

14.13 ANTICIPATED TRANSIENTS WITHOUT SCRAM WITH INSTABILITY (ATWSI)

The NRC has reviewed and accepted the General Electric Hitachi (GEH) disposition of the effect of large coupled thermal hydraulic/neutronic core oscillations during a postulated ATWS event presented in NEDO-32047-A, "ATWS Rule Issues Relative to BWR Core Thermal-Hydraulic Stability," June 1995. The companion report, NEDO-32164, "Mitigation of BWR Core Thermal-Hydraulic Instabilities in ATWS," December 1992, was approved by the same NRC Safety Evaluation Report (SER). In its review, the NRC concluded that the recommended Emergency Procedure Guidelines operator actions, including boron injections and reactor water level control strategy, are sufficient for mitigating ATWS events with large core power oscillations. In its subsequent review of the GEH MELLLA+ Licensing Topical Report (LTR), NEDC-33006P-A Revision 3, "General Electric Boiling Water Reactor Maximum Extended Load Line Limit Analysis Plus," June 2009, the NRC confirmed that their prior conclusions remain applicable for operation in the MELLLA+ operating domain. Furthermore, they concluded that the evaluations documented in the GEH MELLLA+ LTR demonstrate that containment integrity is maintained, long-term shutdown and cooling capability is maintained, and radiological consequences are no more severe than those reported in NEDE-24222, "Assessment of BWR Mitigation of ATWS, Volume II (NUREG-0460 Alternate No. 3)," December 1979. Therefore, the timing and system requirements for operator actions do not change relative to the generic analyses in NEDO-32164, and with an effective mitigation strategy, the probability of violating the ATWS criteria is not increased by MELLLA+.

The MELLLA+ LTR SER Limitation and Condition 12.19 requires a plant-specific ATWS instability calculation be performed to demonstrate that BFN Emergency Operating Instruction actions effectively mitigate an ATWS event with large power oscillations in the MELLLA+ operating domain. The BFN plant-specific calculation was based on the limiting peak reactivity exposure condition, modeled the BFN configuration important to the ATWSI response, and used the limiting channel grouping scheme (regional mode). The MELLLA+ LTR SER Limitation and Condition 12.23.5 requires that the power density be less than 52.5 MWt/Mlbm/hr. For BFN, the plant-specific maximum power-to-flow ratio at rated power and minimum core flow is 45.4 MWt/Mlbm/hr, which meets this requirement. The plant-specific ATWSI calculation modeled in-channel water rod flow in accordance with the MELLLA+ LTR SER Limitation and Condition 12.24.1. The calculation was performed using the NRC-approved neutronic and thermal-hydraulic codes TGBLA06/PANAC11 and TRACG04. An ATRIUM-10XM equilibrium core was used for the calculation, and this complies with the MELLLA+ LTR SER Limitation and Condition 12.3.d.

Table 14.13-1 summarizes the results of the BFN ATWSI evaluation for MELLLA+ conditions.