MEMORANDUM FOR: Robert E. Browning, Director
Division of High-Level Waste Management, NMSS

FROM: Ronald L. Ballard, Chief
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

SUBJECT: SCOPE OF PHASE 1 PERFORMANCE ASSESSMENT DEMONSTRATION

A number of informal discussions during the past weeks indicates that some clarification is needed regarding the scope and refinements that are to be reflected in the performance assessment demonstration scheduled for completion prior to the end of this calendar year. The following discussion briefly summarizes our intended objectives and the level of sophistication that can be achieved with the allocated time and staff resources.

The Phase 1 performance assessment consists of three activities: (1) development of a computational capability, (2) documentation of this capability and preliminary results, and (3) initiation of auxiliary assessments that support the computations. The products of these activities will be, respectively: (1) a computer code or set of codes, (2) a report on the calculations, and (3) a report on supporting analyses. The auxiliary analyses are important and ultimately will influence the computational methods. However, because of time constraints associated with Phase 1, these analyses will be started in parallel with the development of the computational capability and its documentation.

The computational capability that is planned will have three principal components: (1) the system code, (2) the source term code, and (3) the transport code. The system code will use as inputs the results of the transport and source term codes (hereafter labelled "Consequence Modules") and will have the capability to convert these inputs into one or more partial CCDF's. The Consequence Modules will use as inputs a simplified "base case" scenario (a "steady state" site) and one or more alternative scenarios; the latter being constrained by the available skills within the small task group. The Consequence Modules will necessarily be simple characterizations reflecting conditions now known about the site.

The importance of the auxiliary analyses should not be overlooked. It is by this mechanism that participation by the full MOU team can be achieved during this initial development period. The results of these analyses will be compared with the simplified assumptions of the system code and consequence models. They will influence Phase 2 application of the initial assumptions, while at the same time providing a mechanism for active involvement of the entire team in the higher-order code development.

Use of the scenarios described and utilized by EPA in developing their HLW standards has been suggested for demonstrating the performance assessment

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capability. I agree that EPA's efforts should be taken advantage of to the extent that we can. However, the set of scenarios used by EPA needs modification because some are not applicable to the Yucca Mountain site (e.g., the breccia scenario related to salt dissolutioning) and because EPA's set of scenarios seems incomplete (e.g., no consideration of increased precipitation infiltration associated with future climate changes). I anticipate that three types of scenarios will be considered for use in this MOU exercise:

A "stable conditions" scenario in which today's conditions are postulated to remain unchanged indefinitely. This scenario, while unrealistic, provides a baseline set of conditions for developing and testing analytical capabilities.

One or more "evolving conditions" scenarios in which expected changes are superimposed on today's conditions. An example would be increased precipitation infiltration due to "greenhouse effect" climate conditions. These scenarios will be more realistic than the "stable conditions" scenario and, when the modeling results are compared to "stable conditions" results, will provide an indication both of the importance of the evolving conditions and of our capability to model those changes.

"Disruptive events" scenarios similar to those included in EPA's analyses. These scenarios may not involve sophisticated modeling (e.g., volcanism or drilling), but including one or more of them in the overall system analysis may still give an indication of their relative importance compared to other scenarios.

It should be noted that within this set of scenarios only a limited number may be selected for the Phase 1 demonstration, based on the skills and time available within the task group.

Attached is a milestone chart and related tables indicating the staff commitments needed to meet the phase 1 objective. This optimistic projection is highly dependent on adhering to the following set of assumptions:

1. The scope of the modeling effort must be frozen at the level described above.

2. A minimally interrupted work environment for the task group is essential for successful computer code development within the time frame identified in the attached chart (with the exception, of course, of the indicated milestone briefing commitments).
3. Scheduled ACNW and DOE meetings related to Performance Assessment and the Performance Assessment Review Strategy commitments must be deferred until after November 30, 1989, to permit key staff to give their full attention to the code development. (In view of the heavy commitment of other meetings during the next few months, these delays will probably not result in complications.)

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Phase 2 of the joint RES/NMSS program will involve active interaction of NRC and CNWRA staff with SNL in the transfer of SNL's computational model technology. SNL is currently engaged in modifications to the NEFTRAN code to accommodate transport in unsaturated, fractured media. Because this effort will not be completed until late FY90, little can be gained by attempting to use it for the Phase 1 modelling work. The Center will have on board their first performance assessment staff (Dr. R. Green) by the end of August, and others are currently being interviewed. While the Center is expected to participate in an observer capacity for the phase 1 activities, they will take a much more active role in the Phase 2 effort. RES will be working closely with HLWM and Center staff in the next few months to ensure that the SNL work under FIN A1266 will mesh with other programmatic efforts so that we can effectively integrate this work with our Phase 2 program.

