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November 18, 1986

009/Task 5/NWC.008
RS-NMS-85-009
Communication No. 116

U.S. Nuclear Regulatory Commission
Division of Waste Management
Geotechnical Branch
MS-623-SS
Washington, DC 20555

Attention: **Mr. Jeff Pohle, Project Officer**
Technical Assistance in Hydrogeology - Project B (RS-NMS-85-009)

Re: **NWC/W&A Progress on Topical Report on Treating Uncertainty**

Dear Mr. Pohle:

This cover letter transmits a copy of a letter from NWC to Mr. G. Winter (Williams and Associates) concerning our forthcoming meeting (discussed with you in a telephone conversation of November 12, 1986) to begin preparations of the Task 5 topical report on "Treating Uncertainty in GWTT".

NWC's letter to Williams and Associates is transmitted for your information only. No action or review is required; however, if you do have questions or comments, please feel free to provide them to me.

Respectfully submitted,
NUCLEAR WASTE CONSULTANTS, INC.

Mark J. Logsdon

Mark J. Logsdon, Project Manager

Att: Letter to Williams and Associates, re: "Treatment of Uncertainty"

WM-RES
WM Record File
D1021
NWCI

WM Project 10, 11, 16
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Distribution:
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November 18, 1986 009/Task5/W&AOut.02

Mr. Gerry Winter
Project Manager
Williams and Associates
PO Box 48
Viola, Idaho 83872

Dear Gerry:

In our telephone conversation of November 12, you requested that we provide some scoping text on the upcoming NWC/W&A meeting in Denver to begin work on the topical report on Treating Uncertainty. We agree that it would be well for us to set this out in advance, particularly since we are shooting for only a one-day meeting with you. On the other hand, this is a preliminary meeting, intended to begin the process of developing the paper, so differences in details of the scope or even in emphasis can presumably be dealt with as we go along, at least through the initial phases.

First, we understand the scope of the concerns to be limited to matters that relate to evaluating the pre-emplacement groundwater travel-time criterion of Part 60. Based on the meeting in Rockville last week, we understand that the NRC Staff wishes to constrain the interpretation of the performance objective to flow of an ideally non-reactive and non-diffusive/dispersive tracer along flow paths that would exist if the hypothetical tracer were released from a geologic repository under pre-emplacement hydraulic conditions, including pre-emplacement boundary conditions. While there was little discussion of the matter in Rockville, we understand that the Staff wishes essentially to hold to the definition of the "Disturbed Zone" that was presented in the NRC Staff's Draft Technical Position on Interpretatioon of the Disturbed Zone, that is, effectively to a zone extending 50 meters outward from the maximum extent of the underground facility. Based on this interpretation of the Disturbed Zone, we assume that our GWTT deliberations can ignore the whole question of the "disturbed zone" and treat the flow path as if it extended from the underground facilities to the accessible environment, as that term is defined in the 40 CFR 191 and the current draft revisions to Part 60.

Additionally, we understand that the topical reports are to address matters on a "Generic" basis, but that the generic basis must explicitly include, at a minimum, all of the concerns that may exist at the three sites currently under consideration for the first-round repository. Finally, we consider that the NRC Staff intends that the four topical reports fit together in a logical fashion. Thus, it is clear that our forthcoming deliberations on "Treating Uncertainty" must take due cognizance of the work that W&A is preparing on "Sources of Uncertainty".

As we tried to point out in our presentations of last week, we have a point of view on "Treating Uncertainty". (Though I don't mean to imply that you must have the same point of view.) Critical to this point of view are three matters:

- In order for this study to be of significant assistance to the NRC, we consider that it is necessary to develop simple, defensible methods of treating uncertainty - that is, of making supportable regulatory decisions in uncertain situations. The NRC needs a systematic (that is, logical and traceable) method of determining compliance or non-compliance with its performance objective for GWTT.

- The paper should focus on uncertainty in the regulatory decision, rather than uncertainty in the absolute value of the groundwater travel time as a scientific question. This focus allows the regulators to decide the extent to which uncertainty in the actual groundwater travel time needs to be minimized. For example, if the mean travel time were estimated to be 100,000 years and the standard deviation to be 50,000 years, then there would be a very high probability that the travel time is greater than 1,000 years, even though the actual travel time may be viewed as quite uncertain. In this case, there is little or no reason for the NRC to require detailed activities to reduce the uncertainty in the GWTT calculation.

- The paper should allow some way to establish the relative importance of different sources of uncertainty. We consider this to be important as a preliminary step in understanding the programmatic consequences of recommendations for efforts to reduce uncertainty in specific areas. For example, if it were determined that approximately 50% of the residual uncertainty in groundwater travel time were attributable to uncertainty in parameter i and only 2% of the residual uncertainty were attributable to parameter j, and if reduction in uncertainty is necessary to make a decision, then in a fixed-resource project, it seems wisest to concentrate the project's efforts on understanding parameter i. Similarly, if it were determined that residual uncertainty exists in parameter x, but there is no effective method to reduce that uncertainty, then it is not wise to direct the applicant to reduce that uncertainty.

In this framework, I would suggest that we should proceed as follows:

1. Review and classify the sources of uncertainty as to whether they contribute (a) to variability in the range of possible travel times or (b) to uncertainty in ability of regulators to determine compliance with the performance measure. In the initial evaluation, it is possible that some of the sources may contribute to both categories.

2. Develop a framework for evaluating the relative importance of each source or class to the uncertainty in decision-making. Methods to be considered might include some of the statistical and model-testing approaches described by Kirk and Stan in Rockville, as well as some of the "converging alternative approaches" and bounding calculations described by Dan Stephens and Dave McWhorter.

3. Develop a framework for prioritizing efforts to reduce uncertainty in specific sources or classes based on:

    - o Relative importance to decision-making
    - o Technical feasibility of reducing the residual uncertainty
    - o Costs and benefits of reducing the residual uncertainty. (I am thinking of costs and benefits in the sense of "opportunity costs" - to both DOE and NRC -, rather than in the sense of a strict economic evaluation, which would not be clearly NRC's concern.)

4. Integrate steps 1-3 into a systematic (that is logical and traceable) generic approach that could be applied by DOE to any site.

I appreciate that this is a rather formidable task, and I don't anticipate that it can be entirely accomplished in our first meeting, particularly step 4. However, these are the parameters and goals under which we suggest the group begins its efforts.

If you (or Kirk and Stan) have any questions about this letter, please do not hesitate to contact me. I will stay in touch with you concerning logistics this week. As I indicated on the phone, I have made room reservations for you at the Days Inn at the intersection of I-25 and Arapahoe Road in southeast Denver. I will meet you at the motel early on Monday mornoing to lead you to the office. We look forward to seeing you on the 24th - 25th.

Yours truly,

Mark J. Logsdon

Mark J. Logsdon, NWC Project Manager

cc: J. Pohle, NRC
M. Galloway, TTI
L. Davis, WWL
J. Minier, DBS