February 5, 2003

Joseph D. Ziegler, Acting Assistant Manager
Office of Licensing and Regulatory Compliance
U.S. Department of Energy
Office of Civilian Radioactive Waste Management
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P.O. Box 30307
North Las Vegas, NV 89036-0307

SUBJECT: TOTAL SYSTEM PERFORMANCE ASSESSMENT AND INTEGRATION AGREEMENT 3.37: THE INFORMATION PROVIDED WAS NOT RESPONSIVE TO THE AGREEMENT, SO THE AGREEMENT IS STILL CHARACTERIZED AS "NOT RECEIVED"

Dear Mr. Ziegler:

In your letter dated August 23, 2002, the U.S. Department of Energy (DOE) enclosed a report to address Total System Performance Assessment and Integration (TSPAI) Agreement 3.37. After review of this document, the U.S. Nuclear Regulatory Commission staff does not consider that the information in the referenced report addresses the question posed by the agreement. The DOE strategy may not apply to the approach intended for use in the total system performance assessment to support the License Application (TSPA-LA). Also, the arguments in the report are insufficient to indicate the sampling method in TSPA-LA adequately represents the uncertainty and variability and correlations for the biosphere process model. In addition, DOE should ensure that its approach is consistent with the overall approach to uncertainty and variability used for the compliance demonstration.

A detailed discussion of the requirements is provided in the attached Review. Staff concludes that the information provided by DOE was not responsive to the agreement and that DOE has provided insufficient information to address TSPAI Agreement 3.37 at this time. Therefore, TSPAI Agreement 3.37 is listed as "Not Received." If there are any questions regarding this letter please contact James Firth at 301-415-6628, or by e-mail at jrf2@nrc.gov.

Sincerely,

/RA/

Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: NRC review of DOE letter
pertaining to Total System Performance
Assessment and Integration Agreement 3.37

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NRC Review of DOE Documents Pertaining to
Key Technical Issue Agreements

The U.S. Nuclear Regulatory Commission (NRC) goal of issue resolution during the pre-licensing period is to assure that the U.S. Department of Energy (DOE) has assembled enough information on a given issue for NRC to accept a license application for review. Resolution by the NRC staff during pre-licensing does not prevent anyone from raising any issue for NRC consideration during the licensing proceedings. Also, and just as important, resolution by the NRC staff during pre-licensing does not prejudge what the NRC staff evaluation of that issue will be after it's licensing review. Issues are resolved by the NRC staff during pre-licensing when the staff has no further questions or comments about how DOE is addressing an issue. Pertinent new information could raise new questions or comments on a previously resolved issue.

This enclosure addresses one DOE and NRC agreement made during the Total System Performance Assessment and Integration (TSPAI) Technical Exchange and Management Meeting (see letter dated August 23, 2001, which summarized the meeting). By a letter dated August 29, 2002, DOE submitted information to address TSPAI Agreement 3.37. The information submitted for this agreement is discussed below.

Total System Performance Assessment and Integration Agreement 3.37

Wording of the Agreement:

DOE will provide a quantitative analysis that the sampling method including the correlations between [Biosphere Dose Conversion Factors] BDCFs utilized by the [Total System Performance Assessment] TSPA code to abstract the GENII-S process model data adequately represent the uncertainty and variability and correlations for the biosphere process model. This will be documented in Nominal Performance Biosphere Dose Conversion Factor Analysis (ANL-MGR-MD-000009), Disruptive Event Biosphere Dose Conversion Factor Analysis (ANL-MGR-MD-000003) or other document expected to be available to NRC in FY 2003. Results of these analyses will be documented in the TSPA for any potential license application expected to be available to NRC in FY 2003.

NRC Review:

During its review of the information pertaining to the Total System Performance Assessment for Site Recommendation (TSPA-SR), the NRC staff questioned the approach used to propagate uncertainty in BDCFs for the biosphere abstraction. In the TSPA-SR model, no justification was provided for the approach used, which correlated all radionuclide-specific BDCF values with the sample from the Neptunium-237 BDCF distribution. Biosphere factors that influence the magnitude of the BDCFs vary by radionuclide, and the justification of the site recommendation (SR) approach was not self-evident. Fundamentally, the SR approach failed to maintain vectors from the initial GENII-S BDCF modeling, which leads to inconsistencies in the sampled biosphere and receptor parameters. For example, the sampled Neptunium-237 BDCF is based on a specific irrigation rate, but the associated BDCF value for another radionuclide, using the SR correlation approach, would likely be based on a different irrigation rate.

