

ATTACHMENT 2 TO AEP:NRC:08940

PROPOSED REVISED TECHNICAL SPECIFICATION PAGES

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## REACTIVITY CONTROL SYSTEMS

### CHARGING PUMP - SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

##### 3.1.2.3

- a. One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.
- b. One charging flowpath associated with support of Unit 2 shutdown functions shall be available.

APPLICABILITY: Specification 3.1.2.3.a. - MODES 5 and 6  
Specification 3.1.2.3.b. - At all times when Unit 2 is in MODES 1, 2, 3, or 4.

#### ACTION:

- a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.\*\*
- b. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to 152°F, unless the reactor vessel head is removed, remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within one hour.
- c. The provisions of Specification 3.0.3 are not applicable.
- d. In addition to the above, when Specification 3.1.2.3.b is applicable and the required flow path is not available, return the required flow path to available status within 7 days, or provide equivalent shutdown capability in Unit 2 and return the required flow path to available status within the next 60 days, or have Unit 2 in HOT STANDBY within the next 12 hours and HOT SHUTDOWN within the following 24 hours.
- e. The requirements of Specification 3.0.4 are not applicable when Specification 3.1.2.3.b applies.

#### SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying, that on recirculation flow, the pump develops a discharge pressure of greater than or equal to 2390 psig when tested pursuant to Specification 4.0.5 at least once per 31 days.

\*A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F.

\*\*For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.

## REACTIVITY CONTROL SYSTEMS

### CHARGING PUMP - SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

4.1.2.3.2 All charging pumps and safety injection pumps, excluding the above required OPERABLE charging pump, shall be demonstrated inoperable by verifying that the motor circuit breakers have been removed from their electrical power supply circuits at least once per 12 hours, except when:

- a. The reactor vessel head is removed, or
- b. The temperature of all RCS cold legs is greater than 152°F.

4.1.2.3.3 Charging line cross-tie valves to Unit 2 will be cycled full travel at least once per 18 months. Following cycling, the valves will be verified to be in their closed positions.

## REACTOR COOLANT SYSTEM

### SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

- 3.4.1.3 a. The coolant loops listed below shall be OPERABLE and in operation as required by items b and c:
1. Reactor Coolant Loop 1 and its associated steam generator and reactor coolant pump,\*
  2. Reactor Coolant Loop 2 and its associated steam generator and reactor coolant pump,\*
  3. Reactor Coolant Loop 3 and its associated steam generator and reactor coolant pump,\*
  4. Reactor Coolant Loop 4 and its associated steam generator and reactor coolant pump,\*
  5. Residual Heat Removal - East,\*\*
  6. Residual Heat Removal - West,\*\*
- b. At least two of the above coolant loops shall be OPERABLE and at least one loop in operation if the reactor trip breakers are in the open position, or the control rod drive system is not capable of rod withdrawal.\*\*\*
- c. At least three of the above reactor coolant loops shall be OPERABLE and in operation when the reactor trip system breakers are in the closed position and the control rod drive system is capable of rod withdrawal.

#### APPLICABILITY: MODES 4 and 5

\* A reactor coolant pump shall not be started with one or more of the RCS cold leg temperatures less than or equal to 152°F unless 1) the pressurizer water volume is less than 62% of span or 2) the secondary water temperature of each steam generator is less than 50°F above each of the RCS cold leg temperatures. Operability of a reactor coolant loop(s) does not require an OPERABLE auxiliary feedwater system.

\*\* The normal or emergency power source may be inoperable in MODE 5.

\*\*\* All reactor coolant pumps and residual heat removal pumps may be de-energized for up to 1 hour provided 1) no operations are permitted that would cause dilution of the reactor coolant system boron concentration\*\*\*\*, and 2) core outlet temperature is maintained at least 10°F below saturation temperature.

\*\*\*\* For purposes of this specification, addition of water from the RWST does not constitute a dilution activity provided the boron concentration in the RWST is greater than or equal to the minimum required by specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5).

