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Mr. Hubert J. Miller, Chief
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Division of Waste Management
U.S. Nuclear Regulatory Commission
Mail Stop 623-SS
Washington, D.C. 20555

RE: Draft GTP on In Situ Testing

Dear Mr. Miller,

Followiag are comments of the Yakima Indian Nation on the "Draft Generic Technical Position on In Situ Testing During Site Characterization for High-Level Nuclear Waste Repositories." Thank you for the opportunity to offer our comments. We are generally satisfied with most of the guidance offered to DOE. Nonetheless, we have, with the help of our technical consultants, identified a few problems. Our comments are broken down into general and specific categories. We hope you find them useful.

General Comments

1) We agree that the in situ test plan should discuss how data from long duration tests will be used in the repository design. This is an important, often overlooked aspect of the design process. Since schedules drive the program, the design will be complete well in advance of long-term testing. We strongly support the guidance given in this paragraph (page 17, Section 4.5 - Duration of Testing).

2) We strongly support the NRC with respect to Section 4.10 - Presentation and Documentation of Test Data. Independent review is a critical issue to States and Tribes in the licensing process. To date, DOE has sought to inhibit or prevent the affected parties from doing any independent analyses with available data. Adherence by DOE to the guidance presented by NRC in this section would be very useful in correcting this situation.

3) The idea of "sufficiency criteria" is very important. Although the NRC seems to be guiding DOE towards the testing of coupled effects, there are no solid criteria on which the adequacy of characterization can be assessed. The idea of weights for various components has merit, but as expressed may result in little or no testing being done to verify assumptions made regarding

these individual components.

The NRC should initiate a rigorous study on the various causes of uncertainty and find out exactly what can be done to minimize uncertainty, especially in interscale transfer of information. Then, the idea of sufficiency would become more straightforward and some substantial criteria for minimization could be written.

4) The discussion of uncertainty on page 9, first paragraph and the graph of uncertainty shown on page 24 are misleading. The idea that, with sufficient testing at a given scale, some confidence eventually will be attained for certain parameters, has merit. However, given the time frames of both laboratory and in situ testing, it is extremely unlikely (if not impossible) that uncertainty in performance assessment would ever become asymptotic. This graph should be revised or removed. We suggest that the uncertainties involved in determining performance compliance with 10CFR60 would best be represented as an exponential curve.

Specific Comments

Page 5
Introduction

"Therefore a prediction of future repository performance will have to be made by certain analytical models."

Replace the word "analytical" with "analytical, experimental and numerical models."

Page 9, Section 3.0, Paragraph 2
Technical Position on In Situ Testing

"An in situ testing program should consist of the following two major components: 1) observation of host rock characteristics and measurement of its properties prior to construction and waste emplacement ..... 2) determination of response characteristics of the host rock and engineered components to construction and waste emplacement....."

A third objective should be added as follows:

3) In situ testing should be aimed at understanding trends and deviations in geologic data.

If trends and variability of data can be identified, then appropriate analog models can be used to predict behavior. If not, no prediction can be realistically made. A comprehensive discussion of predictive geology can be found in: "Predictive Geology with Emphasis on Nuclear Waste Disposal," edited by Ghislain de Marsily and Daniel F. Merriam. Series of "Computers and Geology," Volume 4, Pergamon Press, 1982, pp. 206.

Page 10, #1
Size Effects Can be Minimized

This would be more appropriately called "scale effects".

Page 11, 3.2.1

"Establishing the information needs for License Application based on performance requirements, and the acceptable level of uncertainties in repository performance prediction."

Mathematical uncertainty is a factor that increases dramatically (exponentially) over the various scales in which the laboratory and in situ test data must be extrapolated. How will an "acceptable level" of uncertainty be identified for performance prediction? This paragraph should be expanded to require a rigorous approach to mathematical uncertainty, especially with regard to interscale transfer of information.

Page 12, Section 3.2.8

"Hydrological, geomechanical and thermal-mechanical-hydrological testing should be run to the extent needed, to support the performance objectives on a scale sufficient to realistically represent the inhomogeneities and discontinuities of the host rock being tested."

Some tests may not be practical to conduct over the required representative scale. For example, consider the hydrologic tracer test, which needs to be conducted to determine the effective porosity, a critical and sensitive hydrologic parameter. This test, if conducted in a tight host rock, could take years to travel a few feet and therefore could not be tested within a lifetime to the preferred scale - on the order of kilometers for performance assessment. The NRC should recognize that this guidance may not be practical in all situations and offer contingencies on addressing the exceptions.

Page 13, 3.2.1. B(3)

"Determination of hydrologic parameters of the host rock, such as ....."

The in situ testing should also include studies of adjacent hydrologically significant units. For instance, if a major aquifer or set of aquifers overlies or underlies the host rock, the potential for flow to enter these units from the host rock is a critical element which must be assessed. In situ hydraulic parameters can be easily obtained for these units either thru the shaft or the underground facility. This requirement should be explicitly stated in the referenced paragraph.

Page 14, 3.2.1.F
Coupled/Interaction Tests:

"These are near field tests designed to simulate the thermal-hydrological-mechanical-geochemical interaction."

The effects of radiolysis on geochemical properties must not be overlooked. It should be added as a coupled parameter.

Page 17, 4.4
Scale of Testing

"One aspect of scale was expressed by NRC in the supplementary information to the procedural rule 10CFR60, that a facility consisting of two exploratory shafts and 1,000 feet of tunnels would be a practical arrangement....."

It is agreed the scale of testing must be site dependent to reflect the scale of nonhomogeneities encountered in the rock. However, the need for two shafts at all full scale test locations may not be warranted from the scientific point of view - safety aside. For example, in an unsaturated zone repository, two shafts may speed the drying of the in situ facility and cause hydrologic test information to be misleading. The current language implies NRC wants two shafts at all large scale test locations - this should be corrected.

Page 19, 4.9.a
Sufficiency Criteria

"Components of the natural system . . . for which performance credit is taken, are characterized adequately for evaluation of overall repository performance."

How will the decision be made that a given component is "adequately characterized"? What are the criteria? This language is much too vague and should be rewritten in specific terms.

Respectfully submitted,

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