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SURVEILLANCE REQUIREMENTS (Continued)

e. When in MODES 3 or 4, 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, and
7. Boron penalty (MODE 4 only).

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within plus or minus 1% Delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

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 1.0% Delta k/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.0% Delta k/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.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.0% Delta k/k:

a. Within one 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rod is immovable or untrippable, the SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable control rod(s).

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~~.~~ and
7. Boron penalty.

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump and charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7a is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until at least one injection path is restored to OPERABLE status.~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

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

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.

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.

~~*For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3

a. One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.

b. One charging flowpath associated with support of Unit 2 shutdown functions shall be available*

APPLICABILITY: Specification 3.1.2.3.a. - MODES 5 and 6
Specification 3.1.2.3.b. - At all times when Unit 2 is in MODES 1, 2, 3, or 4.

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes** except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

b. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to 152°F, unless the reactor vessel head is removed, remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within one hour.

c. The provisions of Specification 3.0.3 are not applicable.

d. In addition to the above, when Specification 3.1.2.3.b is applicable and the required flow path is not available, return the required flow path to available status within 7 days, or provide equivalent shutdown capability in Unit 2 and return the required flow path to available status within the next 60 days, or have Unit 2 in HOT STANDBY within the next 12 hours and HOT SHUTDOWN within the following 24 hours.

e. The requirements of Specification 3.0.4 are not applicable when Specification 3.1.2.3.b applies.

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying that the pump's developed head at the test flow point is greater than or equal to the required developed head when tested pursuant to Specification 4.0.5.

*A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F.

~~**For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by specification 3.1.2.7.b.2.~~

BORIC ACID TRANSFER PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid transfer pump shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if only the flow path through the boric acid transfer pump of Specification 3.1.2.1a is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid transfer pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until at least one boric acid transfer pump is restored to OPERABLE status.~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.5 No additional surveillance requirements other than those required by Specification 4.0.5.

~~*For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and associated heat tracing with:

1. A minimum usable borated water volume of 4300 gallons,
2. Between 20,000 and 22,500 ppm of boron, and
3. A minimum solution temperature of 145°F.

b. The refueling water storage tank with:

1. A minimum usable borated water volume of 90,000 gallons,
2. A minimum boron concentration of 2400 ppm, and
3. A minimum solution temperature of 70°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes[a] ~~until at least one borated water source is restored to OPERABLE status~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6 and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.7 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 water level volume of the tank, 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.

~~[a] For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by specification 3.1.2.7.b.2.~~

TABLE 3.3-1 (Continued)

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6 but below 5% of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5% of RATED THERMAL POWER.

c. Above 5% of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement:

a. Immediately suspend operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODES 3 or 4) or 3.1.2.7.b.2 (MODE 5), and

b. Verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter, and

c. Close the isolation valves for unborated water sources to the chemical and volume control system within 1 hour. In MODE 5, if the RWST boron concentration is less than the reactor coolant system boron concentration and less than the boron concentration required by Specification 3.1.2.7.b.2, isolate the RWST from the reactor coolant system within 1 hour.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 1 hour.

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 2 hours for surveillance testing of the other channels per Specification 4.3.1.1.1.

ACTION 7 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 1 hour.

SAFETY VALVES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.4.2 A minimum of one pressurizer code safety valve shall be OPERABLE with a lift setting of 2485 PSIG ± 3%.*

APPLICABILITY: MODES 4 and 5.

ACTION:

With no pressurizer code safety valve OPERABLE:

a. Immediately suspend all operations involving positive reactivity changes** except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5), and place an OPERABLE RHR loop into operation in the shutdown cooling mode, and

b. Immediately render all Safety Injection pumps and all but one charging pump inoperable by removing the applicable motor circuit breakers from the electric power circuit within one hour.

SURVEILLANCE REQUIREMENTS

4.4.2 The pressurizer code safety valve shall be demonstrated OPERABLE per Surveillance Requirement 4.4.3.

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

~~**For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5).~~

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One diesel generator with:

1. A day fuel tank containing a minimum of 70 gallons of fuel,

2. A fuel storage system containing a minimum indicated volume of 46,000 gallons of fuel, and

3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until the minimum required A.C. electrical power sources are restored to OPERABLE status.~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.

~~* For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 ~~With the reactor vessel head unbolted or removed, t~~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:

a. Either 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 2400 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6~~*~~

ACTION:

a. With the requirements of the above specification not satisfied, 1) immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~**~~ except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2, and 2) initiate and continue boration at greater than or equal to 10 gpm of 20,000 ppm boric acid solution 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 2400 ppm, whichever is the more restrictive.

b. The provisions of Specification 3.0.3 are not applicable.

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.

4.9.1.2 The boron concentration of the reactor coolant system and the refueling canal shall be determined by chemical analysis at least 3 times per 7 days with a maximum time interval between samples of 72 hours.

~~* The reactor shall be maintained in MODE 6 when the reactor vessel head is unbolted or removed.~~

~~** For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two source range neutron flux monitors shall be operating, each with continuous visual indication in the control room and one with audible indication in the containment.

APPLICABILITY: MODE 6.

ACTION:

a. With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes.* except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL FUNCTIONAL TEST at least once per 7 days, and

b. A CHANNEL FUNCTIONAL TEST within 8 hours prior to the initial start of CORE ALTERATIONS, and

c. A CHANNEL CHECK at least once per 12 hours during CORE ALTERATIONS.

~~*For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.3% Delta k/k is initially required to control the reactivity transient and automatic ESF is assumed to be available. With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal and a 1% Delta k/k SHUTDOWN MARGIN provides adequate protection for this event.

The SHUTDOWN MARGIN requirements are based upon the limiting conditions described above and are consistent with FSAR safety analysis assumptions.

