3.4.1.2.1 With the Reactor from 250°F to HOT SHUTDOWN and subcritical for at least one (1) hour, two (2) Main Steam Safety Valves per Steam Generator shall be OPERABLE. With less than two (2) Main Steam Safety Valves per Steam Generator OPERABLE, restore at least two (2) MSS Valves to OPERABLE status for each Steam Generator within 6 hours or be in COLD SHUTDOWN within the following 30 hours.

3.4.1.2.2 With the Reactor from HOT SHUTDOWN to 5% power and having been subcritical for at least one (1) hour, two (2) Main Steam Safety Valves per Steam Generator shall be OPERABLE provided the over power trip setpoint in the RPS is set to less than 5% full power. With less than two (2) Main Steam Safety Valves per Steam Generator OPERABLE, restore at least two (2) MSS Valves to OPERABLE status for each Steam Generator within 6 hours or be in COLD SHUTDOWN within the following 30 hours.

3.4.1.2.3 Except as provided in T.S. 3.4.1.2.2 above, when the Reactor is above HOT SHUTDOWN, all eighteen (18) Main Steam Safety Valves shall be OPERABLE or, if any are not OPERABLE, the maximum overpower trip setpoint (see Table 2.3-1) shall be reset as follows:

Maximum Number of Safety Valves Disabled on Any Steam Generator	Maximum Overpower Trip Setpoint (% of Rated Power)
1	92.4
2	79.4
3	66.3

With more than three (3) Main Steam Safety Valves INOPERABLE, restore at least fifteen (15) Main Steam Safety Valves to OPERABLE status within 4 hours or be in at least HOT SHUTDOWN within the next 6 hours.

3.4.2 Reactor Coolant System temperature 250°F or less.

3.4.2.1 With Reactor Coolant temperature 250°F or less, at least two of the following means for maintaining decay heat removal capability shall be OPERABLE and at least one shall be in operation except as allowed by Specifications 3.4.2.2, 3.4.2.3 and 3.4.2.4.

a. Decay Heat Removal String "A".

b. Decay Heat Removal String "B".

c. Reactor Coolant Loop "A", its associated OTSG, and its associated emergency feedwater flowpath.

d. Reactor Coolant Loop "B", its associated OTSG, and its associated emergency feedwater flowpath.

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3.4.2.2 Operation of the means for decay heat removal may be suspended provided the core outlet temperature is maintained below saturation temperature.

3.4.2.3 The number of means for decay heat removal required to be operable per 3.4.2.1 may be reduced to one provided that one of the following conditions is satisfied:

a. The Reactor is in a Refueling Shutdown condition with the Fuel Transfer Canal water level greater than 23 feet above the reactor vessel flange.

b. Reactor coolant temperature is less than 140°F with BWST level greater than 44 feet and an associated flow path through the RCS OPERABLE such that core outlet temperature can be maintained subcooled for at least 7 days.

c. Equipment Maintenance on one of the means for decay heat removal specified by 3.4.2.1 is required and the equipment outage does not exceed 7 days.

3.4.2.4 Specification 3.4.2.1 does not apply when either of the following conditions exist:

a. Decay heat generation is less than 188 KW with the RCS full.

b. Decay heat generation is less than 100 KW with the RCS drained down for maintenance.

3.4.2.5 With less than the above required loops OPERABLE, immediately initiate corrective action to return the required loops to OPERABLE status as soon as possible.

Bases

A reactor shutdown following power operation requires removal of core decay heat. Normal decay heat removal is by the steam generators with the steam dump to the condenser when RCS temperature is above 250°F and by the decay heat removal system below 250°F. Core decay heat can be continuously dissipated up to 15 percent of full power via the steam bypass to the condenser as feedwater in the steam generator is converted to steam by heat absorption. Normally, the capability to return feedwater flow to the steam generators is provided by the main feedwater system.

The main steam safety valves will be able to relieve to atmosphere the total steam flow if necessary. Below 5% power, only a minimum number of Main Steam Safety Valves need to be operable as stated in Technical Specification 3.4.1.2.1 and 3.4.1.2.2. This is to provide Steam Generator overpressure protection during hot functional testing and low power physics testing. Additionally, when the Reactor is between hot shutdown and 5% full power operation, the over power trip setpoint in the RPS shall be set to less than 5% as is specified in Technical Specification 3.4.1.2.2. The minimum number of valves required to be operable allows margin for testing without jeopardizing plant safety. Plant specific analysis shows that one Main Steam Safety Valve is sufficient to relieve reactor coolant pump heat and stored energy when the reactor is subcritical by 1% ΔK/K for at least one hour. Other plant analyses show that two (2) Main Steam Safety Valves on either OTSG are more than sufficient to relieve reactor coolant pump heat and stored energy when the reactor is below 5% full power operation but had been subcritical by 1% Δ K/K for at least one hour since power operation above 5% full power. According to Technical Specification 3.1.1.2a, both steam generators shall be operable whenever the reactor coolant average temperature is above 250°F. This assures that all four (4) Main Steam Safety Valves are available for redundancy. During power operations at 5% full power or above, if Main Steam Safety Valves are inoperable, the power level must be reduced, as stated in Technical Specification 3.4.1.2.3 such that the remaining safety valves can prevent overpressure on a turbine trip.

In the unlikely event of complete loss of off-site electrical power to the station, decay heat removal is by either the steam-driven emergency feedwater pump, or two half-sized motor-driven pumps. Steam discharge is to the atmosphere via the Main Steam Safety Valves and controlled atmospheric relief valves, and in the case of the turbine driven pump, from the turbine exhaust.(1)

Both motor-driven pumps are required initially to remove decay heat with one eventually sufficing. The minimum amount of water in the condensate storage tanks, contained in Technical Specification 3.4.1.1., will allow cooldown to 250°F with steam being discharged to the atmosphere. After cooling to 250°F, the decay heat removal system is used to achieve further cooling.

When the RCS is below 250°F, a single DHR string, or single OTSG and its associated emergency feedwater flowpath is sufficient to provide removal of decay heat at all times following the cooldown to 250°F. The requirement to maintain two OPERABLE means of decay heat removal ensures that a single failure does not result in a complete loss of decay heat removal capability. The requirement to keep a system in operation as necessary to maintain the system subcooled at the core outlet provides the guidance to ensure that steam conditions which could inhibit core cooling do not occur.

Limited reduction in redundancy is allowed for preventive or corrective maintenance on the primary means for decay heat removal to ensure that maintenance necessary to assure the continued reliability of the systems may be accomplished.

As decay heat loads are reduced through decay time or fuel off loading, alternate flow paths will provide adequate cooling for a time sufficient to take compensatory action if the normal means of heat removal is lost.

With the reactor vessel head removed and 23 feet of water above the reactor vessel flange, a large heat sink is available for core cooling. The BWST with level at 44 feet provides an equivalent reservoir available as a heat sink. Operability of the BWST is to be determined using calculations based on actual plant data or through plant testing at the time the system is to be declared operable. At such times that either of these means is determined to be operable, removal of the redundant or diverse cooling system is permitted.

Following extensive outages or major core off loading, the decay heat generation being removed from the Reactor Vessel is so low that ambient losses are sufficient to maintain core cooling and no other means of heat removal is required. The system is passive and requires no redundant or diverse backup system. Decay heat generation is calculated in accordance with ANSI 5.1-1979 to determine when this situation exists.

An unlimited emergency feedwater supply is available from the river via either of the two motor-driven reactor building emergency cooling water pumps for an indefinite period of time.

The requirements of Technical Specification 3.4.1.1 assure that before the reactor is heated to above 250°F, adequate auxiliary feedwater capability is available. One turbine driven pump full capacity (920 gpm) and the two half-capacity motor-driven pumps (460 gpm each) are specified. However, only one half-capacity motor-driven pump is necessary to supply auxiliary feedwater flow to the steam generators in the onset of a small break loss-of-coolant accident.

REFERENCES

(1) FSAR Section 10.2.1.3