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TECHNICAL SPECIFICATIONS  
APPENDIX A**

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- B. TWO residual heat removal trains shall be operable whenever the average reactor coolant temperature is  $\leq 200^{\circ}\text{F}$  and irradiated fuel is in the reactor, except when in the REFUELING mode with the minimum water level above the top of the vessel flange  $\geq 23$  feet, one train may be inoperable for maintenance.
1. Each residual heat removal train shall be comprised of:
    - a) ONE operable residual heat removal pump
    - b) ONE operable residual heat removal heat exchanger
    - c) An operable flow path consisting of all valves and piping associated with the above train of components and required to remove decay heat from the core during normal shutdown situations. This flow path shall be capable of taking suction from the appropriate Reactor Coolant System hot leg and returning to the Reactor Coolant System.
  2. If one residual heat removal train is inoperable, corrective action shall be taken immediately to return it to the operable status.

3.1.a.3 Pressurizer Safety Valves

LCO 3.1.a.3 Two pressurizer safety valves shall be OPERABLE

APPLICABILITY: Reactor Coolant System Temperature Greater than the Low Temperature Overpressure Protection (LTOP) Enabling Temperature (200°F)

**ACTIONS**

**- NOTE -**

During a hydro test of the RCS, the pressurizer safety valves may be blanked provided the power-operated relief valves and the safety valve on the discharge of the charging pump are set for the test pressure plus 35 psi to protect the system.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One pressurizer safety valve inoperable	A.1 Restore to OPERABLE status	15 Minutes
	<u>OR</u> A.2 Be in HOT SHUTDOWN	12 Hours
B. Both pressurizer safety valves are inoperable	B.1 Restore one pressurizer safety valve to an OPERABLE status	15 Minutes
	<u>OR</u> B.2 Be in a condition with the LTOP system OPERABLE or reactor vessel head removed	48 Hours

#### 4. Pressure Isolation Valves

- A. All pressure isolation valves listed in Table TS 3.1-2 shall be functional as a pressure isolation device during OPERATING and HOT STANDBY modes, except as specified in 3.1.a.4.B. Valve leakage shall not exceed the amounts indicated.
- B. In the event that integrity of any pressure isolation valve as specified in Table TS 3.1-2 cannot be demonstrated, reactor operation may continue, provided that at least two valves in each high pressure line having a non-functional valve are in, and remain in, the mode corresponding to the isolated condition.<sup>(1)</sup>
- C. If TS 3.1.a.4.A and TS 3.1.a.4.B cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the HOT SHUTDOWN condition within the next 4 hours, the INTERMEDIATE SHUTDOWN condition in the next 6 hours and the COLD SHUTDOWN condition within the next 24 hours.

#### 5. Pressurizer Power-Operated Relief Valves (PORV) and PORV Block Valves

- A. Two PORVs and their associated block valves shall be operable during HOT STANDBY and OPERATING modes.
  1. With one or both PORVs inoperable because of excessive seat leakage, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s) with power maintained to the block valve(s), otherwise, action shall be initiated to:
    - Achieve HOT STANDBY within 6 hours
    - Achieve HOT SHUTDOWN within the following 6 hours
  2. With one PORV inoperable due to causes other than excessive seat leakage, within 1 hour either restore the PORV to OPERABLE status or close its associated block valve and remove power from the block valve; restore the PORV to OPERABLE status within the following 72 hours or action shall be initiated to:
    - Achieve HOT STANDBY within 6 hours
    - Achieve HOT SHUTDOWN within the following 6 hours
  3. With both PORVs inoperable due to causes other than excessive seat leakage, within 1 hour either restore at least one PORV to OPERABLE status or close its associated block valve and remove power from the block valve and
    - Achieve HOT STANDBY within 6 hours
    - Achieve HOT SHUTDOWN within the following 6 hours

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<sup>(1)</sup> Manual valves shall be locked in the closed position. Motor operated valves shall be placed in the closed position with their power breakers locked out.

4. With one block valve inoperable, within 1 hour restore the block valve to OPERABLE status or place its associated PORV in manual control. Restore the block valve to OPERABLE status within 72 hours; otherwise action shall be initiated to:
  - Achieve HOT STANDBY within 6 hours
  - Achieve HOT SHUTDOWN within the following 6 hours
5. With both block valves INOPERABLE, within 1 hour restore the block valves to OPERABLE status or place their associated PORVs in manual control. Restore at least one block valve to OPERABLE status within the next hour; otherwise, action shall be initiated to:
  - Achieve HOT STANDBY within 6 hours
  - Achieve HOT SHUTDOWN within the following 6 hours

#### 6. Pressurizer Heaters

- A. At least one group of pressurizer heaters shall have an emergency power supply available when the average RCS temperature is  $> 350^{\circ}\text{F}$ .

