Sandia National Laboratories

Albuquerque, New Mexico 87185

July 11, 1984

WM Record File A-1158 — WM Project 10,11,16 — Docket No. — PDR — LPDR B, N, S

Distribution: ORNSTEIN, Gen. Ticket, Hatte

(Return to WM, 623-SS) 12

Mr. Peter M. Ornstein
Geotechnical Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

Dear Mr. Ornstein:

Enclosed is the monthly report on FIN A-1158, Repository Site Description and Technology Transfer for June 1984.

Please feel free to contact me if you have any questions or comments.

Sincerely,

Robert M. Cranwell

Robert M. Cranwell, Supervisor
Waste Management Systems
Division 6431

RMC:6431:jm

Enclosure

Copy to:
Office of the Director, NMSS
Attn: Program Support
Robert Browning, Director
Division of Waste Management
Malcolm R. Knapp
Division of Waste Management
Enrico Conti, Branch Chief
Health Siting & Waste Management Division
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6431 R. M. Cranwell
6431 R. L. Hunter
6431 M. D. Siegel

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A-1158 PDR

PROGRAM: Repository Site Definitions; Short-term Technical Assistance — FIN#: A-1158 Tasks I, III

CONTRACTOR: Sandia National Laboratories — BUDGET PERIOD: 10/83 - 9/84

NMSS PROGRAM MANAGER: P. M. Ornstein — BUDGET AMOUNT: $265K

CONTRACT PROGRAM MANAGER: R. M. Cranwell — FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: R. L. Hunter — FTS PHONE: 846-6337
M. D. Siegel — FTS PHONE: 846-5448

PROJECT OBJECTIVE

To develop reference repositories in media other than bedded salt (i.e., basalt, domed salt, welded tuff, and granite).

ACTIVITIES DURING JUNE 1984

Repository Site Definition

On June 26, R. L. Hunter presented a review of the work currently being done on the tuff RSD, comparing and contrasting the RSDs for saturated and unsaturated tuff. Work on the RSD has been delayed by preparations for the review meeting.

A rough draft of the last part of Chapter 1, Section 1.8, Energy and Mineral Resources has been completed. This section consists of five hand-written pages of text and a 10-page table (Appendix 1.2), which summarizes the information of precious and base metals and associated mineral resources within the Yucca Mountain region.

Writing of the section on stratigraphy is in progress. The effort includes the preparation and compilation of the following figures, table and appendix:

Figure 3-1	Generalized geologic map with drill hole locations.
Figure 3-2	Fence diagram (revised)
Figure 3-3	Caldera complex north of Yucca Mountain showing possible source area of the Paintbrush Tuff.
Table 3-1	Summary of thickness variation of stratigraphic units in drill holes, Yucca Mountain area.
Appendix 3-1	Stratigraphic and lithologic description of drill holes.

Literature review is continuing for structural geology, hydrology, and thermomechanical properties.

In July, M. D. Siegel will attend an NNWSI/NRC geochemistry workshop.

Short-Term Technical Assistance

No activity.

Development of a Self-Teaching Curriculum for TOUGH

This project involves the following tasks:

1. Finalize TOUGH-version to be documented.

   The version originally given to NRC in September 1983 contains most but not all of the physical effects which are believed to be important in strongly heat driven flow in partially saturated rocks. Development work on the code is continuing, and additional effects are being evaluated and incorporated. The present project calls for code documentation, rather than code development. However, it will be necessary to spend some time examining and testing various TOUGH-versions, and to select and finalize a version to be used in the documentation. The selection will emphasize completeness of physical effects modeled, as well as proven reliability on a broad range of problems. Coding and internal documentation will be improved as may be necessary.

2. Develop a set of sample problems.

   Sample problems need to be chosen carefully, to address a number of issues, including: (i) verify code by working problems for which answers are known; (ii) provide a variety of problems from simple to complex, to illustrate code capabilities and to guide the user in applications; (iii) consider problems which are physically meaningful and relevant to intended code applications.

3. Draft self-teaching curriculum.

   The major topics to be addressed are: (i) physical effects modeled; (ii) governing equations; (iii) mathematical and numerical methods; (iv) architecture of code; (v) preparation of input data; (vi) output of code; (vii) sample problems. After a curriculum has been drafted it will be "tried" on several colleagues at LBL with an interest in the field. This will help to bring out areas which may be incomplete or ambiguous, and need to be revised.

