Sandia National Laboratories
Albuquerque, New Mexico 87185

December 15, 1983

Ms. M. J. Wise
Repository Projects Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

Dear Ms. Wise:

Enclosed is the monthly report on FIN A-1158, Repository Site Description and Technology Transfer for November 1983.

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

Sincerely,

Nestor R. Ortiz, Supervisor
Waste Management System
Division 6431

NRO:6431:jm

Enclosure

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PROGRAM:	Repository Site Data and Technology Transfer	FIN#:	A-1158
CONTRACTOR:	Sandia National Laboratories	BUDGET PERIOD:	10/83 - 9/84
NMSS PROGRAM MANAGER:	M. J. Wise	BUDGET AMOUNT:	$80K
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PROJECT OBJECTIVES

The first objective is 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. The second objective is to develop reference repositories in media other than bedded salt (i.e., basalt, domed salt, welded tuff, and granite).

ACTIVITIES DURING NOVEMBER 1983

Technology Transfer

Paul Davis participated in a workshop on the SWIFT II computer code. The workshop was held in Washington, D.C. from 11/21/83 to 11/23/83. The purpose of the workshop was to train NRC staff in the theory and use of the dual-porosity version of Sandia's waste isolation and transport code. The workshop was presented by Mark Reeves of Geotrans. He described the theory behind the dual-porosity approach and its implementation into the code. Also discussed were improvements made to SWIFT that are not related to dual-porosity but have been incorporated into the SWIFT II code. Dr. Reeves also made an effort to clarify the well-bore model and the use of boundary conditions in both versions of SWIFT. Along with the lectures, several example problems were reviewed by Dr. Reeves and the group. These problems exemplified the use of both dual-porosity and the new free-water surface option of SWIFT II.

Short Term Technical Assistance

A letter report describing calculations of the sensitivity of radionuclide discharge to rate constants for reactions between radionuclide species has been completed and forwarded to the NRC.

A second draft of a report describing the population balance approach to the modelling of colloidal transport has been completed by our subcontractor, Dr. E. Nuttall. This draft has been reviewed by Sandia staff and the subcontractor has been instructed to make revisions. A final version of the subcontractor's report is due at Sandia on December 19, 1983, and will be submitted to the NRC on December 23, 1983.

The letter report by Dr. E. J. Bonano submitted last month and the forthcoming report by Dr. E. Nuttall provide an overview of processes important to colloidal transport and a description of the population balance approach respectively. Neither of these reports, however, provides a detailed assessment of the feasibility of developing a colloid transport model for use in sensitivity studies or compliance assessments in NRC/NMSS projects. In telephone discussions with M. J. Wise and J. Corrado, it was agreed that such an assessment would be made in a third report which will be submitted to the NRC by January 31, 1984.

Repository Site Data (RSD)

The activity on this task remains at a low level pending approval by NRC of the Program plan for unsaturated tuff that was submitted with the August monthly report. Delay in the approval of the program plan requires adjustments in the milestones as listed in the August version of the plan.

During November, only two working days were spent on the unsaturated tuff RSD report. The review of recently obtained reports on the mineralogic and petrologic characteristics of the site, as reported in the October monthly, was begun.

Meetings and Workshops

Attendance at Symposium on Scientific Basis for Nuclear Waste Management.

Malcolm Siegel attended the seventh annual symposium for the Scientific Basis for Nuclear Waste Management sponsored by the Materials Research Society on November 14-17 in Boston, Massachusetts. Over 130 papers dealing with many aspects of nuclear waste disposal were presented. Individual sessions were held for papers dealing with research relevant to each geologic media (salt, basalt, granite, tuff). In addition, sessions dealing with generic studies of waste form characteristics, near field phenomena and far field modeling were held. Of particular interest were sessions dealing with the recent National Academy of Sciences Report on Radwaste Disposal, colloidal transport and the geomicrobiology of

nuclear waste disposal. A trip report which summarizes papers particularly relevant to performance assessment modelling will be submitted to the NRC during December.

Trip reports for trips to Washington D.C. and Columbus Ohio taken towards the end of October were prepared and sent to the NRC Project Manager, copies are attached. The "Exploratory Shaft Test Plan" (draft) prepared by the Basalt Waste Isolation Project (BWIP) staff was reviewed by SNLA. Dr. Wahi reviewed the plan from the thermomechanics and numerical modeling perspectives. Mr. Mark Board reviewed the test plan with an emphasis on the nature of tests, test equipment, and instrumentation of the proposed in-site tests. Preliminary comments were given to NRC prior to a workshop at Richland, Washington on the subjects of Exploratory Shaft and In-Situ Testing.

