# 15.8 Anticipated Transients Without Scram (ATWS)

## 15.8.1 Requirements

10CFR50.62 requires the BWR to have automatic recirculation pump trip (RPT), an Alternate Rod Insertion (ARI) System and an automatic Standby Liquid Control System (SLCS) with a minimum flow capacity and boron content equivalent 86 gpm (326 L/min) of 13 wt% sodium pentaborate solution containing natural boron into a 251-inch ID reactor pressure vessel. SRP 15.8 (Rev. 2) adds the requirement to maintain the primary system pressure below Service Level C, and to implement Emergency Procedures that address ATWS/Stability Mitigation Actions.

## 15.8.2 Plant Capabilities

For ATWS prevention/mitigation for ABWR, the following are provided:

(1) An ARI System that utilizes sensors and logic which are diverse and independent of the reactor protection system

(2) Electrical insertion of FMCRDs that also utilize sensors and logic which are diverse and independent of the reactor protection system

(3) Automatic recirculation pump trip under conditions indicative of an ATWS

(4) Automatic initiation of the SLCS with 378 L/min of 13.4wt.% under conditions indicative of an ATWS

The ABWR has the ATWS-RPT feature which prevents reactor vessel overpressure and possible short-term fuel damage for the most limiting postulated ATWS events. The design details of this system are given in Section 7.7. Emergency procedures for ATWS are described in Chapter 18. Thus, SRP 15.8 is satisfied.

The ATWS rule of 10CFR50.62 was written as hardware-specific, rather than functionally, because it clearly reflected the BWR use of locking-piston control rod drives. The ABWR, however, uses a FMCRD design with both hydraulic and electric means to achieve shutdown. This drive design is described in detail in Section 4.6. The use of this design eliminates the common mode failure potentials of the existing locking-piston CRD by eliminating the scram discharge volume (mechanical common mode potential failure) and by having an electric motor run-in function diverse from the hydraulic scram feature.

This latter feature allows rod run-in if scram air header pressure is not exhausted because of a postulated common mode electrical failure and simultaneous failure of the ARI system, and therefore satisfies the intent required by 10CFR50.62. Thus, the design does not need SLCS to respond to an ATWS threatening event.

The SLCS is required by 10CFR50 Appendix A criteria and is described in Section 9. Because the new drive design eliminates the previous common-mode failure potential and because of the very low probability of simultaneous common-mode failure of a large number of drives, a failure to achieve shutdown is deemed incredible. However, automatic initiation of SLCS under conditions indicative of an ATWS is also incorporated in order to meet the rule specified in 10CFR50.62.

Supporting analysis is documented in Appendix 15E.