#### 7. Reactor Coolant Vent System

- A. A reactor coolant vent path from both the reactor vessel head and pressurizer steam space shall be operable and closed prior to the average RCS temperature being heated  $> 200^{\circ}\text{F}$  except as specified in TS 3.1.a.7.B and TS 3.1.a.7.C below.
- B. When the average RCS temperature is  $> 200^{\circ}\text{F}$ , any one of the following conditions of inoperability may exist:
  1. Both of the parallel vent valves in the reactor vessel vent path are inoperable.
  2. Both of the parallel vent valves in the pressurizer vent path are inoperable.

If operability is not restored within 30 days, then within one hour action shall be initiated to:

- Achieve HOT STANDBY within 6 hours
  - Achieve HOT SHUTDOWN within the following 6 hours
  - Achieve COLD SHUTDOWN within an additional 36 hours
- C. If no Reactor Coolant System vent paths are operable, restore at least one vent path to operable status within 72 hours. If operability is not restored within 72 hours, then within 1 hour action shall be initiated to:
    - Achieve HOT STANDBY within 6 hours
    - Achieve HOT SHUTDOWN within the following 6 hours
    - Achieve COLD SHUTDOWN within an additional 36 hours

b. Heatup and Cooldown Limit Curves for Normal Operation

1. The reactor coolant temperature and pressure and system heatup and cooldown rates (with the exception of the pressurizer) shall be limited in accordance with Figures TS 3.1-1 and TS 3.1-2. Figures TS 3.1-1 and TS 3.1-2 are applicable for the service period of up to 33<sup>(1)</sup> effective full-power years.
  - A. Allowable combinations of pressure and temperature for specific temperature change rates are below and to the right of the limit lines shown. Limit lines for cooldown rates between those presented may be obtained by interpolation.
  - B. Figures TS 3.1-1 and TS 3.1-2 define limits to assure prevention of non-ductile failure only. For normal operation other inherent plant characteristics, e.g., pump heat addition and pressurizer heater capacity may limit the heatup and cooldown rates that can be achieved over certain pressure-temperature ranges.
  - C. The isothermal curve in Figure TS 3.1-2 defines limits to assure prevention of non-ductile failure applicable to low temperature overpressurization events only. Application of this curve is limited to evaluation of LTOP events whenever one or more of the RCS cold leg temperatures are less than or equal to the LTOP enabling temperature of 200°F.
2. The secondary side of the steam generator must not be pressurized > 200 psig if the temperature of the steam generator is < 70°F.
3. The pressurizer cooldown and heatup rates shall not exceed 200°F/hr and 100°F/hr, respectively. The spray shall not be used if the temperature difference between the pressurizer and the spray fluid is > 320°F.
4. The overpressure protection system for low temperature operation shall be operable whenever one or more of the RCS cold leg temperatures are ≤ 200°F, and the reactor vessel head is installed. The system shall be considered operable when at least one of the following conditions is satisfied:
  - A. The overpressure relief valve on the Residual Heat Removal System (RHR 33-1) shall have a set pressure of ≤ 500 psig and shall be aligned to the RCS by maintaining valves RHR 1A, 1B, 2A, and 2B open.
    1. With one flow path inoperable, the valves in the parallel flow path shall be verified open with the associated motor breakers for the valves locked in the off position. Restore the inoperable flow path within 5 days or complete depressurization and venting of the RCS through a ≥ 6.4 square inch vent within an additional 8 hours.
    2. With both flow paths or RHR 33-1 inoperable, complete depressurization and venting of the RCS through at least a 6.4 square inch vent pathway within 8 hours.

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<sup>(1)</sup> Although the curves were developed for 33 EFPY, they are limited to 28 EFPY (corresponding to the end of cycle 28) by WPSC Letter NRC-99-017.

B. A vent pathway shall be provided with an effective flow cross section  $\geq 6.4$  square inches.

1. When low temperature overpressure protection is provided via a vent pathway, verify the vent pathway at least once per 31 days when the pathway is provided by a valve(s) that is locked, sealed, or otherwise secured in the open position. If the vent path is provided by any other means, verify the vent pathway every 12 hours.

c. Maximum Coolant Activity

1. The specific activity of the reactor coolant shall be limited to:

A.  $\leq 0.20 \mu\text{Ci}/\text{gram DOSE EQUIVALENT I-131}$ , and

B.  $\leq \frac{91}{E} \frac{\mu\text{Ci}}{\text{cc}}$  gross radioactivity due to nuclides with half-lives  $> 30$  minutes excluding tritium ( $\bar{E}$  is the average sum of the beta and gamma energies in Mev per disintegration) whenever the reactor is critical or the average coolant temperature is  $> 500^\circ\text{F}$ .

