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STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

December 7, 1978

Please file

Mr. William H. Boley
Forest Engineer
Manti-La Sal National Forest
350 East Main Street
Price, Utah

RE: Culvert Design
Trail Mountain Coal Mine
ACT/015/009

Dear Mr. Boley,

Thank you for forwarding a copy of the "Estimated 10-year, 6-hour Peak Flow" for the small watershed that is diverted at the Trail Mountain Coal Mine. I concur with the Forest Hydrologist's estimation of curve number, area, T_o, and hydrograph family. However, using a watershed length of 7200 feet as proposed by the Forest Hydrologist I computed a time of concentration "T_c" of 0.226 hours using a formula developed by Kirpitch.

I have constructed a composite dimentionless hydrograph as developed by the Soil Conservation Service (N.E.H.-4 pages 21.49 to 21.53) for the 10-year 6-hour storm for the watershed in question. This technique appears to be similar to that used by your Forest Hydrologist; with the only difference being the time of concentration. Estimated peak flow is 52 cubic feet per second. A copy of the calculations is enclosed.

I will call you in the near future to discuss our work. I appreciate the opportunity to work with you and your staff.

Sincerely,

K. MICHAEL THOMPSON
ENGINEERING GEOLOGIST

KMT/te

Enclosure: Calculations

Temporary Diversion Located Near Bath-House
Trail Mountain Mine

Time of Concentration (Tc)

$$Tc\ (hrs) = 0.00013 \frac{L^{0.77}}{S^{0.385}} \quad \text{(Kirpitch)}$$

Where:

L= Length of basin area in feet, measured along the watercourse and in a direct line from the discharge point to the farthest point on the basin:

7,200 feet as proposed by Forest Hydrologist 11/14/78

S= Ratio in feet to "L" of the fall of the basin to the length, or approximately the average slope of the basin in dimentionless ratio:

(9600-7250)/7,200 = 0.326

$$Tc\ (hrs) = 0.00013 \frac{7{,}200^{0.77}}{0.326^{0.385}}$$

= 0.19 hrs.=11.4 minutes

T_o Determination:

T_o is the duration of storm when excess rainfall occurs; ie, the period of the storm when I_a is satisfied.

CN = 79.8 Storm depth = 1.52 in.

S = (1,000/79.8) - 10 = 2.53

$I_a = 0.2S$ = 0.506 ins.

Consult SCS 6-hour design storm Distrobution found on page 21.81 N.E.H.-4

T_θ = Storm duration - Period required to satisfy I_a

T_o = 6 hours - 2.15 hours = 3.85 hours