

The maximum calculated local metal-water was 3.26% which is well below the embrittlement limit of 17% specified in 10CFR50.46. The total core wide metal-water reactions is less than 0.1% for all breaks, as compared with the 1% criterion of 10CFR50.46 and in all cases the cladding temperature transient was terminated at a time when the core geometry was still amenable to cooling. As a result, the core temperature will continue to drop and the ability to remove decay heat generated in the fuel for an extended period of time will be provided.

These results provide assurance that operation with VANTAGE 5 fuel and with the RCS hot leg temperature in the range of 600 to 619.3°F can be accomplished within the requirements of 10CFR50.46 and Appendix K to 10CFR50.46.

Small Break Results

This section presents the results of a spectrum of small break sizes analyzed for the Byron/Braidwood Stations. As noted previously, the calculated peak clad temperature resulting from a small break LOCA is less than that calculated for a large break. Based on the results of LOCA sensitivity studies (Reference 14 and 21) the limiting small break was found to be less than a 10-inch diameter rupture of the RCS cold leg. The worst breaks size (small break) is a 3-inch diameter break in the cold leg. This limiting break size was also analyzed for the reduced RCS operating temperatures to show that the reduced temperature results in a less severe transient. The time sequence of events and the results for all the breaks analyzed is shown in Tables 15.6-1 and 15.6-4.

During the earlier part of the small break transient, the effect of the break flow is not strong enough to overcome the flow maintained by the reactor coolant pumps through the core as they are coasting down following reactor trip. Therefore, upward flow through the core is maintained. The resultant heat transfer cools the fuel rods and cladding to very near the coolant temperature as long as the core remains covered by a two-phase mixture. This effect is evident in the accompanying figures.

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