

WILLIAMS & ASSOCIATES, INC.

P.O. Box 48, Viola, Idaho 83872

(208) 883-0153 (208) 875-0147

Hydrogeology • Mineral Resources Waste Management • Geological Engineering • Mine Hydrology

May 12, 1988

Contract No. NRC-02-85-008

Fin No. D-1020

Communication No. 183

Mr. Fred Ross
Division of Waste Management
Mail Stop 4-H-3
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Dear Fred:

We have reviewed your latest version of the Draft Technical Position On Groundwater Travel Time dated April 25, 1988. We have several comments regarding the direction and content of this paper. Editorial suggestions are included also. We hope these comments will assist you in completing this paper. Please call if you have any questions regarding our comments.

Page 1, Section 1.1 Background, 2nd sentence:
Text reads "GWTT analyses being based on." Change text to read 'GWTT analyses that are based on.'

Page 2, Section 1.2 Purpose and Scope, 2nd sentence:
The text states that "criteria" are provided to review GWTT. The criteria are not made clear in this position paper. Are the criteria on page 9? If so, then that should be explained.

Page 4, Section 2.1 Pre-Waste-Emplacement, paragraphs 1 and 2:
These two paragraphs are inconsistent with respect to the treatment of pumpage. On the one hand, on-site pumpage is not considered. On the other hand, off-site pumpage may be considered. We believe we understand this inconsistency but some additional explanation may be required to enable DOE and the public to understand it.

Page 4, paragraph 1, sentences 1 and 2:
The word "hydrologic" should be changed to 'hydrogeologic.' The word 'hydrogeologic' is more specific. In this case it conveys the intent of this paper much more accurately.

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Page 4, paragraph 2, sentence 1:

The word "hydrologic" should be changed to 'hydrogeologic' for the reason stated above.

Page 5, Section 2.2 Pathway Selection and Travel Time Calculation to Determine Fastest Path, paragraph 2, sentence 1:

The word "hydrologic" should be changed to the word 'hydrogeologic' for the reason stated above.

Page 5, middle of paragraph 2:

The paper should mention the significance of the scale of tests that should be attempted for characterizing the fastest flow path. The paper should acknowledge the differences in scale of tests that can be conducted under saturated and unsaturated conditions and among varying frameworks. The scale of tests that will be conducted at Yucca Mountain will vary greatly between the unsaturated and saturated zones and probably even within the saturated zone as well. This scale issue should be pointed out to the reader. This objective could be accomplished in part by inserting the words 'large scale' between the word "direct" and the word "testing" in line 6 of the 1st paragraph.

Page 5, paragraph 2, last sentence:

The phrase "least flow time" should be changed to read 'least groundwater travel time.' This change will provide a consistent use of terminology which should prove less confusing to the reader.

Page 7, Section 3.0 UNCERTAINTY, end of sentence continued from page 6:

Change the phrase "and accounted for" to 'explained.'

Page 7, Section 3.1 Sources of Uncertainty, item b:

Change the text from "errors in hydraulic parameters" to 'errors in values of hydraulic coefficients.' It is the values which will be in error not the 'coefficients.'

Page 8, Section 3.2 Treating Uncertainty, first sentence:

The first sentence of this paragraph is unclear. Apparently the first "performance" in line 4 should be changed to 'assurance.' We suggest also that the words 'collected at appropriate scales' be inserted into line 7 after the word "information."

Page 9, Section 4.0 STATEMENT OF REGULATORY POSITION:

Are these the criteria that are alluded to on page 2? If these are the criteria then the paper should state that fact. Otherwise the criteria mentioned on page 2 are never presented.

Page 9, Item e.

The first sentence of this item is confusing. We suggest changing this sentence to read: 'Develop and present to the NRC a detailed technical rationale that provides the basis for treating uncertainty. The rationale

should include the extent to which uncertainty in predicting paths of likely radionuclide travel and in predicting GWTT can be expressed.'

Page 9, all items.

The paper does not explain the importance of recognizing the limits to which uncertainty can be evaluated during the prediction of groundwater travel times. The suggested changes in the wording of item e may be adequate to accomplish this objective; however, additional information on this subject may be advisable.

Page 11, Table 1: Partial List of Sources of Uncertainty and the Information Affected by Those Sources of Uncertainty:

Hydraulic head is listed as Item 2 "INFORMATION AFFECTED" opposite "SOURCE OF UNCERTAINTY," Item A. It should be listed as a separate number (not under Hydraulic Coefficients). Hydraulic head is a variable, not a coefficient. Hydraulic head also should be included opposite "SOURCE OF UNCERTAINTY," Item B. Hydraulic head is affected by limitations imposed by data collection techniques such as stretch of the measuring cable or tape, transducer drift, crookedness of the well or borehole, or limitations on moisture measurements. Hydraulic head is affected by the evaluation methodology; for example, variable fluid densities may have to be considered when evaluating vertical gradients.

Although this is a partial list, we suggest the addition of scale of testing and the scale used to predict groundwater travel time as factors that provide significant sources of uncertainty. Uncertainty caused by fallacious scales of testing is not included in the table. This source of uncertainty could be entered in the left hand column between Items B and C if you think it advisable. We also appreciate the fact that you may not want to make the paper that specific. This version appears to us to be the best version we have helped create. Hopefully this one will fly.

Sincerely,

Roy E. Williams
Roy E. Williams

REW:s1

cc: D.L. Chery, Jr.