REACTOR COOLANT SYSTEM

3/4.4.9 PRESSURE/TEMPERATURE LIMITS

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION

3.4.9.1 The Reactor Coolant System (except the pressurizer) temperature and pressure shall be limited in accordance with the limit lines shown on Figures 3.4-2 and 3.4-3 during heatup, cooldown, criticality, and inservice leak and hydrostatic testing with:

- a. A maximum heatup of 60°F in any one hour period,
- b. A maximum cooldown of 100°F in any one hour period, and
- c. A maximum temperature change of  $\leq 5^\circ\text{F}$  in any one hour period, during hydrostatic testing operations above system design pressure.

APPLICABILITY: At all times.\*

ACTION:

With any of the above limits exceeded, restore the temperature and/or pressure to within the limit within 30 minutes; perform an analysis to determine the effects of the out-of-limit condition on the fracture toughness properties of the Reactor Coolant System; determine that the Reactor Coolant System remains acceptable for continued operations or be in at least HOT STANDBY within the next 6 hours and reduce the RCS Tavg and pressure to less than 200°F and 500 psig, respectively, within the following 30 hours.

\* See Special Text Exception 3.10.3.

REACTOR COOLANT SYSTEM PRESSURE (PSIG)

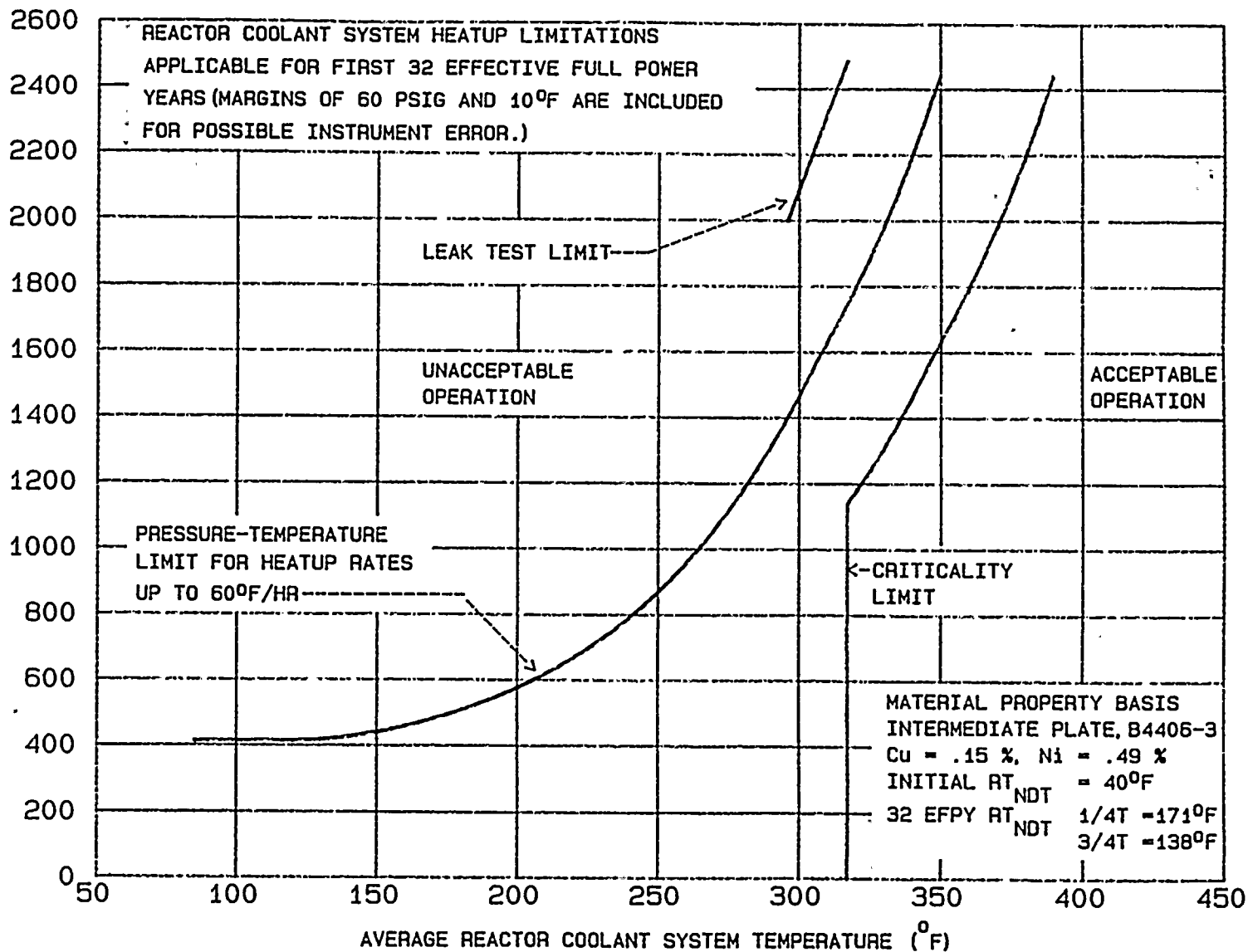


FIGURE 3.4-2

REACTOR COOLANT SYSTEM PRESSURE - TEMPERATURE LIMITS VERSUS 60°F/HR RATE  
CRITICALITY LIMIT AND HYDROSTATIC TEST LIMIT

REACTOR COOLANT SYSTEM PRESSURE (PSIG)

