LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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TABLE 2.2-1

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Manual Reactor Trip	N.A.	N.A.
2. Power Range, Neutron Flux		
a. Low Setpoint	≤ 25% of RATED THERMAL POWER	≤ 26% of RATED THERMAL POWER
b. High Setpoint	≤ 109% of RATED THERMAL POWER	≤ 110% of RATED THERMAL POWER
3. Power Range, Neutron Flux High Positive Rate	≤ 5% of RATED THERMAL POWER with a time constant ≥ 2 seconds	≤ 5.5% of RATED THERMAL POWER with a time constant ≥ 2 seconds
4. Power Range, Neutron Flux High Negative Rate	≤ 5% of RATED THERMAL POWER with a time constant ≥ 2 seconds	≤ 5.5% of RATED THERMAL POWER with a time constant ≥ 2 seconds
5. Intermediate Range, Neutron Flux	≤ 25% of RATED THERMAL POWER	≤ 30% of RATED THERMAL POWER
6. Source Range, Neutron Flux	≤ 10^5 counts per second	≤ 1.3 x 10^5 counts per second
7. Overtemperature ΔT	See Note 1	See Note 2
8. Overpower ΔT	See Note 3	See Note 4
9. Pressurizer Pressure-Low	≥ 1950 psig	≥ 1940 psig
10. Pressurizer Pressure-High	≤ 2385 psig	≤ 2395 psig
11. Pressurizer Water Level-High	≤ 92% of instrument span	≤ 93% of instrument span
12. Reactor Coolant Flow-Low	≥ 90% of design flow per loop* for Unit 2 Cycle 3 ≥ 90% of minimum measured flow** per loop for Units 1 and 2 Cycle 4 and after	≥ 89% of design flow per loop* for Unit 2 Cycle 3 ≥ 88.9% of minimum measured flow** per loop for Units 1 and 2 Cycle 4 and after

*Design flow is 88,500 gpm per loop for Unit 2.
**Minimum measured flow is 89,800 gpm per loop for Unit 1 and 90,625 gpm per loop for Unit 2.

Amendment Nos. 37 and 36
Effective at end of Unit 1 Cycle 3

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

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FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
13. Steam Generator Water Level-Low-Low	≥ 7.2% of narrow range instrument span-each steam generator	≥ 6.2% of narrow range instrument span-each steam generator
14. Steam Generator Water Level-Low Coincident with Steam/Feedwater Flow Mismatch*	≥ 7.2% of narrow range instrument span-each steam generator < 40% of full steam flow at RATED THERMAL POWER	≥ 6.2% of narrow range instrument span-each steam generator < 42.5% of full steam flow at RATED THERMAL POWER
15. Undervoltage-Reactor Coolant Pumps	≥ 8050 volts-each bus	≥ 7935 volts-each bus
16. Underfrequency-Reactor Coolant Pumps	≥ 54.0 Hz - each bus	≥ 53.9 Hz - each bus
17. Turbine Trip		
a. Low Autostop Oil Pressure	≥ 50 psig	≥ 45 psig
b. Turbine Stop Valve Closure	≥ 1% open	≥ 1% open
18. Safety Injection Input from ESF	N.A.	N.A.
19. Reactor Coolant Pump Breaker Position Trip	N.A.	N.A.
20. Reactor Trip Breakers	N.A.	N.A.
21. Automatic Trip and Interlock Logic	N.A.	N.A.

*The steam generator water level-low coincident with steam/feedwater flow mismatch trip is not required upon completion of the digital feedwater control system installation.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

TABLE NOTATIONS

NOTE 1: OVERTEMPERATURE ΔT

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

Where: ΔT_0 = Indicated ΔT at RATED THERMAL POWER;

T = Average temperature, °F;

T' = $\leq$ 576.6°F for Unit 1 and $\leq$ 577.6°F for Unit 2 Reference T_{avg} at RATED THERMAL POWER;

P = Pressurizer pressure, psig;

P' = 2235 psig (indicated RCS nominal operating pressure);

$\frac{1+\tau_1 S}{1+\tau_2 S}$ = The function generated by the lead-lag controller for T_{avg} dynamic compensation;

τ_1 & τ_2 = Time constants utilized in the lead-lag controller for T_{avg}, τ_1 = 30 s, τ_2 = 4 s;

S = Laplace transform operator, s^{-1};

K_1 = 1.200 (Units 1 and 2 Cycle 4 and after);

K_1 = 1.166 (Unit 2 Cycle 3);

K_2 = 0.01817/°F (Units 1 and 2 Cycle 4 and after);

K_2 = 0.01149/°F (Unit 2 Cycle 3);

K_3 = 0.000831/psig (Units 1 and 2 Cycle 4 and after);

K_3 = 0.000502/psig (Unit 2 Cycle 3);

Amendment Nos. 37 and 36
Effective at end of Unit 1 Cycle 3

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TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

TABLE NOTATIONS (Continued)

NOTE 1 (Continued)

and f_1 (ΔI) 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 - 19% and + 9% (Units 1 and 2 Cycle 4 and after) and -32% and +9% (Unit 2 Cycle 3), f_1 (ΔI) = 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 that the magnitude of ($q_t - q_b$) exceeds - 19% (Units 1 and 2 Cycle 4 and after) and - 32% (Unit 2 Cycle 3) the ΔT Trip Setpoint shall be automatically reduced by 2.75% (Units 1 and 2 Cycle 4 and after) and 2.02% (Unit 2 Cycle 3) of its value at RATED THERMAL POWER.

(iii) for each percent that the magnitude of ($q_t - q_b$) exceeds + 9%, (Units 1 and 2 Cycle 4 and after) and 9% (Unit 2 Cycle 3) the ΔT Trip Setpoint shall be automatically reduced by 1.76% (Units 1 and 2 Cycle 4 and after) and 1.454% (Unit 2 Cycle 3) of its value at RATED THERMAL POWER.

NOTE 2: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 3.2% for Units 1 and 2 Cycle 4 and after, and 4% for Unit 2 Cycle 3.

Amendment Nos. 37 and 36
Effective at end of Unit 1 Cycle 3

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

TABLE NOTATIONS (Continued)

NOTE 3: OVERPOWER ΔT

$$\Delta T \leq \Delta T_0 [K_4 - K_5 \left(\frac{\tau_3 S}{1+\tau_3 S}\right) T - K_6 (T - T'') - f_2(\Delta I)]$$

Where: ΔT_0 = Indicated ΔT at rated power;

T = Average temperature, °F;

T'' = ≤ 576.6°F for Unit 1 and ≤ 577.6°F for Unit 2 Reference T_{avg} at RATED THERMAL POWER;

K_4 = 1.072 (Units 1 and 2 Cycle 4 and after);

K_4 = 1.079 (Unit 2 Cycle 3)

K_5 = 0.0174/°F for increasing average temperature and 0 for decreasing average temperature;

K_6 = 0.00145/°F for $T > T''$; $K_6 = 0$ for $T \leq T''$; (Units 1 and 2 Cycle 4 and after)

K_6 = 0.00121/°F for $T > T''$; $K_6 = 0$ for $T \leq T''$; (Unit 2 Cycle 3)

$\frac{\tau_3 S}{1+\tau_3 S}$ = The function generated by the rate lag controller for T_{avg} dynamic compensation;

τ_3 = Time constant utilized in the rate lag controller for T_{avg} τ_3 = 10 s;

S = Laplace transform operator, s^{-1}; and

$f_2(\Delta I)$ = 0 for all ΔI.

NOTE 4: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 2.6% for Units 1 and 2 Cycle 4 and after, and 3% for Unit 2 Cycle 3.

Effective at end of Unit 1 Cycle 3 Amendment Nos. 37 and 36

Steam Generator Water Level

The Steam Generator Water Level Low-Low trip protects the reactor from loss of heat sink in the event of a sustained steam/feedwater flow mismatch resulting from loss of normal feedwater. The specified Setpoint provides allowances for starting delays of the Auxiliary Feedwater System.

Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level*

The Steam/Feedwater Flow Mismatch in coincidence with a Steam Generator Low Water Level trip is not used in the transient and accident analyses but is included in Table 2.2-1 to ensure the functional capability of the specified trip settings and thereby enhance the overall reliability of the Reactor Trip System. This trip is redundant to the Steam Generator Water Level Low-Low trip. The Steam/Feedwater Flow Mismatch portion of this trip is activated when the steam flow exceeds the feedwater flow by greater than or equal to 1.45×10^6 lbs/hr for Unit 1 and 1.49×10^6 lbs/hr for Unit 2. The Steam Generator Low Water level portion of the trip is activated when the water level drops below 7.2%, as indicated by the narrow range instrument. These trip values include sufficient allowance in excess of normal operating values to preclude spurious trips but will initiate a Reactor trip before the steam generators are dry. Therefore, the required capacity and starting time requirements of the auxiliary feedwater pumps are reduced and the resulting thermal transient on the Reactor Coolant System and steam generators is minimized.

Undervoltage and Underfrequency - Reactor Coolant Pump Busses

The Undervoltage and Underfrequency Reactor Coolant Pump Bus trips provide core protection against DNB as a result of complete loss of forced coolant flow. The specified Setpoints assure a Reactor trip signal is generated before the Low Flow Trip Setpoint is reached. Time delays are incorporated in the Underfrequency and Undervoltage trips to prevent spurious Reactor trips from momentary electrical power transients. For undervoltage, the delay is set so that the time required for a signal to reach the Reactor trip breakers following the simultaneous trip of two or more reactor coolant pump bus circuit breakers shall not exceed 0.9 seconds. For underfrequency, the delay is set so that the time required for a signal to reach the Reactor trip breakers after the Underfrequency Trip Setpoint is reached shall not exceed 0.3 seconds. On decreasing power, the Undervoltage and Underfrequency Reactor Coolant Pump Bus trips are automatically blocked by P-7 (a power level of approximately 10% of RATED THERMAL POWER with a turbine impulse chamber pressure at approximately 10% of full power equivalent); and on increasing power, reinstated automatically by P-7.

*Note: The steam generator water level-low coincident with steam/feedwater flow mismatch trip is not required upon completion of the digital feedwater control system installation.

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} GREATER THAN 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.6% Δk/k.

APPLICABILITY: MODES 1, 2*, 3, and 4.

ACTION:

For Unit 1 and 2, Cycle 4:

With the SHUTDOWN MARGIN less than 1.6% Δk/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

For Unit 1 and 2, Cycle 5 and after:

With the SHUTDOWN MARGIN less than 1.6% Δk/k, immediately initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7,000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.6% Δk/k:

a. Within 1 hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod is immovable or untrippable, the above required SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable control rod(s);

b. When in MODES 1 or 2 with K_{eff} greater than or equal to 1, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6;

c. When in MODE 2 with K_{eff} less than 1, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.6;

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of Specification 4.1.1.1.1e., below, with the control banks at the maximum insertion limit of Specification 3.1.3.6; and

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*See Special Test Exceptions Specification 3.10.1.

SHUTDOWN MARGIN - T_{avg} LESS THAN OR EQUAL TO 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be greater than or equal to 1% Δk/k.

APPLICABILITY: MODE 5.

ACTION:

For Unit 1 and 2, Cycle 4:

With the SHUTDOWN MARGIN less than 1% Δk/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

For Unit 1 and 2, Cycle 5 and after:

With the SHUTDOWN MARGIN less than 1% Δk/k, immediately initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7,000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1% Δk/k:

a. Within 1 hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod is immovable or untrippable, the SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable control rod(s); and

b. At least once per 24 hours by consideration of the following factors:

   1) Reactor Coolant System boron concentration,

   2) Control rod position,

   3) Reactor Coolant System average temperature,

   4) Fuel burnup based on gross thermal energy generation,

   5) Xenon concentration, and

   6) Samarium concentration.

3/4.1.2 BORATION SYSTEMS

FLOW PATH - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE with motor-operated valves required to change position and pumps required to operate for boron injection capable of being powered from an OPERABLE emergency power source:

a. A flow path from the boric acid tanks via a boric acid transfer pump and charging pump to the Reactor Coolant System if the boric acid storage tank in Specification 3.1.2.5a. is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if the refueling water storage tank in Specification 3.1.2.5b. is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

For Unit 1 and 2, Cycle 4:

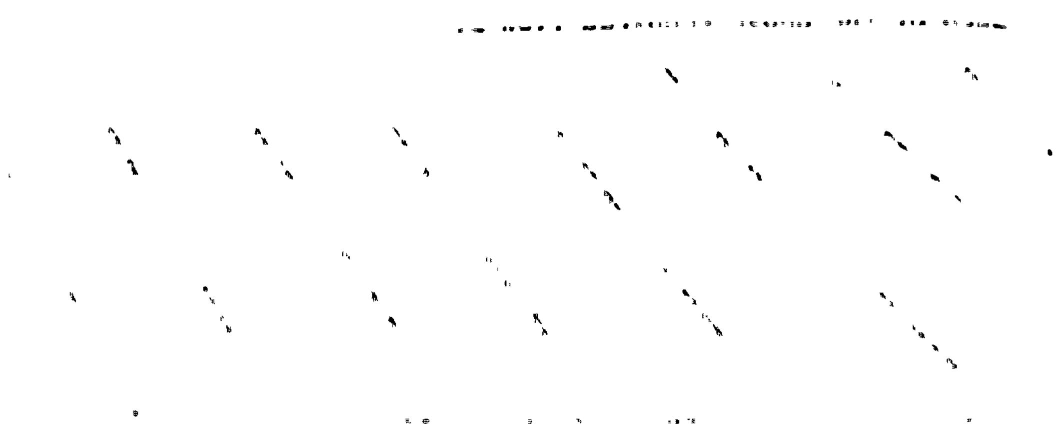
a. At least once per 7 days by verifying that the temperature of the heat traced portion of the flow path is greater than or equal to 145°F when a flow path from the boric acid tanks is used, and

b. At least once per 31 days by verifying that each valve (manual, power-operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position, or

For Unit 1 and 2, Cycle 5 and after:

a. At least once per 7 days by verifying that the temperature of the flow path is greater than or equal to 65°F when a flow path from the boric acid tanks is used, and

b. At least once per 31 days by verifying that each valve (manual, power-operated or automatic) in the flow path that is not locked, sealed or otherwise securied in position, is in its correct position.



FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 Each of the following boron injection flow paths shall be OPERABLE:

a. The flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the Reactor Coolant System (RCS), and

b. The flow path from the refueling water storage tank via a charging pump to the RCS.

APPLICABILITY: MODES 1, 2, 3 and 4#.

ACTION:

a. With the flow path from the boric acid tanks inoperable, restore the inoperable flow path to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the flow path to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the flow path from the refueling water storage tank inoperable, restore the flow path to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 Each of the above required flow paths shall be demonstrated OPERABLE:

For Unit 1 and 2, Cycle 4:

a. At least once per 7 days by verifying that the temperature of the heat traced portion of the flow path from the boric acid tanks is greater than or equal to 145°F,

b. At least once per 31 days by verifying that each valve (manual, power-operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position,

c. At least once per 18 months by verifying that each automatic valve in the flow path actuates to its correct position on a safety injection test signal, and

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#Only one boron injection flow path is required to be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 323°F.

SURVEILLANCE REQUIREMENTS (Continued)

d. At least once per 18 months by verifying that the flow path required by Specification 3.1.2.2a. delivers at least 10 gpm to the RCS.

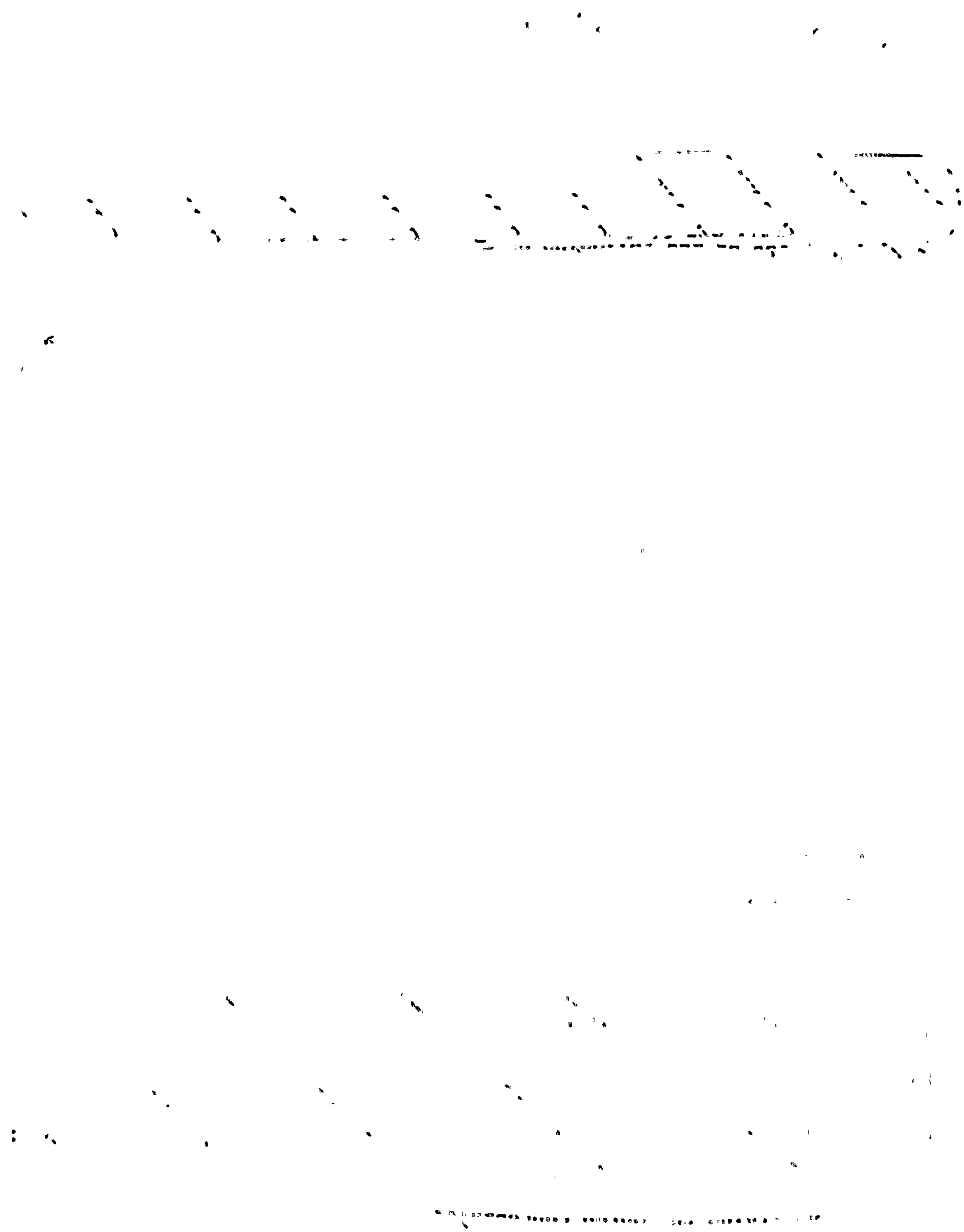
For Unit 1 and 2, Cycle 5 and after:

a. At least once per 7 days by verifying that the temperature of the flow path from the boric acid tanks is greater than or equal to 65°F.

b. At least once per 31 days by verifying that each valve (manual, power-operated or automatic) in the flow path that is not locked, sealed or otherwise secured in position, is in its correct position.

c. At least once per 18 months by verifying that each automatic valve in the flow path actuates to its correct position on a safety injection test signal, and

d. At least once per 18 months by verifying that the flow path required by Specification 3.1.2.2a delivers at least 30 gpm to the RCS.



BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 As a minimum, one of the following borated water sources shall be OPERABLE:

For Unit 1 and 2, Cycle 4:

a. A Boric Acid Storage System and at least one associated heat tracing channel with:

1) A minimum contained borated water volume of 835 gallons,
2) A boron concentration between 20,000 and 22,500 ppm, and
3) A minimum solution temperature of 145°F.

b. The Refueling Water Storage Tank (RWST) with:

1) A minimum contained borated water volume of 50,000 gallons,
2) A minimum boron concentration of 2300 ppm, and
3) A minimum solution temperature of 35°F, or

For Unit 1 and 2, Cycle 5 and after:

a. A Boric Acid Storage System with:

1) A minimum contained borated water volume of 2,499 gallons,
2) A boron concentration between 7,000 and 7,700 ppm, and
3) A minimum solution temperature of 65°F.

b. The Refueling Water Storage Tank (RWST) with:

1) A minimum contained borated water volume of 50,000 gallons,
2) A minimum boron concentration of 2300 ppm, and
3) A minimum solution temperature of 35°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.5 The above required borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1) Verifying the boron concentration of the water,
2) Verifying the contained borated water volume, and
3) Verifying the boric acid storage tank solution temperature when it is the source of borated water.

b. At least once per 24 hours by verifying the RWST temperature when it is the source of borated water and the outside ambient air temperature is less than 35°F.

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 Each of the following borated water source(s) shall be OPERABLE:

For Unit 1 and 2, Cycle 4:

a. A Boric Acid Storage System and at least one associated heat tracing channel with:

1) A minimum contained borated water volume of 5106 gallons,
2) A boron concentration between 20,000 and 22,500 ppm, and
3) A minimum solution temperature of 145°F.

b. The Refueling Water Storage Tank (RWST) with:

1) A contained borated water volume of greater than or equal to 400,000 gallons,
2) A boron concentration between 2300 and 2500 ppm, and
3) A minimum solution temperature of 35°F, or

For Unit 1 and 2, Cycle 5 and after:

a. A Boric Acid Storage System with:

1) A minimum contained borated water volume of 14,042 gallons,
2) A boron concentration between 7,000 and 7,700 ppm, and
3) A minimum solution temperature of 65°F.

b. The Refueling Water Storage Tank (RWST) with:

1) A contained borated water volume of greater than or equal to 400,000 gallons,
2) A boron concentration between 2300 and 2500 ppm, and
3) A minimum solution temperature of 35°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the Boric Acid Storage System inoperable, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1% Δk/k at 200°F; restore the Boric Acid Storage System to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

[illegible]

ROD DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The individual full-length shutdown and control rod drop time from the fully withdrawn position shall be less than or equal to 2.7 seconds for Units 1 and 2 Cycle 4 and after, and 2.2 seconds for Unit 2 Cycle 3 from beginning of decay of stationary gripper coil voltage to dashpot entry with:

a. T_{avg} greater than or equal to 541°F, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

With the drop time of any full-length rod determined to exceed the above limit, restore the rod drop time to within the above limit prior to proceeding to MODE 1 or 2.

SURVEILLANCE REQUIREMENTS

4.1.3.4 The rod drop time of full-length rods shall be demonstrated through measurement prior to reactor criticality:

a. For all rods following each removal of the reactor vessel head,

b. For specifically affected individual rods following any maintenance on or modification to the Control Rod Drive System which could affect the drop time of those specific rods, and

c. At least once per 18 months.

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TABLE 3.2-1

DNB PARAMETERS

PARAMETER	LIMITS
Actual Reactor Coolant System T_{avg}	≤ 584.3°F (Units 1 and 2 Cycle 4 and after)
	≤ 582°F (Unit 2 Cycle 3)
Actual Pressurizer Pressure	≥ 2212 psia* (Units 1 and 2 Cycle 4 and after)
	≥ 2220 psia* (Unit 2 Cycle 3)

*Limit not applicable during either a THERMAL POWER ramp in excess of 5% RATED THERMAL POWER per minute or a THERMAL POWER step in excess of 10% RATED THERMAL POWER.

TABLE 3.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
12. Reactor Coolant Flow-Low					
a. Single Loop (Above P-8)	3/loop	2/loop in one loop	2/loop in each loop	1	6
b. Two Loops (Above P-7 and below P-8)	3/loop	2/loop in two loops	2/loop in each loop	1	6
13. Steam Generator Water Level-Low-Low	3/S.G.	2/S.G. in one S.G.	2/S.G. in each S.G.	1, 2	6
14. Steam Generator Water Level-Low Coincident With Steam/Feedwater Flow Mismatch*	2 S.G. level and 2 stm./feed flow mismatch per S.G.	1 S.G. level coincident with 1 stm./feed flow mismatch in same S.G.	1 S.G. level and 2 stm./feed flow mismatch, or 2 S.G. level and 1 stm./feed flow mismatch per S.G.	1, 2	6
15. Undervoltage-Reactor Coolant Pumps	2/bus	1/bus both busses	1/bus	1	6
16. Underfrequency-Reactor Coolant Pumps	3/bus	2 on same bus	2/bus	1	6
17. Turbine Trip					
a. Low Autostop Oil Pressure	3	2	2	1	7
b. Turbine Stop Valve Closure	4	4	4	1	7

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*The steam generator water level-low coincident with steam/feedwater flow mismatch trip is not required upon completion of the digitial feedwater control system installation.

TABLE 3.3-2

REACTOR TRIP SYSTEM INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
1. Manual Reactor Trip	N.A.
2. Power Range, Neutron Flux	≤ 0.5 second*
3. Power Range, Neutron Flux, High Positive Rate	N.A.
4. Power Range, Neutron Flux, High Negative Rate	≤ 0.5 second*
5. Intermediate Range, Neutron Flux	N.A.
6. Source Range, Neutron Flux	≤ 0.5 second*
7. Overtemperature ΔT	≤ 4 seconds*
8. Overpower ΔT	N.A.
9. Pressurizer Pressure-Low	≤ 2 seconds
10. Pressurizer Pressure-High	≤ 2 seconds
11. Pressurizer Water Level-High	N.A.
12. Reactor Coolant Flow-Low	
a. Single Loop (Above P-8)	≤ 1 second
b. Two Loops (Above P-7 and below P-8)	≤ 1 second
13. Steam Generator Water Level-Low-Low	≤ 2 seconds
14. Steam Generator Water Level-Low Coincident With Steam/Feedwater Flow Mismatch** (DELETED)	N.A.
15. Undervoltage-Reactor Coolant Pumps	≤ 1.2 seconds
16. Underfrequency-Reactor Coolant Pumps	≤ 0.6 second

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

**The steam generator water level-low coincident with steam/feedwater flow mismatch trip is not required upon completion of the digital feedwater control system installation.

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TABLE 4.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

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FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
13. Steam Generator Water Level-Low-Low	S	R	Q	N.A.	N.A.	1, 2
14. Steam Generator Water Level-Low Coincident with Steam/Feedwater Flow Mismatch*	S	R	Q	N.A.	N.A.	1, 2
15. Undervoltage-Reactor Coolant Pumps	N.A.	R	N.A.	Q	N.A.	1
16. Underfrequency-Reactor Coolant Pumps	N.A.	R	N.A.	Q	N.A.	1
17. Turbine Trip						
a. Low Fluid Oil Pressure	N.A.	N.A.	N.A.	S/U(1, 9)	N.A.	1
b. Turbine Stop Valve Closure	N.A.	N.A.	N.A.	S/U(1, 9)	N.A.	1
18. Safety Injection Input from ESF	N.A.	N.A.	N.A.	R	N.A	1, 2
19. Reactor Coolant Pump Breaker Position Trip	N.A.	N.A.	N.A.	R	N.A.	1
20. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	N.A.	R(4)	R	N.A.	N.A.	2##
b. Low Power Reactor Trips Block, P-7	N.A.	R(4)	R	N.A.	N.A.	1
c. Power Range Neutron Flux, P-8	N.A.	R(4)	R	N.A.	N.A.	1

*The steam generator water level-low coincident with steam/feedwater flow mismatch trip is not required upon completion of the digital feedwater control system installation.

TABLE 3.3-4

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Safety Injection (Reactor Trip, Feedwater Isolation, Start Diesel Generators, Containment Fan Cooler Units, and Component Cooling Water)		
a. Manual Initiation	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays	N.A.	N.A.
c. Containment Pressure-High	≤ 3 psig	≤ 3.5 psig
d. Pressurizer Pressure-Low	≥ 1850 psig	≥ 1840 psig
e. Differential Pressure Between Steam Lines-High	≤ 100 psi	≤ 112 psi
f. Steam Flow in Two Steam Lines-High	< A function defined as follows: A Δp corresponding to 40% of full steam flow between 0% and 20% load and then a Δp increasing linearly to a Δp corresponding to 110% of full steam flow at full load.	< A function defined as follows: A Δp corresponding to 44% of full steam flow between 0% and 20% load and then a Δp increasing linearly to a Δp corresponding to 111.5% of full steam flow at full load.
Coincident With Either		
1) T_{avg}-Low-Low, or	≥ 543°F	≥ 540.2°F (Units 1 and 2 Cycle 4 and after) ≥ 541°F (Unit 2 Cycle 3)
2) Steam Line Pressure-Low	≥ 600 psig	≥ 580 psig

Amendment Nos. 37 and 36
Effective at end of Unit 1 Cycle 3

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
3. Containment Isolation (Continued)		
c. Containment Ventilation Isolation		
1) Automatic Actuation Logic and Actuation Relays	N.A.	N.A.
2) Plant Vent Noble Gas Activity-High (RM-14A and 14B)	Per Specification 3.3.3.10.	
3) Safety Injection	See Item 1. above for all Safety Injection Trip Setpoints and Allowable Values.	
4. Steam Line Isolation		
a. Manual	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays	N.A.	N.A.
c. Containment Pressure-High-High	$\leq$ 22 psig	$\leq$ 24 psig
d. Steam Flow in Two Steam Lines-High	$\leq$ A function defined as follows: A Δp corresponding to 40% of full steam flow between 0% and 20% load and then a Δp increasing linearly to a Δp corresponding to 110% of full steam flow at full load.	$\leq$ A function defined as follows: A Δp corresponding to 44% of full steam flow between 0% and 20% load and then a Δp increasing linearly to a Δp corresponding to 111.5% of full steam flow at full load.
Coincident With Either		
1) T_{avg}-Low-Low, or	$\geq$ 543°F	$\geq$ 540.2° (Units 1 and 2 Cycle 4 and after) $\geq$ 541°F (Unit 2 Cycle 3)
2) Steam Line Pressure-Low	$\geq$ [illegible] psig	$\geq$ 580 psig

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Effective at end of Unit 1 Cycle 3

Amendment Nos. 37 and 36

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
7. Loss of Power		
(4.16 kV Emergency Bus Undervoltage)		
a. First Level		
1) Diesel Start	$\geq$ 0 volts with a $\leq$ 0.8 second time delay and $\geq$ 2583 volts with a $\leq$ 10 second time delay	$\geq$ 0 volts with a $\leq$ 0.8 second time delay and $\geq$ 2583 volts with a $\leq$ 10 second time delay
2) Initiation of Load Shed	One relay $\geq$ 0 volts with a $\leq$ 4 second time delay and $\geq$ 2583 volts with a $\leq$ 25 second time delay with one relay $\geq$ 2870 volts, instantaneous	One relay $\geq$ 0 volts with a $\leq$ 4 second time delay and $\geq$ 2583 volts with a $\leq$ 25 second time delay with one relay $\geq$ 2870 volts, instantaneous
b. Second Level		
1) Diesel Start	$\geq$ 3600 volts with a $\leq$ 10 second time delay	$\geq$ 3600 volts with a $\leq$ 10 second time delay
2) Initiation of Load Shed	$\geq$ 3600 volts with a $\leq$ 20 second time delay	$\geq$ 3600 volts with a $\leq$ 20 second time delay
8. Engineered Safety Features Actuation System Interlocks		
a. Pressurizer Pressure, P-11	$\leq$ 1915 psig	$\leq$ 1925 psig
b. Low-Low T_{avg}, P-12 increasing	543°F	$\leq$ 545.8°F ~~(Units 1 and 2 Cycle 4 and after)~~ ~~$\leq$ 545°F (Unit 2 Cycle 3)~~
decreasing	543°F	$\geq$ 540.2°F ~~(Units 1 and 2 Cycle 4 and after)~~ ~~$\geq$ 541°F (Unit 2 Cycle 3)~~
c. Reactor Trip, P-4	N.A.	N.A.