A boron penalty must be applied when operating with no reactor coolant loops in operation but one or more residual heat removal loops providing shutdown cooling. The necessary penalty is included in the SHUTDOWN MARGIN curves.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 2000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 2000 GPM will circulate an equivalent Reactor Coolant System volume of 12,612 plus or minus 100 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each fuel cycle. The surveillance requirement for measurement of the MTC at the beginning, and near the end of each fuel cycle is adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron

3/4.1.2 BORATION SYSTEMS (Continued)

With the RCS average temperature above 200°F, one 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 boration capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% Δ k/k after xenon decay and cooldown from 200°F to 140°F. This condition requires either 2890 gallons of 20,000 ppm borated water from the boric acid storage tanks or 76,937 gallons of 2400 ppm borated water from the refueling water storage tank. The charging flowpath of Unit 1 required for Unit 2 shutdown support ensures that flow is available to Unit 2 and addresses the requirements of 10 CFR 50 Appendix R. The flowpath consists of a charging pump powered from an electrical bus and associated water supplies and delivery system. Fire watches posted in the affected opposite unit areas (i.e., Unit 2 areas requiring use of the Unit 1 charging system in the event of a fire) may serve as the equivalent shutdown capability specified in the action statements of Specification 3.1.2.3. In the affected areas, either establish continuous fire watches or verify the OPERABILITY of fire detectors per Specification 4.3.3.7 and establish hourly fire watch patrols. The required opposite unit equipment along with the surveillance requirements necessary to ensure that this equipment is capable of fulfilling its intended Appendix R alternate safe shutdown function have been established and are included in a plant procedure. An additional plant procedure details how the above noted fire watches will be implemented.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 7.6 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.

The OPERABILITY of boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

Precluding positive reactivity addition capable of challenging the minimum required SHUTDOWN MARGIN or REFUELING boron concentration is required to assure continued safe operation. Introduction of RCS temperature changes must also be evaluated to not increase reactivity above the required SHUTDOWN MARGIN. The RCS heatup and cooldown rate is restricted in MODE 5 to 50°F or less in any one-hour period to ensure that the positive reactivity increase due to temperature changes is comparable to the UFSAR Chapter 14 analysis of a boron dilution event. In this analysis, it was concluded that there is sufficient time available to detect the dilution with the source range neutron flux monitors and terminate the event with operator action. There is no additional heatup or cooldown rate restriction in MODE 6 because the REFUELING boron concentration is above the minimum required to maintain the required SHUTDOWN MARGIN for the RCS temperature range defined for MODE 6. Introduction of coolant inventory from the RWST is acceptable provided the RWST boron concentration is above the minimum required to maintain the specified SHUTDOWN MARGIN.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of rod ejection accident are

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SURVEILLANCE REQUIREMENTS (Continued)

e. When in MODES 3 or 4, 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~~.~~ and
7. Boron penalty (MODE 4 only).

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within plus or minus 1% Delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

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 1.0% Delta k/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.0% Delta k/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.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.0% Delta k/k:

a. Within one 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).

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~~.~~ and
7. Boron penalty.

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump and charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7.a is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7.b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until at least one injection path is restored to OPERABLE status~~, except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6 and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

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

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.

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.

~~*For purpose of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by specification 3.1.2.7.b.2~~

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3

a. One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.

b. One charging flow path associated with support of Unit 1 shutdown functions shall be available.*

APPLICABILITY: Specification 3.1.2.3.a. - MODES 5 and 6
Specification 3.1.2.3.b. - At all times when Unit 1 is in MODES 1, 2, 3, or 4.

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.** except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6; and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5; or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

b. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to 152°F, unless the reactor vessel head is removed, remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within one hour.

c. The provisions of Specification 3.0.3 are not applicable.

d. In addition to the above, when Specification 3.1.2.3.b is applicable and the required flow path is not available, return the required flow path to available status within 7 days, or provide equivalent shutdown capability in Unit 1 and return the required flow path to available status within the next 60 days, or have Unit 1 in HOT STANDBY within the next 12 hours and HOT SHUTDOWN within the following 24 hours.

e. The requirements of Specification 3.0.4 are not applicable when Specification 3.1.2.3.b applies.

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying that the pump's developed head at the test flow point is greater than or equal to the required developed head when tested pursuant to Specification 4.0.5

* A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F.

** ~~For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by specification 3.1.2.7.b.2.~~

BORIC ACID TRANSFER PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid transfer pump shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if only the flow path through the boric acid transfer pump of Specification 3.1.2.1a is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid transfer pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until at least one boric acid transfer pump is restored to OPERABLE status~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.5 No additional Surveillance Requirements other than those required by Specification 4.0.5.

~~*For purpose of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and associated heat tracting with:

1. A minimum usable borated water volume of 4300 gallons,
2. Between 20,000 and 22,500 ppm of boron, and
3. A minimum solution temperature of 145°F.

b. The refueling water storage tank with:

1. A minimum usable borated water volume of 90,000 gallons,
2. A minimum boron concentration of 2400 ppm, and
3. A minimum solution temperature of 70°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~* until at least one borated water source is restored to OPERABLE status~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.7 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.

~~*For purposes of this specification, addition of water from the RWST does not constitute a dilution activity provided the boron concentration in the RWST is greater than or equal to the minimum required by specification 3.1.2.7.b.2~~

TABLE 3.3-1 (Continued)

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6 but below 5% of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5% of RATED THERMAL POWER

c. Above 5% of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement:

a. Immediately suspend operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODES 3 or 4) or 3.1.2.7.b.2 (MODE 5), and

b. Verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter, and

c. Close the isolation valves for unborated water sources to the chemical and volume control system within 1 hour. In MODE 5, if the RWST boron concentration is less than the reactor coolant system boron concentration and less than the boron concentration required by Specification 3.1.2.7.b.2, isolate the RWST from the reactor coolant system within 1 hour.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 1 hour.

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable CHANNEL may be bypassed for up to 2 hours for surveillance testing of the other channels per Specification 4.3.1.1.1.

ACTION 7 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 1 hour.

SAFETY VALVES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.4.2 A minimum of one pressurizer code safety valve shall be OPERABLE with a lift setting of 2485 PSIG ± 1%.*

APPLICABILITY: MODES 4 and 5.

