# DESCRIPTION OF PROPOSED NEW ACTIVITIES FOR FIN A-1755 DURING FY85

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## Introduction

At the review meeting for FIN A-1755 at Sandia (SNLA) on October 15 and 16, 1984 several activities for this project during FY85 were proposed. These activities, some of which were suggested by J. Peshel (NRC), are expected to be carried out in addition to the review of documents and attendance at workshops and meetings. Below, a short description of each of the proposed activities is provided including estimates of costs and personnel efforts required. After review by NRC staff, priorities can be assigned to the tasks suggested by mutual agreement with SNLA personnel. Any questions regarding these activities can be directed to K. Wahi (FTS 844-6268) or E. J. Bonano (FTS 844-5303).

## Proposed Activities

### A. Shaft-seal Failure Analysis

It is proposed that analyses similar to the ones performed during FY84 to investigate the performance of shaft seals be carried out using more realistic parameter values. The new analyses will include effects of seal geometry and a more detailed description of the stratigraphy along the shaft length. Jaak Daemen's input and expertise will be used in the design of these calculations.

The generalized version of the DNET code will be used for the calculations. The code treats creep deformation, salt dissolution and heat conduction simultaneously. The scope of the analysis will be limited to bedded and domed salt.

The estimated effort is 1.25 man-months at a cost of $16K including computer charges.

B. Thermohydrologic Analysis of BWIP Site

Results of a recent two-dimensional analysis (SWIFT II) and the reported variations in the field data for basalt indicate a need to perform a three-dimensional coupled thermal-hydrologic analysis. It is expected that the latter will elucidate the flow-reversal effects obtained with the two-dimensional model and will provide a more realistic estimate of the extent of the disturbed zone. In addition, it will provide a better description of the groundwater flow path and the path length.

It is noted that in the draft EA for basalt, results of different models give widely different flow directions. Thus, this is a subject that deserves further investigation.

For this analysis we propose to use the SWIFT II code which has two- and three-dimensional modeling capabilities. A direct comparison with the two-dimensional model results mentioned earlier will quantify the effects of model dimensionality on flow direction and flow rates.

The estimated effort for this task is 2 man-months at a cost of $30K. This figure includes estimated computer charges of $10K.

C. Near-field Thermomechanical Response

The conceptual design for BWIP has undergone many revisions. The most recent design calls for horizontal emplacement of waste canisters in the pillar walls with one canister per hole. When thermomechanical stresses are superimposed on the in-situ stress field, the stress concentrations near the pillar walls may cause structural instabilities. An elastic-plastic analysis is proposed that would simulate the thermomechanical response of a typical emplacement room. The predicted stress and strain fields

could be used to identify potential "failure" zones where artificial support may be required. It would also serve as an independent verification of DOE analyses and help assess the adequacy of their design.

Two-dimensional simulations using STEALTH and/or SANCHO are proposed. The estimated effort is 1.5 man-months and the cost is $20K, including computer charges.

D. Structural Integrity of Waste Package

Depending on the design, an initial gap between the host rock (hole surface) and the waste package may exist; this gap is expected to close with time. Once the host rock and the package surface come in contact, radial stresses will be transmitted to the package liner (overpack). The magnitude of the radial stress will be a function of factors such as elastic properties of the host rock, thermal load, temperature gradient, etc. In order to elucidate these effects, the structural integrity of the package needs to be analyzed.

A combination of analytical and numerical techniques is proposed for these calculations. The estimated effort is 3 man-months at a cost of $35K including computer charges.

E. Stress-permeability Relationships

Changes in flow, particularly in fractured media, due to variations in stresses are usually not considered in existing models. Empirical stress-fracture aperture relationships and expressions relating fracture aperture and permeability that allow treatment of the effect of stress variations on flow have been proposed in the literature. A search of the pertinent

literature is proposed to assess the state-of-the-art for the treatment of these coupled effects. Following the proposed review, we expect to make recommendations with respect to the incorporation of appropriate relationships into existing or future analyses.

The effort required in this task is estimated at 2 man-months at a cost of $20K.