Amendment Nos. 37 and 36
Effective at end of Unit 1 Cycle 3

TABLE 3.3-5

ENGINEERED SAFETY FEATURES RESPONSE TIMES

INITIATING SIGNAL AND FUNCTION	RESPONSE TIME IN SECONDS
1. Manual Initiation	
a. Safety Injection (ECCS)	N.A.
1) Feedwater Isolation	N.A.
2) Reactor Trip	N.A.
3) Phase "A" Isolation	N.A.
4) Containment Ventilation Isolation	N.A.
5) Auxiliary Feedwater	N.A.
6) Component Cooling Water	N.A.
7) Containment Fan Cooler Units	N.A.
8) Auxiliary Saltwater Pumps	N.A.
b. Phase "B" Isolation	
1) Containment Spray (Coincident with SI Signal)	N.A.
2) Containment Ventilation Isolation	N.A.
c. Phase "A" Isolation	
1) Containment Ventilation Isolation	N.A.
d. Steam Line Isolation	N.A.
2. Containment Pressure-High	
a. Safety Injection (ECCS)	$\leq 27^{(7)}/25^{(4)}$
1) Reactor Trip	≤ 2
2) Feedwater Isolation	$\leq 63^{(2)}$
3) Phase "A" Isolation	$\leq 18^{(4)}/28^{(5)}$
4) Containment Ventilation Isolation	N.A.
5) Auxiliary Feedwater	$\leq 60^{(1)}$
6) Component Cooling Water	$\leq 38^{(4)}/48^{(5)}$
7) Containment Fan Cooler Units	$\leq 40^{(1)}$
8) Auxiliary Saltwater Pumps	$\leq 48^{(4)}/58^{(5)}$
3. Pressurizer Pressure-Low	
a. Safety Injection (ECCS)	$\leq 27^{(7)}/25^{(4)}/35^{(5)}$
1) Reactor Trip	≤ 2
2) Feedwater Isolation	$\leq 63^{(2)}$
3) Phase "A" Isolation	$\leq 18^{(1)}$
4) Containment Ventilation Isolation	N.A.
5) Auxiliary Feedwater	$\leq 60^{(3)}$
6) Component Cooling Water	$\leq 48^{(3)}/38^{(1)}$
7) Containment Fan Cooler Units	$\leq 40^{(3)}$
8) Auxiliary Saltwater Pumps	$\leq 58^{(3)}/48^{(1)}$

TABLE 3.3-5 (Continued)

ENGINEERED SAFETY FEATURES RESPONSE TIMES

INITIATING SIGNAL AND FUNCTION	RESPONSE TIME IN SECONDS
7. Containment Pressure-High-High	
a. Containment Spray	≤ 48.5(6)
b. Phase "B" Isolation	N.A.
c. Steam Line Isolation	≤ 7
8. Steam Generator Water Level-High-High	
a. Turbine Trip	≤ 2.5
b. Feedwater Isolation	≤ 66(2)
9. Steam Generator Water Level Low-Low	
a. Motor-Driven Auxiliary Feedwater Pumps	≤ 60(3)
b. Turbine-Driven Auxiliary Feedwater Pump	≤ 60
10. RCP Bus Undervoltage	
Turbine-Driven Auxiliary Feedwater Pump	≤ 60
11. Plant Vent Noble Gas Activity-High	
Containment Ventilation Isolation	≤ 11

TABLE NOTATIONS

(1) Diesel generator starting delay not included because offsite power available.

(2) Feedwater System overall response time shall include verification of each individual Feedwater System valve closure time as shown below:

Valve	Closure Time (not including instrumentation delays)
FCV-438	≤ 60 seconds
439	≤ 60 seconds
440	≤ 60 seconds
441	≤ 60 seconds
510	≤ 5 seconds
520	≤ 5 seconds
530	≤ 5 seconds
540	≤ 5 seconds
1510	≤ 5 seconds
1520	≤ 5 seconds
1530	≤ 5 seconds
1540	≤ 5 seconds

(3) Diesel generator starting and loading delays included.

(4) Diesel generator starting delay not included because offsite power is available. Response time limit includes opening of valves to establish SI path and attainment of discharge pressure for centrifugal charging pumps (where applicable). Sequential transfer of charging pump suction from the VCT to the RWST (RWST valves open, then VCT valves close) is included.

For Units 1 and 2 Cycle 4, the Safety Injection response time limit shall be as follows:

Pressurizer Pressure-Low	≤ 12
Differential Pressure Between Steam Lines-High	≤ 13
Steam Flow in Two Steam Lines-High Coincident with T_{avg}-Low-Low	≤ 15
Steam Flow in Two Steam Lines-High Coincident with Steam Line Pressure-Low	≤ 13

Diesel generator starting delay not included because offsite power is available. Response time limit includes opening of valves to establish SI path and attainment of discharge pressure for centrifugal charging pumps (where applicable).

(5) Diesel generator starting and sequence loading delays included. Offsite power is not available. Response time limit includes opening of valves to establish SI path and attainment of discharge pressure for centrifugal charging pumps. Sequential transfer of charging pump suction from the VCT to the RWST (RWST valves open, then VCT valves close) is included.

TABLE 3.3-5 (Continued)

TABLE NOTATIONS

For Units 1 and 2 Cycle 4, the Safety Injection response time limit shall be as follows:

Differential Pressure Between Steam Lines-High	≤ 23
Steam Flow in Two Steam Lines-High Coincident with T_{avg}-Low-Low	≤ 25
Steam Flow in Two Steam Lines-High Coincident with Steam Line Pressure-Low	≤ 23

Diesel generator starting and sequence loading delays included. Response time limit includes opening of valves to establish SI path and attainment of discharge pressure for centrifugal charging pumps (where applicable).

(6) The maximum response time of 48.5 seconds is the time from when the containment pressure exceeds the High-High Setpoint until the spray pump is started and the discharge valve travels to the fully open position assuming off-site power is not available. The time of 48.5 seconds includes the 28-second maximum delay related to ESF loading sequence. Spray riser piping fill time is not included. The 80-second maximum spray delay time does not include the time from LOCA start to "P" signal.

