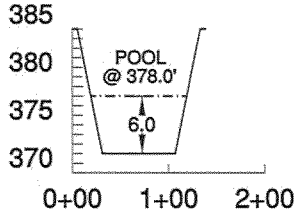


HZ 1" = 200' VT 1" = 20'

Combination Spillway



Cross-section B - B'



HZ 1" = 200' VT 1" = 20'

UMI LLC 566 Dickeyville Road, Lynnville IN	DATE: 8-16-2017	REVISION NO.: DATE:
Sediment Control Basin SB 001 Cross-sections and Spillway Section Seven Hills Mine, Permit S-357	SCALE: As noted SHEET 2 OF 2	NOTES: