



## State of Utah

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February 22, 1993

TO: Pamela Grubaugh-Littig, Permit Supervisor

FROM: Jess Kelley, Reclamation Engineer *JK*

RE: Stability Analysis of Waste Rock Pile at Interface with Sediment Pond, PacifiCorp Power Supply, Cottonwood/Wilberg Waste Rock Site, ACT/015/019-DO-91B, Folder #2, Emery County, Utah

SYNOPSIS

Division Order DO-91B was issued November 25, 1991 in order to correct six permit deficiencies in the design and operation of the Cottonwood/Wilberg Waste Rock Site. Deficiency #5 was the absence in the Mine Plan of an analysis of the potential effect of the sediment pond on the stability of the face of the waste rock pile.

On January 13, 1993, the permittee submitted, pursuant to the Division Order, a stability study which was done in October of 1992 by the engineering firm of RB&G. The study recommended that changes be made in the configuration of the waste rock pile and the operator agreed to make these changes. This memorandum is the writer's review and approval of the study and its recommendations.

ANALYSIS

RB&G first determined the subsurface conditions which prevail at the site. This they did by digging four test pits and by drilling three holes and by analyzing the material removed. They found the pile to be made up of permeable refuse material over impermeable shale with a thin layer of impermeable clay (from weathered shale) in between. The test pits and drill holes were all dry.

RB&G then determined the material properties of the waste rock material. The material was found to have a friction angle ( $\phi$ ) of  $32^\circ$ , a dry density ( $\gamma_d$ ) of 90 pcf, and a cohesion (C) of 0 psf.

RB&G then performed a standard, circular failure analysis of the waste rock pile using its final geometry and the material properties of the waste rock. They analyzed the pile as it would be under three different sets of conditions:

- 1) Present slope of 2h:1v; present surface; no water in the sediment pond or the waste rock;
- 2) Present slope of 2h:1v; surface covered with a layer of relatively cohesive material; sediment pond filled; waste rock saturated to the elevation of the water in the sediment pond (6770 feet); and
- 3) Modified slope of 2.5h:1v; present surface; sediment pond filled; waste rock saturated to an elevation of 6805 feet.

From the circular failure analysis, RB&G found that the only way the pile could be made to have the required static stability safety factor of 1.5 was to reduce the slope to 2.5h:1v, as in the third condition listed above. RB&G thus recommended that the slope be lessened to 2.5h:1v by widening all terraces, after the third terrace, from 3 feet to 8 feet. The permittee agreed to take this course of action.

### RECOMMENDATIONS

It is recommended that the RB&G stability study be approved as fulfilling the requirements of deficiency #5 of Division Order DO-91B and that the permittee be allowed to carry out the recommendations of the study.