

Marked-up Technical Specification Pages

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TABLE 2.2-1 (Continued)

TABLE NOTATIONS

NOTE 1: OVERTEMPERATURE  $\Delta T$

$$\Delta T \left( \frac{1 + \tau_1 S}{1 + \tau_2 S} \right) \left( \frac{1}{1 + \tau_3 S} \right) \leq \Delta T_0 \{ K_1 - K_2 \left( \frac{1 + \tau_4 S}{1 + \tau_5 S} \right) [ T \left( \frac{1}{1 + \tau_6 S} \right) - T' ] + K_3 (P - P') \} - f_1(\Delta I)$$

Where:  $\Delta T$  = Measured  $\Delta T$  by RTD Manifold Instrumentation;

$\frac{1 + \tau_1 S}{1 + \tau_2 S}$  = Lead-lag compensator on measured  $\Delta T$ ;

$\tau_1, \tau_2$  = Time constants utilized in lead-lag compensator for  $\Delta T$ ,  $\tau_1 = 8$  s,  $\tau_2 = 3$  s;

$\frac{1}{1 + \tau_3 S}$  = Lag compensator on measured  $\Delta T$ ;

$\tau_3$  = Time constant utilized in the lag compensator for  $\Delta T$ ,  $\tau_3 = 0$  s;

$\Delta T_0$  = ~~61.0°F~~ (Referenced  $\Delta T$  at DESIGN THERMAL POWER);

$K_1$  = ~~Estimated~~  $\Delta T$  at RATED THERMAL POWER;

= 1.15;

$K_2$  = 0.0251/°F;

$\frac{1 + \tau_4 S}{1 + \tau_5 S}$  = The function generated by the lead-lag compensator for  $T_{avg}$  dynamic compensation;

$\tau_4, \tau_5$  = Time constants utilized in the lead-lag compensator for  $T_{avg}$ ,  $\tau_4 = 28$  s,  $\tau_5 = 4$  s;

$T$  = Average temperature, °F;

$\frac{1}{1 + \tau_6 S}$  = Lag compensator on measured  $T_{avg}$ ;

$\tau_6$  = Time constant utilized in the measured  $T_{avg}$  lag compensator,  $\tau_6 = 0$  s;

TABLE 2.2-1 (Continued)  
 TABLE NOTATIONS (Continued)

NOTE 3: OVERPOWER  $\Delta T$

$$\Delta T \left( \frac{1 + \tau_1 S}{1 + \tau_2 S} \right) \left( \frac{1 + \tau_1 S}{1 + \tau_3 S} \right) \leq \Delta T_0 \left[ K_4 - K_5 \left( \frac{\tau_7 S}{1 + \tau_7 S} \right) \left( \frac{1}{1 + \tau_6 S} \right) T - K_6 \left[ T \left( \frac{1}{1 + \tau_6 S} \right) - T^u \right] - f_2(\Delta I) \right]$$

- Where:  $\Delta T$  = Measured  $\Delta T$  by RTD Manifold Instrumentation;  
 $\frac{1 + \tau_1 S}{1 + \tau_2 S}$  = Lead-lag compensator on measured  $\Delta T$ ;  
 $\tau_1, \tau_2$  = Time constants utilized in lead-lag compensator for  $\Delta T$ ,  $\tau_1 = 8$  s.,  $\tau_2 = 3$  s;  
 $\frac{1}{1 + \tau_3 S}$  = Lag compensator on measured  $\Delta T$ ;  
 $\tau_3$  = Time constant utilized in the lag compensator for  $\Delta T$ ,  $\tau_3 = 0$  s;  
 $\Delta T_0$  = ~~61.0°F~~ (Referenced  $\Delta T$  at DESIGN THERMAL POWER);  
 $K_4$  = ~~Indicated  $\Delta T$  at RATED THERMAL POWER~~;  
 $K_5$  = 1.080;  
 $K_6$  = 0.02/°F for increasing average temperature and 0 for decreasing average temperature;  
 $\frac{\tau_7 S}{1 + \tau_7 S}$  = The function generated by the rate-lag compensator for  $T_{avg}$  dynamic compensation;  
 $\tau_7$  = Time constant utilized in the rate-lag compensator for  $T_{avg}$ ,  $\tau_7 = 10$  s;  
 $\frac{1}{1 + \tau_6 S}$  = Lag compensator on measured  $T_{avg}$ ;  
 $\tau_6$  = Time constant utilized in the measured  $T_{avg}$  lag compensator,  $\tau_6 = 0$  s;

LIMITING SAFETY SYSTEM SETTINGS

BASES

Intermediate and Source Range, Neutron Flux

The Intermediate and Source Range, Neutron Flux trips provide core protection during reactor startup to mitigate the consequences of an uncontrolled rod cluster control assembly bank withdrawal from a subcritical condition. These trips provide redundant protection to the Low Setpoint trip of the Power Range, Neutron Flux channels. The Source Range channels will initiate a Reactor trip at about  $10^5$  counts per second unless manually blocked when P-6 becomes active. The Intermediate Range channels will initiate a Reactor trip at a current level equivalent to approximately 25% of RATED THERMAL POWER unless manually blocked when P-10 becomes active.

