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June 4, 1992

TO: Pamela Grubaugh-Littig, Permit Supervisor

FROM: Jesse Kelley, Reclamation Engineer *JK*

RE: Evaluation of Stability of Pond 1 (Treatment Facility No. 1) to Satisfy Conditions of Division Order DO-92A, Item 4, Cyprus Plateau Mining Corporation, Star Point Mine, ACT/007/006, Folder #2, Carbon County, Utah

Synopsis

The Division issued Division Order DO-92A on February 18, 1992 in order to correct a number of permit deficiencies. Among the six items listed in DO-92A, Item 4 required that the operator demonstrate that the embankments of Pond 1 (Treatment Facility No. 1) have a static stability safety factor of at least 1.3, as required by R645-301-533.100. The safety factor now demonstrated in the permit is less than the required 1.3 and is based on an analysis done by R & M Consultants of Salt Lake City, Utah in 1981 and 1982.

On May 29, 1992, the operator submitted, for Division approval, a stability analysis of Pond 1 done by Applied Geotechnical Engineering Consultants, Inc. (AGEC) of Midvale, Utah. For this analysis, AGEC reevaluated the assumptions about the cohesion of the embankment material made by R & M in their 1982 analysis and collected and analyzed additional samples. Using this additional data, AGEC demonstrated that the embankments of Pond 1 have a static safety factor of at least the required 1.3.

Analysis

AGEC found that the density of the embankment material is about 100 pcf, and the material is primarily silty sand. With these characteristics, the material should have a cohesion of at least 75 psf. The R & M stability analysis assumed no cohesion, while the AGEC analysis used the value of 75 psf determined from its sample analyses.

Page 2
Evaluation Memo
ACT/007/006
June 4, 1992

AGEC also determined, like R & M before it, that there is little potential for saturation of the embankments. The embankment material is quite porous and thus allows water in the pond to seep down to the underlying bedrock instead of seeping through the embankments and saturating them. And this can only improve as fine material is added to the pond and further seals the embankments.

Using a friction angle of 38 degrees, a cohesion of 75 psf, and no saturation, AGECE performed a stability analysis of the embankment. AGECE used a standard circular failure model (Simplified Janbu Method of Slices), generating 600 potential failure surfaces. Of the 600 generated surfaces, 10 were found to be critical and the minimum static safety factor of these 10 surfaces was slightly over 1.3. Thus, the minimum safety factor of 1.3 required by R645-301-533.100 is displayed by the embankments of Pond 1 if it is assumed that their material strength is the result of both friction and cohesion. That this assumption is correct is borne out both by AGECE's sample analysis and by the empirical fact that Pond 1 has been in place for many years and has shown no instability under wet or dry conditions.

Recommendations

It is recommended that the AGECE report be approved as satisfying the requirements of R645-301-533.100 and that Item 4 of DO-92A be terminated.

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