MAY 22 1990

MEMORANDUM FOR: N. King Stablein, Senior Project Manager
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

FROM: Neil Coleman, Hydrogeologist
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Geosciences & Systems Performance Branch

SUBJECT: ACCEPTANCE AND START-WORK REVIEW OF STUDY PLAN FOR CHARACTERIZATION OF THE SITE SATURATED-ZONE GROUNDWATER FLOW SYSTEM (L64335 411432)

In response to your note dated May 8th, I have performed a Phase I review of the subject study plan, consisting of a combined acceptance and start-work review. Preliminary results of the review were presented in the Yucca Mt. team meeting on May 16th.

On first examining the study plan, I was concerned that activity-level work has been documented as a separate study plan. As shown in the SCP (8.3.1.2.3.1), the study to characterize the site saturated-zone groundwater system consists of eight activities (Attachment 1). Only one of these activities, reactive tracer testing at the C-hole sites (8.3.1.2.3.1.7), is included in the submitted study plan. Consequently, this review deals only with that one activity, which I shall refer to as activity 7. It is unclear why a separate study plan has been generated for activity level work. I suggest that the DOE merge this "study plan" with documentation for the other seven activities to produce an overall study plan for the site saturated-zone study.

## Acceptance Review

I have completed this review and find the activity to be acceptable in terms of content and level of detail. A checklist that documents this review is attached (Attachment 2). I have also reviewed the list of 100 references and found 22 that may not be readily available to the NRC staff. These references should be requested from the DOE (Attachment 3).

## Start-Work Review

I have completed this review and have several concerns. As described above, although the subject document is called a study plan, it contains only one of eight activities under the site saturated-zone study. There are three general "sub-activities" under the reactive tracer testing activity. These are: (1) tracer identification and characterization; (2) field experiments; and (3) modeling analyses. Detailed procedures for the field testing sub-activity do not yet exist. These will be adapted from the procedures to be written by the USGS for Activity 5 (conservative tracer testing at the C-hole sites). However,

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I cannot recommend start-work approval for sub-activities that have no documented procedures.

Further, the work is closely related to two other activities, involving work in hydraulic testing and conservative tracer testing at the C-hole sites. Those activities are not yet available for review, and I cannot evaluate the potential for interference between related tests.

Based on this review, I recommend that the DOE be notified to start work on a limited number of the sub-activities described in activity 7. Specifically, start-work approval should be granted only for those sub-activities in this "study plan" that have written technical procedures. No start-work approval should be given for the sub-activities titled "Field Experiments" in activity 7 of the study plan.

The recommendation of a partial start-work should stipulate that the USGS and LANL closely coordinate their related activities in tracer and hydraulic testing. The NRC can monitor progress in that regard through technical interactions with the DOE. In particular, development of procedures for the tracer identification and characterization tasks for the reactive and conservative tracer studies should be closely coordinated.

Recommendations Regarding Detailed Review

I recommend that a limited start-work approval be granted and that a detailed review of the reactive tracer testing be performed. However, I suggest that a detailed review not be performed until plans for the other activities of this study are submitted. At a minimum, we would need documentation for the following activities: (1) multiple-well interference testing at the C-hole sites (8.3.1.2.3.1.4), and (2) C-hole conservative tracer testing (8.3.1.2.3.1.5). These activities are closely related to the reactive tracer testing. Concurrent detailed reviews are needed to properly evaluate potential interferences.

ORIGINAL SIGNED BY

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Attachments: As Stated

Study 8.3.1.2.3.1

"Characterization of the site saturated-zone groundwater flow system"

Activities:

1. Solitario Canyon fault study (boreholes WT-8,9 and H-6,7)

2. Site potentiometric level evaluation

3. Analysis of single- and multiple-well hydraulic stress tests

4. Multiple-well interference testing at the C-hole complex

5. Testing at the C-hole sites with conservative tracers

6. Well testing with conservative tracers throughout the site

** 7. Testing at the C-hole sites with reactive tracers

8. Well testing with reactive tracers throughout the site

Acceptance Review of Content of Study Plan 8.3.1.2.3.1.7
Study Plan for Testing of the C-Hole Sites with Reactive Tracers

Neil M. Coleman, Hydrologic Transport Section
May, 1990

I. Purpose and Objective

° Describe the information to be obtained in the study.

Yes __X__ No ____ N/A ____

° Provide the rationale for information to be obtained.

Yes __X__ No ____ N/A ____

II. Rationale for Study/Investigation

° Provide rationale for tests and analyses, indicating alternatives considered and options, advantages, and limitations.

Yes __X__ No ____ N/A ____

° Provide the rationale for the number, location, duration, and timing of tests, considering uncertainties, and identify obvious alternatives.

Yes __X__ No ____ N/A ____

The start of the field testing described in this study plan is linked to the beginning of hydraulic testing at the C-hole sites. The hydraulic testing is considered an independent activity within the overall study.

