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REMARKS

Comments on BWIP Design Workshop, Oct 5-6, 1982

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COMMENTS ON BWIP DESIGN WORKSHOP--Oct. 5-6, 1982

by E. L. Corp

This report summarizes my concerns on major issues discussed at the workshop meeting in Richland, Wash. Aside from these concerns, I was impressed by the fact that significant progress has been made by Rockwell Hanford Operations (RHO) over the past year in addressing many key issues, and laying out a program to analyze and solve major problems. The comments are arranged in the order they were covered in the meeting agenda.

Conceptual Design

1.) The latest repository design based on elastic analysis of stresses at the crown of the openings does not represent real conditions and may obligate RHO to opening configurations that in actuality are not the safest or most cost effective. The design is not realistic because:

a. it assumes a maximum compressive strength failure criterion,

b. the compressives strengths selected do not have a realistic basis,

c. the analysis does not account for jointing in the basalt and a more probable elastic-plastic behavior,

d. the analysis does not take into account deformation which is the most likely factor limiting failure.

2.) It was recommended a year ago that some conceptual design be done using an elastic-plastic finite-element program. Even though in situ stress, strength and physical properties information is not precise, a sensitivity analysis could be conducted using a range of values. This would give some idea of what problem areas in design are most likely. Alternative designs could be proposed based on changes in the more sensitive parameters.

In Situ Stress/Rock Strength

1.) Because of the variations in in-situ stress data obtained at the Near Surface Test Facility
(NSTF),
there appears to be some disillusionment with overcoring techniques and a greater reliance placed on hydrofracturing. There is even talk about building a small-scale hydrofracturing tool for use at the repository horizon. The preclusion of overcoring and use of hydrofracturing as a result of this experience may not be the best decision. Overcoring is a more reliable technique even in jointed basalt.

The poor repeatability in readings taken at the NSTF could to some extent be expected. Low stress levels at the test horizon are close to the level of measurement accuracy, and the use of downholes versus horizontal holes produced unnecessary water problems and gage bonding problems.

2.) The most reliable in situ strength data can be obtained from mining full size openings in the experimental shaft test facility, instrumenting these

openings, and then backcalculating the modulus, etc. using a suitable finite-element model. Also, a mine by test or the use of tunnel stress relief gages ahead of a development heading would provide useful properties information.

Exploratory Shaft (ES I/II) Test Plan

1.) A six-foot-diameter drilled shaft is very small for determining the extent and geologic suitability of the repository horizon. NRC should verify RHO's statements regarding maximum diameters for drilled shafts based on the current state of the art. This information will also help determine future sizes of drilled shafts in the repository, the number that will be required, and whether or not conventional sinking (with freezing) will be needed.

2.) One of the most important tasks before licensing is to establish the geologic suitability of the repository horizon. This can be done by:

a. establishing a reliable predictive technique during mining of ES II,

b. sinking more boreholes around and within the repository perimeter,

c. exploratory drifting around the repository.

It is imperative that a suitable repository horizon be established before repository construction proceeds.

3.) It appears that mechanically-anchored bolts have been selected as a means of support and instrumentation in the experimental shaft test facility. Other means of bolting should be tested as part of a support evaluation plan. These include resin- and cement-grouted rebar, cable bolts, and angle bolting with trusses. Vertical jointing in the back may necessitate something other than vertical bolts. Also, the use of white hydrocal as a cement grout will provide as quick a setting time as resin. Resin-grouted bolts may not be as impractical as first thought.

Load cells on expansion-anchored bolts do not provide reliable results because of creep. It is more effective to point grout a piece of rebar or cable and attach the load cell.

Exploratory Shaft Grouting

1.) The shaft grouting and sealing plan proposed by RHO is a 20-year-old technology used in the oil industry. There is little doubt that it will be successful over the working life of the repository, however, long-term effectiveness after abandonment is an unknown. Some effort should be made to determine the effects of long-term mechanical and chemical deterioration on the cement materials. Also, there were discussions a year ago about removing the steel liner on abandonment. This could effect seal integrity before permanent plugging is installed.

2.) If conventional shaft sinking with freezing is needed for the main repository shafts, an entirely different sealing scheme may have to be used. How will such a system be evaluated prior to shaft development?