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MEMORANDUM FOR: John J. Linehan, Director
 Repository Licensing and Quality Assurance
 Project Directorate
 Division of High-Level Waste Management

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

SUBJECT: PHASE I REVIEW OF STUDY PLAN FOR
 CHARACTERIZATION OF FLOOD POTENTIAL AND DEBRIS
 HAZARDS OF THE YUCCA MOUNTAIN SITE
 (S.P.8.3.1.16.1.1, Rev 0)

As requested we have completed the Phase I review of the Study Plan for Characterization of Flood Potential and Debris Hazards of the Yucca Mountain Site, Rev. 0 (see enclosed). This review was conducted using the Review Plan for NRC Staff Review of DOE Study Plans Revision 1 (December 6, 1990).

The findings of this review consist of two concerns, one of which is the failure of the study plan to provide the information required by the Level of Detail Agreement and the other is in regard to analysis methods chosen (a technical issue). We recommend that the study plan be revised and resubmitted for review. A satisfactory response to the enclosed concerns, as determined by a final Phase I review, should preclude the need for a detailed technical review of this study plan.

The review was conducted by Rex Wescott (x20167) of the Hydrologic Transport Section.

R/L

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

Enclosure:
 As stated

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PHASE I REVIEW: STUDY PLAN FOR CHARACTERIZATION OF FLOOD POTENTIAL AND DEBRIS HAZARDS OF THE YUCCA MOUNTAIN SITE (S.P.8.3.1.16.1.1 Rev. 0)

by Rex Wescott
Hydrologic Transport Section
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS
January 4, 1991

Introduction

The purpose of this study is to characterize flood and debris hazards potential at or near the Yucca Mountain site. The study contains one activity (i.e., "Site Flood and Debris Hazards Studies 8.3.1.16.1.1.1). The study plan was reviewed with respect to (1) DOE/NRC agreements on the content of study plans, (2) Identification of objections, (3) Closure of NRC open Items, and (4) The Need for a Detailed Review (See review Plan for NRC 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)

Attached is an itemized check list of the study plan content versus the agreement on content resulting from the level of detail meeting. We consider most of the study plan to be in accordance with the agreement. However, we have a concern regarding the lack of detail in the study plan with respect to field stream channel surveys (See check list Part III). We consider the field surveys to be equivalent to tests and therefore the equipment, quality assurance, personnel qualifications, etc, should be described. In addition, we believe that specific field surveys will be required for this study plan even though detailed topographic information may be available. These surveys should cover at least all control sections in a stream channel as well as topography around planned structures. We recommend that the DOE/USGS revise the study plan to provide more detail in regard to field surveys in accordance with Part III of the Level of Detail Meeting Agreement, and re-submit the study for NRC review.

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

The study plan lists 16 references in addition to the USGS Quality Assurance Program Plan for the Nevada Nuclear Waste Storage Investigations and the DOE Site Characterization Plan (SCP). Of these 16 references ten are either readily available or have been provided to NRC as SCP references. The other six references are either federal or state government publications which can be obtained by request.

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.

There are no open items in the U.S. Geological Survey Quality - assurance program plan for Nevada Waste Storage Investigations, NNWSI-USGS-QAPP-01, R4 (1986).

Identification of Objections (Objectives 2 through 6)

Criterion 1 -Potential adverse effects on repository performance;

None. Field activities under this study will not alter the site in a way that could affect repository performance. Fieldwork will be limited to surveys of channels and floodplain geometries. The only site impact will be placement of survey stakes.

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

None. The study as described will not affect the collection of data under other site characterization activities. Analyses under this study are mostly dependent on data from other studies. These studies include evaluations of surface-runoff monitoring, transport of debris by severe runoff, regional paleofloods, and analysis of future surface hydrology due to climatic changes.

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;

None. This study cannot disrupt characterization schedules because it is mostly dependent on data from other studies. The field surveys under this study should have no impact on the schedules of other activities.

