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LETTER TO: Dr. Roy E. Williams
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FROM: Jeffrey A. Pohle, Project Officer
Hydrology Section
Technical Review Branch
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REQUEST TO REVIEW THE CONSULTATION DRAFT OF THE SITE
CHARACTERIZATION PLAN, YUCCA MOUNTAIN SITE

DATE: 88/01/

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Dr. Roy E. Williams
Williams and Associates, Inc.
P.O. Box 48
Viola, Idaho 83872

SUBJECT: REQUEST TO REVIEW THE CONSULTATION DRAFT OF THE SITE
CHARACTERIZATION PLAN, YUCCA MOUNTAIN SITE

This letter authorizes Williams and Associates to review the groundwater and surface water portions of the Yucca Mountain Consultation Draft Site Characterization Plan within available funding. The review period began on January 11, 1988, and will continue through February 16, 1988. The Consultation Draft will be reviewed as described in the "Draft Technical Review Plan for NRC Staff Review of DOE's Site Characterization Plans," with focus provided by the Project Officer.

As we discussed with you in our telephone conference on 1/14/88, this is a "level of effort" review which means you must select only the most important concerns to review and discuss within the time and resources allocated for the review. To assist you in this "level of effort" review, the NRC staff is providing focusing guidance in this letter.

Copies of the Draft Technical Review Plan for NRC Staff Review of DOE's Site Characterization Plans" (TRP) with attached "Administrative Plan and Procedures for NRC Staff Review of DOE's Consultation Draft Site Characterization Plans" (APP) have been sent to you. Particular attention should be paid to the eight step review process described in TRP Section 4.1.2 (Review Approach) and the relevant Detailed Review Guides in TRP Section 4.3 (Sections 4.3.15 and 4.3.16). Step 8 of TRP Section 4.1.2 requires that the adequacy of the SCP's consideration of the NRC's DEA comments be addressed. However, these comments are contained in the Yucca Mountain Final Environmental Assessment comment. Therefore, only the Final Environmental Assessment comment need be assessed to meet this requirement. Comments on Chapters 1-7 of the consultation draft should be incorporated in Chapter 8 comments per guidance in paragraph 2 of TRP Section 4.1.2 (Review Approach, Page 8) and Section 4.2.1 (Review Guide For Site and Design Descriptions (Chapters 1-7), Page 11).

Comments on the consultation draft will be prepared as "point papers" following the format and example provided in the APP. In reviewing the consultation draft, you are to focus your attention on Sections 8.3.1.2, 8.3.5.12, 8.3.5.13, 8.3.5.15, 8.3.5.17 and within Section 8.3.12 to focus your review on the saturated zone and infiltration investigations. Furthermore, your review should focus more on testing investigations rather than modeling studies.

When conducting the review you should remember that the Site Characterization Plan contains descriptions of Investigations and not Study Plans.

To understand the distinction, a copy is provided of "Comparison Chart-NRC 4.17 to DOE Requirements" and Attachment B and C from the "Summary of the NRC/DOE meeting on the Level of Detail For Site Characterization Plans and Study Plans", May 7-8, 1986. As was discussed with you on 1/14/88, "point papers" are in general to be no more than one page in length with a maximum of 2 pages. Papers are to be submitted as they are completed. The last completed point papers should be delivered to the NRC by close of business on February 16, 1988. Should you have any questions, please contact William Ford at (301) 497-0506.

Because this is a "level of effort" review, your technical assistance resource expenditures are limited to no more than 600 man-hours. Internal distribution of resources remains the contractors responsibility. If more resources are required within the given schedule to complete the review in a manner consistent with the guidance provided, contact me immediately.

The action taken by this letter is considered to be within the scope of the current contract NRC-02-85-008. No changes to costs or delivery of contracted products are authorized. Please notify me immediately if you believe this letter would result in a change to costs or delivery of contracted products.

Sincerely,

Jeffrey A. Pohle, Project Officer
Hydrology Section
Technical Review Branch
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As stated