ACTION:

With no pressurizer code safety valve OPERABLE:

a. Immediately suspend all operations involving positive reactivity changes** except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5), and place an OPERABLE RHR loop into operation in the shutdown cooling mode; and

b. Immediately render all Safety Injection pumps and all but one charging pump inoperable by removing the applicable motor circuit breakers from the electrical power circuit within one hour.

SURVEILLANCE REQUIREMENTS

4.4.2 No additional Surveillance Requirements other than those required by Specification 4.0.5.

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

~~**For purposes of this specification, addition of water from the RWST does not constitute a dilution activity provided the boron concentration in the RWST is greater than or equal to the minimum required by specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5).~~

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One diesel generator with:

1. A day fuel tank containing a minimum of 70 gallons of fuel,

2. A fuel storage system containing a minimum indicated volume of 46,000 gallons of fuel, and

3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes[a] ~~until the minimum required A.C. electrical power sources are restored to OPERABLE status~~ except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.+

~~[a]For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

+The provisions of Technical Specification 4.0.8 are applicable.

BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 ~~With the reactor vessel head unbolted or removed, t~~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:

a. Either 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 2400 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6~~*~~

ACTION:

~~a.~~ With the requirements of the above specification not satisfied, ~~1)~~ immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes~~**~~ except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2, and ~~2)~~ initiate and continue boration at greater than or equal to 10 gpm of 20,000 ppm boric acid solution 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 2400 ppm, whichever is the more restrictive.

~~b.~~ The provisions of Specification 3.0.3 are not applicable.

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 pressure 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 per 72 hours.

~~*The reactor shall be maintained in MODE 6 when the reactor vessel head is unbolted or removed.~~

~~**For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two source range neutron flux monitors shall be operating, each with continuous visual indication in the control room and one with audible indication in the containment and control room.

APPLICABILITY: MODE 6.

ACTION:

a. With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes[*] except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL FUNCTIONAL TEST at least once per 7 days, and

b. A CHANNEL FUNCTIONAL TEST within 8 hours prior to the initial start of CORE ALTERATIONS, and

c. A CHANNEL CHECK at least once per 12 hours during CORE ALTERATIONS.

~~[*] For purposes of this specification, addition of water from the RWST does not constitute a positive reactivity addition provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.~~

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.3% Delta k/k is initially required to control the reactivity transient and automatic ESF is assumed to be available.

With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal and a 1% Delta k/k SHUTDOWN MARGIN provides adequate protection for this event.

The SHUTDOWN MARGIN requirements are based upon the limiting conditions described above and are consistent with FSAR safety analysis assumptions.

A boron penalty must be applied when operating with no reactor coolant loops in operation but one or more residual heat removal loops providing shutdown cooling. The necessary penalty is included in the SHUTDOWN MARGIN curves.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 2000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 2000 GPM will circulate an equivalent Reactor Coolant System volume of 12,612 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.2 BORATION SYSTEMS (Continued)

The charging flowpath of Unit 2 required for Unit 1 shutdown support ensures that flow is available to Unit 1 and addresses the requirements of 10 CFR 50 Appendix R. The flowpath consists of a charging pump powered from an electrical bus and associated water supplies and delivery system. Fire watches posted in the affected opposite unit areas (i.e., Unit 1 areas requiring use of the Unit 2 charging system in the event of a fire) may serve as the equivalent shutdown capability specified in the action statements of Specification 3.1.2.3. In the affected areas, either establish continuous fire watches or verify the OPERABILITY of fire detectors per Specification 4.3.3.7 and establish hourly fire watch patrols. The required opposite unit equipment along with the surveillance requirements necessary to ensure that this equipment is capable of fulfilling its intended Appendix R alternate safe shutdown function have been established and are included in a plant procedure. An additional plant procedure details how the above noted fire watches will be implemented.

Precluding positive reactivity addition capable of challenging the minimum required SHUTDOWN MARGIN or REFUELING boron concentration is required to assure continued safe operation. Introduction of RCS temperature changes must also be evaluated to not increase reactivity above the required SHUTDOWN MARGIN. The RCS heatup and cooldown rate is restricted in MODE 5 to 50°F or less in any one-hour period to ensure that the positive reactivity increase due to temperature changes is comparable to the UFSAR Chapter 14 analysis of a boron dilution event. In this analysis, it was concluded that there is sufficient time available to detect the dilution with the source range neutron flux monitors and terminate the event with operator action. There is no additional heatup or cooldown rate restriction in MODE 6 because the REFUELING boron concentration is above the minimum required to maintain the required SHUTDOWN MARGIN for the RCS temperature range defined for MODE 6. Introduction of coolant inventory from the RWST is acceptable provided the RWST boron concentration is above the minimum required to maintain the specified SHUTDOWN MARGIN.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) limit the potential effects of rod misalignment on associated accident analyses. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met. Misalignment of a rod requires measurement of peaking factors or a restriction in THERMAL POWER; either of these restrictions provide assurance of fuel rod integrity during continued operation. In addition, those accident analysis affected by a misaligned rod are reevaluated to confirm that the results remain valid during future operation.

The maximum rod drop time restriction is consistent with the assumed rod drop time used in the accident analyses. Measurement with T_{avg} greater than or equal to 541°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Control rod positions and OPERABILITY of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

ATTACHMENT 3A TO AEP:NRC:1327

PROPOSED TECHNICAL SPECIFICATIONS PAGES

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SURVEILLANCE REQUIREMENTS (Continued)

e. When in MODES 3 or 4, 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,
6. Samarium concentration, and
7. Boron penalty (MODE 4 only).

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within plus or minus 1% Delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

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 1.0% Delta k/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.0% Delta k/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.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.0% Delta k/k:

a. Within one 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).

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,

6. Samarium concentration, and

7. Boron penalty.

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump and charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7a is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

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

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.

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.

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3

a. One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.

b. One charging flowpath associated with support of Unit 2 shutdown functions shall be available*

APPLICABILITY: Specification 3.1.2.3.a. - MODES 5 and 6
Specification 3.1.2.3.b. - At all times when Unit 2 is in MODES 1, 2, 3, or 4.