Describe the constraints for the study, considering:

° Potential site impacts

Yes __X__ No ____ N/A ____

° Need to simulate repository conditions

Yes __X__ No ____ N/A ____

° Required accuracy and precision

Yes __X__ No ____ N/A ____

° Limits of analytical methods

Yes __X__ No ____ N/A ____

° Capability of analytical methods

Yes __X__ No ____ N/A ____

° Time required vs. time available

Yes __X__ No ____ N/A ____

° Scale of phenomena and parameters

Yes __X__ No ____ N/A ____

° Interference among tests

Yes __X__ No ____ N/A ____

° Interference between tests and ES

Yes __X__ No ____ N/A ____

The C-holes are located more than 3 km downgradient from the proposed exploratory shaft (ES) location. No interference is expected between the C-hole testing and work at the ES.

III. Description of Tests and Analyses

For Each Type of Test

° Describe general approach that will be used.

Yes __X__ No ____ N/A ____

° Describe key parameters that will be measured in test and experimental conditions under which test will be conducted.

Yes __X__ No ____ N/A ____

° Indicate number of tests and locations.

Yes __X__ No ____ N/A ____

The location of testing is given. Although the total number of tests is not provided, the various types of of tests are described. Some tests may be repeated.

- Summarize test methods, if non-standard procedure, summarize steps of test, how it will be modified, and reference technical procedure.

  Yes __X__ No ____ N/A ____

  Although not all tests are described, brief summaries are given for six of the non-standard tests. As stated on page 58 of the study plan, procedures have not been written for the field testing portion of this activity. Procedures will be adapted from those to be prepared by the USGS under the conservative tracer testing activity.

- Indicate level of QA and provide rationale for any tests not QA level.

  Yes __X__ No ____ N/A ____

- Reference the applicable specific QA requirements applied to test.

  Yes __X__ No ____ N/A ____

- Specify tolerance, accuracy, and precision required in test.

  Yes __X__ No ____ N/A ____

- Indicate range of expected results and basis for those results.

  Yes __X__ No ____ N/A ____

- List equipment requirements, briefly describing special equipment.

  Yes __X__ No ____ N/A ____

- Describe techniques to be used for data reduction and analysis.

  Yes __X__ No ____ N/A ____

- Discuss representativeness of test, indicating limitations and uncertainties that apply to use of results.

  Yes __X__ No ____ N/A ____

- Provide illustrations of test locations.

  Yes __X__ No ____ N/A ____

- Discuss relationship of test to set performance goals and confidence levels.

  Yes __X__ No __X__ N/A ____

  Resolution of performance issue 1.6 is discussed, but confidence levels are not.

  For Each Type of Analysis

- State purpose of analysis, indicate conditions to be evaluated and describe any uncertainty analysis.

  Yes __X__ No ____ N/A ____

- Describe methods of analysis, including analytical expressions and numerical models to be used.

  Yes __X__ No ____ N/A ____

- Reference the technical procedures document that will be followed during analysis.

  Yes __X__ No ____ N/A ____

  All of the detailed technical procedures listed in the study plan are nonstandard. Procedure numbers and dates are given for the tracer identification and characterization task. Proposed procedures for the field experiments task will be developed by the USGS under the conservative tracer testing activity. Procedures for this study will be adapted from those under the USGS activity.

- Indicate levels of QA applied.

  Yes __X__ No ____ N/A ____

- Identify data input requirements.

  Yes __X__ No ____ N/A ____

- Describe expected output and accuracy.

  Yes __X__ No ____ N/A ____

- Describe representativeness of analytical approach, indicating limitations and uncertainties that apply to results.

  Yes __X__ No ____ N/A ____

IV. Application of Results

- Briefly discuss where results from study will be used for support of other studies.

  Yes __X__ No ____ N/A ____

- Refer to specific performance assessment analyses.

  Yes __X__ No ____ N/A ____

- Describe where information from study will be used in construction equipment and engineering system design and development.

  Yes ____ No ____ N/A __X__

  This activity is not directly relevant to engineering system design.

- Describe where information from study will be used in planning other characterization activities.

  Yes __X__ No ____ N/A ____

V. Schedule and Milestones

- Provide durations of and inter-relationships among principal activities associated with this study.

  Yes __X__ No ____ N/A ____

- List key milestones including decision points associated with study activities.

  Yes __X__ No ____ N/A ____

- Describe timing of study relative to other studies and other program activities.

  Yes __X__ No ____ N/A ____

- Provide dates for activities for the study plans; reference section 8.5 in SCP.

  Yes ____ No __X__ N/A ____

  Dates for activities are not provided because the field testing portion of the reactive tracer testing will be concurrent with C-hole hydraulic testing. Specific dates for the hydraulic testing have not been established. Although SCP Section 8.5 was not referenced, Table 8.3.1.2-11 of the SCP (page 8.3.1.2-449) was referenced (Section 8.5 is a summary of the schedule information given in Section 8.3).

References to be provided by the DOE


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