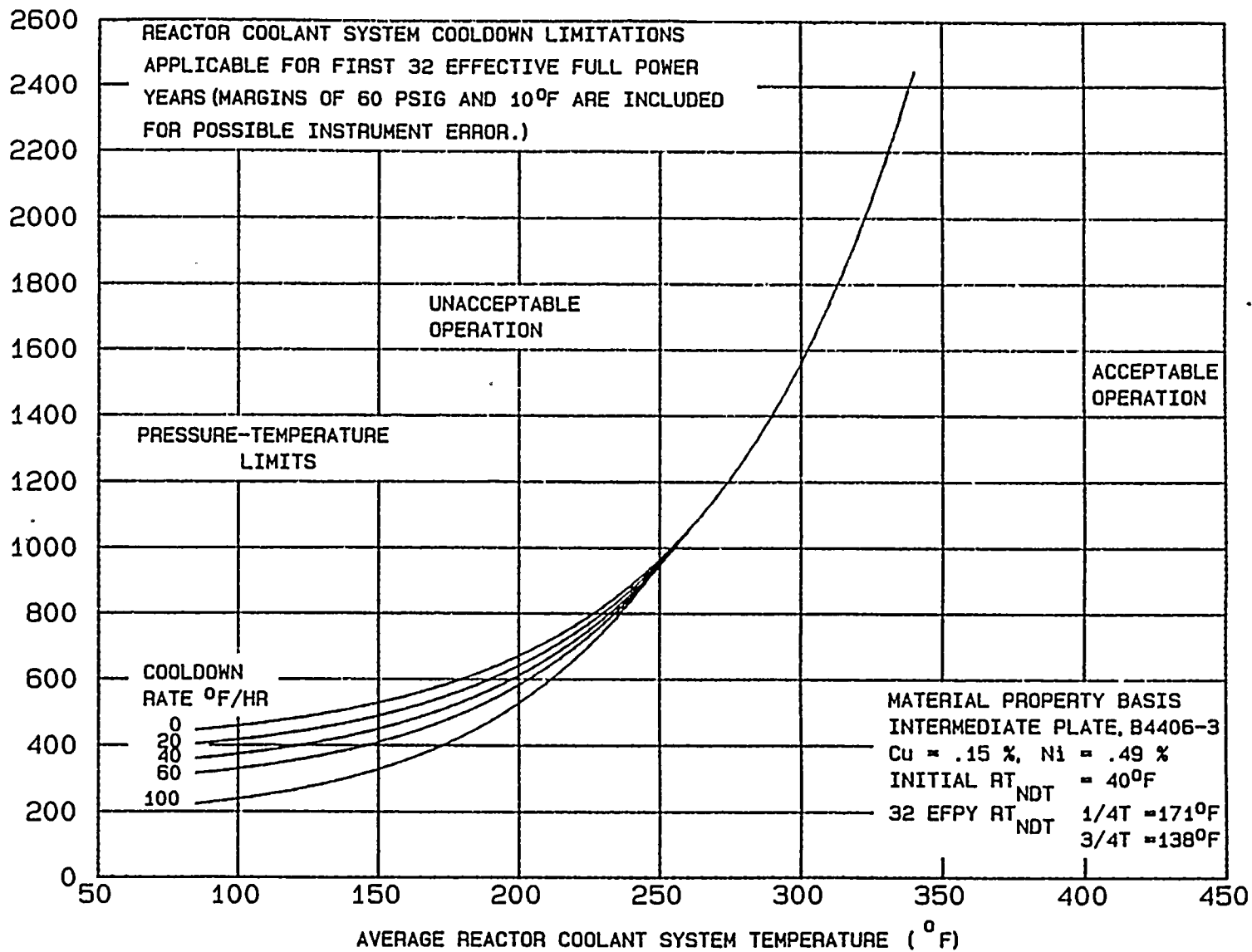


FIGURE 3.4-3

REACTOR COOLANT SYSTEM PRESSURE - TEMPERATURE LIMITS VERSUS COOLDOWN RATES

## REACTOR COOLANT SYSTEM

### OVERPRESSURE PROTECTION SYSTEMS

#### LIMITING CONDITION FOR OPERATION

3.4.9.3 At least one of the following overpressure protection systems shall be OPERABLE:

- a. Two power operated relief valves (PORVs) with a lift setting of less than or equal to 435 psig, or
- b. One power operated relief valve (PORV) with a lift setting of less than or equal to 435 psig and the RHR safety valve with a lift setting of less than or equal to 450 psig, or
- c. A reactor coolant system vent of greater than or equal to 2 square inches.

APPLICABILITY: When the temperature of one or more of the RCS cold legs is less than or equal to 152°F, except when the reactor vessel head is removed.

#### ACTION:

- a. With two PORV's inoperable or with one PORV inoperable and the RHR safety valve inoperable, either restore the inoperable PORV(s) or RHR safety valve to OPERABLE status within 7 days or depressurize and vent the RCS through an at least 2 square inch vent(s) within the next 8 hours; maintain the RCS in a vented condition until the inoperable PORV or RHR safety valve has been restored to OPERABLE status.
- b. With both PORVs inoperable, depressurize and vent the RCS through an at least 2 square inch vent(s) within 8 hours; maintain the RCS in a vented condition until both PORVs or one PORV and the RHR safety valve have been restored to OPERABLE status.
- c. In the event either the PORVs, the RHR safety valve or the RCS vent(s) are used to mitigate a RCS pressure transient, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 30 days. The report shall describe the circumstances initiating the transient, the effect of the PORVs or vent(s) on the transient and any corrective action necessary to prevent recurrence.
- d. The provisions of Specification 3.0.4 are not applicable.