Lawrence Berkeley Laboratory
1 Cyclotron Road Berkeley, California 94720
(415) 486-4000 • FTS 451-4000

June 4, 1984

Gene E. Runkle
Division 6431
Sandia National Laboratory
Albuquerque, NM 87185

Re: Development of a self-teaching curriculum for TOUGH

Dear Gene:

Thank you for your letter of April 23, 1984, and the outline for the curriculum, which looks very reasonable to me. As I mentioned to you over the phone, we are very interested to develop complete documentation for TOUGH, but because of our present heavy commitments cannot start this work until autumn 1984. I have prepared a somewhat detailed description of the tasks to be done, and a proposed schedule with milestones (enclosed). If for some reason you would prefer to start the project in FY '84 (September 1, say), this could be accommodated. However, our level of effort would have to be low initially, and the expected completion date of June 30, 1985, would not change.

I estimate that completion of the tasks as outlined in the attachment will require 50% of my time (as principal investigator) and 50% of another scientist's time, over the anticipated 9-month period of the project. In addition we need approximately 2 manmonths of help from a programmer, chiefly for preparation of the sample problems. Then there are computer charges, and various cost items such as supplies, and perhaps a couple of trips to Albuquerque. Adding all this up, and figuring our usual overhead, I estimate total project cost at 91.3 k$.

I will be out of the country for 2 months, starting around August 10. I hope that we will be able to conclude a contract before I leave.

Sincerely,

Karsten

K. Pruess
Staff Scientist
Earth Sciences Division

KP/lf
cc: C. F. Tsang

NMSS Review of the Technology Transfer Program

The Technology Transfer Program was presented to the NRC staff on June 26, 1984 by Gene Runkle. The self-teaching curriculum, seminars, and sample problems that are the main products of this program were discussed. Dr. M. Knapp, NRC, pointed out that this program provides continuity between staff changes that occur at SNLA and NRC. In addition, this program provides a basis for comparison of the NRC and SNLA versions of the codes and techniques developed in the research programs (FIN A-1192).

In addition, time spent in preparation for and attending the June 25-27 review by R. V. Guzowski was charged to this task.

PROGRAM:	Technology Transfer	FIN#:	A-1158 Task II
CONTRACTOR:	Sandia National Laboratories	BUDGET PERIOD:	10/83 - 9/84
NMSS PROGRAM MANAGER:	P. M. Ornstein	BUDGET AMOUNT:	$245K
CONTRACT PROGRAM MANAGER:	R. M. Cranwell	FTS PHONE:	844-8368
PRINCIPAL INVESTIGATORS:	R. L. Hunter	FTS PHONE:	846-6337
	M. D. Siegel	FTS PHONE:	846-5448

PROJECT OBJECTIVE

To insure through technical support, problem definition, and documentation the timely, thorough, and efficient transfer of the information, analysis techniques, and analysis tools developed for the U.S. Nuclear Regulatory Commission (NRC) by the methodology program.

ACTIVITIES DURING JUNE 1984

SWIFT II Self-Teaching Curriculum

The report entitled "SWIFT II Self-Teaching Curriculum: Illustrative Problems for Sandia Waste-Isolation Flow and Transport Model for Fractured Media" is currently in typing to incorporate the extensive comments received from the reviewers. Preparation for the NMSS review meeting held in Washington D.C., June 25-28, 1984, has caused some delay in the manuscript revision. The final review copy for Sandia management is expected to be circulated in early July. A final copy will be prepared incorporating any review comments by the end of July or no later than August 15, 1984. The revision of this report has been extensive and time-consuming; however, the final product will be much improved by this effort.

TOUGH Self-Contained Document

The outline of tasks to be performed by K. Pruess, Lawrence Berkeley Laboratory, in the development of the TOUGH documentation and the overall project cost estimate was received on June 4, 1984. The $91.3K estimated in the attached letter is beyond the $80K originally agreed upon by NRC, SNLA, and K. Pruess and must be negotiated to the $80K limit. A meeting between K. Pruess, SNLA staff, and the NRC PM has been arranged for July 23, 1984 at Lawrence Berkeley to discuss the tasks and specific costs and to agree on a final contractual design that will be implemented by Sandia.

Development of a Self-Teaching Curriculum for TOUGH

Task	1984			1985					
	October	November	December	January	February	March	April	May	June
(1) Finalize TOUGH				•A					
(2) Develop sample problems								•B	
(3) Draft curriculum									•C

Milestones:
A. Computer program complete.
B. All sample problems run.
C. Delivery of code and draft curriculum.