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

b. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to 152°F, unless the reactor vessel head is removed, remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within one hour.

c. The provisions of Specification 3.0.3 are not applicable.

d. In addition to the above, when Specification 3.1.2.3.b is applicable and the required flow path is not available, return the required flow path to available status within 7 days, or provide equivalent shutdown capability in Unit 2 and return the required flow path to available status within the next 60 days, or have Unit 2 in HOT STANDBY within the next 12 hours and HOT SHUTDOWN within the following 24 hours.

e. The requirements of Specification 3.0.4 are not applicable when Specification 3.1.2.3.b applies.

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying that the pump's developed head at the test flow point is greater than or equal to the required developed head when tested pursuant to Specification 4.0.5.

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*A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F.

BORIC ACID TRANSFER PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid transfer pump shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if only the flow path through the boric acid transfer pump of Specification 3.1.2.1a is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid transfer pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.5 No additional surveillance requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and associated heat tracing with:

1. A minimum usable borated water volume of 4300 gallons,
2. Between 20,000 and 22,500 ppm of boron, and
3. A minimum solution temperature of 145°F.

b. The refueling water storage tank with:

1. A minimum usable borated water volume of 90,000 gallons,
2. A minimum boron concentration of 2400 ppm, and
3. A minimum solution temperature of 70°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.7 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 water level volume of the tank, 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.

TABLE 3.3-1 (Continued)

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6 but below 5% of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5% of RATED THERMAL POWER.

c. Above 5% of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement:

a. Immediately suspend operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODES 3 or 4) or 3.1.2.7.b.2 (MODE 5), and

b. Verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter, and

c. Close the isolation valves for unborated water sources to the chemical and volume control system within 1 hour. In MODE 5, if the RWST boron concentration is less than the reactor coolant system boron concentration and less than the boron concentration required by Specification 3.1.2.7.b.2, isolate the RWST from the reactor coolant system within 1 hour.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 1 hour.

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 2 hours for surveillance testing of the other channels per Specification 4.3.1.1.1.

ACTION 7 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 1 hour.

SAFETY VALVES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.4.2 A minimum of one pressurizer code safety valve shall be OPERABLE with a lift setting of 2485 PSIG ±3%.*

APPLICABILITY: MODES 4 and 5.

ACTION:

With no pressurizer code safety valve OPERABLE:

a. Immediately suspend all operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5), and place an OPERABLE RHR loop into operation in the shutdown cooling mode, and

b. Immediately render all Safety Injection pumps and all but one charging pump inoperable by removing the applicable motor circuit breakers from the electric power circuit within one hour.

SURVEILLANCE REQUIREMENTS

4.4.2 The pressurizer code safety valve shall be demonstrated OPERABLE per Surveillance Requirement 4.4.3.

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

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One diesel generator with:

1. A day fuel tank containing a minimum of 70 gallons of fuel,

2. A fuel storage system containing a minimum indicated volume of 46,000 gallons of fuel, and

3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.

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:

a. Either 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 2400 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6

ACTION:

a. With the requirements of the above specification not satisfied, 1) immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2, and 2) initiate and continue boration at greater than or equal to 10 gpm of 20,000 ppm boric acid solution 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 2400 ppm, whichever is the more restrictive.

b. The provisions of Specification 3.0.3 are not applicable.

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.

4.9.1.2 The boron concentration of the reactor coolant system and the refueling canal shall be determined by chemical analysis at least 3 times per 7 days with a maximum time interval between samples of 72 hours.

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two source range neutron flux monitors shall be operating, each with continuous visual indication in the control room and one with audible indication in the containment.

APPLICABILITY: MODE 6.

ACTION:

a. With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL FUNCTIONAL TEST at least once per 7 days, and

b. A CHANNEL FUNCTIONAL TEST within 8 hours prior to the initial start of CORE ALTERATIONS, and

c. A CHANNEL CHECK at least once per 12 hours during CORE ALTERATIONS.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.3% Delta k/k is initially required to control the reactivity transient and automatic ESF is assumed to be available. With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal and a 1% Delta k/k SHUTDOWN MARGIN provides adequate protection for this event.

The SHUTDOWN MARGIN requirements are based upon the limiting conditions described above and are consistent with FSAR safety analysis assumptions.

A boron penalty must be applied when operating with no reactor coolant loops in operation but one or more residual heat removal loops providing shutdown cooling. The necessary penalty is included in the SHUTDOWN MARGIN curves.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 2000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 2000 GPM will circulate an equivalent Reactor Coolant System volume of 12,612 plus or minus 100 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each fuel cycle. The surveillance requirement for measurement of the MTC at the beginning, and near the end of each fuel cycle is adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron

3/4.1.2 BORATION SYSTEMS (Continued)

With the RCS average temperature above 200°F, one 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 boration capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% Δ k/k after xenon decay and cooldown from 200°F to 140°F. This condition requires either 2890 gallons of 20,000 ppm borated water from the boric acid storage tanks or 76,937 gallons of 2400 ppm borated water from the refueling water storage tank. The charging flowpath of Unit 1 required for Unit 2 shutdown support ensures that flow is available to Unit 2 and addresses the requirements of 10 CFR 50 Appendix R. The flowpath consists of a charging pump powered from an electrical bus and associated water supplies and delivery system. Fire watches posted in the affected opposite unit areas (i.e., Unit 2 areas requiring use of the Unit 1 charging system in the event of a fire) may serve as the equivalent shutdown capability specified in the action statements of Specification 3.1.2.3. In the affected areas, either establish continuous fire watches or verify the OPERABILITY of fire detectors per Specification 4.3.3.7 and establish hourly fire watch patrols. The required opposite unit equipment along with the surveillance requirements necessary to ensure that this equipment is capable of fulfilling its intended Appendix R alternate safe shutdown function have been established and are included in a plant procedure. An additional plant procedure details how the above noted fire watches will be implemented.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 7.6 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.