## EMERGENCY CORE COOLING SYSTEMS

### ECCS SUBSYSTEMS - $T_{avg} < 350^{\circ}\text{F}$

#### LIMITING CONDITION FOR OPERATION

3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE:

- a. One OPERABLE centrifugal charging pump, #
- b. One OPERABLE residual heat removal heat exchanger,
- c. One OPERABLE residual heat removal pump, and
- d. An OPERABLE flow path capable of taking suction from the refueling water storage tank upon being manually realigned and transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODE 4.

#### ACTION:

- a. With no ECCS subsystem OPERABLE because of the inoperability of either the centrifugal charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.
- b. With no ECCS subsystem OPERABLE because of the inoperability of either the residual heat removal heat exchanger or residual heat removal pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System  $T_{avg}$  less than  $350^{\circ}\text{F}$  by use of alternate heat removal methods.
- c. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to  $152^{\circ}\text{F}$ , remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within 1 hour.
- d. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date.

#A maximum of one centrifugal charging pump shall be OPERABLE and both safety injection pumps shall be inoperable whenever the temperature of one or more of the RCS cold legs is less than or equal to  $152^{\circ}\text{F}$ .

## EMERGENCY CORE COOLING SYSTEMS

### SURVEILLANCE REQUIREMENTS

4.5.3.1 The ECCS subsystem shall be demonstrated OPERABLE per the applicable Surveillance Requirements of 4.5.2.\*

4.5.3.2 All charging pumps and safety injection pumps, except the above required OPERABLE charging pump, shall be demonstrated inoperable, by verifying that the motor circuit breakers have been removed from their electrical power supply circuits, at least once per 12 hours whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F as determined at least once per hour when any RCS cold leg temperature is between 152°F and 200°F.