2. If the reactor is critical or the average temperature is  $> 500^\circ\text{F}$ :

A. With the specific activity of the reactor coolant  $> 0.20 \mu\text{Ci}/\text{gram DOSE EQUIVALENT I-131}$  for more than 48 hours during one continuous time interval, or exceeding the limit shown on Figure TS 3.1-3, be in at least INTERMEDIATE SHUTDOWN with an average coolant temperature of  $< 500^\circ\text{F}$  within 6 hours.

B. With the specific activity of the reactor coolant  $> \frac{91}{E} \frac{\mu\text{Ci}}{\text{cc}}$  of gross radioactivity, be in at least INTERMEDIATE SHUTDOWN with an average coolant temperature  $< 500^\circ\text{F}$  within 6 hours.

C. With the specific activity of the reactor coolant  $> 0.20 \mu\text{Ci}/\text{gram DOSE EQUIVALENT I-131}$  or  $> \frac{91}{E} \frac{\mu\text{Ci}}{\text{cc}}$  perform the sample and analysis requirements of Table TS 4.1-2, item 1.f, once every 4 hours until restored to within its limits.

3. Annual reporting requirements are identified in TS 6.9.a.2.D.

d. Leakage of Reactor Coolant

1. Any Reactor Coolant System leakage indication in excess of 1 gpm shall be the subject of an investigation and evaluation initiated within 4 hours of the indication. Any indicated leak shall be considered to be a real leak until it is determined that no unsafe condition exists. If the Reactor Coolant System leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the HOT SHUTDOWN condition utilizing normal operating procedures. If the source of leakage exceeds 1 gpm and is not identified within 48 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.
2. Reactor coolant-to-secondary leakage through the steam generator tubes shall be limited to 150 gallons per day through any one steam generator. With tube leakage greater than the above limit, reduce the leakage rate within 4 hours or be in COLD SHUTDOWN within the next 36 hours.
3. If the sources of leakage other than that in 3.1.d.2 have been identified and it is evaluated that continued operation is safe, operation of the reactor with a total Reactor Coolant System leakage rate not exceeding 10 gpm shall be permitted. If leakage exceeds 10 gpm, the reactor shall be placed in the HOT SHUTDOWN condition within 12 hours utilizing normal operating procedures. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.
4. If any reactor coolant leakage exists through a non-isolable fault in a Reactor Coolant System component (exterior wall of the reactor vessel, piping, valve body, relief valve leaks, pressurizer, steam generator head, or pump seal leakoff), the reactor shall be shut down; and cooldown to the COLD SHUTDOWN condition shall be initiated within 24 hours of detection.
5. When the reactor is critical and above 2% power, two reactor coolant leak detection systems of different operating principles shall be in operation with one of the two systems sensitive to radioactivity. Either system may be out of operation for up to 12 hours provided at least one system is operable.

e. Maximum Reactor Coolant Oxygen, Chloride and Fluoride Concentration

1. Concentrations of contaminants in the reactor coolant shall not exceed the following limits when the reactor coolant temperature is  $> 250^{\circ}\text{F}$ .

CONTAMINANT	NORMAL STEADY-STATE OPERATION (ppm)	TRANSIENT LIMITS (ppm)
A. Oxygen	0.10	1.00
B. Chloride	0.15	1.50
C. Fluoride	0.15	1.50

2. If any of the normal steady-state operating limits as specified in TS 3.1.e.1 above are exceeded, or if it is anticipated that they may be exceeded, corrective action shall be taken immediately.
3. If the concentrations of any of the contaminants cannot be controlled within the transient limits of TS 3.1.e.1 above or returned to the normal steady-state limit within 24 hours, the reactor shall be brought to the COLD SHUTDOWN condition, utilizing normal operating procedures, and the cause shall be ascertained and corrected. The reactor may be restarted and operation resumed if the maximum concentration of any of the contaminants did not exceed the permitted transient values; otherwise a safety review by the Plant Operations Review Committee shall be made before starting.
4. Concentrations of contaminants in the reactor coolant shall not exceed the following maximum limits when the reactor coolant temperature is  $\leq 250^{\circ}\text{F}$ .

