

Confinement Review RAIs

- 9-1 Provide a discussion in chapter 7 of the SAR of how radionuclide releases from the CASTOR® geo69 DSS will impact the doses calculated at the owner controlled area boundary, and how any release might affect the ability of the CASTOR® geo69 DSS to meet the dose limits prescribed in 10 CFR Part 72.104 and 106.

In sections 1.2.1.7 and 2.0.2.4 of the CASTOR® geo69 DSS SAR, the geo69 confinement boundaries (i.e., the “cask” and “canister,” which are referred to as a “double containment system”) the application indicates that the confinement boundaries remain “leak tight” for the duration of storage of spent fuel contents. The NRC staff interprets this to mean that there is no credible leakage from either the cask or the canister; however, chapter 7 of the SAR does not specifically discuss how leakage from the CASTOR® geo69 DSS confinement boundary might impact the doses calculated for the owner controlled area boundary, nor does it discuss how the design of the confinement boundary contributes to meeting the requirements found in 10 CFR 72.104 or 106.

This information is needed to determine compliance with 10 CFR 72.236(d).

- 9-2 Clarify the maximum absolute pressure values for off-normal and accident conditions and provide the correct references for the “filling gas” temperatures cited in SAR sections 7.2.2, 7.3.2, and 7.4.3.

The pressures and fill gas temperatures cited for the off-normal and accident-fire conditions appear to be the same [*withheld per 10 CFR 2.390*], in SAR sections 7.3.2 and 7.4.3, respectively. It is not clear if this is correct. Further, the citations for the “filling gas” temperatures stated in SAR sections 7.2.2, 7.3.2, and 7.4.3 include the following thermal review section citations: sections 4.4, 4.5, and 4.6, respectively. It is not clear where the temperature values cited in the sections of chapter 7 above, appear in the sections of chapter 4 cited from the SAR.

This information is needed to determine compliance with 10 CFR 72.236(l).

- 9-3 Revise the appropriate sections of the CASTOR® geo69 DSS SAR to properly address the terms “leak-tight” and “leak tight” and the use of the phrases “leak-tightness” and “leak tightness” considering the definition for “leaktight” provided in ANSI N14.5-2014, which is included in the list of references for chapters 7 - 10 of the SAR. The response provided to RAI 9-1, above, should be considered in the development of the response to this RAI, as they are related.

Chapter 7 of the SAR references ANSI N14.5 – 2014, *American National Standard for Radioactive Materials – Leakage Tests on Packages for Shipment*, as the standard for leakage testing for the CASTOR® geo69 DSS inner and outer confinement boundaries (i.e., the “cask” and the “canister”). The ANSI N14.5 - 2014 standard defines the term “leaktight” as:

The degree of package containment that, in a practical sense, precludes any significant release of radioactive materials. This degree of containment is achieved by demonstration of a leakage rate less than or equal to 1×10^{-7} ref · cm³/s, of air at an upstream pressure of 1 atmosphere (atm) absolute (abs), and a downstream pressure of 0.01 atm abs or less.

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The ANSI N14.5 - 2014 standard provides the only definition of the term “leaktight”, as it relates to radioactive material package leakage testing, that is recognized by the NRC. Therefore, any use of the term (or similar terms such as “leak-tight”, “leak tight”, or “leak tightness”) must be in reference to the definition provided in the ANSI N14.5 - 2014 standard.

Sections 1.2.1.7 and 2.0.2.4 of the CASTOR® geo69 DSS SAR describe that both the geo69 confinement boundaries (i.e., the “cask” and “canister,” which are referred to as a “double containment system” in the SAR) remain “leak tight” for the duration of storage of spent fuel contents. The staff understands this to mean that there is no credible leakage from either the cask or the canister; however, the terms “leak-tight” and “leak tight” should only refer, by definition, to the specific DSS components that have been demonstrated to be “leaktight” by leak testing performed in accordance with ANSI N14.5 and meeting the “leaktight” criteria found in ANSI N14.5 - 2014.

This information is needed to determine compliance with 10 CFR 72.236(e), (j) and (l).

- 9-4 Provide additional justification for the request for the approval of a significant departure from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) code Section III, Division 3, WC-6120 and subsequent leak testing according to WC-6224, as indicated in table 2.0-5 of the SAR.

Table 2.0-5 “List of BPVC Alternatives for DSS” (on page 2.0-8 of the SAR), provides a justification for an alternative to ASME B&PV code Section III, Division 3, WC-6120, for pressure testing of the storage cask and canister of the CASTOR® geo69 DSS. The justification provided includes the following statement:

[withheld per 10 CFR 2.390]

This exception, if granted by the NRC as requested, would provide relief from the ASME code requirement for any pressure testing and subsequent leak testing of each of the CASTOR® geo69 DSS storage containments in the course of serial production of both the “cask” and “canister”, based solely on the structural analysis of the CASTOR® geo69 DSS presented in chapter 3 of the SAR. The alternative proposed represents a significant departure from the ASME code requirements, one that NRC staff has not previously granted to any applicant for a storage design; therefore, the alternative requested would need additional justification in order for the staff to further consider the request. In addition, refer to section 7.3 and table 1 of ANSI N14.5 – 2014 that describes fabrication leakage rate testing.

This information is needed to determine compliance with 10 CFR 72.236(l).