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03 August 1984

Mr. Kien C. Chang
Mail Stop 623-SS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chang:

COMMENTS -- DSTP ON ENVIRONMENTAL PARAMETERS

As you requested, we have reviewed the 5/15/84 draft of NUREG-1076, "Draft Staff Technical Position on Repository Environmental Parameters Relevant to Assessing the Performance of High-Level Waste Packages."

Our comments are attached. In view of our recent discussion with you, we have concentrated on suggestions for the future work.

Please call me if you have any questions.

Very truly yours,

Kenneth W. Stephens

Kenneth W. Stephens
Manager Technology Assessments
Eastern Technical Division

KWS/gbf
Attachment

General Comments:

1. Any position on the environmental parameters affecting waste package performance must take into account the fact that repository environmental parameters provide the boundary conditions for the waste package performance assessment models. This DSTP draft includes most of these, however, one of the most important parameters, groundwater flow has not been adequately emphasized.

   Although the groundwater parameter is defined as groundwater characteristics and includes flow, not enough emphasis is placed on flow rate as a parameter separate from groundwater chemistry. Revisions should be made to add groundwater flow discussion throughout the document as a significant parameter, because it strongly affects the waste package performance (e.g., time to resaturate upon closure and transport of nuclides upon package failure).

2. Treatment of the second objective (providing guidance on the models/methodologies employed to determine the parameters) is sufficient from a generic standpoint in discussing attributes or specifications for models/methodologies, but it is not adequate in describing actual process models available for handling the parameters. The Appendix E discussion on available models relevant to environmental parameters should be expanded similar to the level of discussion given to WAPPA and should include groundwater flow models relevant to near-field resaturation upon closure and include transport models after package failure. For example, the repository walls and waste package zones will be essentially dry upon closure from the heat emission of the waste. The resaturation time must be determined. Models/methodologies specifically for this should be added to this draft. These models must by necessity include the coupled or feedback effects of combined environmental parameters (e.g., radiation field, temperature, water flow, and water chemistry).

3. Discussion on the subject of coupling or feedback of environmental parameters in general should be added in Section 2 in greater depth. Instead of a few examples, it is suggested that a list or diagram showing all of the on-going processes in the near field of the repository and waste package should be added. An indication of those parameters which are believed to be strongly coupled should be provided. It should be noted that there is coupling between the repository and the waste package as well as coupling among processes within the repository and within the waste packages.

4. The third objective, of providing a data base on the environmental parameters that input to the models is not covered to any appreciable depth. To make this document useful to others, a more complete property characterization and data base should be added (e.g., thermophysical properties, thermal and radiation source terms, transport properties, water flow and chemistry) to document the extent and uncertainty of the known environmental properties. This information would allow the range of parameters given in Appendix D to be substantiated.

5. Based upon the DOE review comments on the draft NRC technical position on waste package reliability (NUREG-0997R), this DSTP should be altered where quotes are made from NUREG-0997, so as not to be too restrictive in defining which probabilistic method or technique should be used.

Detailed Comments:

1. pg vii, 3a: Suggest dropping caveat in parentheses, as it is too subjective.

2. pg 1-2, 3rd paragraph: Add a reasonable earthquake specification. It is probable that some sort of earthquake will occur in 10,000 years. Don't just neglect this natural effect unless it can be shown to be unlikely.

3. pg 1-3, items 8 and 9: Something is wrong with Ref. Item 8 and Item 9.

4. pg 2-3, Last Line: Section 1.1.3.2 not found in draft.

5. pg 2-5, 2nd paragraph: Add reference(s).

6. pg 2-5, Under 2.2: Add section on groundwater flow following closure until resaturation occurs. Include discussion on the simultaneous interactions associated with phase change and radiolysis.

7. A.1, last 2 lines: Provide a reference for the "fill" time discussion.