Mr. Board travelled to Albuquerque, NM to conduct his review of the test plan and have discussions with Dr. Wahi on that subject. These meetings took place on November 10-11, 1983. Dr. Wahi travelled to Seattle to participate in a pre-workshop meeting on November 28 with NRC personnel and its consultants. He then travelled to Richland, Washington to take part in the DOE/NRC Workshop on Exploratory Shaft and In-Situ Testing (November 29 - December 2, 1983).

Milestones

Pending agreement with NRC.

Anticipated Problems

Further delays in the approval of the program plan require adjustments in the dates of the milestones.

Internal Report
Sandia National Laboratories

October 1983

Trip Report: Discussion between NRC and its consultants on various topics related to high-level waste repositories, held October 11-14, 1983, at Silver Spring, Maryland.

This report presents a summary of the discussions that occurred on October 11-14, 1983, between NRC and its consultants on various topics related to high-level waste repositories.

The meeting on October 11 included presentations by Engineers International, Inc. (EI) on their latest work performed under contract to NRC. The EI presentations focussed on two Staff Technical Positions (STPs) for BWIP, and a number of document reviews. One STP dealt with design issues and the other with retrievability. Under EI's "Technical Assistance for Design Reviews" task order, an abstract report was submitted on Water Intrusion. A draft letter report was also submitted on document reviews. In all, the letter report contained a review of ten documents. In addition to providing document summaries and general comments, the reviews consisted of "Issue Identification and Relation to Final Rule".

A pre-meeting on "Repository Design, In-Situ Testing and Exploratory Shaft Design and Construction for Salt" was held on October 12 and 13. This meeting was in preparation for a meeting ONWI in Columbus on October 25 and 26, 1983. Representatives from NRC, EI, Golder Associates, Inc. (GAI), U.S. Bureau of Mines (BOM) and Sandia National Laboratories (SNL) took part in the discussions. Spokespersons were assigned (informally) to field questions from ONWI (at the October 25 meeting) on different issues. This was done in order to let the person presumably most qualified in a given area have the initial opportunity to address issues in that area. The agenda included the following topics: Repository Design, NRC Design Issues, DOE In-Situ Testing Plans, Exploratory Shaft (ES) Design and Construction, and Quality Assurance (QA).

Robert Johnson outlined the current status of the DOE Salt Program and the objectives of NRC/DOE Workshop. Of the seven salt sites under consideration, DOE expects to nominate three sites by February, 1984. Present ONWI schedule calls for one salt site to be recommended by January, 1985, followed by an SCP for that site by March, 1985. The ONWI has issued a contract to Fluor Corporation for the Exploratory Shaft (ES). A procedural agreement between DOE and NRC was signed in June, 1983, that would allow frequent interactions (meetings, workshops, etc.) for information exchange and NRC guidance to DOE. In principle, NRC should now have on-line access to the DOE data base. The following objectives were identified for the upcoming workshop at ONWI:

- Broad exposure and familiarization with each other's programs
- Issue identification
- Areas of agreement and disagreement
- Action items

- o Contents of the SCP
- o Familiarization with DOE's QA programs
- o Basis for future meetings.

GAI made a presentation on their draft Technical Position on In-Situ Testing (prepared for NRC). Three major points resulted from the discussion of that document. Although the spirit of these points is implicit in the document, it was decided that ONWI (or DOE) should be asked to comment directly on the following:

1. Type and number of in-situ tests to be performed;
2. Reliability and confidence of data;
3. Relationship of parameters to numerical criteria.

Mr. Nataraja (NRC) gave a talk on coupled Thermal-Mechanical-Hydrological-Chemical (THMC) phenomena. The need for developing a fully-coupled THMC model was debated and the state-of-art in modeling coupled behavior was summarized.

A third meeting was convened to address the question of how to define the "Disturbed Zone". Only NRC and SNL participated in this afternoon meeting on October 13. M. Knapp (NRC) described the problem and the history of the term "disturbed zone". A task force was appointed to look into the regional extents to which different processes might cause a "disturbance". M. Weber has been asked to lead the effort. The definition is crucial in terms of site selection in that the groundwater travel time requirement involves the distance between the boundary of the disturbed zone and the accessible environment. The possibility of defining separate disturbed zones for separate processes was also mentioned. In any event, some changes to the existing text of 10CFR60 are anticipated as a result of the revised definition of the disturbed zone.