Total System Performance Assessment and Integration Agreement 3.37 addresses information that the NRC staff believes is necessary for it to conduct a detailed review of a potential license application. By letter dated August 29, 2002, DOE provided NRC with a report entitled, "Adequacy of the BDCF Sampling Method and Correlation," and indicated that it believes that this response fulfills TSPAI Agreement 3.37. The report indicates that: (1) the analysis provided addresses the BDCF sampling method used in TSPA-SR, (2) that the approach used in TSPA-SR would need to incorporate changes to reflect the current regulatory requirements at 10 CFR Part 63, and (3) DOE has not decided upon the approach that they intend to use in their potential license application, but the TSPA-SR approach is under consideration for such use. Consequently, the analysis provided may not be relevant to the approach used in the potential license application.

Two other agreements address similar issues with DOE's approach to uncertainty and variability. In TSPAI Agreement 3.38, DOE has agreed to develop guidance for model abstraction to provide an integrated and systematic representation of uncertainty across the TSPA model. In TSPAI Agreement 3.39, DOE has agreed to document the simplifications used for abstractions, including how process model uncertainties are propagated. On May 9, 2002, DOE provided information that addresses these agreements. On October 11, 2002, the NRC staff provided the results of its review and documented the information that was still needed to satisfy these agreements including, for example, the information identified in TSPAI Agreement 3.39.

The DOE report fails to meet the intent of TSPAI Agreement 3.37.

First, the agreement pertains to the approach that DOE would use in the potential license application. DOE acknowledges that they have not decided on the approach that they intend to use in their potential license application. The report only attempts to provide justification for the approach used in TSPA-SR and may not apply to the approach intended for use in the TSPA to support the potential license application (TSPA-LA).

Second, the agreement called for a quantitative analysis of the approach; however, the report mainly describes reasoned arguments and theoretical statistical analyses. The reasoned arguments and theoretical statistical analyses provided are not sufficient to indicate that the sampling method in TSPA-LA adequately represents the uncertainty and variability and correlations for the biosphere process model. For example, DOE did not provide ancillary analyses that show a sufficiently large number of samples is being used, such that the theoretical arguments would apply.

DOE should consider the following as they develop their justification for their approach to uncertainty and variability for the biosphere:

1. Any selected approach by DOE should be consistent with the overall approach to uncertainty and variability used for the compliance demonstration (i.e., their "Guidelines for Developing and Documenting Alternative Conceptual Models, Model Abstractions, and Parameter Uncertainty in the Total System Performance Assessment for the License Application").

2. A quantitative analysis should be used to support the justification of the selected approach. Possible quantitative analyses could include (1) comparing the expected doses calculated from the biosphere dose conversion factors from the original stochastic modeling with the expected doses from the selected approach, or (2) ancillary analyses showing stability in the mean dose to

support the claim that the DOE is using a sufficiently large number of samples. If theoretical arguments are used, sufficient information should be provided to show the theoretical basis holds for the approach to be used in the TSPA-LA.

3. DOE asserts that the TSPA-SR approach is conservative, because the approach results in an increased variance of the calculated dose distribution. Because compliance with the postclosure public health and environmental standards is based on the mean of the distribution of projected doses (see 10 CFR 63.303), the claim that the approach is conservative as a consequence of this increased variance does not appear to be sufficiently justified. For example, the response demonstrates that the sampling approach does not affect the mean of the dose distribution if enough samples are taken, so the approach would not be conservative with respect to the mean.

4. A typographical error was found in Section 3.2.1 (page 8, 4th line of Equation 8). It currently reads as " $= \pm(C_x s_x + C_y s_y)^2$."

With all else being correct, this should read: $= (C_x s_x \pm C_y s_y)^2$ or $= (\pm C_x s_x + C_y s_y)^2$,

to give the desired equivalency to: $= C_x^2 s_x^2 \pm 2C_x C_y s_x s_y + C_y^2 s_y^2$.

The conclusion still holds that: $s_D^2(r = 1) \geq s_D^2(r = 0)$.

Information Needed: The information requested in TSPAI Agreement 3.37 needs to be addressed.

Status of Agreement: TSPAI Agreement 3.37 is "Not Received."