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

In regard to the fourth criterion, we consider the lack of explicit QA requirements for field surveys a deficiency that must be corrected before surveys are obtained, but not necessarily before work under the study plan begins. In addition, the effect of taking field surveys without applicable QA requirements in effect will mean, at worst, resurvey of the channel sections and possible re-calculation of water levels. However, we do consider QA requirements on the field surveys to be necessary for the licensee's flood potential analysis to be submitted for licensing purposes. Hence, we consider our concern regarding the lack of detail provided about field surveys to be significant.

Closure of NRC Open Items (Objectives 8 and 11)

NOT APPLICABLE - DOE did not propose to close any open items with this study plan in its transmittal letter.

Need for Detailed Technical Review

This study plan does not require a detailed technical review in accordance with the five criteria listed under step 6 of Section 4.2 of The Standard Review Plan. However, because of the relatively short length of this study plan, technical issues were noted as part of the Phase I review. A technical issue that we consider significant enough to be relayed to the DOE/USGS concerns the types of analyses proposed. The study plan specifically referred to the unit hydrograph method for determination of a flood hydrograph and the standard step method for determination of water level. Although both procedures can be conservatively applied, more sophisticated procedures may be required to model sediment and debris transport along with rainfall and runoff. We recommend that the study plan be revised to include the use of kinematic flow or other unsteady flow hydraulic methods and the possible coupling of such methods with an erosion and transport model.

Study Plan 8.3.1.16.1.1 R0

Phase I Check List of Study Plan 8.3.1.16.1.1 : Characterization of Flood Potential and Debris Hazards of the Yucca Mountain Site

I. Purpose and Objective

Describe the information to be obtained in the study.

Yes No N/A

Provide the rationale for information to be obtained.

Yes No N/A

II. Rationale for Study/Investigation

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

Yes No N/A

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

Yes No N/A

Actual field work associated with this task will consist of stream channel cross sections only. The actual number of cross sections needed will depend on channel characteristics, availability of accurate topography maps and other factors which can not be determined at this time.

Describe the constraints for the study, considering:

- Potential site impacts

Yes No N/A

- Need to simulate repository conditions

Yes No N/A

- Required Accuracy and precision

Yes No N/A

- Limits of Analytical Methods

Yes No N/A

- Capability of Analytical Methods

Yes No N/A

- Time required vs. time available

Yes No N/A

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- Scale of Phenomena and Parameters
Yes _____ No _____ N/A X
- Interference among test
Yes X No _____ N/A _____
- Interference between tests and ES
Yes _____ No _____ N/A X

III. Description of Tests and Analysis
For each Type of Test

The work described in this study plan does not include testing. However, floodplain and channel geometries may be field surveyed. These field surveys will be regarded as tests for this checklist.

- Describe general approach that will be used.
Yes _____ No X N/A _____
- Describe key parameters that will be measured in test and experimental conditions under which the test will be conducted.
Yes _____ No _____ N/A X
- Indicate number of tests and locations.
Yes X No _____ N/A _____
(locations of sites provided in table 3.1-2)
- Summarize test methods if non-standard procedure, summarize steps of test, how it will be modified, and reference technical procedure.
Yes _____ No _____ N/A X
- Indicate level of QA and provide rationale for any tests not QA level.
Yes _____ No X N/A _____
- Reference the applicable specific QA requirements applied to test.
Yes _____ No X N/A _____
- Specify tolerance, accuracy, and precision required in test.
Yes _____ No X N/A _____
(It is customary to specify the precision required for field survey work.)

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- Indicate range of expected results and basis for those results.
Yes _____ No _____ N/A X
- List equipment requirements, briefly describing special equipment.
Yes _____ No X N/A _____
- Describe techniques to be used for data reduction and analysis.
Yes _____ No _____ N/A X
- Describe representativeness of test, indicating limitations and uncertainties that apply to use of results.
Yes _____ No _____ N/A X
- Provide illustrations of test locations.
Yes X No _____ N/A _____
- Discuss relationship of test to set performance goals and confidence levels.
Yes _____ No _____ N/A X

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 _____
- 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 _____

Study Plan 8.3.1.16.1.1 R0

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

Yes _____ No _____ N/A X

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 _____ No _____ N/A X

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

Yes X No _____ N/A _____

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

Yes X No _____ N/A _____

V. Schedules and Milestones

Provide durations of and interrelationships 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 are expressed in terms of fiscal years after inception of the study plan.