Comparison Chart - NRC 4.17 to DOE Content Requirements

NRC Table B-1 (Reg. Guide 4.17) ^a	DOE Content Requirements for Descriptions of Investigations in Chapter B.3 of the Site Characterization Plans	DOE Content Requirements for Descriptions of Studies in Study Plans
1. Title of Test or Experiment	III. Description of Studies • list tests	
2. Purpose of Test or Experiment • summarize why test or experiment proposed • what types of information will be obtained	I. Purpose and Objectives of Investigations • provide rationale and justification for information to be obtained • describe information that will be obtained	I. Purpose and objectives of studies • provide rationale and justification for information to be obtained II. Rationale for Selected Study • provide rationale and justification for selected tests and analyses I. Purpose and objectives of studies • describe information that will be obtained III. Description of Tests and Analyses • describe general approach to test
3. Objectives • discuss how results of test or experiment will relate to overall site characterization program • describe how results will be used to help resolve specific information needs or unresolved issues	III. Description of Studies • state objectives of study IV. Application of Results • refer to use of information in planning characterization activities II. Rationale for Selected Investigation • discuss strategy for resolving technical issues (discussion correlated with information needs)	III. Description of Tests and Analyses • indicate range of expected results and basis • discuss relationship of test to set performance goals and confidence levels IV. Application of Results • refer to use of information in planning characterization activities
4. Descriptive Summary • summarize methods, techniques, analyses used in test or experiment • state precision and accuracy of test or experiment. • describe in detail the procedures used. The procedures should describe the experimental design that ensures representativeness of data and demonstrates precision and accuracy.	III. Description of Studies • list tests, test methods, data/parameters to be collected, location and number of tests, technical procedures; reference study plans • list methods of analysis and resulting information • indicate if test is to support conceptual model development	III. Description of Tests and Analyses • summarize test methods • reference procedures; if not standard, summarize steps; indicate schedule for developing additional procedures • specify tolerance, accuracy, and precision required • describe techniques for data reduction and analysis • discuss representativeness of test, including uncertainties

Comparison Chart - NRC 4.17 to DOE Content Requirements (Continued)

NRC Table B-1 (Reg. Guide 4.17) ^a	DOE Content Requirements for Descriptions of Investigations in Chapter B.3 of the Site Characterization Plans	DOE Content Requirements for Descriptions of Studies in Study Plans
<p>4. Quality Assurance</p> <ul style="list-style-type: none"> • describe quality assurance program to be applied to data collection • discuss limitations and uncertainty in data 		<p>III. Description of Tests and Analyses</p> <ul style="list-style-type: none"> • reference applicable QA requirements applied to specific test <p>III. Description of Tests and Analyses</p> <ul style="list-style-type: none"> • indicate limitations and uncertainties that will apply to the use of results

<p>6. Principal Investigator</p> <ul style="list-style-type: none"> • give name and organization of principal investigator 		

<p>7. Contact</p> <ul style="list-style-type: none"> • provide name, address, telephone number of persons to contact concerning status of test or experiment 		

^a Table 2 of the DOE's Annotated Outline for SCPs is identical to Table B-1 of the NRC's Reg. Guide 4.17, except that DOE's Table 2 does not include items 6 and 7 from NRC's Table B-1.

DOE CONTENT REQUIREMENTS FOR DESCRIPTIONS OF STUDIES
IN STUDY PLANS

The test program presented in Chapter 8 of the SCP will be subdivided into a hierarchy of increasing detail. The SCP test program hierarchy will include (in increasing detail): generic program; specific program; investigation; study; tests and analyses; and test procedures. Details for studies and tests and analyses, listed in Chapter 8 of the SCP, will be presented in study plans. Study plans will be separate from the SCP proper and will be issued periodically throughout site characterization. Individual test procedures will be referenced in the study plans.

The following outline describes the information on studies, tests and analyses that will be presented in the study plans. A study may involve a single test or a set of tests and analyses, as appropriate. The tests include those measurements of physical parameters, or observations of physical phenomena, that are performed in the field or in the laboratory. Test activities include preparation of procedures, test set-up, conduct of the test, data acquisition, and data reduction. The analyses include those calculations or other evaluations needed to assess site characteristics and support design activities.

The items listed in the outline will be addressed for studies and tests and analyses to the extent that each item applies. Not all items will be applicable in all studies.

In some cases, tests and analyses may be planned for later stages in the study for which the detailed plans depend on the results of earlier tests and analyses. Under these circumstances, it will not be possible to provide the same level of detail for all tests and analyses at the time the study plan is first issued. In such cases, the initial study plans will present complete descriptions of the tests and analyses that occur early in the study and less detailed information for tests and analyses that occur later.

I. Purpose and Objectives of Studies:

- o Describe the information that will be obtained in this study. Briefly discuss how this information will be used; and
- o Provide the rationale and justification for the information to be obtained by the study. It can be justified by: 1.) a performance goal and a confidence level in that goal (developed via the performance allocation process and results that will be described elsewhere in the SCP); 2.) a design goal and a confidence level in that goal (design goals beyond those related to performance issues); 3.) a direct Federal, State, and other regulatory requirements for specific studies. Where relevant

performance or design goals actually apply at a higher level than the study (e.g. where the goals apply to a group of studies), describe the relationship between this study and that higher level goal.