Overtemperature  $\Delta T$

The Overtemperature  $\Delta T$  trip provides core protection to prevent DNB for all combinations of pressure, power, coolant temperature, and axial power distribution, provided that the transient is slow with respect to piping transit delays from the core to the temperature detectors (about 4 seconds), and pressure is within the range between the Pressurizer High and Low Pressure trips. The Setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water and includes dynamic compensation for piping delays from the core to the loop temperature detectors, (2) pressurizer pressure, and (3) axial power distribution. With normal axial power distribution, this Reactor trip limit 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 the notations in Table 2.2-1.

Insert A →

Overpower  $\Delta T$

The Overpower  $\Delta T$  trip provides assurance of fuel integrity (e.g., no fuel pellet melting and less than 1% cladding strain) under all possible overpower conditions, limits the required range for Overtemperature  $\Delta T$  trip, and provides a backup to the High Neutron Flux trip. The Setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water, and (2) rate of change of temperature for dynamic compensation for piping delays from the core to the loop temperature detectors, to ensure that the allowable heat generation rate (kW/ft) is not exceeded. The Overpower  $\Delta T$  trip provides protection to mitigate the consequences of various size steam breaks as reported in WCAP-9226, "Reactor Core Response to Excessive Secondary Steam Releases."

Insert A →

TABLE 4.3-1 (Continued)

TABLE NOTATIONS

\*Only if the Reactor Trip System breakers happen to be closed and the Control Rod Drive System is capable of rod withdrawal.

#The specified 18 month frequency may be waived for Cycle I provided the surveillance is performed prior to restart following the first refueling outage or June 1, 1986, whichever occurs first. The provisions of Specification 4.0.2 are reset from performance of this surveillance.

##Below P-6 (Intermediate Range Neutron Flux interlock) Setpoint.

###Below P-10 (Low Setpoint Power Range Neutron Flux interlock) Setpoint.

- (1) If not performed in previous 31 days.
- (2) Comparison of calorimetric to excore power indication above 15% of RATED THERMAL POWER. Adjust excore channel gains consistent with calorimetric power if absolute difference is greater than 2%. The provisions of Specification 4.0.4 are not applicable for entry into MODE 2 or 1.
- (3) Single point comparison of incore to excore AXIAL FLUX DIFFERENCE above 15% of RATED THERMAL POWER. Recalibrate if the absolute difference is greater than or equal to 3%. The provisions of Specification 4.0.4 are not applicable for entry into MODE 2 or 1.
- (4) Neutron detectors may be excluded from CHANNEL CALIBRATION.
- (5) Detector plateau curves shall be obtained, evaluated and compared to manufacturer's data. For the Intermediate Range and Power Range Neutron Flux channels the provisions of Specification 4.0.4 are not applicable for entry into MODE 2 or 1.
- (6) Incore - Excore Calibration, above 75% of RATED THERMAL POWER. The provisions of Specification 4.0.4 are not applicable for entry into MODE 2 or 1. *Insert B*
- (7) Each train shall be tested at least every 62 days on a STAGGERED TEST BASIS. The TRIP ACTUATING DEVICE OPERATIONAL TEST shall independently verify the OPERABILITY of the Undervoltage and Shunt Trip Attachments of the Reactors Trip Breakers.
- (8) Deleted
- (9) Quarterly surveillance in MODES 3\*, 4\*, and 5\* shall also include verification that permissives P-6 and P-10 are in their required state for existing plant conditions by observation of the permissive annunciator window. Quarterly surveillance shall include verification of the Boron Dilution Alarm Setpoint of less than or equal to an increase of twice the count rate within a 10-minute period.
- (10) Setpoint verification is not required.
- (11) Following maintenance or adjustment of the Reactor trip breakers, the TRIP ACTUATING DEVICE OPERATIONAL TEST shall include independent verification of the Undervoltage and Shunt trips.
- (12) At least once per 18 months during shutdown, verify that on a simulated Boron Dilution Doubling test signal the normal CVCS discharge valves will close and the centrifugal charging pumps suction valves from the RWST will open within 30 seconds.

#### Insert A

Delta-T<sub>o</sub>, as used in the Overtemperature and Overpower Delta-T trips, represents the 100% RTP value as measured by the plant for each loop. This normalizes each loop's  $\Delta T$  trips to the actual operating conditions existing at the time of measurement, thus forcing the trip to reflect the equivalent full power conditions as assumed in the accident analyses. These differences in vessel  $\Delta T$  can arise due to several factors, the most prevalent being measured RCS loop flows greater than Minimum Measured Flow, and slightly asymmetric power distributions between quadrants. While RCS loop flows are not expected to change with cycle life, radial power redistribution between quadrants may occur, resulting in small changes in loop specific vessel  $\Delta T$  values. Accurate determination of the loop specific vessel  $\Delta T$  value should be made when performing the Incore/Excore quarterly recalibration and under steady state conditions (i.e., power distributions not affected by Xe or other transient conditions).

#### Insert B

Determination of the loop specific vessel  $\Delta T$  value should be made when performing the Incore/Excore quarterly recalibration, under steady state conditions.