OCT 10 1991

QUATPH1.

MEMORANDUM FOR: Joseph Holonich, Acting Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

FROM: Margaret Federline, Chief
Hydrology and Systems Performance Branch
Division of High-Level Waste Management

SUBJECT: PHASE I REVIEW OF REVISION I OF STUDY PLAN 8.3.5.2.1 ON CHARACTERIZATION OF YUCCA MOUNTAIN QUATERNARY REGIONAL HYDROLOGY (PPSAS 411431 L60198) (PPSAS 411432 L60205)

As requested, we have completed the Phase I review of Revision I of the subject study plan (see enclosures). This review was conducted using the Review Plan for NRC Staff Review of DOE Study Plans Revision 1 (Dec. 6, 1990).

Revision I of the subject study plan contains no new technical information. The only revisions found refer to changes in statements about quality assurance. Previously, revision 0 of the subject study plan, which contained only three of the five activities proposed for the study plan, had undergone an Acceptance and Start Work Review, the equivalent of a Phase I review as well as a Detailed Technical Review of the three activities. The previous review found the three activities substantively consistent with the agreement on content resulting from the level of detail meeting (NRC-DOE Meeting on May 7-8, 1986). Of the 131 references all but 17 are readily available. These references were not requested by the NRC. The NRC did request "unpublished data" referenced in the study plan, which the DOE has provided in the letter from Dwight Shelor to John Linehan on June 5, 1991. No objections were identified in either revision 0 or revision I of this study plan.

In addition, DOE has supplied responses to 10 open items generated by our previous Detailed Technical Review. Our analysis of DOE's responses concludes that one open item has been closed and nine remain open. Suggestions for progress toward resolution are provided in the Attachment 5. It should be noted that our response to Comment 4 raises a policy issue about the need for documenting oral and personal communications for licensing purposes (Also see Shelor to Linehan, June 5, 1991 cited above).

Further, there is also concern that, although the study plan describes general relationships between this and other studies, there is no explicit discussion of an overall program of iterative performance assessment, or discussion of the timing of this study relative to such a program. This kind of assessment is a systematic, iterative approach to identifying the information and analyses needed to support a license application. Such an approach was recommended in NRC's SCA Comment #1.

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Finally, while revision I meets the criteria for a detailed technical review, such a review is not warranted at this time. Future revisions which contain technical information will probably require detailed technical review.

This review was conducted by John Bradbury of the Hydrologic Transport Section. For additional information, please contact him at x20535.

/s/

Margaret Federline, Chief
Hydrology and Systems Performance Branch
Division of High-Level Waste Management

Enclosure(s): See next page
As stated

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Rec'd with letter dtd 10/10/91

PHASE I REVIEW
CHARACTERIZATION OF THE YUCCA MOUNTAIN QUATERNARY REGIONAL HYDROLOGY
STUDY PLAN 8.3.1.5.2.1, REVISION 1

by

John Bradbury

Hydrologic Transport Section
Hydrology & Systems Performance Branch
Division of High-Level Waste Management, NMSS
U. S. Nuclear Regulatory Commission

September 26, 1991

Introduction

This study plan describes three activities to be performed in the Yucca Mountain vicinity or at analog sites as part of the Climate Program. The objective of these activities is to describe hydrologic conditions in the Yucca Mountain area for the Quaternary and more especially for the past 20,000 years. The activities that are included in the present version of the study plan are:

- Evaluation of past discharge areas
- Analog recharge studies
- Studies of calcite and opaline-silica vein deposits

Plans for two additional activities will be included in a subsequent version of the study plan. These are:

- Regional paleoflood evaluation
- Quaternary unsaturated-zone hydrochemical analysis

Revision I of the subject study plan contains no new technical information. The only revisions found refer to changes in statements about quality assurance.

Revision 0 of the subject study plan has had an Acceptance and Start Work Review and a Detailed Technical Review of the three activities. The Acceptance Review (Attachment 1) and the Start Work Review (Attachment 2) include criteria found in the Phase I Review. The Acceptance Review found the three activities substantively consistent with the agreement on content resulting from the level of detail meeting (NRC-DOE Meeting on May 7-8, 1986). Of the 131 references all but 17 are readily available. These references were not requested by the NRC. The NRC did request "unpublished data" referenced in the study plan. The DOE has provided the "unpublished data" in the letter from Dwight Shelor to John Linehan on June 5, 1991. In the Start Work Review, no objections were identified.

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A Phase I review of Revision I of the study plan was done with respect to (A) DOE/NRC agreements on the content of study plans, (B) Identification of objections, (C) Closure of NRC open items, and (D) The Need for a Detailed Review (See Review Plan for Staff Review of DOE Study Plans, Revision I, 12/6/90).