\* The provisions of Specification 4.0.6 are applicable.

### 3/4.1 REACTIVITY CONTROL SYSTEMS

#### BASES

##### 3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC) (Continued)

concentration associated with fuel burnup. The confirmation that the measured and appropriately compensated MTC value is within the allowable tolerance of the predicted value provides additional assurances that the coefficient will be maintained within its limits during intervals between measurement.

##### 3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 541°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, and 3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT<sub>NDT</sub> temperature. Administrative procedures will be established to ensure the P-12 blocked functions are unblocked before taking the reactor critical.

##### 3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid transfer pumps, 5) associated heat tracing systems, and 6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps and safety injection pumps, except the required OPERABLE charging pump, to be inoperable below 152°F, unless the reactor vessel head is removed, provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The boration capability of either system is sufficient to provide the required SHUTDOWN MARGIN from all operating conditions after xenon decay and cooldown to 200°F. The maximum expected boration capability, usable volume requirement, is 5641 gallons of 20,000 ppm borated water from the boric acid storage tanks or 99,598 gallons of 2400 ppm borated water from the refueling water storage tank. The minimum contained RWST volume is based on ECCS considerations. See Section B 3/4.5.5.

### 3/4.4 REACTOR COOLANT SYSTEM

#### BASES

#### 3/4.4.1 REACTOR COOLANT LOOPS

The plant is designed to operate with all reactor coolant loops in operation, and maintain DNBR above 1.69 during all normal operations and anticipated transients. A loss of flow in two loops will cause a reactor trip if operating above P-7 (11 percent of RATED THERMAL POWER) while a loss of flow in one loop will cause a reactor trip if operating above P-8 (31 percent of RATED THERMAL POWER).

In MODE 3, a single reactor coolant loop provides sufficient heat removal capability for removing decay heat; however, single failure considerations require that two loops be OPERABLE. Three loops are required to be OPERABLE and to operate if the control rods are capable of withdrawal and the reactor trip breakers are closed. The requirement assures adequate DNBR margin in the event of an uncontrolled rod withdrawal in this mode.

In MODES 4 and 5, a single reactor coolant loop or RHR loop provides sufficient heat removal capability for removing decay heat; but single failure considerations require that at least two loops be OPERABLE. Thus, if the reactor coolant loops are not OPERABLE, this specification requires two RHR loops to be OPERABLE.

The operation of one Reactor Coolant Pump or one RHR pump provides adequate flow to ensure mixing, prevent stratification and produce gradual reactivity changes during boron concentration reductions in the Reactor Coolant System. The reactivity change rate associated with boron reduction will, therefore, be within the capability of operator recognition and control.

The restrictions on starting a Reactor Coolant Pump below P-7 with one or more RCS cold legs less than or equal to 152°F are provided to prevent RCS pressure transients, caused by energy additions from the secondary system, which could exceed the limits of Appendix G to 10 CFR Part 50. The RCS will be protected against overpressure transients and will not exceed the limits of Appendix G by either (1) restricting the water volume in the pressurizer and thereby providing a volume for the primary coolant to expand into or (2) by restricting starting of the RCP's to when the secondary water temperature of each steam generator is less than 50°F above each of the RCS cold leg temperatures.

## REACTOR COOLANT SYSTEM

### BASES

#### 3/4.4.9 PRESSURE/TEMPERATURE LIMITS

All components in the Reactor Coolant System are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, and startup and shutdown operations. The various categories of load cycles used for design purposes are provided in Section 4.1.4 of the FSAR. During startup and shutdown, the rates of temperature and pressure changes are limited so that the maximum specified heatup and cooldown rates are consistent with the design assumptions and satisfy the stress limits for cyclic operation.

An ID or OD one-quarter thickness surface flaw is postulated at the location in the vessel which is found to be the limiting case. There are several factors which influence the postulated location. The thermal induced bending stress during heatup is compressive on the inner surface while tensile on the outer surface of the vessel wall. During cooldown the bending stress profile is reversed. In addition, the material toughness is dependent upon irradiation and temperature and therefore the fluence profile through the reactor vessel wall, the rate of heatup and also the rate of cooldown influence the postulated flaw location.

