

Sandia National Laboratories

Albuquerque, New Mexico 87185

September 15, 1986

Neil M. Coleman
Hydrology Section
Geotechnical Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

86 SEP 19 P3:02

WM DOCKET CONTROL CENTER

Dear Mr. Coleman:

Enclosed is the monthly report on FIN A-1158, Repository Site Definition and Technology Transfer for August 1986. 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

Enclosure

Copy to:
Office of the Director, NMSS
Attn: Program Support
Robert Browning, Director
Division of Waste Management
Philip Justus
Division of Waste Management
Enrico Conti, Branch Chief
Health Siting & Waste Management Division
John Randall
Division of Radiation Programs and
Earth Sciences
6400 R. C. Cochrell
6430 N. R. Ortiz
6431 R. M. Cranwell
6431 C. P. Harlan
6431 G. F. Wilkinson

WM-RES
WM Record File
A-1158
SNH

WM Project 10, 11, 16

Docket No. _____

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PROGRAM: Repository Site Definitions

FIN#: A-1158
Task I

CONTRACTOR: Sandia National
Laboratories

BUDGET PERIOD: 10/85 -
9/86

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: - 0 -

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: G. F. Wilkinson
C. P. Harlan

FTS PHONE: 844-0074
FTS PHONE: 844-8164

PROJECT OBJECTIVE

To develop RSDs for candidate host media and provide data for use in developing and testing performance assessment methodologies for the various media.

ACTIVITIES DURING AUGUST 1986

No activity.

PROGRAM: Technology Transfer

FIN#: A-1158
Task II

CONTRACTOR: Sandia National
Laboratories

BUDGET PERIOD: 10/85 -
9/86

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$115K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: G. F. Wilkinson
C. P. Harlan

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PROJECT OBJECTIVE

To provide technical support for the transfer of the capability to use the information, analytical techniques, and tools developed for the NRC under the Performance Assessment Methodology program (FIN A-1266).

ACTIVITIES DURING AUGUST 1986

SWIFT II Self-Teaching Curriculum (STC)

Preparation of an errata sheet to the SWIFT II Self-Teaching Curriculum is currently underway. When complete, it will be transmitted to the Division of Technical Information and Document Control for distribution. We anticipate completion during the month of September.

SWIFT II Seminar

A seminar on the capabilities and use of the Sandia Waste-Isolation Flow and Transport Model for Fractured Media (SWIFT II) was held at NRC in Silver Spring, MD on August 19-21, 1986. The objectives of this course were to provide a detailed description of SWIFT II (evolution, assumptions and equations, numerical implementation, code structure, data input, quality assurance) and illustrate the use of the code through sample problems. Documentation including the SWIFT II Theory and Implementation, SWIFT II Data Input Guide, SWIFT II Self-Teaching Curriculum, "Theoretical Description of Boundary Conditions" by Everdingen and Hurst, and a copy of the instructors' viewgraphs was provided to the twelve attendees, which consisted of NRC staff and contractors. The course was taught by P. A. Davis and E. J. Bonano, and a presentation on procedures for accessing SWIFT II on the INEL computing system was delivered by C. P. Harlan.

PROGRAM: Maintenance of Computer Codes

FIN#: A-1158
Task III

CONTRACTOR: Sandia National
Laboratories

BUDGET PERIOD: 10/85 -
9/86

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$175K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: G. F. Wilkinson
C. P. Harlan

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FTS PHONE: 844-8164

PROJECT OBJECTIVE

To implement a quality assurance program to maintain computer codes, detect and correct errors, document changes, and inform the NRC staff.

ACTIVITIES DURING AUGUST 1986

USGS 3-D Model Code

The USGS-3D model code has been read from tape onto the SNL Open NOS computing system in preparation for transfer to INEL. At the present time we are experiencing difficulties in compiling, which is probably due to some hardware incompatibilities. SNL computing center consultants are working with us on this matter. This code was developed for use on specific hardware and, consequently, is very machine-dependent.

As we had outlined in the April monthly report, there are many unknowns in implementing this code, which was developed by another agency entirely independent of SNLA's QA program. Ongoing progress will continue to be reported.

TOUGH Code

In the July monthly report we informed you that our output from running sample problems 3 and 6 on the Sandia NOS operating system compared poorly with the results contained in the draft user's guide. We have informed Karsten Pruess of these discrepancies. In discussions with him, we have resolved our concerns with sample problem 6. Our results should have been plotted in mole fractions instead of mass fractions and effective saturations instead of saturations. The fact that mole fractions instead of mass fractions, which is the TOUGH output, are used in Figure 19 of the draft documentation is not clear in the text but is listed on the y-axis of Figure 19. The use of effective saturation is indicated neither in the text nor on Figure 19 of the draft documentation. Dr. Pruess advised that he would expand the draft documentation to indicate that the mole fractions and effective saturations were used to construct Figure 19. We have revised the figure comparing the output from our TOUGH runs with Figure 19 of the draft documentation to reflect mole fractions and effective saturations and have noted excellent agreement

between the two. The discrepancy involving sample problem 3 has not been resolved as yet.

INEL Computing System

Procedures for submitting a batch job during an interactive session and re-dimensioning SWIFT II for larger problems were added to QUAHELP, the on-line help procedure on the INEL computing system. Information on using these features is included as attachments to this report.

PROGRAM: Code Validation and Verification

FIN#: A-1158
Task IV

CONTRACTOR: Sandia National
Laboratories

BUDGET PERIOD: 10/85 -
9/86

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$87K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: G. F. Wilkinson
C. P. Harlan

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PROJECT OBJECTIVE

To assemble the various tests that have been performed to help validate and verify various portions of relevant codes and recommend any additional feasible tests.

ACTIVITIES DURING AUGUST 1986

Work continued on the SWIFT II verification/validation effort. We performed a computerized literature search of the DOE, NTIS, and GEOREF databases through DIALOG Information Services. This search yielded a few references to SWIFT II, but none were related to either verification/validation or other lab or field problems.

In addition, we began preparation of a rough draft of the SWIFT II verification/validation report. The planned format is as follows. Any verification/validation problems that have been previously described in literature will be summarized in the report. Any verification/validation problems we found or will find that are not described in the literature will be explained in more detail than those problems found in the literature. Finally, any problems we recommend to complete a SWIFT II verification/validation effort will be explained in detail and cited with the appropriate references. Current plans are to complete a rough draft of the report by September 30, 1986.

PROGRAM: Short-term Technical Assistance

FIN#: A-1158
Task V

CONTRACTOR: Sandia National
Laboratories

BUDGET PERIOD: 10/85 -
9/86

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$39K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: G. F. Wilkinson
C. P. Harlan

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PROJECT OBJECTIVE

To provide general technical assistance on waste management matters relating to Tasks I-IV.

ACTIVITIES DURING AUGUST 1986

No activity.

PROCEDURE TO RE-DIMENSION SWIFT II FOR LARGER PROBLEMS

- (1) Examine page 5 of output file for a table entitled 'UTILIZATION OF COMMON ARRAY STORAGE'
- (2) Compare current core dimensions with your data requirements for arrays G, G2, G3, and IG.
- (3) Create and save your own binaries with the following interactive control stream:
 - (a) GET,SWIIDIM/UN=CRH
 - (b) BEGIN,,SWIIDIM (This procedure prompts you for sizes)
 - (c) DEFINE,MYLGO (Select a name for binaries, ex, MYLGO)
 - (d) COPYBF,LGO,MYLGO (Save your binaries in your area)
 - (e) ROUTE,MYLIST,DC=PR,ST=M01,UN=NRC,UJN=XYZ.
(where XYZ is your userid. WARNING -
this route is optional and sends a very
large compile listing to your printer)
- (4) Use your binary file MYLGO in place of the library binary file SWIILGO.
- (5) The request for extended memory at execution time should be increased to reflect the added memory. An estimate of this number is printed out from the procedure in step (3). As an example, the RFL,0,472 requirements for the QA version of SWIFT II were determined by:

G array	G2 array	G3 array	IG array						
48000	+	30000	+	58000	+	20000	=	156000	
								=	472 K Octal
- (6) INEL system limitations:
 - (a) A single common block size is 131071 maximum
 - (b) The total of all four array sizes must not exceed 262144 (1000K octal)

A-1756
1646.010
August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date ----
I. Direct Manpower (man-months of charged effort)	0.4 -----	12.2 -----
II. Direct Loaded Labor Costs	3	125
Materials and Services	0	2
ADP Support (computer)	1	3
Subcontracts	24	149
Travel	0	8
Other (computer roundoff)	0	0
	-----	-----
TOTAL COSTS	28	287

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
None	365K	365K	None

A-1158

Total for 0976.010, 0976.020, 0976.030, 0976.040 and 0976.050
August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	4.9 -----	23.2 -----
II. Direct Loaded Labor Costs	34	189
Materials and Services	0	0
ADP Support (computer)	2	14
Subcontracts	19	* 70
Travel	0	1
Other (computer roundoff)	1	4
	-----	-----
TOTAL COSTS	56	278

* Some of these charges are accruals.

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
\$150K	\$486K **	\$336K **	- 0 -

** \$70K of these funds were transferred to A-1755 by NRC Form 173
dated April 4, 1986.

A-1158, Task I
0976.010
August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.0 ---
II. Direct Loaded Labor Costs	0	0
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	0	0
	---	---
TOTAL COSTS	0	0

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
None	None	None	None

A-1158, Task II
 0976.020
 August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
 SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date ----
I. Direct Manpower (man-months of charged effort)	4.0 ---	11.0 ---
II. Direct Loaded Labor Costs	28	90
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	6	*33
Travel	0	0
Other (computer roundoff)	0	1
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TOTAL COSTS	34	124

* Some of these charges are only accruals.

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
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\$115K

-0-

A-1158, Task III
0976.030
August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date ----
I. Direct Manpower (man-months of charged effort)	0.7 ---	9.5 ---
II. Direct Loaded Labor Costs	5	79
Materials and Services	0	0
ADP Support (computer)	2	14
Subcontracts	7	*12
Travel	0	0
Other (computer roundoff)	1	3
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TOTAL COSTS	15	108

* Some of these charges are only accruals.

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
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\$175K

-0-

A-1158, Task IV
 0976.040
 August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
 SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date ----
I. Direct Manpower (man-months of charged effort)	0.2 ---	2.1 ---
II. Direct Loaded Labor Costs	1	15
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	6	*25
Travel	0	1
Other (computer roundoff)	0	1
	---	---
TOTAL COSTS	7	42

* Some of these charges are accruals.

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
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\$87K

-0-

A-1158, Task V
0976.050
August 1986

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY
SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date ----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.6 ---
II. Direct Loaded Labor Costs	0	5
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	0	0
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TOTAL COSTS	0	5

III. Funding Status

Prior FY Carryover -----	FY 86 Projected Funding Level -----	FY 86 Funds Received to Date -----	FY 86 Funding Balance Needed -----
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\$39K

-0-