Evaluation of Study Plans Relative to the Agreement and to the Responsible DOE Contractor's QA Program (Objectives 1 and 5)

Criterion 1 The content of the study plan under review is reasonably consistent, as appropriate for the activities, tests and analyses described, with the Agreement (NRC-DOE meeting on the level of detail for site characterization plans (SCP) and study plans, May 7-8, 1986)

Staff Review: In general, the content of the study plan is reasonably consistent with the NRC/DOE agreements on the content of study plans (See Attachment 1).

Criterion 2 All study plan references have been provided when the study plan was issued.

Staff Review: All references have not been provided (See Attachment 1). The NRC has not requested the 17 references that are not readily available. These references were not needed for the detailed technical review (See Attachment 3).

Criterion 3 Open items relative to the QA program [of the DOE contractor responsible for the study plan] that could call into question the quality of the study plan have been resolved.

Staff Review: It is noted that the only changes to the study plan are related to quality assurance. Based on a meeting with K. Hooks (QA), there currently are no QA inadequacies that have to be resolved before the work begins.

Identification of Objections (Objectives 2 through 6)

Criterion 1 Potential adverse effects on repository performance;

Staff Review: Adverse effects are not expected (See Attachment 2).

Criterion 2 Potential significant and irreversible/unmitigatable effects on characterization that would physically preclude obtaining information necessary for licensing;

Staff Review: No effects of this type have been identified (See Attachment 2). This criterion is equivalent to Criterion 2 of the Start-Work Review which addresses interferences between tests and analyses.

Criterion 3 Potential significant disruption to characterization schedules or sequencing of studies that would substantially reduce the ability of DOE to obtain information necessary for licensing.

Staff Review: No significant disruption in schedules is expected (See Attachment 2). This criterion is equivalent to Criterion 2 of the Start-Work Review which addresses interferences between tests and analyses. Also as part of the Acceptance Review checklist (Attachment 1), the NRC staff found that there was a statement in each activity that "in cases where methods do interfere, the USGS investigators have planned their testing sequences accordingly, in order to maximize data collection and minimize interference."

Criterion 4 Inadequacies in the QA program which must be resolved before work begins.

Staff Review: Based on a meeting with K. Hooks (QA), there currently are no QA inadequacies that have to be resolved before the work begins.

Closure of NRC Open Items (Objectives 8 and 11)

Criterion 1 If DOE has proposed that one or more NRC open items be closed on the basis of the material in the study plan, determine whether those items can be closed.

Staff Review: The NRC staff performed a Detailed Technical Review of the study plan (Attachment 3) from which four comments and six questions were generated. Attachment 4 is the DOE's response to those comments and questions. Attachment 5 is the NRC staff's evaluation of those responses. Four comments remain open; five questions remain open and one question is closed.

Need for Detailed Technical Review

A study plan is a candidate for detailed technical review if it meets any of the following criteria from step 6 of part 4.2 of the Review Plan. Revision I of this study plan is a candidate for a detailed technical review based on criteria 1, 2, and 3. However, Revision 0 of the study plan has undergone a Detailed Technical Review. Furthermore, Revision I of the subject study plan contains no new technical information. The only revisions found refer to changes in statements about quality assurance. Thus, a Detailed Technical Review of Revision I of this study plan is not warranted.

Criterion 1 The study plan may be related to one or more key site related issues.

Staff Review: The study plan may provide information to address key site-specific issues such as ground-water travel time and postclosure repository conditions.

Criterion 2 The study plan pertains to some NRC open items.

Staff Review: Responses to comments and questions from the Detailed Technical Review of Revision 0 of the study plan has led to open items. Attachment 4 is the DOE's response to those comments and questions. Attachment 5 is the NRC staff's evaluation of those responses. Further, progress toward resolution, however, would not result from a Detailed Technical Review of

Revision I of the study plan.

Criterion 3 The study plan describes unique, state-of-the-art tests or analysis methods that therefore do not have a supportive scientific history of providing data usable in licensing.

Staff Review: The testing to be performed under this study does consist of state-of-the-art methods.

Criterion 4 The study plan describes a study critical to the evaluation of site performance that cannot be repeated for a number of years due to its disruption of the natural baseline.

Staff Review: There should be no disruption of the natural baseline by performing this study, since most of the studies are performed outside the controlled area.

Criterion 5 The study has some other critical relationship to potential licensing concerns.

Staff Review: The staff has two potential licensing concerns regarding this study plan other than those listed above. First, the DOE response to NRC Comment 4 (Attachments 4 and 5) raises concerns about the need for documentation of "oral" and "personal" communications used as supporting evidence for statements that affect site characterization. Such communications may eventually be a point of contention in licensing from both a QA and technical point of view. Second, although the study plan describes general relationships between this and other studies including performance assessment, there is no explicit discussion of an overall program of iterative performance assessment, or discussion of the timing of this study relative to such a program. This kind of assessment is a systematic, iterative approach to identifying the information and analyses needed to support a license application. Such an approach was recommended in NRC's SCA Comment #1.

