REQUEST FOR ADDITIONAL INFORMATION
Volume 2 – Preclosure
Chapter 2.1.1.4, Set 8 – Identification of Event Sequences
(RAI #1–8)

The following questions pertain to DOE's evaluation of internal event sequence described in SAR Sections 1.7.3. This information is needed to assess whether or not DOE has demonstrated compliance with 10 CFR 63.21 (c)(5), 10 CFR 63.112(b), §63.111(a) and (b). In addition to the SAR, these questions also refer to other references on the docket.

RAI #1

Clarify whether the "throughput" numbers listed in SAR Tables 1.2.1-1 and 1.7-5 represent the maximum numbers for each waste form configuration during the preclosure period.

DOE has used "throughput" numbers for waste form configurations presented in SAR Tables 1.2.1-1 and 1.7-5 for the preclosure safety analyses. In BSC 2007bh, Section 4.3, DOE appears to imply that "throughput" numbers are expected values that will not be exceeded. Therefore, it is not clear whether or not these numbers represent the maximum capacity and rate of receipt for the operations at the geologic repository operations area, as required by 10 CFR 63.21(c)(5).

RAI #2

Provide technical basis for not including 1165 of the Transportation Aging and Disposal (TAD) canisters, as a part of the total throughput in the event sequence, CRCF-ESD09-TAD, for assessment of structural challenges to TADs (Table A.4.9-1, BSC 2008ac). These TAD canisters are transferred from Site Transfer Casks to Aging Overpacks in the Wet Handling Facility (Section 6.1.2.23, BSC 2008bq), using the Canister Transfer Machine.

RAI #3

Provide technical basis for not including additional lifts of the Transportation Aging and Disposal (TAD) canisters during staging operations in the "throughput" estimate for the TAD canisters.

SAR section 1.2.4.1.2.2 and Figure 1.25.10 of the SAR indicate areas staging TAD canisters. It is not clear to staff how many TADs are likely to be staged, and how the additional lifts for moving TAD to and from the staging rack, are accounted for in the event sequence analysis.

RAI #4

Provide technical basis for evaluating event sequences separately on the basis of 1) individual waste forms, and 2) operational steps (SAR Section 1.7.4). For example, the event sequences, related to direct exposure resulting from failure to close the port gate during canister transfer operations in the CRCF (CRCF-ESD-18), appear to be predominately initiated by operator error, regardless of the waste form. Explain why the frequencies are not added.

In Section SAR Section 1.7.4, DOE provides the rationale for segregating event sequences by waste form. In response to a staff request for additional information for RAI 2.2.1.1.3-3-014, DOE explained that event sequences are categorized one at a time, based on a waste form type, because of differences between specific event sequences. DOE attributes these differences to facility configuration, operations, waste forms robustness, throughputs, and potential dose consequences. However, DOE does not explain why these differences are relevant for purposes of categorization. Many of these different event sequences share important common operations that are independent of the waste forms. However, NRC staff did not find any discussions of the significance of similarity between different event sequences and how that may affect compliance with the performance objectives specified at 10 CFR 63.111.

RAI #5

Provide technical basis for assuming zero probability of failure for degradation or loss of shielding of Waste Package Transfer Trolley (WPTT) (Tables 6.3-6, BSC 2008ac) under structural challenges (e.g., collision of WPTT with facility structures).

The End State Cut Sets Detailed Report for CRCF event sequence ESD10-WP-TAD-SEQ2-DE in the SAPHIRE model (Attachment H, BSC2008ac)) shows that number of WPTT collision during the preclosure period is about 24 obtained from WP-TAD=8.1×10^{3} and 060-OPWCOLLIDE1-HF-NOD=3×10^{-3}. DOE relied on the statement “structural challenge sufficiently mild” from the impact (Table 6.3-6, BSC2008ac) for assigning zero probability of failure for the pivotal event ESD10-WP-TAD-COLLIDE-SH to prevent the event sequence.

RAI #6

Clarify how event sequence probability is determined for each initiating event identified under a “small bubble” (e.g., Figure F-3, BSC 2008ab).

DOE has grouped several initiating events under a “small bubble.” For example, event sequence diagram CRC-ESD-03 (Figure F-3, BSC 2008ab) shows that “TC [transportation cask] drop from operational height” during upending and transfer of transportation cask to the Cask Transfer Trolley operations (represented by the small bubble) can potentially occur due to

six independent initiating events. However, it is not clear how DOE has determined the event sequence probability for each independent initiating event.

RAI #7

Explain the significance of DOE's event sequences involving multi-canister overpacks (MCOs).

In SAR Chapter 1, Section 1.7.1 (page 1.7-7), DOE states that the analyses needed to demonstrate the safety compliance of DOE MCOs "will be completed, documented, and included in an update to the license application." DOE, however, includes MCOs in Table 1.7-5 and Figure 1.7-2 of the SAR and analyzed the event sequences involving handling of DOE MCOs in the docketed reference BSC (2008ac) without this information. Staff also notes that event sequences involving MCOs (e.g., event sequence ESD10-WP-H&M-SEQ03-RRF, in Table 6.8-3, BSC, 2008ac) do not appear in Table 1.7-11 of the SAR. It is not clear why these event sequences were not included.

RAI #8

Provide an analysis of potential event sequences related to failure of cut or fill slopes near the aging pads or on transportation routes to and from the aging pads, or explain how these event sequences will be prevented or mitigated.

SAR Figure 1.1-129 and information on the terraced layout of the aging pads in DOE's response to a previous RAI (RAI: 2.2.1.1.7-3-001) on this subject suggests that excavation and fill for aging pad foundations could expose the alluvium in cut and fill slopes of up to approximately 9 to10 m [29 to 32 ft] high. Failure of the cut slope could result in the failed material depositing on the Aging Facility located in the vicinity of the toe of the slope. This material could block the vents of the Aging casks and potentially impact the Aging cask complying with the thermal limit requirement for the fuel being aged at the facility. Failure of a fill slope, where the Aging facility is located on top of the slope, has the potential for the Aging Casks to be in the failure zone and be unstable. Also, transportation routes that link the aging pads to other surface-facility structures (SAR figure 1.2.7-2) could involve cut or fill slopes. DOE has not provided an assessment of the stability of the slopes for static and applicable seismic loading conditions and did not identify potential event sequences resulting from failure of the slopes. This information is needed to determine compliance with 10 CFR 63.21(c)(5) and 63.112(b).

References:

BSC. 2007bh. "Waste Form Throughputs for Preclosure Safety Analysis." 000–PSA–MGR0–01800–00A. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008ab. “Canister Receipt and Closure Facility Event Sequence Development Analysis.” 060–PSA–CR00–00100–000. Rev. 00A. CACN 001. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008bq. “Wet Handling Facility Reliability and Event Sequence Categorization Analysis.” 050–PSA–WH00–00200–000. Rev. 00A. CACN 001. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008ac. “Canister Receipt and Closure Facility Reliability and Event Sequence Categorization Analysis.” 060–PSA–CR00–00200–000. Rev. 00A CACN 001. Las Vegas, Nevada: Bechtel SAIC Company, LLC.