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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
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CORRECTED TECHNICAL SPECIFICATION PAGES FOR THE RTD BYPASS REMOVAL AMENDMENT

Gentlemen:

Attached are four revised Technical Specification pages. These pages correct previously submitted pages that were found to contain typographical errors or omissions. Please replace, page for page, the previously submitted pages with the attached.

If you have any questions concerning this issue, please contact Mr. R. W. Prunty at (919) 836-7318.

Yours very truly,

R. B. Richey

DBB/mf

Attachment

cc: Mr. M. L. Ernst
Mr. R. Lo
Mr. L. Garner (NRC - HBR)

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are set to preclude bulk boiling at the vessel exit. An arbitrary upper safety limit of 118% thermal power is shown. This limit is based on the high flux trip including all uncertainties.

Radial power peaking factors consistent with the limit on $F_{\Delta H}$ given in Specification 3.10.2.1 have been employed in the generation of the curves in Figure 2.1-1. An additional heat flux factor of 1.03 has been included to account for fuel manufacturing tolerances and in-reactor densification of the fuel.

The safety limit curves given in Figure 2.1-1 are based on a minimum RCS flow of 97.3 x 10^6 lbm/hr. These curves would not be applicable in the case of a loss of flow transient. The evaluation of such an event would be based upon the analysis presented in Section 15.3 of the FSAR. The minimum RCS flow is 99.8 x 10^6 lbm/hr, which is the minimum thermal design flow of 97.3 x 10^6 lbm/hr with a 2.6% allowance added for instrument uncertainty associated with the precision calorimetric flow measurement.[3]

The Reactor Control and Protection System is designed to prevent any anticipated combination of transient conditions for Reactor Coolant System temperature, pressure, and thermal power level that would result in a DNB ratio of less than 1.17[2] based on steady state nominal operating power levels less than or equal to 100%, steady state moninal operating Reactor Coolant System average temperatures less than or equal to 575.4°F, and a steady state nominal operating pressure of 2235 psig. Allowances are made in initial conditions assumed for transient analyses for steady state errors of +2% in power, +4°F in Reactor Coolant System average temperature, and ±30 psi in pressure. The combined steady state errors result in the DNB ratio at the start of a transient being 10 percent less than the value at nominal full power operating conditions.

<u>Reference</u>

(1) XN-NF-711(P) Rev. 0, "XNB Addendum for 26 Inch Spacer."
(2) FSAR Section 15.
(3) WCAP-11889, "RTD Bypass Elimination Licensing Report for H. B. Robinson, Unit 2"

2.3.2 Protective instrumentation settings for reactor trip interlocks shall be as follows:

2.3.2.1 The low pressurizer pressure trip, high pressurizer level trip, and the low reactor coolant flow trip (for two or more loops) may be bypassed below 10% of rated power.

2.3.2.2 The single-loop-loss-of-flow trip may be bypassed below 45% of rated power.

2.3.3 The RCS narrow range temperature sensors response time shall be less than or equal to a 4.0 second lag time constant.

Basis

The power range reactor trip low setpoint provides protection in the power range for a power excursion beginning from lower power. This trip value was used in the safety analysis.(1)

In the power range of operation, the overpower nuclear flux reactor trip protects the reactor core against reactivity excursions which are too rapid to be protected by temperature and pressure protective circuitry. The prescribed set point, with allowance for errors, is consistent with the trip point assumed in the accident analysis.(2)

The source and intermediate range reactor trips do not appear in the specification, as these settings are not used in the transient and accident analysis (FSAR Section 15). Both trips provide protection during reactor startup. The former is set at about 10^{+5} counts/sec and the latter at a current proportional to approximately 25% of full power.

The high and low pressure reactor trips limit the pressure range in which reactor operation is permitted. The high pressurizer pressure reactor trip is also a backup to the pressurizer code safety valves for overpressure protection, and is therefore set lower than the set pressure for these valves (2485 psig). The low pressurizer pressure reactor trip also trips the reactor in the unlikely event of a loss-of-coolant accident.(3)

The overtemperature ΔT reactor trip provides core protection against DNB for all combinations of pressure, power, coolant temperature, and axial power distribution provided only that (1) the transient is slow with respect to transport to and response time of the temperature detectors (about 4 seconds), and (2) pressure is within the range between the high and low pressure reactor trips. With normal axial power distribution, the reactor trip limit, with allowance for errors,[2] is always below the core safety limit as shown in Figure 2.1-1. If axial peaks are greater than design, as indicated by the difference between top and bottom power range nuclear detectors, the reactor trip is automatically reduced according to Specification 2.3.1.2.d.

The overpower ΔT reactor trip prevents power density anywhere in the core from exceeding 118% of design power density as discussed in Section 7.2.2 of the FSAR and includes corrections for axial power distribution, change in density, and heat capacity of water with temperature, and dynamic compensation for piping delays from the core to the loop temperature detectors. The specified setpoints meet this requirement and include allowance for instrument errors.[2]

The setpoints in the Technical Specifications ensure the combination of power, temperature, and pressure will not exceed the core safety limits as shown in Figure 2.1-1.

The low flow reactor trip protects the core against DNB in the event of a sudden loss of power to one or more reactor coolant pumps. The setpoint specified is consistent with the value used in the accident analysis.[5] The undervoltage and underfrequency reactor trips protect against a decrease in flow caused by low electrical voltage or frequency. The specified setpoints assure a reactor trip signal before the low flow trip point is reached.

The high pressurizer water level reactor trip protects the pressurizer safety valves against water relief. Approximately 1150 ft^3 of water corresponds to 92% of span. The specified setpoint allows margin for instrument error[2] and transient level overshoot beyond this trip setting so that the trip function prevents the water level from reaching the safety valves.

The low-low steam generator water level reactor trip protects against loss of feedwater flow accidents. The specified set point assures that there will be sufficient water inventory in the steam generators at the time of trip to allow for starting delays for the auxiliary feedwater system.[6]

The specified reactor trips are blocked at low power where they are not required for protection and would otherwise interfere with normal plant operations. The prescribed set point above which these trips are unblocked assures their reliability in the power range where needed.

Above 10% power, an automatic reactor trip will occur if two reactor coolant pumps are lost during operation. Above 45% power, an automatic reactor trip will occur if any pump is lost. This latter trip will prevent the minimum value of the DNB ratio, DNBR, from going below 1.17 during normal operational transients and anticipated transients when only two loops are in operation and the overtemperature ΔT trip setpoint is adjusted to the value specified for three loop operation.

The turbine and steam-feedwater flow mismatch trips do not appear in the specification, as these settings are not used in the transient and accident analysis. (FSAR Section 15)

The RCS temperature measurement response time parameters define the time delay between when the OTΔT reactor trip conditions are reached and when the control rods are released and free to fall and is based on a sensor lag of 4.0 seconds for the narrow range temperature measurement with a 0.75 second electromechanical delay.[7][8][9]

References

(1) FSAR Section 15.4
(2) FSAR Section 15.0
(3) FSAR Section 15.6
(4) Deleted
(5) FSAR Section 15.3
(6) FSAR Section 15.2
(7) FSAR Section 7.2.2.2.2