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BUREAU OF MINES
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D Tikinsky

(Return to WM, 623-SS)

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Mr. David H. Tiktinsky
Engineering Branch
Division of Waste Management, NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Tiktinsky:

Enclosed are draft review comments on the following documents:

1. Exploratory Shaft - Phase I, Functional Design Criteria, BWI-FDC-003, August 1984
2. Exploratory Shaft - Phase I, Title II Design Report, System Design Description, BWI-DR-001, July 1984
3. Functional Design Criteria - Exploratory Shaft Phase II, BWI-FDC-007, January 1985
4. Task VIII, Exploratory Shaft Phase II, Conceptual Design Report, May 1985

The reviews were performed by Mike Beus and Mike Sokaski of SRC per your request in preparation for the upcoming BWIP Technical Meeting on November 19-20, 1985.

Sincerely,

M. E. Ford

for Ernest L. Corp
Supv. Mining Engineer

Enclosures

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Review Comments

1. Exploratory Shaft - Phase I, Functional Design Criteria

p. 21, 3.72 - Design of steel liner presumes that only construction loads, i.e. hydrostatic loads from grout operation, need be considered. The high, unequal stress levels projected at the shaft bottom (from ES-I-System Design Description) may result in stress induced yield of the rock mass around the opening and post construction displacement of the shaft wall.

A detailed plan for implementing a liner and grout monitoring system after placement is highly recommended. A contingency plan (internal stiffening, grouted bars through the lining, etc.) may be desirable to counter effects of unequal rock loads and non-uniform rock displacement profile.

3.7.3 - I assume that the "shaft breakout" is the station intersection. This is an area where rock instability is most likely to occur, particularly in the station "brow". This might be particularly important because mining personnel will be at the working face.

p. 22 - I assume "... this appropriate ... criteria" means non-elastic based on laboratory and "porthole" measurements. Factor of safety implies an elastic "Hookes Law" type behavior.

p. 42, 3.10.1 - Will QA program include both pre- and post-construction monitoring of the shaft and support system for structural integrity? Is this responsibility of A-E or Rockwell?

2. Exploratory Shaft - Phase I, Title II, Design Report, System Design Description

p.2-13, 2.2.6.2 - Will there be interface requirements for casing/grouting monitoring through porthole access, particularly if A-E is responsible for QA of shaft integrity.

Other interface requirements may include cable hangers for signal cable from instrumentation, hoist operation for drilling, and drill platform in cage.

p.2-15, 2.2.9.4 - Again, will shaft and support structure be monitored. If liner is unstable, a "QA Level I" failure might be appropriate.

p. 2-18, 2.2.11.1.1 - Station brow also has high potential for failure.

p. 4-2, 4.1.1 - It should be pointed out that in situ stress levels presented here may be considerably in error, depending on technique used, skill of personnel, etc. Large error bands should be assigned both stress levels and lab determined strengths. Rock mass strength may be only a fraction of core strength. Therefore, even the elastically induced shaft wall stress may exceed rock strength and yield may occur.

The "... inelastic stress redistribution ..." will reduce shaft wall stress but increase shaft wall displacement.

p. 4-5, 4.1.3.1 - Lining load may induce rock load from local block failure or generalized yield/dilation effects.

4.1.3.4 - I don't see how a blanket statement can be made that "Rock pressure does not affect either the surface or deep casings." (3rd paragraph), for reasons previously discussed. Considering the uncertainty of both projected stress levels and rock mass strength at 4,000 ft, I consider rock yield and subsequent liner loading a distinct possibility.'

p. 4-32, 4.4.5 - Fully grouted cable or bars are often used in practice and are primary support members to enhance stability of station brows. Length may be determine by analysis of intersection geometry. PL 107 shows only 6 ft rock bolts. Are these split sets, grouts bars, or what?

3. Functional Design Criteria - Exploratory Shaft Phase II:

& 4. Task VI, Exploratory Shaft Phase II, Conceptual Design Report:

Some comments apply as on (1.) and (2.) as regards shaft and lining design. Some general comments. Why not do some physical modelling on shaft/liner system and also foam concrete would seem like excellent choice for tunnel development lining because of its favorable yield characteristics and insulative value.

Review Comments

Page 6-8 -- The support design depends on increasing the number of rock bolts as support requirements increase. This may not be feasible in some types of heavy ground such as extremely fractured or ravelling ground. In these conditions, yielding steel sets with lagging may be required.

Page C-9 -- The rope safety factor of 1.5 is incorrect. Assuming a catalog strength of 44.9 tons for the rope and a maximum load of 8.79 tons, the correct safety factor is about 5.

Page G-5 -- The reference at the bottom of the page in incomplete.

Page 21, last paragraph -- Don't see the reason for using different principal stress ratios for the interbed and interflow regions as opposed to the central portions of the basalt flows. Why not use the previously reported values?

Page 25, first paragraph -- The temperature at which personnel can work depends on the dry and wet bulb temperatures, airflow, and acclimatization of personnel. In mine environments, the temperature should generally not exceed 85° F where personnel are working. Above this temperature, a refrigeration system is advised.

Page 27, Dewatering -- Some provision should be made for handling sudden inflows of water. This would be extra pump capacity and emergency procedures to be followed. It is important to recognize that sudden inflows can occur in areas with an arid climate, low water table, and flat topography.