TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION

NOTE 1: OVERTEMPERATURE ΔT

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

Where:

ΔT	=	Measured ΔT by Loop Narrow Range RTD,
ΔT_0	=	Indicated ΔT at RATED THERMAL POWER,
$\frac{1+\tau_1 S}{1+\tau_2 S}$	=	Lead-lag compensator on measured ΔT,
τ_1, τ_2	=	Time constants utilized in the lead-lag controller for ΔT, as presented in the Core Operating Limits Report,
$\frac{1}{1+\tau_3}$	=	Lag compensator on measured ΔT,
τ_3	=	Time constant utilized in the lag compensator for ΔT, as presented in the Core Operating Limits Report,
K_1	=	Overtemperature ΔT reactor trip setpoint as presented in the Core Operating Limits Report,
K_2	=	Overtemperature ΔT reactor trip heatup setpoint penalty coefficient as presented in the Core Operating Limits Report,
$\frac{1+\tau_4 S}{1+\tau_5 S}$	=	The function generated by the lead-lag controller for T_{avg} dynamic compensation,
τ_4, τ_5	=	Time constants utilized in the lead-lag controller for T_{avg}, as presented in the Core Operating Limits Report,
T	=	Average temperature, °F,
$\frac{1}{1+\tau_6 S}$	=	Lag compensator on measured T_{avg},

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION (Continued)

NOTE 1: (Continued)

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, as presented in the Core Operating Limits Report,

T′ = ≤ 588.2 °F Reference T_{avg} at RATED THERMAL POWER,

K_3 = Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient as presented in the Core Operating Limits Report,

P = Pressurizer pressure, psig,

P′ = 2235 psig (Nominal RCS operating pressure),

S = Laplace transform operator, sec^{-1},

and $f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_1(\Delta I)$ breakpoints as presented in the Core Operating Limits Report; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than the $f_1(\Delta I)$ "negative" breakpoint presented in the Core Operating Limits Report, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "negative" slope presented in the Core Operating Limits Report; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than the $f_1(\Delta I)$ "positive" breakpoint presented in the Core Operating Limits Report, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "positive" slope presented in the Core Operating Limits Report.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION (Continued)

T = As defined in Note 1,

T'' = ≤ 588.2 °F Reference T_{avg} at RATED THERMAL POWER,

S = As defined in Note 1, and

$f_2(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_2(\Delta I)$ breakpoints as presented in the Core Operating Limits Report; $f_2(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than the $f_2(\Delta I)$ "negative" breakpoint presented in the Core Operating Limits Report, the ΔT Trip Setpoint shall be automatically reduced by the $f_2(\Delta I)$ "negative" slope presented in the Core Operating Limits Report; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than the $f_2(\Delta I)$ "positive" breakpoint presented in the Core Operating Limits Report, the ΔT Trip Setpoint shall be automatically reduced by the $f_2(\Delta I)$ "positive" slope presented in the Core Operating Limits Report.

Note 3: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 4.4% of Rated Thermal Power.

Note 4: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 3.0% of Rated Thermal Power.

BORATION SYSTEMS (Continued)

Refueling Water Storage Tank Requirements for Maintaining SDM - Modes 1-4

Required volume for maintaining SDM	presented in the COLR
Unusable volume (below nozzle)	16,000 gallons
Additional margin	17,893 gallons

With the RCS temperature below 200°F, one Boron Injection System is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single Boron Injection System becomes inoperable.

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable below 300°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% delta k/k after xenon decay and cooldown from 200°F to 140°F. The minimum borated water volumes and concentrations required to maintain shutdown margin for the Boric Acid Storage System and the Refueling Water Storage Tank are presented in the Core Operating Limits Report.

The Technical Specification LCO value for the Boric Acid Storage Tank and the Refueling Water Storage Tank minimum contained water volume during Modes 5 and 6 is based on the required volume to maintain shutdown margin, an allowance for unusable volume and additional margin as follows:

Boric Acid Storage Tank Requirements for Maintaining SDM - Modes 5 & 6

Required volume for maintaining SDM	presented in the COLR
Unusable volume (to maintain full suction pipe)	4,132 gallons
Additional margin	1,415 gallons

Refueling Water Storage Tank Requirements for Maintaining SDM - Modes 5 & 6

Required volume for maintaining SDM	presented in the COLR
Unusable volume (below nozzle)	16,000 gallons
Additional margin	6,500 gallons

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics.