



Department of Energy
Washington, DC 20585

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Mr. B.J. Youngblood
Deputy Director
Division of High-Level
Waste Management
Office of Nuclear Material Safety
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Youngblood:

We understand that NRC staff is in the process of re-evaluating the Technical Position on Ground Water Travel Time (GWTT-GTP), which was published for comment some time ago. Our Project Office developed comments on the draft, which might be of use to you in your current deliberations.

Enclosed find a copy of comments relevant to the GWTT-GTP. These comments are for your information and use in NRC's evaluation of the Technical Position. They may not represent the Department's eventual view on this topic, depending on the results of your current efforts.

Questions regarding this transmittal should be addressed to myself or Gordon Appel of my staff at (202) 586-1462.

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Enclosure: Comments on NRC Draft GTP on GWTT

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ENCLOSURE 1

DOE Comments on NRC GWTT-GTP

1. Further consideration should be given to the properties of unsaturated media and the utility of applying a conceptual model incorporating matrix diffusion in the GWTT analysis. The NRC note "...if GWTT is supposed to represent the travel time of inert tracer molecules from their points of release along the disturbed zone to the accessible environment, then the diffusive properties of the tracer are important. Processes that control the transport of tracer between the mobile and immobile water phases have been called matrix diffusion..." However, the NRC concludes that "...the consensus in the hydrogeologic community is that GWTT should be based on the average seepage velocity and should not consider matrix diffusion." The use of a conceptual model involving matrix diffusion although discouraged, is permitted. "...Groundwater travel time also could be interpreted to consider the exchange of flowing and immobile water by diffusion. The staff would entertain arguments for travel time based on inert, diffusing tracers if ample justification is provided..."

For one possible conceptual model the travel time of nondiffusive, inert tracer particles which move with the average seepage velocity is not representative of the flow conditions at Yucca Mountain. Additional information regarding the NRC criteria for "ample justification" as well as additional discussion of acceptable methods for calculating a cumulative distribution function in unsaturated media, would balance the approach to GWTT calculations and would be helpful to the U.S. Department of Energy in attempting to comply with NRC requirements.

The simplified approach which defines a conservatively short path along which the travel time of a single particle could be calculated should also be further discussed. Additional discussion of the requirements for suitable conservatism in the application of such an approach should be included in future drafts of the GTP.

2. Clarification of the term "path" and the use of the term "fastest path" is requested. The GTP states that "...the paths from the disturbed zone to the accessible environment are to be described in a macroscopic sense; e.g., aquifers..." For repositories in the unsaturated zone, it is unlikely that the single "path" in this macroscopic sense could be postulated. Clarification of the method of determining the "path" in this situation would be helpful.

3. Revision of the NRC position regarding calculation of the GWTT assuming future boundary conditions and present day environmental conditions is requested. There is an inconsistency between the regulation (10 CFR 60) and the interpretation of the GWTT aspect of the regulation. In the GTP, an interpretation is expressed that calls for present day environmental conditions, such as rainfall, to be used in the pre-waste emplacement ground-water travel time calculation. The GTP on the disturbed zone, which defines the starting point for the GWTT calculation, uses different conditions. The disturbed zone GTP interprets the regulation and concludes that future conditions, such as the maximum thermal effects resulting from the emplacement of waste, should form the basis for the calculation of the extent of the disturbed zone. Because the disturbed zone calculation is fundamental to the pre-waste emplacement GWTT calculation, the net result is a calculation based on present conditions with a boundary defined by future conditions. This appears to be an inconsistent interpretation of the regulation.

Our concern is that this GTP links pre-waste emplacement GWTT to a disturbed zone boundary determined by performance rather than pre-waste emplacement rock conditions. Although the disturbed zone is defined in terms of performance assessment, it is only used for one thing -- a starting point for calculating pre-waste emplacement GWTT. If 10 CFR 60.113(2) and this GTP are to be consistent the pre-waste emplacement GWTT should start from a boundary established by pre-waste emplacement conditions.

4. Mathematical errors were also noted in the document. Equation 1, page 4, appears to be in error; the term u/n should be inverted. Equation 2, page 5, has a decay coefficient in it. Either "non-decaying" should be change to "decaying" in line 1, paragraph 2, or the second line of equation 2 should be deleted.