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ACT/015/017
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EMERY MINING CORPORATION

A SAVAGE BROTHERS COMPANY

RECEIVED

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DIVISION OF OIL
GAS & MINING

February 15, 1985

NOV # 84-2-22-1

Mr. D. Wayne Hedburg
Permit Supervisor/Reclamation Hydrologist
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Hedburg:

In response to your further requests to clarify item #2 of your deficiency letter of January 15, 1985, to Chris Shingleton the following is proposed:

To control the erosion at the inlets to the culverts at stations 219, 227 and 50 and 131, a stone check dam will be installed approximately 10' upstream of the inlets. Refer to UP&L DWG CM-10584-DS sheet 34 for details of the dam configuration.

Refer to the attached calculations for the rock sizes to be used in the specific dams.

Should you require further information please contact me.

Sincerely,

Larry J. Guymon

Larry J. Guymon
Construction Manager

cc: Bill Zeller
Morgan Moon
Tom Kerns
Dale Grange

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CALCULATION OF ROCK SIZE FOR STONE CHECK DAMS

From hydrological analysis, flow rates at stations 131, 219, and 227+50 are 5.75, 9.58 and 9.58 cfs, respectively.

Assume a weir length of 3 feet at the base for station 131 and 4 feet for stations 219 and 227+50.

For a broad crested weir:

$$Q = CLd^{3/2}$$

Q = flow, cfs; C = weir constant

L = length of weir, D = depth of flow

$$d = \left(\frac{Q}{CL}\right)^{2/3} \qquad C = 3.0$$

$$d = \left(\frac{9.58}{(3.0)(4.0)}\right)^{2/3} = .861' \quad \text{for station 219 and 227+50}$$

$$d = \left(\frac{5.75}{(3.0)(3.0)}\right)^{2/3} = .742' \quad \text{for station 131}$$

Determine stability of rock at stations 219 and 227+50.

$$\tau = \gamma ds \qquad \gamma = 62.4 \text{ lbs/ft}^3$$

$$S = \text{Slope of } 0.02463 \text{ ft/ft}$$

$$= (62.4)\ (.861)\ (.02463)$$

$$= 1.323 \text{ lbs/ ft}^2$$

$$\eta_b = \frac{21 \quad \tau}{\gamma\ (SG-1)\ D_{50}}$$

SG = Specific Gravity
= 2.2 for sandstone

Assume D_{50} = 12" = 1'

$$\eta_b = \frac{21\ (1.323)}{62.4\ (2.2-1)\ (1.0)} = .3710$$

$$S.F. = \frac{\cos\theta * \tan\phi}{\sin\theta + \eta_b \tan\phi}$$

ϕ = Angle of repose of rock
= 40° for round rock
θ = slope of channel
= 1.411° of slope of 0.02463 ft/ft

$$= \frac{\cos 1.411 \tan 40}{\sin 1.411 + (.3710) \tan 40}$$

$= 2.497 > 1.5$ ok D_{50} = 12"

Rock stability at station 131:

$\tau = \gamma ds =$ s = slope of 0.08 ft/ft

$= 62.4\ (.742)\ (.08)$

$3.704\ \text{lb/ft}^2$

$N_b = \dfrac{21\ (3.704)}{62.4\ (2.2-1)\ (1.83)}$ $D_{50} = 1.83' = 22''$

$= .5676$

$SF = \dfrac{\text{COS } 4.574 \tan 40}{\text{SIN } 4.574 + (.5676) \tan 40}$ $\Theta = 4.574°$

$= 1.504 > 1.5$ $D_{50} = 22''$

This procedure is taken from pages 185 to 188 of <u>Applied Hydrology and Sedimentlogy for Distrubted Areas</u> by B. J. Barifled, R.C. Warner and C.T. Haan, 1981.