CONTAMINANT	NORMAL CONCENTRATION (ppm)	TRANSIENT LIMITS (ppm)
A. Oxygen	Saturated	Saturated
B. Chloride	0.15	1.50
C. Fluoride	0.15	1.50

5. If the transient limits of TS 3.1.e.4 are exceeded or the concentrations cannot be returned to normal values within 48 hours, the reactor shall be brought to the COLD SHUTDOWN condition and the cause shall be ascertained and corrected.
6. To meet TS 3.1.e.1 and TS 3.1.e.4 above, reactor coolant pump operation shall be permitted for short periods, provided the coolant temperature does not exceed  $250^{\circ}\text{F}$ .

f. Minimum Conditions for Criticality

1. The reactor shall not be brought to a critical condition until the pressure-temperature state is to the right of the criticality limit line shown in Figure TS 3.1-1.
2. The reactor shall be maintained subcritical by at least 1%  $\Delta k/k$  until normal water level is established in the pressurizer.
3. When the reactor is critical and  $\leq 60\%$  RATED POWER, the moderator temperature coefficient shall be  $\leq 5.0$  pcm/ $^{\circ}$ F, except during LOW POWER PHYSICS TESTING. When the reactor is  $> 60\%$  RATED POWER, the moderator temperature coefficient shall be zero or negative.
4. The reactor will have a moderator temperature coefficient no less negative than  $-8$  pcm/ $^{\circ}$ F for 95% of the cycle time at full power.
5. If the limits of 3.1.f.3 cannot be met, power operation may continue provided the following actions are taken:
  - A. Within 24 hours, develop and maintain administrative control rod withdrawal limits sufficient to restore the moderator temperature coefficient to within the limits specified in TS 3.1.f.3. These withdrawal limits shall be in addition to the insertion limits specified in TS 3.10.d.
  - B. If the actions specified in TS 3.1.f.5.A are not satisfied, be in HOT STANDBY within the next 6 hours.

The requirement for at least one train of residual heat removal when in the REFUELING MODE is to ensure sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor vessel < 140°F. The requirement to have two trains of residual heat removal operable when there is < 23 feet of water above the reactor vessel flange ensures that a single failure will not result in complete loss-of-heat removal capabilities. With the reactor vessel head removed and at least 23 feet of water above the vessel flange, a large heat sink is available. In the event of a failure of the OPERABLE train, additional time is available to initiate alternate core cooling procedures.

#### Pressurizer Safety Valves (TS 3.1.a.3)

Each of the pressurizer safety valves is designed to relieve 325,000 lbs. per hour of saturated steam at its setpoint. Below 350°F and 350 psig, the Residual Heat Removal System can remove decay heat and thereby control system temperature and pressure. If no residual heat were removed by any of the means available, the amount of steam which could be generated at safety valve relief pressure would be less than half the valves' capacity. One valve therefore provides adequate protection against overpressurization.

At temperatures and pressures when the LTOP System is required, the pressurizer safeties no longer provide RCS system pressure protection. Therefore, one or both pressurizer safeties can be removed or be inoperable while LTOP System is OPERABLE with the reactor head on.

#### Pressure Isolation Valves (TS 3.1.a.4)

The Basis for the Pressure Isolation Valves is discussed in the Reactor Safety Study (RSS), WASH-1400, and identifies an intersystem loss-of-coolant accident in a PWR which is a significant contributor to risk from core melt accidents (EVENT V). The design examined in the RSS contained two in-series check valves isolating the high pressure Primary Coolant System from the Low Pressure Injection System (LPIS) piping. The scenario which leads to the EVENT V accident is initiated by the failure of these check valves to function as a pressure isolation barrier. This causes an overpressurization and rupture of the LPIS low pressure piping which results in a LOCA that bypasses containment.<sup>(2)</sup>

#### PORVs and PORV Block Valves (TS 3.1.a.5)

The pressurizer power-operated relief valves (PORVs) operate as part of the Pressurizer Pressure Control System. They are intended to relieve RCS pressure below the setting of the code safety valves. These relief valves have remotely operated block valves to provide a positive shutoff capability should a PORV become inoperable.

The pressurizer PORVs and associated block valves must be OPERABLE to provide an alternate means of mitigating a design basis steam generator tube rupture. Thus, an inoperable PORV (for reasons other than seat leakage) or block valve is not permitted in the HOT STANDBY and OPERATING MODES for periods of more than 72 hours.

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<sup>(2)</sup> Order for Modification of License dated 4/20/81