



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 18, 1997

Dr. Robert G. Baca
Performance Assessment Element Manager
Center for Nuclear Waste Regulatory Analyses
6220 Culebra Road
San Antonio, Texas 78228-0510

SUBJECT: REVIEW OF INTERMEDIATE MILESTONE 5708-761-710 ENTITLED "DETAILED
REVIEW OF SELECTED ASPECTS OF TOTAL SYSTEM PERFORMANCE ASSESSMENT -
1995"

Dear Dr. Baca:

The Center for Nuclear Waste Regulatory Analyses (CNWRA) transmitted the subject Intermediate Milestone on February 27, 1997. Per a decision by the High-Level Waste Management Board on January 31, 1997, the scope of this detailed review was reduced to minimize resource diversion from the TPA version 3.0 code development work. We have reviewed and find the subject CNWRA letter report programmatically acceptable based on the reduced scope. We acknowledge, as clarified by you in a March 13, 1997, telephone conversation, that the work conducted on the Dilution Topic has been documented in the FY96 Annual Report and is not repeated in this letter report. In addition, due to FY97 resource reduction, sensitivity analyses (SA) were carried out for *EBS FAIL*, but not *EBS_RELEASE* by CNWRA. Results of the *EBS_FAIL* SA are documented in this report.

During our review of this deliverable, we have identified the following technical issues:

- The section on Container Life and Source Term does not indicate the infiltration rate used to determine the temperature and relative humidity profiles. The analyses on which these profiles are based used an infiltration rate of 0.3 mm/year. The temperature and relative humidity profiles for higher infiltration rates could be significantly different. The conclusions in the report are, therefore, limited to the low infiltration rate used. The failure times and the time of wetting for higher infiltration rates should be examined.
- The letter report provides geochemical evidence that fracture water and matrix water are distinct (i.e., there is very little communication between water in fractures and water in the matrix). The chloride calculations used as input into EBSPAC were based on MULTIFLO calculations (i.e., matrix water). However, the water from fractures is considered more likely to contact the waste packages. This limitation is not addressed, even though the differences in the chemistry are highlighted.

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- The paper equates changes in relative humidity to changes in critical relative humidity, which is not correct. The primary value of the critical relative humidity is the humidity below which no corrosion of the metal takes place. After corrosion has commenced, it is possible for increases in the corrosion rate to occur at threshold values (secondary and tertiary critical humidity). The letter report equates the relative humidity at which condensation takes place (using capillary radii of 1.5 nm) to the critical relative humidity and uses the relative humidity above a saturated salt solution (NaCl) as a multiplication factor on the critical relative humidity. There does not appear to be sufficient justification for using either of these factors to conclude that critical relative humidities as low as 36 percent are possible. It is expected that CNWRA will adequately justify the approach used to modify the critical relative humidity from experimentally derived values in future products.

Furthermore, CNWRA data used to generate the input for the EBSPAC calculations should be referenced, i.e., made available to DOE. Note also that, on page 2-11, CNWRA attributes temperature and relative humidity predictions to NRC. The reference for these predictions is a CNWRA letter report and the numbers have not been endorsed by NRC staff.

The importance of some of the above technical issues may be evaluated in the upcoming SA using TPA version 3.0 code. Other issues, e.g., the effects of higher infiltration rates, may require more substantial changes to the TPA code or codes used in the supporting analyses before their importance can be properly examined. Therefore, any potential limitations in current codes should be discussed with us early so that they can be addressed in a timely fashion. We need to continue our dialogue in the code development and SA work to ensure that we have an appropriate tool for conducting our own performance assessment and reviewing any DOE work.

If you have any questions, please contact Jim Firth at (301) 415-6628 or Christiana Lui at (301)415-6200.

Sincerely,
 [Original signed by:]
 Keith I. McConnell, Element Manager
 Total System Performance Assessment and
 Integration KTI
 Division of Waste Management
 Office of Nuclear Materials Safety
 and Safeguards

cc: B. Meehan, CAB1/ADM
 J. Linehan, PMDA

CNWRA TICKET#: 970020

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