<u>Containment RAI</u> Demonstrate that the Normal Conditions of Transport (NCT) and Hypothetical Accident Conditions (HAC) package pressures consider the effects of all the gases within the package air gap.

SAR section 3.5.2 presented a revised calculation for determining pressure at NCT and HAC, in which the package pressure was dependent on gases within the LDCC, which is a solid structure with internal pores. However, the calculation did not explicitly address the air within the 3-inch gap between the top of the LDCC and the bottom of the package lid.

Typically, the pressure within a container considers the ideal gas law and its input parameters and their effects, including volume of the air gap, gases within the air gap (e.g., moles), and gas temperature of the air gap. For the CR3MP package, both the gas temperature and quantity of gases would increase once the package is closed for transport.

For example, the gas temperature would increase from approximately ambient temperature (e.g., 5°C) at closure to the eventual steady-state NCT value, and the quantity of gases within the air gap would increase after closure due to the presence of radiolysis gases. In addition, water vapor pressure from concrete-associated water would impact pressure (e.g., total pressure is the summation of each gas component's partial pressure). The package pressure would increase during the fire hypothetical accident condition due to, for example, the increase in water vapor pressure and the gas temperature within the air gap and LDCC.

This information is needed to determine compliance with Title 10 of the Code of Federal Regulations, Section 71.43 and 71.51.

Containment RAI Response:

The CR3MP Pressure Calculation in SAR Appendix Section 3.5.2, *Evaluation of Pressure in the CR3MP*, has been updated to consider the partial pressures due to the combined effects of air, radiolysis gases and water vapor. Revised calculations have been included in SAR Appendix Section 3.5.2, *Evaluation of Pressure in the CR3MP*, to address each of these partial pressures and their impact on the resultant total CR3MP pressure during both NCT and HAC. In addition, the calculation considers the volume of air within the 3-inch gap between the top of the LDCC and the bottom of the top cover.

Both the NCT *Maximum Normal Operating Pressure*, (MNOP) and the HAC maximum pressure are computed and are shown to increase. Since the MNOP is above 5 psi, SAR Section 1.1, *Introduction and Background* and SAR Section 8.1.3.2, *Containment Boundary Pressure Testing*, have been modified to confirm the CR3MP containment boundary integrity during NCT. In addition, SAR Sections 2.7.4.1, *Summary of Pressures and Temperatures*, and 2.7.4.3, *Stress Calculations*, is revised to reflect the higher pressure on the containment boundary during the HAC fire event. Other SAR Sections affected because of response to this RAI are identified below.

[Changes to SAR]

SAR Appendix Section 3.5.2, *Evaluation of Pressure in the CR3MP* has been revised in response to this RAI. Other sections of the SAR affected because of changes due to this RAI response are as follows:

- SAR Section 1.1, *Introduction and Background*,
- SAR Section 8.1.3.2, *Containment Boundary Pressure Testing,*
- SAR Section 2.7.4.1, *Summary of Pressures and Temperatures*,
- SAR Section 2.7.4.3, *Stress Calculations*,
- SAR Section 2.6.1.1, *Summary of Pressures and Temperatures*,
- SAR Section 2.6.1.3.1, *Stresses Due to Pressure Loading*,
- SAR Section 2.6.3, *Reduced External Pressure*,
- SAR Section 2.7.1, *Free Drop*,
- SAR Section 2.7.8, *Summary of Damage*,
- SAR Section 3.1.4, *Summary Tables of Maximum Pressures*,
- SAR Section 3.3.2, *Maximum Normal Operating Pressure*,
- SAR Section 3.4.3, *Maximum Temperatures and Pressure*,
- SAR Appendix Section 3.5.1, *References*