

PLANT SYSTEMS

BASES

- Q = Nominal NSSS power rating of the plant (including reactor coolant pump heat), Mwt
- K = Conversion factor, $947.82 \frac{\text{Btu/sec}}{\text{Mwt}}$
- w_s = Minimum total steam flow rate capability of the operable MSSVs on any one steam generator at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, in lb/sec. For example, if the maximum number of inoperable MSSVs on any one steam generator is one, then w_s should be a summation of the capacity of the operable MSSVs at the highest operable MSSV operating pressure, excluding the highest capacity MSSV. If the maximum number of inoperable MSSVs per steam generator is three then w_s should be a summation of the capacity of the operable MSSVs at the highest operable MSSV operating pressure, excluding the three highest capacity MSSVs.
- h_{fg} = heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, Btu/lbm
- N = Number of loops in plant

The values calculated from this algorithm must then be adjusted lower to account for instrument and channel uncertainties.

3/4.7.1.2 AUXILIARY FEEDWATER SYSTEM

The AFW System is configured into three trains. The AFW System is considered OPERABLE when the components and flow paths required to provide redundant AFW flow to the steam generators are OPERABLE. This requires that the two motor-driven AFW pumps be OPERABLE in two diverse paths, each supplying AFW to separate steam generators. The turbine-driven AFW pump is required to be OPERABLE with redundant steam supplies from each of two main steam lines upstream of the MSIV's, and shall be capable of supplying AFW to any steam generator. The piping, valves, instrumentation, and controls in the required flow paths also are required to be OPERABLE.

The AFW System mitigates the consequences of any event with loss of normal feedwater.

The design basis of the AFW System is to supply water to the steam generator to remove decay heat and other residual heat by delivering at least the minimum required flow rate to the steam generators at a pressure corresponding to 1085 psig. This pressure is in excess of the maximum expected steam generator pressure with the existing safety valve setpoints.

In addition, the AFW System must supply enough makeup water to replace steam generator secondary inventory lost as the unit cools to MODE 4 conditions. Sufficient AFW flow must also be available to account for flow losses such as pump recirculation and line breaks.

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The limiting Design Basis Accidents (DBAs) and transients for the AFW System are as follows:

- a. Feedwater Line Break (FWLB); and
- b. Loss of main feedwater (MFW).

In addition, the minimum available AFW flow and system characteristics are credited for removing decay heat in the analysis of a small break loss of coolant accident (LOCA).

The AFW System design is such that it can perform its function following a FWLB between the MFW isolation valves and containment, combined with a loss of offsite power following turbine trip, and a single active failure of the steam turbine-driven AFW pump (above 50% power) or one motor-driven AFW pump (below 50% power with steam generator low level reactor trip time delay). For 50% power operation and higher, one motor-driven AFW pump is assumed to deliver to the broken MFW header at the pump run-out flow. Sufficient flow would be delivered to the intact steam generator by the redundant motor-driven AFW pump.

For partial power operation (below 50% power with trip time delay active), one motor-driven AFW pump is assumed to fail. All flow from the turbine-driven AFW pump and the redundant motor-driven AFW pump is assumed to deliver to the broken MFW header until the faulted steam generator is isolated by operator action 10 minutes after the break. After isolation of the faulted steam generator, sufficient flow is delivered to the intact steam generator by the turbine-driven and redundant motor-driven AFW pump.

The Engineered Safety Feature Actuation System (ESFAS) automatically actuates the AFW turbine-driven pump and associated valves and controls when required to ensure an adequate feedwater supply to the steam generators during loss of power.

The surveillance requirements (SRs) provide a means of ensuring the AFW system components are capable of supplying required flow to the steam generators, the flow path is aligned correctly, and the automatic functions actuate as designed. The automatic functions are verified through either an actual or simulated actuation signal. The actuation signal associated with SR 4.7.1.2.3 (automatic valve actuation) include the AFW actuation test signal and the low AFW pump suction pressure test signal. The actuation signal associated with SR 4.7.1.2.4 (automatic pump start) includes only the AFW actuation test signal.

Each motor-driven auxiliary feedwater pump (one Train A and one Train B) supplies flow paths to two steam generators. Each flow path contains an automatic air-operated level control valve (LCV). The LCVs have the same train designation as the associated pump and are provided trained air. The turbine-driven auxiliary feedwater pump supplies flow paths to all four steam generators. Each of these flow paths contains an automatic opening (non-modulating) air-operated LCV, two of which are designated as Train A, receive A-train air, and provide flow to the same steam generators that are supplied by the B-train motor-driven auxiliary feedwater pump. The remaining two LCVs are designated as Train B, receive B-

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SEQUOYAH NUCLEAR PLANT

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