A-1755

PDR -
LPDR -
WM-10 (2)
WM-11 (2)
WM-16 (2)

Sandia National Laboratories
Albuquerque, New Mexico 87185

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January 12, 1987

Mr. John Peshel
Engineering Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

Dear Mr. Peshel:

Enclosed is a summary of proposed work to be completed under FIN A-1755 during FY 87 and a request for travel for L. R. Shipers as discussed during our telephone conversation of December 17, 1986.

If you have any questions, please feel free to contact me at FTS 846-3051.

Sincerely,

Larry R. Shipers
Waste Management Systems
Division 6431

RMC:6431

Enclosure

Copy to:
6431 R. M. Cranwell
6431 K. K. Wahi

3644

PROPOSAL OF WORK TO BE COMPLETED UNDER FIN A-1755

The following subtasks are proposed under Task 1 of FIN A-1755 as an effort to explore areas that require further investigation under this contract. Completion of any or all of these subtasks during FY 87 is dependent upon the type and quantity of work requested by the NRC project director under Tasks 1 and 2 of the contract. Any subtasks specifically requested by the NRC will be assumed to have priority and will be completed first. The proposed tasks are as follows:

1. Complete and report on the reviews currently underway at the request of the NRC.

2. Continue the 2-dimensional modelling of a shaft liner at BWIP as discussed in the October and November monthly reports.

3. Extend the BWIP shaft liner analysis to include a fully 3-dimensional model. This, when coupled with the results of the previous task, could be used to assess the relative merits 2- and 3-dimensional modelling in this type of application.

4. Automate the coupled thermal-mechanical response analysis procedure formulated to investigate the stability of underground openings and shaft penetrations. Details of this analysis procedure are presented in the August and September monthly reports. This should result in a "user friendly" suite of computer codes that run on a PC to analyze the coupled stresses in the vicinity of the intersection of two cavities.

5. Computerize existing simple analytical and semi-analytical shell solutions (based on pressure vessel theory) for use in shaft liner design and analysis. This should result in a computer code capable of running on a PC that has the potential of being integrated with the suite of codes discussed in the previous subtask to analyze the coupled thermal-mechanical response of a shaft liner and its surrounding rock mass.

6. Continue installation of the STEALTH 3D computer code received from EPRI (see November monthly report) on the Open NOS computer system at SNLA. This effort will include verification of the standard 3-dimensional version and generation appropriate 3D updates to allow the code to function in a static or quasi-static mode. An extension of currently available STEALTH 2D updates will be used to generate a static or quasi-static 3D version of the code. This updated version would allow repository-type analyses in a fully 3-dimensional mode and should be easily transportable to the NRC or INEL.

7. Reinitiate the shaft seal failure analysis in a bedded salt repository using the DNET computer code. This analysis

would include the effects of both salt dissolution and creep. Certain modifications of the DNET computer code will be considered to improve its modelling capabilities of problems of this type. These modifications could include the addition of a "shaft seal leg" that would consider the seal material and geometry, the rock-seal interface, and the surrounding disturbed rock zone. The effects of salt dissolution and creep could be considered in the rock-seal interface and the disturbed rock zone. Additional modifications could include an improved salt creep model, consideration of the effects of backfill-creep interactions on flow, and the consideration of of partially saturated flow.

8. Extent the existing suite of analytical and semi-analytical models to consider thermal phenomena and aspects not normally included in simple models. Some of the phenomena and aspects to be considered could include canister scale thermal effects and interactions, thermal radiation in a cavity (e.g., air gap between waste canister and borehole, enclosure radiation in emplacement rooms), conduction in composite media (e.g., backfill around a canister, layered rock mass), finite domains, and forced and natural convective heat transfer.

TRAVEL REQUEST

This travel request is for L. R. Shipers to attend a three day short course on the topic of groundwater flow and transport. The details of the course are as follows:

Title: Groundwater Contaminant Transport Modelling 1987

Date: January 26-28, 1987

Location: Princeton University

Lecturers: G. F. Pinder
D. P. Ahlfeld
M. A. Celia

Course Fee: $575

The course objectives include providing a background in geology, groundwater hydrology, numerical methods, and groundwater contaminant transport. Participants will also be provided a PC version of a computer code capable of simulating both groundwater flow and transport in three dimensions. Hands-on experience will also be provided in the use of this code. This course should provide information that will be useful and applicable in the analysis of coupled thermal-mechanical-hydrological problems as well as improving the background of L. R. Shipers in the area of hydrology.