

4/19/99

Outline- Joseph Staudenmeier

Fuel failure criteria

Work is being done to establish the appropriate fuel failure criteria. The two candidate failure criteria are clad ballooning and rupture leading to gap release and the onset of a zirconium fire leading to release of fission products from the fuel. The appropriate failure criteria will depend on the time after shutdown and the precision of the calculations used to predict fuel failure criteria. Other considerations such as the melting of aluminum before the onset of a zirconium fire will also have to be considered.

Heatup Calculation Uncertainties and Sensitivities

Both simplified and detailed heatup calculations will be performed to help evaluate the conditions that lead to the fuel failure. Simplified fast running calculations will be performed to gain an understanding of the level of uncertainty due to variation of important physical parameters and assumptions. Chris Boyd of RES is performing more detailed BWR calculations in order to evaluate the validity and accuracy of simplifying assumptions made in the fast running calculations. Since these calculations are assumption driven, a list of key assumptions and their impact on the calculations will be given. An evaluation of past calculations will also be given. Zirconium fire propagation calculations can not be performed in the allotted time since there is no available code to perform these calculations. Preliminary review has determined that the past heatup calculations performed using SFUEL and SHARP are non-conservative due to the neglect of grid spacer flow resistance and the neglect of mixing between the downward flow in the spent fuel pool and the hot air exiting from the fuel bundles.

Critical Decay Times

The results from the above sections will give the critical decay time for a spent fuel pool after shutdown. An attempt will also be made to evaluate the uncertainty in critical decay time. Preliminary studies indicate that a generic critical decay time will be no less than 3-4 years after shutdown and could be as long as 5-6 years.

C/2-8