The OPERABILITY of boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

Precluding positive reactivity addition capable of challenging the minimum required SHUTDOWN MARGIN or REFUELING boron concentration is required to assure continued safe operation. Introduction of RCS temperature changes must also be evaluated to not increase reactivity above the required SHUTDOWN MARGIN. The RCS heatup and cooldown rate is restricted in MODE 5 to 50°F or less in any one-hour period to ensure that the positive reactivity increase due to temperature changes is comparable to the UFSAR Chapter 14 analysis of a boron dilution event. In this analysis, it was concluded that there is sufficient time available to detect the dilution with the source range neutron flux monitors and terminate the event with operator action. There is no additional heatup or cooldown rate restriction in MODE 6 because the REFUELING boron concentration is above the minimum required to maintain the required SHUTDOWN MARGIN for the RCS temperature range defined for MODE 6. Introduction of coolant inventory from the RWST is acceptable provided the RWST boron concentration is above the minimum required to maintain the specified SHUTDOWN MARGIN.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of rod ejection accident are

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SURVEILLANCE REQUIREMENTS (Continued)

e. When in MODES 3 or 4, 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,
6. Samarium concentration, and
7. Boron penalty (MODE 4 only).

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within plus or minus 1% Delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

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 1.0% Delta k/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.0% Delta k/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.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.0% Delta k/k:

a. Within one 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).

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,
6. Samarium concentration, and
7. Boron penalty.

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump and charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7.a is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7.b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

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

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.

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.

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3

a. One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.

b. One charging flow path associated with support of Unit 1 shutdown functions shall be available.*

APPLICABILITY: Specification 3.1.2.3.a. - MODES 5 and 6
Specification 3.1.2.3.b. - At all times when Unit 1 is in MODES 1, 2, 3, or 4.

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

b. With more than one charging pump OPERABLE or with a safety injection pump(s) OPERABLE when the temperature of any RCS cold leg is less than or equal to 152°F, unless the reactor vessel head is removed, remove the additional charging pump(s) and the safety injection pump(s) motor circuit breakers from the electrical power circuit within one hour.

c. The provisions of Specification 3.0.3 are not applicable.

d. In addition to the above, when Specification 3.1.2.3.b is applicable and the required flow path is not available, return the required flow path to available status within 7 days, or provide equivalent shutdown capability in Unit 1 and return the required flow path to available status within the next 60 days, or have Unit 1 in HOT STANDBY within the next 12 hours and HOT SHUTDOWN within the following 24 hours.

e. The requirements of Specification 3.0.4 are not applicable when Specification 3.1.2.3.b applies.

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying that the pump's developed head at the test flow point is greater than or equal to the required developed head when tested pursuant to Specification 4.0.5

* A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 152°F.

BORIC ACID TRANSFER PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid transfer pump shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if only the flow path through the boric acid transfer pump of Specification 3.1.2.1a is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid transfer pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.5 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and associated heat tracing with:

1. A minimum usable borated water volume of 4300 gallons,
2. Between 20,000 and 22,500 ppm of boron, and
3. A minimum solution temperature of 145°F.

b. The refueling water storage tank with:

1. A minimum usable borated water volume of 90,000 gallons,
2. A minimum boron concentration of 2400 ppm, and
3. A minimum solution temperature of 70°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.1.2.7 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.

TABLE 3.3-1 (Continued)

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6 but below 5% of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5% of RATED THERMAL POWER

c. Above 5% of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement:

a. Immediately suspend operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODES 3 or 4) or 3:1.2.7.b.2 (MODE 5), and

b. Verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter, and

c. Close the isolation valves for unborated water sources to the chemical and volume control system within 1 hour. In MODE 5, if the RWST boron concentration is less than the reactor coolant system boron concentration and less than the boron concentration required by Specification 3.1.2.7.b.2, isolate the RWST from the reactor coolant system within 1 hour.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 1 hour.

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable CHANNEL may be bypassed for up to 2 hours for surveillance testing of the other channels per Specification 4.3.1.1.1.

ACTION 7 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 1 hour.

SAFETY VALVES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.4.2 A minimum of one pressurizer code safety valve shall be OPERABLE with a lift setting of 2485 PSIG ± 1%.*

APPLICABILITY: MODES 4 and 5.

ACTION:

With no pressurizer code safety valve OPERABLE:

a. Immediately suspend all operations involving positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.8.b.2 (MODE 4) or 3.1.2.7.b.2 (MODE 5), and place an OPERABLE RHR loop into operation in the shutdown cooling mode, and

b. Immediately render all Safety Injection pumps and all but one charging pump inoperable by removing the applicable motor circuit breakers from the electric power circuit within one hour.

SURVEILLANCE REQUIREMENTS

4.4.2 No additional Surveillance Requirements other than those required by Specification 4.0.5.

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

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One diesel generator with:

1. A day fuel tank containing a minimum of 70 gallons of fuel,

2. A fuel storage system containing a minimum indicated volume of 46,000 gallons of fuel, and

3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes except: 1) heatup or cooldown of the reactor coolant volume provided that SHUTDOWN MARGIN sufficient to accommodate the change in temperature is maintained in accordance with Specification 3.1.1.2 in MODE 5 or Specification 3.9.1 in MODE 6, and the heatup or cooldown rate is restricted to 50°F or less in any one-hour period in MODE 5, or 2) addition of water from the RWST, provided the boron concentration in the RWST is greater than or equal to the minimum required by Specification 3.1.2.7.b.2.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.+

+The provisions of Technical Specification 4.0.8 are applicable.

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:

a. Either 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 2400 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6

ACTION:

a. With the requirements of the above specification not satisfied, 1) immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2, and 2) initiate and continue boration at greater than or equal to 10 gpm of 20,000 ppm boric acid solution 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 2400 ppm, whichever is the more restrictive.

b. The provisions of Specification 3.0.3 are not applicable.

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 pressure 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 per 72 hours.

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two source range neutron flux monitors shall be operating, each with continuous visual indication in the control room and one with audible indication in the containment and control room.

APPLICABILITY: MODE 6.

ACTION:

a. With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes except addition of water from the RWST, provided the boron concentration in the RWST is greater than the minimum required by Specification 3.1.2.7.b.2.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL FUNCTIONAL TEST at least once per 7 days, and

b. A CHANNEL FUNCTIONAL TEST within 8 hours prior to the initial start of CORE ALTERATIONS, and

c. A CHANNEL CHECK at least once per 12 hours during CORE ALTERATIONS.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.3% Delta k/k is initially required to control the reactivity transient and automatic ESF is assumed to be available.