This memorandum and attachments reflect input by Mel Silberberg and his staff, and he fully supports the objectives reflected herein.

/s/

Ronald L. Ballard, Chief
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

Attachments:
As stated

cc: L. Shao
M. Silberberg

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see attach clarification note

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MOU ACTIVITY PLAN (REVISED PHASE 1, TASKS 2 AND 3)

MOU Task	Team Members	August	September	October	November	December 1989
1. System Code	N. Eisenberg* J. Park			System Code Up and Running	Run Code with Transport and Source Term Modules Debug Code	Generate CCDF for Yucca Mountain
2. Source Term Code	D. Codell* K. Chang J. Park T. Mo			Simple Source Term Code Up and Running	Data Base Installed; Code Evaluation Documented	Document Performance of Source Term Code and Recommendations to Improve
3. Transport Code	T. McCartin* T. Margulies J. Park D. Codell D. Fehringer N. Eisenberg J. Pohle			Simple Transport Code Up and Running	Database Installed Code Evaluation Documented	Document Performance of Transport Code Recommend Methods Improvement
4. Scenario Analysis	D. Fehringer* J. Trapp N. Eisenberg J. Pohle			Develop and Document Scenario Methodology	Generate Probability Estimates for Scenarios to be Analyzed	Document CCDF Scenario Analysis Recommend Methods Improvement Prioritize Omitted Scenarios
				MILESTONE #1	MILESTONE #2	MILESTONE #3

* Team Lead

MOU ACTIVITY PLAN (REVISED PHASE 1, TASK 2 AND 3)

MOU Task	Team Members	August	September	October	November	December 1989
5. Auxillary Analyses	T. MacCartin J. Pohle J. Bradbury Others			Define Analysis Needed Document Proposed Approach MILESTONE #1	Execute Computer Analyses MILESTONE #2	Document Purpose Scope and Modeling Results Document Implications of PA Method MILESTONE #3

MOU RESOURCE ESTIMATE (REVISED PHASE 1, TASKS 2 AND 3

MOU Task	Team Members	Job Description	Percent of Time Required
1. System Code	N. Eisenberg*	Lead; evaluates existing system codes and and uses or adapts them to NRC objective; assures correct interfaces with other tasks.	30
	J. Park	Principal Assistant; executes trial runs and implements programming as directed. Researches literature, maintains records of computer runs.	30
2. Source Term Code	D. Codell*	Lead; evaluates existing source term codes and uses or adapts them to Yucca Mountain analysis; provides a comprehensive analysis and review of existing information and recommends improvements for Phase 2.	30
	K. Chang	Provides peer review and original analyses of the applicability of source term codes to NRC objective; develops data bases needed.	30
	J. Park	Principal Assistant; executes trial runs and implements programming as directed. Researches literature, maintains records of computer runs.	30
	T. Mo	Participate in development of source term relationships.	20
3. Transport Code	T. McCartin*	Lead: code selection, modification, evaluation, and preparation of databases.	50
	T. Margulies	Code evaluations, comparisons among codes, interfaces with Tasks 1 & 2	65
	J. Park	Provides assistance; executes trial runs and implements programming as directed. Researches literature, maintains records of computer runs.	30

* Team Lead

MOU RESOURCE ESTIMATE (REVISED PHASE 1, TASKS 2 AND 3

MOU Task	Team Members	Job Description	Percent of Time Required
3. Transport Code (continued)	D. Codell	Analyst; assures compatibility of transport code with source term code; assures compatibility of transport modeling with groundwater flow modeling, transport modeling for non-groundwater pathways -- assists in assuring compatibility with system code.	60
	D. Fehringer	Transport modeling for disruptive scenarios; data bases and modeling changes.	10
	N. Eisenberg	Assures compatibility of transport modeling with system code.	10
	J. Pohle	Evaluation of groundwater flow and transport for Yucca Mountain; puts MOU analysis in perspective with a body of scientific knowledge, provides input for databases.	20
4. Scenario Analysis	D. Fehringer*	Lead; reviews mathematical basis; helps to formulate, screen, and quantify scenarios.	30
	J. Trapp	Provides basis for estimating scenario probabilities, reviews scenarios analysis as represented on systems code, including source term and transport models.	TBD
	N. Eisenberg	Describes mathematical basis for scenario analysis; assures compatibility with system code.	20
	J. Pohle	Assures scenario analysis is consistent with knowledge of flow and transport at Yucca Mountain.	10

MOU RESOURCE ESTIMATE (REVISED PHASE 1, TASKS 2 AND 3

MOU Task	Team Members	Job Description	Percent of Time Required
5. Auxiliary Analysis	T. McCartin*	Flow or transport, as determined.	15
	J. Pohle	Initiate flow and modeling capability development.	20
	J. Bradbury	Geochemistry, as determined.	50
	Others	As determined.	