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8.2.10 Hypothetical Accident Pressurization

Accident pressurization is classified as a hypothetical Design Event IV as defined by ANSI/ANS-57.9. This is not a credible accident.

8.2.10.1 Cause of Accident

The spent fuel is stored in a manner that complies with the general design criteria 10 CFR 72.122(h), in that the spent fuel cladding is protected during storage against degradation that could lead to gross ruptures. The space internal to the confinement boundary is filled with an inert gas (helium) without the presence of air or moisture that might produce the potential for long term degradation of the spent fuel cladding. The spent fuel storage systems are designed to assure that fuel is maintained at temperatures below those at which fuel cladding degradation occurs, under normal, off-normal, and accident conditions. It is therefore highly unlikely that a spent fuel assembly with intact fuel cladding will undergo cladding failure during storage, and the assumption of complete cladding failure of all rods in a canister is extremely conservative. Failure of the cladding of all fuel rods contained in a canister is considered to be a non-credible event. Nevertheless, a hypothetical breach of all fuel rods in the canister and subsequent release of their fission and fill gases to the canister interior is analyzed. This would pressurize the canister shell and lids.

8.2.10.2 Accident Analysis

The analysis of this accident entails calculation of the free volume in the canister as well as the quantities of fill and fission gases in the fuel assemblies. The canister pressure is then determined based on the addition of 100 percent of the fuel rod fill gas and a conservative fraction of the fission gases to the helium already present in the canister. The fuel rods are initially assumed to be at a bounding fill pressure.

The evaluation of the canister pressurization accident is provided in HI-STORM Section 11.2.9 and TranStor SAR Section 11.2.6. Table 4.3.4 of the HI-STORM SAR and Section 11.2.6 of the TranStor SAR identify the fractions of fission product gases assumed to be released from fuel rods into the canister. The vendors' structural analyses evaluate the canister confinement boundary for this accident condition. The structural analyses show that stresses resulting from accident pressure, or the canister design basis internal pressure that exceeds accident pressure, are within applicable ASME BPVC Section III allowables.

8.2.10.3 Accident Dose Calculations

Since the analyses determined that the canisters would retain their integrity, there are no radiological consequences for this accident.