

November 25, 1980

Memo to Coal File:

RE: Riprap Height  
 Trail Mountain Mine  
 Trail Mountain Coal Company  
 ACT/015/009

On November 6, 1980, D. Wayne Hedberg and Tom Suchoski visited the Trail Mountain minesite for the purpose of determining the riprap height for the pond embankment for the 50-year, 24-hour storm (450 CFS).

From field measurements, the narrowest or confining point in the channel was determined to be 50 ft<sup>2</sup> in area. The solution of riprap depth is shown below. (This is an iterative process and not all iterations are shown.)

$$q = A * V$$

q = discharge (CFS)  
 A = area (ft<sup>2</sup>)  
 V = velocity (F/S)

Solve for V:

$$V = q/a = \frac{450 \text{ CFS}}{50 \text{ ft}^2} = 9.0 \text{ F/S}$$

$$V = \frac{1.49}{N} R^{2/3} S^{1/2} \quad (2)$$

V = velocity F/S  
 N = roughness coefficient  
 R = hydraulic radius (ft)  
 S = slope (ft/ft)

Solve for R:

$$R = \left[ \frac{V}{\frac{1.49}{N} S^{1/2}} \right]^{3/2} = \left[ \frac{9.0}{\frac{1.49}{0.040} (0.0697)^{1/2}} \right] = 0.9448$$

$R = \frac{A}{P}$   
 R = hydraulic radius (ft)  
 A = Area (ft<sup>2</sup>)  
 P = wetted perimeter (ft)

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Solve for P:

$$P = \frac{A}{R} = \frac{50 \text{ ft}^2}{0.9448 \text{ ft}} = 52.92 \text{ FT}$$

Comparing the wetted perimeter figure to the channel configuration the riprap must be placed to a height of 10 feet above the base of the embankment.

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