REQUEST FOR ADDITIONAL INFORMATION
Volume 2 – Preclosure
Chapter 2.1.1.5, Set 1 – Consequence Analyses
(RAI #1 - #8)

The following questions pertain to DOE's consequence analyses described in SAR Section 1.8 and other supporting documents and references. The NRC review of this part of the license application evaluates the applicant's dose methodology, source term, public dose, worker dose, and dose compliance demonstrations. This information is needed to verify compliance with 10 CFR 63.111(a) (1), 63.111(a) (2), 10 CFR 63.111(b) (1), 63.111(b) (2), 10 CFR 63.111(c) (1), and 63.111(c) (2).

RAI #1

Explain the discrepancies between worker organ dose results and total effective dose equivalent (TEDE), shown in SAR Tables 1.8-25 and 1.8-36.

In SAR Tables 1.8-25 and 1.8-36, DOE has listed worker TEDE of 1.3 rem and the maximum dose equivalent to an individual organ as <0.01 rem/yr. Effective dose equivalent is defined as a weighted sum of organ dose equivalents and organ weighting factors. Organ weighting factors are defined to sum to unity. Based on these definitions, it is not clear why worker dose for an individual organ (or tissue) is less than the TEDE.

RAI #2

Provide documentation of (a) dose calculations to support radiation worker dose results presented in SAR Section 1.8.4.2 and Table 1.8-25; (b) organ dose results (maximally exposed organ/tissue, lens of the eye, and shallow dose to the skin) for radiation workers presented in SAR Table 1.8-36. For example BSC (2008b) presents calculations of total effective dose equivalent for radiation workers in the Receipt Facility, but doses to individual organs are not calculated. Also, explain how different external radiation source terms used in the DOE worker dose assessments at other facilities affect the organ doses estimates, and identify the facility with the largest dose equivalent to an individual organ/tissue, lens of the eye, and shallow dose to the skin for radiation workers.

RAI #3

Assess worker exposure to airborne radioactive material inside the Wet Handling Facility during normal operations. SAR Section 1.8.2.2.1 indicates that airborne releases of radionuclides are expected during normal operations in the Wet Handling Facility. Information is needed on

- Room locations for releases of radioactive material into the air from individual fuel assemblies during normal operations
- Indoor radionuclide concentrations in air during normal operations

- Worker access to these rooms during normal operations
- Indoor worker exposure to airborne radionuclides

RAI #4

Provide information on potential worker dose resulting from handling of individual spent nuclear fuel assemblies with damaged cladding in the WHF pool, during normal operations. Alternatively, provide a rationale why this type of exposure (e.g., indoor exposure of workers to airborne radioactive material) does not need to be considered in the DOE consequence analysis (SAR Section 1.8).

RAI #5

In BSC (2008bo, Figure F-30), DOE has considered a potential of lifting a fuel assembly too high during pool transfer operations leading to direct exposure of individual radiation workers and thus indicating that workers will be present in the pool room during transfer operations. For this event sequence, provide the following Information:

- Radionuclide releases into the pool from fuel assemblies during normal operations
- Airborne source term above the pool for these underwater releases
- Indoor radionuclide concentrations in air above the pool during normal operations
- Worker access to the pool room during normal operations
- Indoor worker exposure to airborne radionuclides in the pool room

RAI #6

Demonstrate that throughput assumptions in the DOE consequence analysis are in compliance with 10 CFR 63.21(c)(5).

In BSC (2008al, Table 3), DOE presents annual maximum and nominal worker doses for different throughput and source term assumptions. In BSC (2008al, Table 3 footnote b on Assumption 3.1.1), DOE indicates that nominal worker doses, derived from nominal facility throughput values, are used for comparison with regulatory limits. It is not clear how the nominal worker doses comply with 10 CFR 63.21(c)(5), which require an analysis assuming that operations at the GROA are carried out at the maximum capacity and rate of receipt.

RAI #7

Describe the effect of the assumption of a single canister in a transportation cask on dose estimates for radiation workers. In radiation shielding calculations, the applicant assumed that each transportation cask received in the Receipt Facility and Canister Receipt and Closure Facility will contain one canister of any type (BSC 2007, Section 3.1.7). SAR Table 1.7-5 indicates that transportation casks will contain more than one canister. For example, 5 to 9 DOE standardized canisters or 5 canisters of DOE high-level waste could be received in a single transportation cask at the CRCF.

RAI #8

Provide technical basis for the conversion factors used for radiation worker doses due to different throughput assumptions and direct radiation source terms. BSC (2008al, Table 3) presents annual maximum and nominal worker doses at individual facilities from normal operations. For example, in SAR Table 1.8-25, DOE reports an operator dose of 1.3 rem in the Receipt Facility as the maximum individual annual worker dose from operations in any surface or subsurface facility. However, in BSC 2008b, Section 7, DOE reports 4.5 rem as the estimated annual dose to an individual operator in the Receipt Facility.

References

BSC. 2007. "Shielding Calculation for Canister Receipt and Closure Facility 1 and Receipt Facility." 100–00C–WHS0–00600–000–00A. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008a. "Aging Facility and Site Worker Dose Assessment." 000–00C–MGR0–04200–000–00B. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008b. "Receipt Facility Worker Dose Assessment." 200–00C–RF–00100–000–00B. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008al. "GROA Worker Dose Calculation." 000–PSA–MGR0–01400–000–00C. Las Vegas, Nevada: Bechtel SAIC Company, LLC.

BSC. 2008bo. "Wet Handling Facility Event Sequence Development Analysis." 050–PSA–WH00–00100–000. Rev. 00A. CACN 001, CACN 002. Las Vegas, Nevada: Bechtel SAIC Company, LLC.