Sandia National Laboratories
Albuquerque, New Mexico 87185

May 15, 1986

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

Dear Mr. Peshel:

The enclosed monthly report summarizes the activities during the month of April for FIN A-1755.

If you have any questions, please feel free to contact me at FTS 844-8368 or E. J. Bonano at FTS 844-5303.

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 Branch
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3056

PROGRAM: Coupled Thermal-Hydrological-Mechanical Assessments and Site Characterization Activities for Geologic Repositories

FIN#: A-1755

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/85 - 9/86

DRA PROGRAM MANAGER: J. Peshel

BUDGET AMOUNT: 226K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: E. J. Bonano
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PROJECT OBJECTIVES

To provide technical assistance to NRC in the assessment of coupled thermal-hydrological-mechanical phenomena and site characterization activities for high-level waste repositories.

ACTIVITIES DURING APRIL 1986

Activities and Accomplishments

All the effort during the month of April was spent on the CorStar/Teknekron Benchmark Problems. Additional errors and difficulties were encountered when attempts were made to use certain capabilities of the STEALTH codes. The restart capability, which was successfully used in the standard version, would not work in the Waste Isolation (WI) Version of the code. A missing statement in one of the common blocks was discovered to be the cause of the problem. Recall that Problems 2.4, 2.8, 2.9, and 3.5 (two cases) had been set up and run in late 1985 and early 1986. Due to extensive revisions in the STEALTH code (particularly, differences between the standard and WI versions at SNLA), it was necessary to convert all previous benchmark-related modifications to the WI version. The above stated problems were then re-run using the WI version. In addition, Problems 5.2, 5.3 and 6.1 were set-up and are now being run. After discussions with CorStar, Inc. and Acres, Inc. it was decided that the time-exponential creep law would be used for Problems 5.2, 5.3 and 6.1; the parameter values would be those from the Avery Island dataset (see p. 114, NUREG/CR-3636). Past models of the Project Salt Vault (PSV) experiment had used the transient power creep law. In the present effort, Problem 6.1, which is a simulation of PSV, has been designed to use the time-exponential law. However, fast closure rates occur as soon as the array heaters are activated. Whereas the total convergence

was of the order of a few centimeters in the past simulations (and as measured in the field), the present model gives over a meter of convergence in a matter of days. In several conversations with the SAIC modellers who developed the creep model for STEALTH, we have been assured that the creep model is free of major errors. Some possible explanations are that either there is an error in the problem set-up and updates, or the exponential creep law (with Avery Island data) is inappropriate for the PSV site. Further work is underway in an effort to identify potential causes of this discrepancy. A meeting in early May has been planned with CorStar, Inc. We expect to transfer all the results and data files to them at that time. A number of the problems will be run far enough in simulation time for Teknekron to take over and complete. Some problems have been run to completion. Limited assistance will be provided to Teknekron after this transfer, primarily in the form of answering questions over the phone.

The trip report for the March 24-25, 1986 meeting at the NRC in Silver Spring, Maryland concerning issues related to the exploratory shaft test plan and review of the SCP for BWIP has been completed and is included in this report as an attachment.

Travel

None.

Problems Encountered

Year-to-date expenditure figures reported in this month do not reflect actual expenditures as this contract has been overcharged. These charges are being returned and the corrected figures will appear in subsequent monthly reports. Preliminary estimates indicate that at least $80K still remain in this contract.

Attachment I

BWIP Trip Report

by

K. K. Wahi

A meeting was held in Silver Spring, Maryland on March 24-25, 1986 between the NRC and some of its contractors to discuss issues related to the exploratory shaft test plan and review of the SCP. Representatives from Engineer's International (EI), Itasca Consulting Group (Itasca), Bureau of Mines (BOM), and Sandia National Laboratories (SNLA) participated in this meeting.

There were three overall objectives for holding this meeting: 1) the desire to provide a more focussed and consistent work load for the contractors and staff, 2) discuss and plan the final EA review for the basalt site, and 3) develop a preliminary strategy for reviewing the Site Characterization Plan (SCP). Each contractor or consultant was assigned one or more technical topics on which he was to give a brief presentation during the course of the meeting.