Individual discussions took place with J. Greeves and J. Buckley on the afternoon of October 13 and morning of October 14. Program objectives and SNL's role in the project were discussed with J. Greeves. The meetings with J. Buckley focussed on the capability, availability and user-friendliness of the various thermomechanical codes.

Internal Report
Sandia National Laboratories

December 1983

Trip Report: A. NRC/Consultants Pre-Workshop Meeting: held November 28, 1983, at Seattle, Washington.
B. BWIP/NRC Workshop on Underground Test Plan: held November 29 - December 2, 1983, at Richland, Washington.

The following is a two-part summary report that describes the activities of two recent meetings with NRC. The first meeting was a pre-workshop meeting between the NRC and its consultants, and was held on November 28, 1983, in Seattle, Washington. The second meeting was a BWIP/NRC Workshop on Underground Test Plan, and was held November 29, through December 2, 1983, in Richland, Washington.

A. NRC/Consultants Pre-Workshop Meeting in Seattle.

This meeting was held to discuss and debate the preliminary comments resulting from a review of the BWIP draft Exploratory Shaft Test Plan (ESTP) document. Several NRC staff members and consultants had reviewed the ESTP prior to this meeting.

A major objective of this meeting was to integrate the various comments and discard redundant points. Clarifications were given by each reviewer on his or her comments. Agreement was sought on the statement of key questions that were to be posed later to the BWIP staff. After a morning session, the attendees were divided into two groups: 1. Geomechanics and, 2. Geology/Hydrology.

The Geomechanics group finalized a set of ten general concerns raised in the draft SCA document. Each participant in this group was asked to select two or three specific comments from his own review that were the most significant. These questions or comments would be brought up during the workshop, if time permitted.

The technical discussions during this meeting were very useful in clearing up some of the confusion and certain misinterpretations of the contents of the ESTP document. As a result, some comments were eliminated even prior to the workshop.

B. BWIP/NRC Workshop on Underground Test Plan.

Introductory remarks were made by D. Squires (DOE), P. Saget (DOE), and R. Wright (NRC) at the opening of the workshop on November 29. The remainder of the morning was devoted to presentations by DOE/BWIP personnel to give an overview of the Exploratory Shaft Test Plan (ESTP). The speakers included H. Dietz on Programmatic, T. Wintczak on Geology, R. Gephart on Hydrology, W. McCabe on Geomechanics, and R. Bielefeld on Constructibility overview. Copies of all the vu-graphs shown were handed out as notes. The possibility of a second exploratory shaft was mentioned by H. Dietz. He also compared the test schedules associated with one versus two shafts. The ESTP document did not contain any reference to a second shaft.

The NRC's preliminary comments in the areas of geology, hydrology, and geophysics were discussed during the afternoon session on November 29.

On November 30, the entire day was devoted to the discussion of geomechanics comments. As planned, the ten general draft SCA concerns were raised one-by-one by R. Nataraja (NRC). BWIP's response was sought on NRC's perception of whether these concerns had been appropriately addressed in the ESTP document. The BWIP/DOE staff seemed to be in general agreement with NRC's assessment. (The meeting minutes reflect this impression). Suggestions were made by NRC representatives on how to modify the ESTP. Individual geomechanics tests were discussed next. Each member of the NRC's geomechanics team was assigned to discuss two to three tests in his area of expertise. Many important concerns were raised on these specific tests. Due to time constraints, not all the questions regarding any particular test could be raised. One area that was not discussed (as it relates to testing) was that of numerical models. Future dialogue is desired to bring out performance assessment/modeling concerns since the test data will be used to validate, develop or calibrate many of the models.

The discussions of the first two days raised additional questions for the NRC hydrology team. As a result, they requested further discussion on the specific tests for hydrologic characterization. This discussion took place during the morning session of December 1. Some confusion existed among the BWIP staff as to whether they wanted to "take credit" for the barrier provided by the host rock (namely, Cohassett). NRC suggested that BWIP develop a defensible rationale for the proposed hydrology tests in the Cohassett, whether they wanted to "take credit" or not.

The afternoon session on December 1 was used to prepare lists of agreements, disagreements, open items, etc., and each side (BWIP and NRC) displayed its list(s). All members of the NRC team participated in preparing the lists and contributed in their respective field of expertise.

The Friday session was between the managements of NRC and DOE/BWIP. Meeting minutes were written, finalized, and signed in this session.