December 23, 1985

TO: Technical File

FROM: Rick P. Summers, Reclamation Hydrologist RS

RE: Response to Division 11/18/85 Deficiency Letter Concerning Disposal of Sediment From Sedimentation Pond, Skyline Mine, ACT/007/005.

#9

Summary:

Skyline Mine's response to the above referenced letter dated 11/18/85 was reviewed. The response addresses the design of diversion ditch BC-12 located beneath the conveyor at the Skyline loadout. Designs for a relocated diversion were required due to the disposal of sediment from the pond at the original diversion location. Although the submittal contained a significant number of errors, sufficient information was available to perform a technical analysis. Based upon that analysis, it was shown that the diversion has been overdesigned relative to the capacity to convey the runoff from a 10 yr-24 hr precipitation event (capacity for a 100 yr-24 hr event exists). Design velocities were calculated to be approximately 5.5 fps for a 50 yr-24 hr design flow. A channel lining of 4 inch riprap would be required to insure stability at this velocity.

Recommendations:

Diversion BC-12 routes disturbed area drainage to an existing sedimentation pond at the loadout. Combined with consideration of the length of the diversion (350 ft.), it is my recommendation that the diversion should be given final approval with the following condition:

Condition #1:The applicant must install a channel lining of four (4) inch material in diversion BC-12 prior to July 15, 1986. The Division may waive this requirement following inspection of the diversion by Division Hydrologists following the snowmelt period. Selective placement of material may be approved in lieu of lining the entire reach following the above inspection. Additionally, smaller material may be used if a demonstration of reduced velocities (increased Manning's n value) is submitted and approved by the Division.

cc: Lowell P. Braxton
Sue Linner
Wayne Hedberg
Tom Wright

0317R-69

Project: Skyline Mine, Designs for Diversion BC-12

Date: 12-18-85

Reviewer: Rick Summers, Reclamation Hydrologist

I- PEAK FLOW VALUE ASSUMPTIONS

	Skyline	DOGM
Area (Ac)	2.0	2.7
Hydraulic Length	NA[2]	1,320'
Slope	NA	5.68%
CN	NA	90
Time Conc.	6.3 min	.196 hrs. (11.7 min)
10yr-24hr ppt.	Discrepancy in MRP	2.4[3]
50yr-24hr ppt.		3.2
100yr-24hr ppt.	3.6	3.6

Comments

Reference: Sheets 2 and 3 (maps)

1) Not applicable: Applicant submitted Rational Method

3) Clear Creek Station Records.

II- PEAK FLOW RESULTS

	Skyline	DOGM
Q_{10-24}	Not Calc.	3.7 cfs.
Q_{50-24}	Not Calc.	5.44 cfs.
Q_{100-24}	5.8 cfs	6.32 cfs.

III. Channel Capacity and Velocity Calculations

For Q = 5.8 cfs: (50 yr - 24 hr event)

Minimum Slope : Capacity Design

Available Depth 1.2' - 0.3 freeboard = 0.90 ft.

Cross-sectional Area: (4.6 in²)(1'/0.64 ft²) (exhibit 2)

= 2.95 ft²

n = 0.023

Slope min = 2.5% reference: Map, sheet 2.

Wetted Perimeter: (7.2 in)(1 in/0.8 ft) reference: exhibit 3

= 5.76 ft.

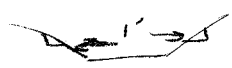
Results

	DOEM	Skyline
Slope	2.5%	2.5%
Depth	0.9'	0.9'
Area	2.95 ft²	2.84 ft²
Wp	5.76'	6.5'
Hydr. Radius	0.512	0.437
n-value	0.023	0.023
Velocity	6.55 fps	2.25 fps ← error 1)
Q capacity	19.339 cfs.	5.97

1) It appears applicant left Area out of the computation of discharge.

Solution: Find Depth and Velocity for Q = 5.8 cfs

1) Rough check: assume trapezoidal channel



2.5:1 sideslopes

Q	D	A'	P	S	V
5.8 cfs	0.526	1.217	3.831	.025	4.809
3.7	0.424	0.87	3.28	.025	4.236
3.7	0.383	0.75	3.06	.038	4.941

2) Check Exhibit 3 (cross-section).

	Depth	Area	Wet P.	slope	velocity	Q cfs
	0.6	1.83 ft²	4.48	0.025	5.64	10.32
	0.5	1.40	3.68	0.025	5.37	7.51
use this. →	0.4	1.06	2.80	0.025	5.36	5.68
	0.3	< 0.59 >	2.24	0.038	(5.19)	<3.06>
→	0.4	1.06	2.80	0.038	6.61	7.01

so,

@ 0.4' depth, Q = 5.7 to 7.0 cfs depending on slope

Velocity = 5.36 to 6.61 fps

assume 5.5 fps velocity for all sections.

3) Riprap sizing:

@ 5.5 fps, channel lining must be 4" material