II. Rationale for Selected Study:

- o Provide the rationale and justification for the selected tests and analyses (including standard tests). Indicate the alternative test and analytical methods from which they were selected, including options for type of test, instrumentation, data collection and recording, and alternative analytical approaches. Describe the advantages and limitations of the various options; and
- o Provide the rationale for the selected number, location, duration, and timing of tests with consideration to various sources of uncertainty (e.g. test method, interference with other tests, and estimated parameter variability). This rationale should also identify reasonable alternatives, summarize reasons for not selecting these alternatives and reference, if available, reports which evaluate alternatives considered (refer to NRC Observation 8).
- o Describe the constraints that exist for the study, and explain how these constraints affect selection of test methods and analytical approaches. Factors to be considered include:
 - Potential impacts on the site from testing;
 - Whether the study needs to simulate repository conditions;
 - Required accuracy and precision of parameters to be measured with test instrumentation;
 - Limits of analytical methods that will use the information from the tests;
 - Capability of analytical methods to support the study; and
 - Time required versus time available to complete the study.
 - The scale of the phenomena, especially the limitations of the equipment relative to the scale of the phenomena to be measured and the applicability of studies conducted in the laboratory to the scale of the phenomena in the field.
 - Interrelationships of tests involving significant interference with other tests and how plans have been designed or sequenced to address such interference.
 - Interrelationships involving significant interference

among tests and exploratory shaft facility design and construction (as appropriate, refer to Section 8.4 of the SCP or its references for specific exploratory shaft facility design information such as design drawings or specifications) (refer to NRC Observation 4).

III. Description of Tests and Analyses:

- o Since studies are comprised of tests and analyses, provide for each type of test:
 - Describe the general approach that will be used in the test. Describe key parameters that will be measured in the test and the experimental conditions under which the test will be conducted. Indicate the number of tests and their locations (e.g. spatial location relative to the site, exploratory shaft facility elements, repository layout, stratigraphic units, depth, and test location);
 - Summarize the test methods. Reference any standard procedures (e.g., ASTM, API) to be used. If any of the procedures to be used are not standard, or if a standard procedure will be modified, summarize the steps of the test, how it will be modified, and reference the technical procedures that will be followed during the test. If procedures are not yet available, indicate when they will be available. Indicate the level of quality assurance and provide a rationale for any tests which are not judged to be QA level 1. Reference the applicable specific QA requirements that will be applied to the test;
 - Specify the tolerance, accuracy, and precision required in the test, where appropriate;
 - Indicate the range of expected results of the test and the basis for those expected results;
 - List the equipment required for the test and describe briefly any such equipment that is special;
 - Describe techniques to be used for data reduction and analysis of the results;
 - Discuss the representativeness of the test including why the test results are considered representative of future conditions or the spatial variability of existing conditions. Also indicate limitations and uncertainties that will apply to the use of the results; and
 - Provide illustrations such as maps, cross sections, and facility design drawings to show the locations of tests and schematic layouts of tests.

- Relationship of the test to the set performance goals and confidence levels.

- o For each type of analysis:

- State the purpose of the analysis, indicating the testing or design activity being supported. Indicate what conditions or environments will be evaluated and any sensitivity or uncertainty analyses that will be performed. Discuss the relationship of the analysis to the set performance goals and confidence levels;
- Describe the methods of analysis, including any analytical expressions and numerical models that will be employed;
- Reference the technical procedures document that will be followed during the analysis. If procedures are not yet available, indicate when they will be available. Indicate the level of quality assurance that will be applied to the analysis and provide a rationale for any analyses which are not judged to be QA level 1. Reference the applicable QA requirements;
- Identify the data input requirements of the analysis;
- Describe the expected output and accuracy of the analysis; and
- Describe the representativeness of the analytical approach (e.g., with respect to spatial variability of existing conditions and future conditions) and indicate limitations and uncertainties that will apply to the results.

- IV. Application of Results:

- o Briefly discuss where the results from the study will be used for the support of other studies (performance assessment, design, and characterization studies);
- o For performance assessment uses, refer to specific performance assessment analyses (described in Section 8.3.5 of the SCP) which will use the information produced from the studies described above, and refer to any use of the results for model validation;
- o For design uses, refer to, or describe, where the information from the study described above will be used in construction equipment design and development and engineering system design and development (e.g., waste package, repository engineered barriers, and shafts and borehole seals); and
- o For characterization uses, refer to, or describe, where the

information from the study described above will be used in planning other characterization activities.