(7) Diesel generator starting and sequence loading delays included. Sequential transfer of charging pump suction from the VCT to the RWST (RWST valves open, then VCT valves close) is not included. Response time limit includes opening of valves to establish SI flow path and attainment of discharge pressure for centrifugal charging pumps, SI, and RHR pumps (where applicable).

LIMITING CONDITION FOR OPERATION

3.4.2.2 All pressurizer Code safety valves shall be OPERABLE with a lift setting of 2485 psig ± 1%.*#

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With one pressurizer Code safety valve inoperable, either restore the inoperable valve to OPERABLE status within 15 minutes or be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

b. The provisions of Specification 3.0.4 may be suspended for up to 18 hours per valve for entry into and during operations in MODE 3 for the purpose of setting the pressurizer Code safety valves under ambient (hot) conditions provided a preliminary cold setting was made prior to heatup.

SURVEILLANCE REQUIREMENTS

4.4.2.2 No additional requirements other than those required by Specification 4.0.5.

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*The lift setting pressure shall correspond to ambient conditions of the valve at nominal operating temperature and pressure.

#For Unit 2 from February 21, 1990 until entry into Mode 4, but no later than March 11, 1990, only two pressurizer Code safety valves are required to be OPERABLE with a lift setting of 2485 psig ± 1% provided the third pressurizer Code safety valve is disabled and at least one pressurizer power-operated relief valve (PORV) is OPERABLE and its associated block valve is open. For this technical specification, the pressurizer PORV is OPERABLE if it is capable of opening automatically.

[illegible]

[illegible]

3/4.5 EMERGENCY-CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1 Each Reactor Coolant System accumulator shall be OPERABLE with:

a. The isolation valve open and power removed,

b. A contained borated water volume of between 836 and 864 cubic feet of borated water,

c. A boron concentration of between 1900 and 2200 ppm (Unit 1 Cycle 2), A boron concentration of between 2200 and 2500 ppm (Unit 1 Cycle 3 and after, Unit 2), and

d. A nitrogen cover-pressure of between 595.5 and 647.5 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

a. With one accumulator inoperable, except as a result of a closed isolation valve, restore the inoperable accumulator to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

b. With one accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1) Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and

2) Verifying that each accumulator isolation valve is open.

*Pressurizer pressure above 1000 psig.

[illegible]

[illegible]

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

g. By verifying the correct position of each electrical and/or mechanical position stop for the following ECCS throttle valves:

1) Within 4 hours following completion of each valve stroking operation or maintenance on the valve when the ECCS subsystems are required to be OPERABLE, and

2) At least once per 18 months.

Charging

~~Boron~~ Injection Throttle Valves	Safety Injection Throttle Valves
8810A	8822A
8810B	8822B
8810C	8822C
8810D	8822D

h. By performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics and verifying that:

For Unit 1 Cycle 5 ~~and Unit 2 Cycle 4~~

1) For centrifugal charging pump lines, with a single pump running:

a) The sum of the injection line flow rates, excluding the highest flow rate, is greater than or equal to 346 gpm, and

b) The total pump flow rate is less than or equal to 550 gpm.

2) For safety injection pump lines, with a single pump running:

a) The sum of the injection line flow rates, excluding the highest flow rate, is greater than or equal to 463 gpm, and

b) The total pump flow rate is less than or equal to 650 gpm.

For Unit 1 Cycle 6 and after, and Unit 2 Cycle 5 and after:

1) For centrifugal charging pumps, with a single pump running:

a) The sum of injection line flow rates, excluding the highest flow rate, is greater than or equal to 299 gpm, and

DELETE

EMERGENCY CORE COOLING SYSTEMS

3/4.5.4 BORON INJECTION SYSTEM

BORON INJECTION TANK

LIMITING CONDITION FOR OPERATION

3.5.4.1 The boron injection tank shall be OPERABLE with:

a. A minimum contained borated water volume of 900 gallons of borated water,

b. A boron concentration of between 20,000 and 22,500 ppm, and

c. A minimum solution temperature of 145°F.

APPLICABILITY: MODES 1, 2 and 3. For Units 1 and 2 Cycle 4.

ACTION:

With the boron injection tank inoperable, restore the tank to OPERABLE status within 1 hour or be in HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the tank to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.4.1 The boron injection tank shall be demonstrated OPERABLE by:

a. Verifying the contained borated water volume through a recirculation flow test at least once per 7 days,

b. Verifying the boron concentration of the water in the tank at least once per 7 days, and

c. Verifying the water temperature at least once per 24 hours.

DELETE

EMERGENCY CORE COOLING SYSTEMS

HEAT TRACING

LIMITING CONDITION FOR OPERATION

3.5.4.2 At least two independent channels of heat tracing shall be OPERABLE for the boron injection tank and for the heat traced portions of the associated flow paths.

APPLICABILITY: MODES 1, 2 and 3. For Units 1 and 2 Cycle 4.

ACTION:

With only one channel of heat tracing on either the boron injection tank or on the heat traced portion of an associated flow path OPERABLE, operation may continue for up to 30 days provided the tank and flow path temperatures are verified to be greater than or equal to 145°F at least once per 8 hours; otherwise, be in HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.5.4.2 Each heat tracing channel for the boron injection tank and associated flow path shall be demonstrated OPERABLE:

a. At least once per 31 days by energizing each heat tracing channel, and

b. At least once per 24 hours by verifying the tank and flow path temperatures to be greater than or equal to 145°F. The tank temperature shall be determined by measurement. The flow path temperature shall be determined by either measurement or recirculation flow until establishment of equilibrium temperatures within the tank.

STEAM GENERATOR 10% ATMOSPHERIC DUMP VALVES

LIMITING CONDITION FOR OPERATION

3.7.1.6 Four steam generator 10% atmospheric dump valves (ADVs) with the associated block valves open and associated remote manual controls, including the backup air bottles, shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3. (Cycle 5 and after)

ACTION:

a. With one less than the required number of 10% ADVs OPERABLE, restore the inoperable steam generator 10% ADV to OPERABLE status within 7 days; or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With two less than the required numbered of 10% ADVs OPERABLE, restore at least one of the inoperable steam generator 10% ADVs to OPERABLE status within 72 hours; or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.7.1.6 Each steam generator 10% ADV, associated block valve and associated remote manual controls including the backup air bottles shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying that the backup air bottle for each steam generator 10% ADV has a pressure greater than or equal to 260 psig, and

b. At least once per 31 days by verifying that the steam generator 10% ADV block valves are open, and

c. At least once per 18 months by verifying that all steam generator 10% ADVs will operate using the remote manual controls and the backup air bottles.

