

LIMITING SAFETY SYSTEM SETTINGS

BASES

RC High Temperature

The RC high temperature trip ≤ 618 F prevents the reactor outlet temperature from exceeding the design limits and acts as a backup trip for all power excursion transients.

Flux - Δ Flux/Flow

The power level trip setpoint produced by the reactor coolant system flow is based on a flux-to-flow ratio which has been established to accommodate flow decreasing transients from high power where protection is not provided by the high flux/number of reactor coolant pumps on trips.

The power level trip setpoint produced by the power-to-flow ratio provides both high power level and low flow protection in the event the reactor power level increases or the reactor coolant flow rate decreases. The power level setpoint produced by the power-to-flow ratio provides overpower DNB protection for all modes of pump operation. For every flow rate there is a maximum permissible power level, and for every power level there is a minimum permissible low flow rate. Examples of typical power level and low flow rate combinations for the pump situations of Table 2.2-1 that would result in a trip are as follows:

1. Trip would occur when four reactor coolant pumps are operating if power is 107.0% and reactor coolant flow rate is 100% of full flow rate, or flow rate is 93.5% of full flow rate and power level is 100%.
2. Trip would occur when three reactor coolant pumps are operating if power is 80.0% and reactor coolant flow rate is 74.7% of full flow rate, or flow rate is 70.0% of full flow rate and power is 75%.

For safety calculations the maximum calibration and instrumentation errors for the power level were used. Full flow rate in the above two examples is defined as the flow calculated by the heat balance at 100% power.

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BASES

The AXIAL POWER IMBALANCE boundaries are established in order to prevent reactor thermal limits from being exceeded. These thermal limits are either power peaking kW/ft limits or DNBR limits. The AXIAL POWER IMBALANCE reduces the power level trip produced by a flux-to-flow ratio such that the boundaries of Figure 2.2-1 are produced.

RC Pressure - Low, High, and Pressure Temperature

The high and low trips are provided to limit the pressure range in which reactor operation is permitted.

During a slow reactivity insertion startup accident from low power or a slow reactivity insertion from high power, the RC high pressure setpoint is reached before the high flux trip setpoint. The trip setpoint for RC high pressure, 2300 psig, has been established to maintain the system pressure below the safety limit, 2750 psig, for any design transient. The RC high pressure trip is backed up by the pressurizer code safety valves for RCS over pressure protection, and is therefore set lower than the set pressure for these valves, 2435 psig. The RC high pressure trip also backs up the high flux trip.

The RC low pressure, 1983.4 psig, and RC pressure-temperature (12.60 Tout - 5662) psig, trip setpoints have been established to maintain the DNB ratio greater than or equal to 1.30 for those design accidents that result in a pressure reduction. It also prevents reactor operation at pressures below the valid range of DNB correlation limits, protecting against DNB.

High Flux/Number of Reactor Coolant Pumps On

In conjunction with the flux - Δ flux/flow trip the high flux/number of reactor coolant pumps on trip prevents the minimum core DNBR from decreasing below 1.30 by tripping the reactor due to the loss of reactor coolant pump(s). The pump monitors also restrict the power level for the number of pumps in operation.

REACTIVITY CONTROL SYSTEMS

SAFETY ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.3.5 All safety rods shall be fully withdrawn.

APPLICABILITY: 1* and 2*#.

ACTION:

With a maximum of one safety rod not fully withdrawn, except for surveillance testing pursuant to Specification 4.1.3.1.2, within one hour either:

- a. Fully withdraw the rod or
- b. Declare the rod to be inoperable and apply Specification 3.1.3.1.

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each safety rod shall be determined to be fully withdrawn:

- a. Within 15 minutes prior to withdrawal of any regulating rod during an approach to reactor criticality.
- b. At least once per 12 hours thereafter.

*See Special Test Exception 3.10.1 and 3.10.2.

#With $K_{eff} \geq 1.0$.

REACTIVITY CONTROL SYSTEMS

REGULATING ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.6 The regulating rod groups shall be limited in physical insertion as shown on Figures 3.1-2a, -2b, and -2c and 3.1-3a, -3b, and -3c for the first 200 ± 10 EFPD of operation. If the axial power shaping rods are completely withdrawn at 200 ± 10 EFPD for extension of cycle length, then the regulating rod groups shall be limited in physical insertion as shown on Figures 3.1-2e and 3.1-3e for the remainder of the cycle. However, if the axial power shaping rods are not completely withdrawn at 200 ± 10 EFPD, then the regulating rod groups shall be limited in physical insertion as shown on Figures 3.1-2d and 3.1-3d for the remainder of the cycle. A rod group overlap of $25 \pm 5\%$ shall be maintained between sequential withdrawn groups 5, 6 and 7.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

With the regulating rod groups inserted beyond the above insertion limits (in a region other than acceptable operation), or with any group sequence or overlap outside the specified limits, except for surveillance testing pursuant to Specification 4.1.3.1.2, either:

- a. Restore the regulating groups to within the limits within 2 hours, or
- b. Reduce THERMAL POWER to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the rod group position using the above figures within 2 hours, or
- c. Be in at least HOT STANDBY within 6 hours.

NOTE: If in unacceptable region, also see Section 3/4.1.1.1.

*See Special Test Exceptions 3.10.1 and 3.10.2.

#With $k_{eff} \geq 1.0$.