3.8 STEAM AND POWER CONVERSION SYSTEMS

Applicability: Applies to the operating status of the steam and power conversion systems.

Objective: To define conditions of the steam-relieving capacity and auxiliary feedwater system.

Specification:

1. When the reactor coolant of a nuclear unit is heated above 350°F the following conditions must be met:

   a. TWELVE (12) of its steam generator safety valves shall be operable (except for testing).

   b. System piping, interlocks and valves directly associated with the related components shall be operable.

   c. Its condensate storage tank shall contain a minimum of 185,000 gallons of water.

   d. Its main steam stop valves shall be operable and capable of closing in 5 seconds or less.

2. The iodine-131 activity on the secondary side of a steam generator shall not exceed 0.67 Ci/cc.

3. During power operation, if any of the conditions of 3.8.1 or 3.8.2 cannot be met within 48 hours, the reactor shall be shut down and the reactor coolant temperature reduced below 350°F.

4. The following number of independent steam generator auxiliary feedwater pumps and associated flow path shall be operable when the reactor coolant is heated above 350°F:

   a. Single Nuclear Unit Operation

      Two auxiliary feedwater pumps capable of being powered from an operable steam supply.

   b. Dual Nuclear Unit Operation

      Three auxiliary feedwater pumps capable of being powered from an operable steam supply.

5. During power operation, if any of the conditions of 3.8.4 cannot be met, the reactor shall be shut down and the reactor coolant temperature reduced below 350°F, unless one of the following conditions can be met;

a. For single unit operation with one of the two required auxiliary feedwater pumps inoperable, restore the inoperable pump to operable status within 72 hours or the reactor shall be shut down and the reactor coolant temperature reduced below 350°F within the next 12 hours.

b. For dual unit operation with one of the three required auxiliary feedwater pumps inoperable, restore the inoperable pump to operable status within 72 hours or a reactor shall be shut down and its reactor coolant temperature reduced below 350°F within the next 12 hours.

B3.8 BASES FOR LIMITING CONDITIONS FOR OPERATION, STEAM AND POWER CONVERSION SYSTEMS

In the unlikely event of complete loss of electrical power to the nuclear units, decay heat removal will be assured by the availability of the steam-driven auxiliary feedwater pumps and steam discharge to the atmosphere via the steam generator safety valves and power relief valves.(1) The operability of the auxiliary feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350° F from normal operating conditions in the event of a total loss of off-site power. Each steam driven auxiliary feedwater pump is capable of delivering a total feedwater flow of 600 gpm to the entrance of the steam generators. This capacity is sufficient to ensure that adequate feedwater flow is availiable to remove decay heat and reduce the Reactor Coolant System temperature to less than 350° F when the Residual Heat Removal System may be placed into operation. The minimum amount of water in the condensate storage tanks is established from FSAR Figure 9.11-1, and meets safe shutdown requirements. (2)

The limit on secondary coolant iodine-131 specific activity is based on a postulated release of secondary coolant equivalent to the contents of three steam generators to the atmosphere due to a net load rejection. The limiting dose for this case would result from radioactive iodine in the secondary coolant. I-131 is the dominant isotope because of its low MPC in air and because the other shorter lived iodine isotopes cannot build up to significant concentrations in the secondary coolant under the limits of primary system leak rate and activity. One tenth of the iodine in the secondary coolant is assumed to reach the site boundary making allowance for plate-out and retention in water droplets. The inhalation thyroid dose at the site boundary is then:

$$\text{Dose (Rem)} = C \cdot V \cdot B \cdot DCF \cdot X/Q \cdot 0.1$$

Where: C = secondary coolant I-131 specific activity
= 1.34 curies/m^3 (μCi/cc) or 0.67 Ci/m^3, each unit
V = equivalent secondary coolant volume released = 214 m^3
B = Breathing rate = 3.47×10^{-4} m^3/sec.
X/Q = atmospheric dispersion parameter = 1.54×10^{-4} sec/m^3
0.1 = equivalent fraction of activity released
DCF = Dose conversion factor, Rem/Ci

The resultant thyroid dose in less than 1.5 Rem.

References

(1) FSAR - Section 10.3
(2) FSAR - Section 14.2.5