The heatup limit curve, Figure 3.4-2, is a composite curve which was prepared by determining the most conservative case, with either the inside or outside wall controlling, for any heatup rate up to 60°F per hour. The cooldown limit curves of Figure 3.4-3 are composite curves which were prepared based upon the same type analysis with the exception that the controlling location is always the inside wall where the cooldown thermal gradients tend to produce tensile stresses while producing compressive stresses at the outside wall. The heatup and cooldown curves were prepared based upon the most limiting value of the predicted adjusted reference temperature at the end of 32 EFPY.

Reactor operation and resultant fast neutron ( $E > 1$  Mev) irradiation will cause an increase in the  $RT_{NDT}$ . Therefore, an adjusted reference temperature, based upon the fluence, and the copper and nickel content of the material must be predicted. The heatup and cooldown limit curves of Figures 3.4-2 and 3.4-3 include the adjusted  $RT_{NDT}$  at the end of 32 EFPY, as well as adjustments for possible errors in the pressure and temperature sensing instruments.

## REACTOR COOLANT SYSTEM

### BASES

The 32 EFPY heatup and cooldown curves were developed based on the following:

1. The intermediate shell plate, B4406-3, being the limiting material with a copper and nickel content of .15% and .49% respectively.
2. The fluence values contained in Table 6-14 of Westinghouse's WCAP-12483 report, "Analysis of Capsule U From the American Electric Power Company D. C. Cook Unit 1 Reactor Vessel Radiation Surveillance Program," dated January 1990.
3. Figure 1, NRC Regulatory Guide 1.99, Revision 2

The shift in RT<sub>NDT</sub> of the reactor vessel material has been established by removing and evaluating the material surveillance capsules installed near the inside wall of the reactor vessel in accordance with the removal schedule in Table 4.4-5. Per this schedule, Capsule U is the last capsule to be removed until Capsule S is to be removed after 32 EFPY (EOL). Capsule V, W, and Z will remain in the reactor vessel, and will be removed to address industry reactor embrittlement concerns, if required.

The pressure-temperature limit lines shown on Figure 3.4-2 for reactor criticality and for inservice leak and hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR 50.

The number of reactor vessel irradiation surveillance specimens and the frequencies for removing and testing these specimens are provided in Table 4.4-5 to assure compliance with the requirements of Appendix H to 10 CFR Part 50.

The limitations imposed on pressurizer heatup and cooldown and spray water temperature differential are provided to assure that the pressurizer is operated within the design criteria assumed for the fatigue analysis performed in accordance with the ASME Code requirements.

The OPERABILITY of two PORVs, one PORV and the RHR safety valve, or an RCS vent opening of greater than or equal to 2 square inches ensures that the RCS will be protected from pressure transients which could exceed the limits of Appendix G to 10 CFR Part 50 when one or more of the RCS cold legs are less than or equal to 152°F. Either PORV or RHR safety valve has adequate relieving capability to protect the RCS from overpressurization when the transient is limited to either (1) the start of an idle RCP with the secondary water temperature of the steam generator less than or equal to 50°F above the RCS cold leg temperatures or (2) the start of a charging pump and its injection into a water solid RCS.

## EMERGENCY CORE COOLING SYSTEM

### BASES

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps and safety injection pumps, except the required OPERABLE charging pump, to be inoperable below 152°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance requirements for throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

### 3/4.5.4 BORON INJECTION SYSTEM

The OPERABILITY of the boron injection system as part of the ECCS ensures that sufficient negative reactivity is injected into the core to counteract any positive increase in reactivity caused by RCS system cooldown. RCS cooldown can be caused by inadvertent depressurization, a loss-of-coolant accident or a steam line rupture.

The limits on injection tank minimum contained volume and boron concentration ensure that the assumptions used in the steam line break analysis are met.

The OPERABILITY of the redundant heat tracing channels associated with the boron injection system ensure that the solubility of the boron solution will be maintained above the solubility limit of 135°F at 21000 ppm boron.