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From: George Hubbard NRR
To: David Diec, Paula Magnanelli NRR
Date: 10/5/00 2:01PM
Subject: Section 2 on Thermal-hydraulics

See attached

Tim, it is rough be it is a start.

George Hubbard
2870

CC: Joseph Staudenmeier, Timothy Collins

2/9

2. THERMAL-HYDRAULIC ANALYSIS

Analysis were to performed to evaluate thermal-hydraulic characteristics of spent fuel stored in the SFPs of decommissioning and determine the times available to perform actions to prevent occurrence of a zirconium fire. These times were then utilized in performing the risk assessment discussed in Section 3. The analysis documented in Appendix 1 demonstrates that the decay heat necessary for a zirconium fire in typical SFPs can exists for a number of years following plant shutdown depending. The analysis shows that the length of time over which the fuel is vulnerable depends on several factors: including but not limited to fuel burn-up, fuel storage configuration, building ventilation rates, fuel cladding oxidation rates, and whether there is a complete or partial uncovery of the fuel. In particular, the calculations performed indicated that in the event of a partial draindown of the spent fuel pool, the time to preclude a zirconium fire could extend well in access of 5 years.

Some specific calculations performed and included in the appendix included boiloff times of the SFP coolant from normal pool level to a level three feet above the top of the fuel (Table 1 of the appendix), fuel heat up times from 30*C to 900*C with air cooling versus time since reactor shutdown (Figure 1 of the appendix), and a comparison between fuel times with air cooling and no cooling (adiabatic) versus reactor shutdown (Figure 2 of the appendix). Additionally, discussions in the appendix address the important temperatures of fuel when assessing whether fission product releases will occur and what the composition and size of the release would be.