Attachment 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 12 1989

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

FROM: Donald L. Chery, Jr., Section Leader
Hydrologic Transport Section
Geosciences & Systems Performance Branch

SUBJECT: ACCEPTANCE REVIEW OF STUDY PLAN FOR CHARACTERIZATION OF THE QUATERNARY REGIONAL HYDROLOGY (S. P. 8.3.1.5.2.1) (411431, L64323)

The results of the acceptance review for the Study Plan for Characterization of the Quaternary Regional Hydrology are provided herein. This review was conducted using section 4.2 (Review Guide for Acceptance Reviews) of the draft review plan for NRC staff review of DOE study plans and procedures (December 22, 1987).

The two criteria used for acceptance reviews are as follows:

- The study plan content is substantively consistent, as appropriate for the studies, tests, and analyses described, with the agreement on content resulting from the level of detail meeting (NRC-DOE meeting on the level of detail for site characterization plans (SCP) and study plans, May 7-8, 1986).

- All study plan references have been provided when the study plan was issued. (This does not include procedures, which are to be selectively requested during the detailed technical review.)

Attached is an itemized review of study plan content versus the agreement on content resulting from the level of detail meeting (content requirements as defined by enclosure 4, attachment B of the meeting summary). Of the 41 specific content requirements, all were fulfilled except for four that were not and two were judged not applicable. However, certain qualifications applied to the "no" responses, and you are referred to the specific comments in the attachment.

With respect to the providing of references, the study plan lists 131 references of which 27 were cited in the SCP. Sixteen references are available in the Hydrologic Transport Section's reference file. In all, more than 100 references are not immediately available in the NMSS office. Of these references, approximately 17 may need to be obtained from the DOE, while the remainder should be available in the open literature. The reference list from the study plan is enclosed as a second attachment, and notations have been made to show which references were cited in the SCP reference lists.

King Stablein 9-11-3

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As you requested, we suggest that at least the following disciplines will be needed for a technical review: hydrogeology, geology, and geochemistry. We provide the study plan content review and summary of provided references for you to decide whether to accept the study plan for further review. Our acceptance review is complete.

Donald L. Chery, Jr., Section Leader
Hydrologic Transport Section

Attachments:
As stated

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Project Directorate
Division of High-Level Waste Management

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/S/

Donald L. Chery, Jr., Section Leader
Hydrologic Transport Section

Attachments:
As stated

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OFC	HLGP	HLGP				
NAME	NColeman/eg	DLChery				
DATE	9/12/89	9/12/89				

Acceptance Review of Content of Study Plan 8.3.1.5.2.1
Characterization of the Yucca Mountain Quaternary Regional Hydrology

Neil M. Coleman, Hydrologic Transport Section
September 12, 1989

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 _____

  A qualified yes. I could not find detailed information about the number of "tests" under the three activities. The nature of the work, in my opinion, would make it hard to predict how many actual "tests" or sampling events would be needed to satisfy information needs.

- 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 _____

III. Description of Tests and Analyses

<u>For Each Type of Test</u>

- 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 _____ No __X__ N/A _____

  General testing areas were shown, but I was unable to find discussions of actual numbers of "tests" or sampling events. As discussed under section II of this outline, this may be a result of the indirect nature of these Quaternary investigations.

- 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 ____

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

  Yes __X__ No ____ N/A ____

  See attachment to study plan.

- 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 ____

  These topics were discussed in very general terms. In my opinion, that is necessary due to the nature of these Quaternary investigations.

- Provide illustrations of test locations.

  Yes __X__ No ____ N/A ____

  Very generalized locations were shown.

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

Yes ____ No __X__ N/A ____

I could not find detailed discussions of results with respect to performance goals and confidence levels, but the nature of these Quaternary activities generally precludes a high degree of precision regarding confidence levels under performance goals.

For Each Type of Analysis

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

  Yes __X__ No ____ N/A ____

  A qualified yes. Uncertainty was discussed in very general terms. This seems acceptable given the nature of these Quaternary activities.

- 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 ____

- Indicate levels of QA applied.

  Yes __X__ No ____ N/A ____

  See attachment to study plan.

- 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 ____ No ____ N/A __X__

  In my opinion, not directly applicable.

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__

  In my opinion, the three activities described in the study plan are not directly relevant to construction equipment and 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 _____

  See Section 5.1 of study plan. Figure 5.1-1 gives the summary network for the Quaternary regional hydrology study. Figure 5.1-2 gives the summary network for the calcite-silica vein deposits activity.

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

  Yes __X__ No _____ N/A _____

  See Section 5.2 of study plan.

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

Yes _____ No __X__ N/A _____

See note below.

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

Yes _____ No __X__ N/A _____

SCP Section 8.5 is not referenced under study plan Section 5 (schedules and milestones). Network timelines are given in terms of fiscal years <u>after</u> implementation of study plan. No actual start and end dates were found in the study plan.

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