3/4.9.1 BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 The boron concentration of all filled portions of the Reactor Coolant System and the refueling canal shall be maintained uniform and sufficient to ensure that the more restrictive of the following reactivity conditions is met either:

a. A K_{eff} of 0.95 or less, which includes a 1% $\Delta k/k$ conservative allowance for uncertainties, or

b. A boron concentration of greater than or equal to 2000 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6*.

ACTION:

For Unit 1 and 2, Cycle 4:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or its equivalent until K_{eff} is reduced to less than or equal to 0.95 or the boron concentration is restored to greater than or equal to 2000 ppm, whichever is the more restrictive, or

For Unit 1 and 2, Cycle 5 and after:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7,000 ppm boron or its equivalent until K_{eff} is reduced to less than or equal to 0.95 or the boron concentration is restored to greater than or equal to 2,000 ppm, whichever is the more restrictive.

SURVEILLANCE REQUIREMENTS

4.9.1.1 The more restrictive of the above two reactivity conditions shall be determined prior to:

a. Removing or unbolting the reactor vessel head, and

b. Withdrawal of any full-length control rod in excess of 3 feet from its fully inserted position within the reactor vessel.

4.9.1.2 The boron concentration of the Reactor Coolant System and the refueling canal shall be determined by chemical analysis at least once each 72 hours.

*The reactor shall be maintained in MODE 6 whenever fuel is in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed.

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 may be suspended for measurement of control rod worth and shutdown margin provided reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s).

APPLICABILITY: MODE 2.

ACTION:

For Unit 1 and 2, Cycle 4:

a. With any full-length control rod not fully inserted and with less than the above reactivity equivalent available for trip insertion immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full-length control rods fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

For Unit 1 and 2, Cycle 5 and after:

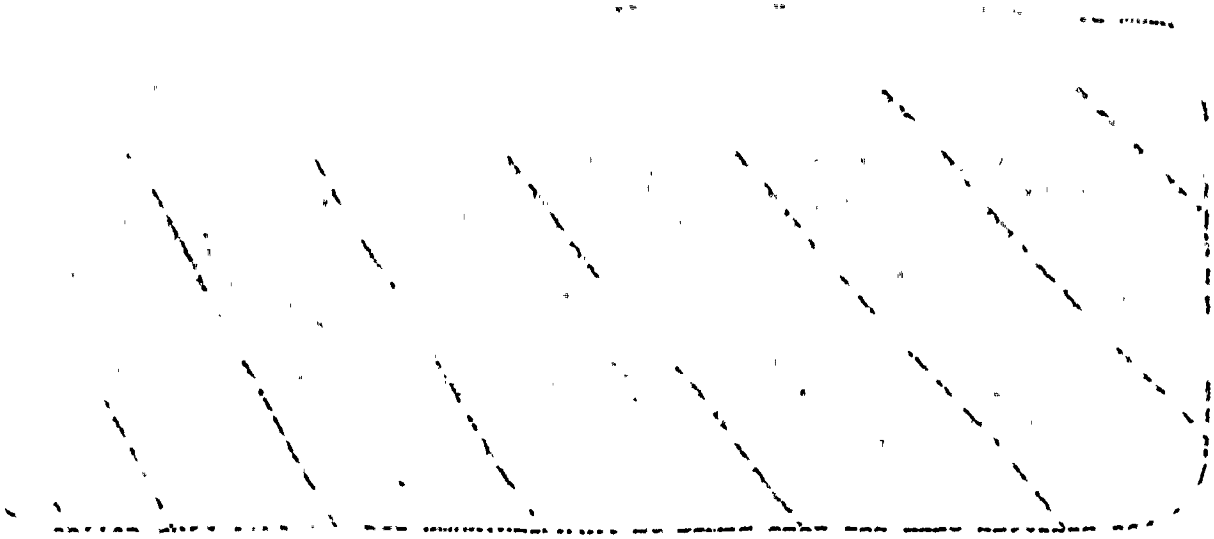
a. With any full-length control rod not fully inserted and with less than the above reactivity equivalent available for the trip insertion immediately initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7,000 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full-length control rods fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7,000 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full-length control rod either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each full-length control rod not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 24 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.



3/4.1.1.4 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, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor vessel is above its minimum RT_{NDT} temperature.

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, and (5) associated heat tracing systems (only Unit 1 and 2, Cycle 4), and (6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 1.6% Δk/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at BOL when borating from hot zero power to COLD SHUTDOWN and requires 5206 gallons of 20,000 ppm (Unit 1 and 2, Cycle 4) or 14,042 gallons of 7,000 ppm (Unit 1 and 2, Cycle 5 and after) borated water from the boric acid storage tanks or 65,784 gallons of 2300 ppm borated water from the refueling water storage tank.

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 change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% Δk/k after xenon decay and cooldown from 200°F to 140°F. This condition requires either 835 gallons of 20,000 ppm (Unit 1 and 2, Cycle 4) or 2,499 gallons of 7,000 ppm (Unit 1 and 2, Cycle 5 and after) borated water from the boric acid storage tanks or 17,865 gallons of 2300 ppm borated water from the refueling water storage tank.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 8.0 and 9.5 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

ECCS SUBSYSTEMS (Continued)

The maximum flow Surveillance Requirement ensures that the minimum injection line resistance assumptions are met. These assumptions are used to calculate maximum flows to the RCS for safety analyses which are limited by maximum ECCS flow to the RCS.

The Surveillance Requirement for the maximum difference between the minimum and maximum individual injection line flows ensures that the minimum individual injection line resistance assumed for the spilling line following a LOCA is met.

The maximum total pump flow Surveillance Requirements ensure the pump runout limits of 560 gpm for the centrifugal charging pumps and 675 gpm for the safety injection pumps are met.

The safety analyses are performed assuming the miniflow recirculation lines for the ECCS subsystems associated with the centrifugal charging and safety injection pumps are open. The flow balancing test is, therefore, performed with these miniflow recirculation lines open.

Some of the flow from the centrifugal charging pumps will go to the RCP seals during ECCS operation. Therefore, the flow balance test is performed with a simulated flow from the centrifugal charging pumps to the RCP seals. The simulated flow rate is consistent with the actual RCP seal resistance and the resistance of the RCP seals assumed in the calculation of ECCS flows for the safety analyses.

3/4.5.4 BORON INJECTION SYSTEM

The Boron Injection System is only required for Units 1 and 2 Cycle 4. 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 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 contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.

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 21,000 ppm boron.