After introductory remarks on the first day, the first agenda item was to go through the Final EA Reference list and identify new references since the draft EA. Responsibilities for reviewing the important references were assigned based on individuals area(s) of expertise. A total of five documents were tentatively assigned to SNLA pending written authorization. Brief reference was made to the FEA review plan and the approximate dates it is to take place.

To learn more about the site and progress since the last visit, an "Appendix 7" visit to the BWIP site is tentatively scheduled for June of this year. Appendix 7 visits are a part of a consultation and cooperation agreement between the DOE and the NRC. A presentation on Quality Assurance (QA), based on 10CFR50-Appendix B requirements, was given by J. Kennedy (NMSS, NRC). Some clarifications on the role of contractors were made in response to a question on QA compliance. A lengthy discussion of the Exploratory Shaft Test Plan (ESTP) then took place. The main points and conclusions of that discussion are summarized in the meeting minutes prepared by John Buckley (WMEG, NRC). Itasca has been asked to prepare a site-specific technical position on the ESTP.

Some time was then spent by the group examining a package of vu-graphs from an earlier (March 4-5, 1986) presentation on the SCP Conceptual Design Report (90% Design Review). It was not possible to conduct a through discussion on the 90% Design due to

time constraints. However, the consultants pointed out some obvious limitations that were apparent from the material examined.

Mark Board (Itasca) and K. Wahi (SNLA) made presentations on the constructability issues. Pertinent issues relate to shaft construction method, drilling equipment, porthole locations, shaft liner design, underground construction methods, construction within the vesicular zone. extent of disturbed zone, rockbursting, rock support systems, and water inflow. The meeting minutes contain the collective views of the group on these issues. A. Mukherjee (EI) then presented his thoughts on the thickness of the Cohassett Flow and whether it is sufficiently thick to permit construction of a safe repository. It now remains an open issue.

On March 25, the meeting began with a slide presentation by Beus and Sokowski (BOM) on rockbursts and deformation response around the liner. In general, the group agreed that the DOE has not adequately addressed the effects of thermal loading on rockbursts; nor have they addressed effects of rockbursts on the long term repository performance and on the stability of openings during retrieval. Sokowski (BOM) agreed to produce a short paper for the NRC on rockbursting. Peter Huck (EI) and K. Wahi (SNLA) made short presentations on shaft seals. At issue are the extrapolation of short term test results to long-term performance and the proprietary nature of the chemical shaft seals that BWIP proposes to use during operation. There was consensus on the belief that short-term seals will affect the performance of long-term seals.

Adrian Brown (Itasca) made a presentation on the level of detail expected in the SCP for surface and underground structures. He referred to NRC's review responsibilities in terms of the guidelines of 10CFR60.10d. Further discussion was postponed on this topic until the Design Information Needs Generic Technical Position was ready.

K. Wahi (SNLA) and Mark Board (Itasca) gave a talk on the validity of modeling assumptions. The group expressed concern over BWIP's apparent lack of modeling efforts. The meeting minutes outline what the group considered as important information that DOE should provide with respect to thermomechanical modeling.

John Buckley began the discussion on ventilation. It was brought to the attention of the group that, according to Morrison Knudson (a DOE contractor), significant amounts of methane may be present at the BWIP site. The group has concerns regarding ventilation problems caused by methane and the capacity needed to control the temperature to within design limits.

Meeting minutes were prepared and signed at the end of the meeting.

A-1755
1628.010
APRIL 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)	0.3	6.5
II.	Direct Loaded Labor Costs	3.0	67.0
	Materials and Services	0.0	0.0
	ADP Support (computer)	1.0	4.0
	Subcontracts	52.0	168.0
	Travel	1.0	1.0
	Other (computer roundoff)	0.0	0.0
	TOTAL COSTS	57.0	240.0

III. Funding Status

Prior FY Carryover	FY 86 Projected Funding Level	FY 86 Funds Received to Date	FY 86 Funding Balance Needed
31K	226K	195K	None