

Sandia National Laboratories
Albuquerque, New Mexico 87185

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September 11, 1984

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

WM-RES
WM Record File
CA-1158
SNL

WM Project 10,11,16
Docket No. _____
PDR
LPDR LLB,US

Distribution:
Ornstein
PHHc
(Return to WM, 623-SS)

Jean-Ticket
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Dear Mr. Ornstein:

Enclosed is the monthly report on FIN A-1158, Repository Site Description and Technology Transfer for August 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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Earth Sciences
6431 R. M. Cranwell
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PDR WMRES EXISANL
A-1158 PDR

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

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

NMSS PROGRAM MANAGER: P. M. Ornstein BUDGET AMOUNT: \$364K

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 AUGUST 1984

Repository Site Definition

The first draft of Chs. 1 through 4 of the RSD for unsaturated tuff is complete, including the typed text, references, and appendices and rough drafts of figures.

A draft of Ch. 5, Geochemistry, will be finished by the end of September. In August, the literature review was substantially finished. The literature reviewed included work on: 1) theoretical modeling of interactions between rock and ground water, 2) experimental studies of these interactions, and 3) mode of transport of water in the unsaturated zone. LANL believes that the assumption of slug flow in fractures in the unsaturated zone will be more conservative than the assumption of film flow. We plan to investigate these assumptions.

A draft of Ch. 6, Hydrology, is in progress and will be complete in mid-September. The literature review was finished in August and some tables have been compiled.

A draft of Ch. 7, Thermomechanical Properties, is in progress and will be complete by the end of September. Literature review and compilation of tables continued in August.

Short-Term Technical Assistance

No activity.

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: \$315K

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 AUGUST 1984

SWIFT II Self-Teaching Curriculum

The final draft of the report entitled "SWIFT II Self-Teaching Curriculum: Illustrative Problems for the Sandia Waste-Isolation Flow and Transport Model for Fractured Media" has been reviewed by SNLA staff. The comments are being incorporated into the document. The NRC staff review comments are due to the PM on September 4, 1984. These comments will be provided to Sandia in mid-September. All comments will be considered for the final camera-ready copy of the report. The NRC comments will be addressed in a letter to the PM detailing the disposition of each comment and the supporting reasons for the decision.

A new version of SWIFT II has recently been delivered to SNLA from GeoTrans. This new version contains two primary changes:

- 1) conversion from top-centered to block-centered boundary conditions
- 2) improved machine independence, making the code more portable.

Appropriate documentation for these changes will be included in the SWIFT II Self-Teaching Curriculum and the sample problems rerun. This additional effort should not cause any delay in completion of the Self-Teaching report.

Self-Contained Document for TOUGH

A draft copy of the various tasks that are to be included in the contract between SNLA and Lawrence Berkeley Laboratory (LBL) for the preparation of the TOUGH Self-Contained Document was provided to K. Pruess in early August. These contractual tasks were reviewed by K. Pruess and LBL management, and several wording changes and modifications of due dates were suggested. The final due date for the TOUGH document remained unchanged. The suggested changes have been incorporated into the attached copy of the tasks, which will be included in the contract between SNLA and LBL. The ceiling price of the contract is \$80,000 and will be funded from FIN A-1158. Task 6, providing for validation and verification of TOUGH, will be funded from FIN A-1166, if funding becomes available.

PROPOSED TASKS FOR
DEVELOPMENT OF A SELF-CONTAINED CURRICULUM FOR THE TOUGH CODE

TASK 1:

Finalize a version of the TOUGH computer code and document. This version of the code should be similar to the code described in the seminar presented to the Nuclear Regulatory Commission in August, 1983. Additional capabilities should include: a) non-linear material properties, b) a scaling factor to adjust the units, and c) an extended library of capillary functions.

Time Schedule

September 1984 - December 1, 1984 -- Finalize version

December 1984 - January 1985 -- Rework final version to be consistent with sample problems developed

TASK 2:

Assist Argonne Software Center in resolving the proprietary claim to the Harwell Subroutine Library MA28 package. This package is in the TOUGH computer code.

Time Schedule

September 1984 - November 31, 1984

TASK 3:

Develop sample problems for the purposes of illustrating capabilities of the TOUGH code. Provide a variety of problems from simple to complex. Consider problems which are meaningful and relevant to the intended use of the code. Include problems to demonstrate the following: 1) 1-D infiltration problem, 2) 2-D infiltration problem, 3) flow to a geothermal well, 4) radial heat flow problem around a canister for purposes of demonstration of code capability for two-component, two-phase fluid and heat flow, 5) similar to problem 4 only for fractured media, 6) demonstration of code capability for two-component, two-phase fluid and heat flow using 2-D stratigraphy from a real site, and 7) 3-D infiltration and heat problem, if feasible.

Time Schedule

September 1984 - February 28, 1985 -- Complete first four problems.
-- Detailed approach for problems 5 - 7

March 15, 1985 -- Status meeting to discuss problems 5 - 7.

TASK 4:

Draft a self-contained document for the TOUGH code. Include the following topics: 1) physical effects modeled by TOUGH, 2) governing equations, 3) mathematical and numerical methods, 4) architecture of code, 5) preparation of input data, 6) output of code, 7) description of sample problems.

All work performed under this task shall meet the standards of NUREG-0856.

Time Schedule

June 1985 - August 1985

TASK 5:

Revise draft self-contained document incorporating and addressing comments from Sandia National Laboratories and the NRC. Prepare final camera-ready document for publication by the NRC.

Time Schedule

June 1985 - August 1985

TASK 6:

Assist in verification and validation efforts of the TOUGH code. This would include furnishing appropriate analytical problems for purposes of verifying the code and supplying field data, laboratory experiments, etc. for use in validation activities.

NOTE: Tasks 1 - 5 will be funded with a ceiling price of \$80,000 from FIN A-1158.

Task 6 will be funded in FY 85 from FIN A-1166.

Monthly progress reports will be provided to Sandia National Laboratories by the 1st day of the following month.

MAJOR MILESTONES FOR FIN A-1158

(Updated 8/6/84)

Task 1: Repository Site Definition

MILESTONE DESCRIPTION	SCHEDULED START	SCHEDULED COMPLETION	ACTUAL COMPLETION	ESTIMATED COST
RSD for TUFF (1984)	3/84	Continued '85	-	\$240K
RSD for TUFF Continued (1985)	-	2/85	-	35K
SCOPING REPORT - RSD FOR GRANITE	1985	1985	-	10K

Task 2: Technology Transfer

1984

SWIFT II Seminar	11/83	11/83	11/83	15K
SWIFT II Self-Teaching Curriculum	12/83	6/84	8/84	60K

1985

TOUGH Self-Contained Curriculum	9/84	5/85	-	100K (carryover from FY 84)
Scenario Seminar	To Be Scheduled			22K (20K carryover from FY 84)
Scenario Self-Teaching Curriculum	To Be Scheduled			53K (50K carryover from FY 84)
NWFT/DVM Generalized Network and Dual Porosity Self-Teaching Curriculum (Suggested)	To Be Scheduled			70K

MILESTONE DESCRIPTION	SCHEDULED START	SCHEDULED COMPLETION	ACTUAL COMPLETION	ESTIMATED COST
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NWFT/DVM Generalized Network and Dual-Porosity Seminar	To Be Scheduled			30K
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Task 3: Short-Term Technical Assistance

<u>1984</u>	As Needed			79K
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<u>1985</u>	As Needed			40K
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