With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal and a 1% Delta k/k SHUTDOWN MARGIN provides adequate protection for this event.

The SHUTDOWN MARGIN requirements are based upon the limiting conditions described above and are consistent with FSAR safety analysis assumptions.

A boron penalty must be applied when operating with no reactor coolant loops in operation but one or more residual heat removal loops providing shutdown cooling. The necessary penalty is included in the SHUTDOWN MARGIN curves.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 2000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 2000 GPM will circulate an equivalent Reactor Coolant System volume of 12,612 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.2 BORATION SYSTEMS (Continued)

The charging flowpath of Unit 2 required for Unit 1 shutdown support ensures that flow is available to Unit 1 and addresses the requirements of 10 CFR 50 Appendix R. The flowpath consists of a charging pump powered from an electrical bus and associated water supplies and delivery system. Fire watches posted in the affected opposite unit areas (i.e., Unit 1 areas requiring use of the Unit 2 charging system in the event of a fire) may serve as the equivalent shutdown capability specified in the action statements of Specification 3.1.2.3. In the affected areas, either establish continuous fire watches or verify the OPERABILITY of fire detectors per Specification 4.3.3.7 and establish hourly fire watch patrols. The required opposite unit equipment along with the surveillance requirements necessary to ensure that this equipment is capable of fulfilling its intended Appendix R alternate safe shutdown function have been established and are included in a plant procedure. An additional plant procedure details how the above noted fire watches will be implemented.

Precluding positive reactivity addition capable of challenging the minimum required SHUTDOWN MARGIN or REFUELING boron concentration is required to assure continued safe operation. Introduction of RCS temperature changes must also be evaluated to not increase reactivity above the required SHUTDOWN MARGIN. The RCS heatup and cooldown rate is restricted in MODE 5 to 50°F or less in any one-hour period to ensure that the positive reactivity increase due to temperature changes is comparable to the UFSAR Chapter 14 analysis of a boron dilution event. In this analysis, it was concluded that there is sufficient time available to detect the dilution with the source range neutron flux monitors and terminate the event with operator action. There is no additional heatup or cooldown rate restriction in MODE 6 because the REFUELING boron concentration is above the minimum required to maintain the required SHUTDOWN MARGIN for the RCS temperature range defined for MODE 6. Introduction of coolant inventory from the RWST is acceptable provided the RWST boron concentration is above the minimum required to maintain the specified SHUTDOWN MARGIN.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) limit the potential effects of rod misalignment on associated accident analyses. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met. Misalignment of a rod requires measurement of peaking factors or a restriction in THERMAL POWER; either of these restrictions provide assurance of fuel rod integrity during continued operation. In addition, those accident analysis affected by a misaligned rod are reevaluated to confirm that the results remain valid during future operation.

The maximum rod drop time restriction is consistent with the assumed rod drop time used in the accident analyses. Measurement with T_{avg} greater than or equal to 541°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Control rod positions and OPERABILITY of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

ATTACHMENT 4 TO AEP:NRC:1327

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

No Significant Hazards Consideration Evaluation

Indiana Michigan Power Company (I&M) has evaluated this proposed amendment and determined that it involves no significant hazards consideration. According to 10 CFR 50.92(c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

1. involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated;

2. create the possibility of a new or different kind of accident from any previously analyzed; or

3. involve a significant reduction in a margin of safety.

The proposed changes would revise limitations on positive reactivity additions in several technical specifications (T/S) action statements. These changes would allow reactor coolant system (RCS) temperature changes in certain Mode 5 and 6 T/S action statements if the SDM is sufficient to accommodate the expected RCS temperature change. In addition, footnotes regarding additions of water from the refueling water storage tank (RWST) to the RCS are clarified and relocated to T/S action statements. Additional T/S action statement requirements are added in Table 3.3-1, "Reactor Trip System Instrumentation," when the required source range neutron flux channel is inoperable. Corresponding changes are proposed for the bases for T/S 3/4.1.1, "Boration Control," and T/S 3/4.1.2, "Boration Systems." Administrative changes are made to improve clarity. Finally, additions are made to SDM T/S surveillance requirements (SRs) to identify use of a boron penalty (requirement for additional boron) during residual heat removal system operation in Modes 4 and 5.

The determination that the criteria set forth in 10 CFR 50.92 are met for this amendment request is indicated below.

1. Does the change involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated?

No. I&M proposes to permit operators to make RCS temperature changes under conditions not previously allowed. RCS temperature changes may add positive reactivity to the reactor core that could reduce the SDM necessary to maintain subcritical conditions. Acceptable consequences for an inadvertent criticality rely on prevention. Maintaining an adequate SDM is an essential means to prevent an inadvertent criticality.

When equipment that is relied upon to prevent, detect, correct, or mitigate an unintentional approach to a critical condition is unavailable or degraded, activities that may reduce the SDM must be precluded or adequately controlled. This amendment request is based on maintaining adequate control of positive reactivity additions as a result of RCS temperature changes in Modes 5 and 6. The control is provided by requirements to confirm that the SDM required by the T/S is available to accommodate the expected RCS temperature change. This preserves the validity of accident analyses that assume the T/S SDM requirements are met when the accident is initiated.

The following accidents of potential applicability in Modes 5 and 6 are described in Section 14.2, "Standby Safeguards Analysis" of the Updated Final Safety Analysis Report (UFSAR).

1. Fuel handling accident
2. Waste liquid release
3. Waste gas release
4. Steam generator tube rupture
5. Steam pipe rupture
6. Rupture of control rod mechanism housing - rod cluster control assembly (RCCA) ejection
7. Environmental consequences following secondary system accidents
8. Rupture of a feedline (Unit 2 only)

The UFSAR also describes these events:

9. Uncontrolled RCCA withdrawal from a subcritical condition (Section 14.1.1)
10. Uncontrolled boron dilution (Section 14.1.5)

Accidents 4 through 8, above, are not credible in Modes 5 and 6 due to negligible stored energy (temperature and pressure) in the primary and secondary systems below the Mode 5 RCS temperature limit of 200°F. Therefore, they are not analyzed in Mode 5 and 6 and are not considered further.