V. Schedule and Milestones:

- o Provide the durations of and interrelationships among the principal activities associated with conducting the study (e.g., preparation of test procedures, test set-ups, testing, data analyses, preparation of reports), and indicate the key milestones including decision points associated with the study activities;
- o Describe the timing of this study relative to other studies and other program activities that will affect, or will be affected by, the schedule for completion of the subject study; and
- o Dates for activities or milestones, including durations and interrelationships, for the study plans will be provided. These should reference the master schedules provided in Section 8.5. of the SCP.

DOE CONTENT REQUIREMENTS FOR DESCRIPTIONS OF INVESTIGATIONS
IN CHAPTER 8.3 OF THE SITE CHARACTERIZATION PLANS

The test program presented in Chapter 8.3 of the Site Characterization Plans (SCPs) will be subdivided into a hierarchy of increasing detail. The SCP test program hierarchy will include (in increasing detail): generic program; specific program; investigation; study; and test and analysis. Generic programs, specific programs, and investigations will be described in Chapter 8.3 of the SCP. Details for studies, tests, and analyses will be presented in study plans separate from the SCP (see Attachment B).

The following outline describes the content requirements for investigations that will be presented in Chapter 8.3 of the SCP. An investigation may involve a single study or a set of studies, as appropriate.

I. Purpose and Objectives of Investigations:

- o Describe the information that will be obtained in this investigation. Briefly discuss how this information will be used; and
- o Provide the rationale and justification for the information to be obtained by the investigation. It can be justified by: 1.) a performance goal and a confidence level in that goal (developed via the performance allocation process and results that will be described elsewhere in the SCP); 2.) a design goal and a confidence level in that goal (design goals beyond those related to performance issues); 3.) a direct Federal, State, and other regulatory requirements for specific studies. Where relevant performance or design goals actually apply at a higher level than the investigation (e.g. where the goals apply to a group of investigations), describe the relationship between this investigation and that higher level goal.

II. Rationale for Selected Investigation:

- o Provide the rationale and technical basis for why the investigation will be conducted. Identify relevant technical issues;
- o Describe the constraints that exist for the investigation, explain how these constraints affect selection of studies, include a summary of the interrelationships involving significant interference among studies and investigations

and how plans have been designed or sequenced to address such interferences, and include a summary of the interrelationships involving significant interferences among studies and exploratory shaft facility design and construction (refer to NRC Observation 4); and

- o Discuss the strategy, including how the planned studies, tests and analyses will be collectively used, for resolving the relevant technical issues.

III. Description of Studies:

- o Since investigations are comprised of one or more studies, for each study:
 - State the objectives of the study, incorporating the tests and analyses that make up the study;
 - Indicate if the study is to provide information for the development of conceptual models (e.g., the collection of water level data will provide input to the development of the conceptual and numerical ground-water flow models);
 - Indicate if the study is being performed to guide the development of subsequent characterization, performance assessment and/or design activities (e.g., simulations with ground-water flow models will be performed to determine where additional drilling will be required);
 - List the tests, the test methods to be used, the data/parameters that are to be collected and/or evaluated for each test, the locations, numbers, and duration of tests and the technical procedures that will be used for the test. Reference the study plans, as appropriate; and
 - For each analysis that the study will support, list the method of analysis and the information that will result from the analysis.

IV. Application of Results:

- o Briefly discuss where the results from the investigation will be used for the support of other investigations (performance assessment, design, and characterization investigations);
- o For performance assessment uses, refer to specific performance assessment studies (described in Section 8.3.5 of the SCP) which will use the information produced from the studies described above, and refer to any use of the results

for model validation;

- o For design uses, refer to, or describe, where the information from the studies described above will be used in construction equipment design and development and engineering system design and development (e.g., waste package, repository engineered barriers, and shafts and borehole seals); and
- o For characterization uses, refer to, or describe, where the information from the studies described above will be used in planning other characterization activities.

V. Schedule and Milestones:

- o List in tabular form, major milestones which will result from the studies that comprise the investigation. Proposed titles, expected delivery dates, and milestones are to be included;
- o Present the schedule for the studies supporting the investigation, providing beginning and end dates for tests and analyses, or groups thereof; and
- o Show the interrelationships and sequencing of the tests, analyses, or groups, with particular attention to those that will affect or be affected by the scheduled completion of other activities. Dependencies on data derived from other investigations also should be indicated on the schedule as well as the major milestones and decision points associated with the studies. A simple PERT chart should be used to illustrate these relationships.