Remaining accidents 1, 2, 3, 9, and 10 are discussed below:

1. Fuel Handling Accident

The only time a fuel handling accident could occur is during the handling of a fuel assembly. The required action to suspend core alterations is not changed. Changing RCS temperature in Modes 5 and 6 would not initiate this accident. SDM is not a factor or initial condition assumed in the analysis of a fuel handling accident. Therefore, since the requirements that would

preclude this accident are not affected, the probability of the accident is not changed. Similarly, a potential reduction in SDM does not increase the consequences of this accident.

2. Waste Liquid Release

The inadvertent release of radioactive liquid wastes to the environment was evaluated for the waste evaporator condensate and monitor tanks, condensate storage tank, primary water storage tank, RWST, auxiliary building storage tanks, and chemical and volume control system (CVCS) holdup tanks. It was concluded in the Updated Final Safety Analysis Report Chapter 14 evaluation that loss of liquid from these tanks to the environment is not a credible accident. This conclusion is not impacted by the thermal effects or reactivity changes due to RCS temperature while in Modes 5 and 6.

3. Waste Gas Release

Radioactive gases would be introduced into the RCS by the escape of fission products if defects existed in the fuel cladding. The processing of the reactor coolant by auxiliary systems results in the accumulation of radioactive gases in various tanks. The two main sources of any significant gaseous radioactivity that could occur would be the volume control tank and the gas decay tanks. It is assumed that a tank ruptures by an unspecified mechanism after the reactor has been operating for one core cycle with 1% defects in the fuel cladding. The integrity of these tanks is not affected by changes in RCS temperature and SDM is not a factor in the consequences of these events. Therefore, it is concluded that the probability of occurrence of a tank rupture and the consequences of a tank rupture are not significantly increased by this change.

9. Uncontrolled RCCA Withdrawal from a Subcritical Condition

The proposed changes specifically permit positive reactivity additions due to temperature changes. However, all other positive reactivity changes are suspended when the action applies. Therefore, intentional rod withdrawal would not be permitted.

Additionally, this event could occur only when the reactor trip breakers are closed and the control rod drive mechanisms are energized. With the exception of testing or special maintenance, the rod drive motor generator set

remains tagged out (de-energized with administrative cards to alert operators) in Modes 4 and 5. This alone would preclude rod movement. If the physical conditions for rod withdrawal were intentionally met, T/S require that two source range neutron flux instruments, two reactor trip instrumentation channels, and associated reactor trip breakers must be operable to automatically terminate the event. RCS temperature changes in Mode 5 and 6 are sufficiently below the normal operating and designed temperature of the drive mechanisms. The thermal effects of the proposed RCS temperature changes are not a significant contributor to the possibility of a drive mechanism failure. Acceptable consequences for the rod withdrawal event rely on termination by an automatic reactor trip prior to criticality, and no assumptions are made in the analysis about the SDM existing at the start of rod withdrawal. Therefore, it is concluded that this proposed license amendment would have no impact on the probability or consequences of an uncontrolled rod withdrawal event.

10. Uncontrolled Boron Dilution

Uncontrolled boron dilution is analyzed for refueling, startup, and power operation described in UFSAR section 14.1.5 for Unit 1 and Unit 2. The source of water for this event is primary grade water from the reactor makeup portion of the CVCS. The CVCS is designed to limit, even under various postulated failure modes, the potential rate of dilution to a value that provides the operator sufficient time to correct the situation in a safe and orderly manner. Acceptable consequences for this event rely on preventing an uncontrolled dilution.

The proposed change to allow RCS temperature changes below 200°F do not involve changes to the operating methods for the CVCS or modifications to the CVCS. Additionally, the CVCS pumps and valves required to add water to the RCS are not affected by the RCS temperature changes themselves. Any such effects in the range of 68°F to 200°F that would be permitted would be small compared to changes between 200°F to normal RCS operating temperature. Therefore, the thermal effects are significantly less than those that occur during normal operation. It is concluded that the probability and consequences of an uncontrolled boron dilution event are not significantly increased by the proposed license amendment.

The initiators and precursors for the accidents described above are not changed. Therefore, the probability of their occurrence is not changed and the consequences are bounded by the current

analyses. Therefore, there is no increase in the types or amounts of effluents released offsite.

The proposed additions to action 5 of T/S Table 3.3-1 are conservative. They provide additional assurance that instrumentation would be available to alert operators to a dilution event. The requirement to isolate sources of dilution water removes potential initiators for an inadvertent dilution. The RWST would be considered a dilution source if the RWST boron concentration is less than the RCS boron concentration and less than the minimum boron concentration in T/S limiting condition for operation 3.1.2.7.b.2. Isolating the RWST in this case is appropriate because it eliminates a potential accident initiator. The borated water concentration and volume in Mode 5 are established to provide the required SDM after xenon decay and cooldown from 200°F to 140°F. The accidents described above do not require a minimum volume for reasons other than boration control.

The addition to T/S SRs 4.1.1.1.e and 4.1.1.2.b, which requires application of a boron penalty, is an additional restriction that is imposed administratively already. The remaining changes are administrative. They correct typographical errors or change format, and are not intended to change the meaning. They do not affect accident initiators or precursors.

In summary, based on the above, the probability of occurrence or the consequences of accidents previously evaluated are not increased.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

No. The proposed changes permit RCS temperature changes under conditions that were previously prohibited. However, no new methods of changing RCS temperature are involved, and the T/S limits on the permissible rates of RCS temperature changes are not altered. Therefore, the integrity of the reactor vessel when subject to RCS temperature changes is not affected.

The accident of concern for the proposed amendment is an unintentional reduction in SDM leading to an inadvertent criticality. This is not a new or different kind of accident, although the causal mechanism adding the positive reactivity is an RCS temperature change instead of a dilution event.

As discussed in question 1, the requirement to maintain SDM during RCS temperature changes provides assurance that the probability of the SDM reduction is not increased. However, as an additional conservative measure, a maximum RCS heatup and

cooldown rate of 50°F in any one-hour period is imposed when the action applies. This increases the time necessary for a RCS temperature change to reduce the SDM by an unacceptable amount. Thus, if a heatup or cooldown was initiated at 50°F/hr, and inadvertently continued beyond the intended temperature, sufficient time would be available for the operators to detect the SDM reduction with the source range nuclear instruments and secure the temperature change. The rate of 50°F in any one-hour period was estimated to provide at least as much time as was considered adequate for detecting and correcting a dilution event. The acceptable time for a dilution event is described in UFSAR Section 14.1.5. Conservative assumptions of the maximum positive or negative moderator temperature coefficient were used for the estimate.

It should be noted that compliance with the current T/S action statements prohibit deliberate heatup and cooldown. However, it does not prevent use of the equipment involved in removing decay heat to maintain plant temperature (for example residual heat removal system pumps, valves, and heat exchangers). Therefore, the probability of a malfunction of this equipment during deliberate heatup and cooldown is not significantly greater than it is when the equipment is operated, as necessary, to maintain steady-state temperatures for decay heat removal.

The addition to T/S SRs 4.1.1.1.e and 4.1.1.2.b, which requires application of a boron penalty, is an additional restriction that is imposed administratively already. The proposed additions to the T/S action statements for the source range neutron flux instrumentation provide additional controls to prevent an unmonitored positive reactivity addition. The remaining changes are administrative. They correct typographical errors or change format, and are not intended to change the meaning.

Isolating the RWST when it is a potential dilution source and when there are no source range neutron flux instrument channels operable in Mode 5 is not an accident initiator. Borated makeup to the RCS can be accomplished with the boric acid storage tank.

Based on the above, it is concluded that the change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the change involve a significant reduction in a margin of safety?

No. The margin of safety pertinent to the proposed changes is the T/S-required SDM. The additions to T/S SRs 4.1.1.1.e and 4.1.1.2.b require application of a boron penalty. Because this penalty is controlled administratively already and there are no

other changes to the SDM requirements, the margin of safety is maintained. Additionally, the proposed change to isolate the RWST when it is a potential dilution source does not impact the ability of the boric acid storage tank to supply the boron required for SDM during cooldown from 200°F to 140°F including xenon decay.

The minimum time available to the operators to detect and terminate an unintentional addition of positive reactivity could also be considered a margin of safety. The proposed changes limit temperature changes to 50°F in a one-hour period so as not to reduce this time. Compliance with the proposed changes would continue to provide assurance that there is no significant reduction in these margins of safety.

The remaining changes are administrative. They correct typographical errors or change format, and are not intended to change the meaning.

Based on the above, the proposed changes do not involve a significant reduction in a margin of safety.

In summary, based upon the above evaluation, I&M has concluded that the proposed amendment involves no significant hazards consideration.

ATTACHMENT 5 TO AEP:NRC:1327

ENVIRONMENTAL ASSESSMENT

Environmental Assessment

Indiana Michigan Power Company (I&M) has evaluated this license amendment request against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. I&M has determined that this license amendment request meets the criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50 that changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or that changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria.

(i) The amendment involves no significant hazards consideration.

As demonstrated in attachment 4, this proposed amendment does not involve significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

As documented in attachment 1, there will be no significant change in the types or significant increase in the amounts of any effluents released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed changes will not result in significant changes in the operation or configuration of the facility. There will be no change in the level of controls or methodology used for processing of radioactive effluents or handling of solid radioactive waste, nor will the proposal result in any change in the normal radiation levels within the plant. Therefore, there will be no significant increase in individual or cumulative occupational radiation exposure resulting from this change.

ATTACHMENT 1 TO AEP:NRC:0433Q

DESCRIPTION AND SAFETY ANALYSIS FOR PROPOSED CHANGES

Description and Safety Analysis For Proposed Changes

A. Summary of Proposed Changes

The Licensee proposes to make administrative changes to several technical specifications (T/S) for Donald C. Cook Nuclear Plant unit 1 and unit 2. The proposed changes include: (1) revising boron sampling requirements in mode 6; (2) deleting a reference to obsolete equipment in a footnote, (3) deleting a redundant figure; (4) correcting a reference to another requirement; (5) deleting obsolete notes; (6) adding to surveillance requirements; (7) clarifying instrumentation configuration; and (8) correcting typographical errors. These changes are proposed to remove obsolete information, provide consistency between unit 1 and unit 2, provide consistency with the Standard Technical Specifications, provide clarification, and correct typographical errors.

The proposed changes are described in detail in Section B of this attachment. T/S pages that are marked to show the proposed changes are provided in attachments 2A and 2B for unit 1 and unit 2, respectively. The proposed T/S pages with the changes incorporated are provided in attachments 3A and 3B for unit 1 and unit 2, respectively.

B. Detailed Description of Proposed Changes

1. Proposed Revision to Boron Sampling Requirements in Mode 6

Description and Bases of the Current Requirement

T/S surveillance requirement 4.9.1.2 for unit 1 requires that the boron concentration of the reactor coolant system and refueling canal be determined at least three times per seven days with a maximum time interval between samples of 72 hours. The requirement provides assurance that a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel.

Description and Bases of the Requested Revision

The Licensee proposes to remove the unit 1 restriction to determine the concentration at least three times per seven days for consistency with the unit 2 surveillance requirement, NUREG-1431, "Standard Technical Specifications," and its predecessor, NUREG-0452. The 72-hour maximum interval between samples is not changed. According to NUREG-1431, a minimum frequency of once every 72 hours is a reasonable amount of time to verify the boron concentration of representative samples. The frequency is based on operating experience, which has shown 72 hours to be adequate.

2. Proposed Revision to Footnote for T/S 3.9.12, Action a

Description and Bases of the Current Requirement

T/S 3.9.12, Action a, is modified by a footnote describing operation of the drumming room roll-up door. The crane bay roll-up door and the drumming room roll-up door provide a ventilation barrier to maintain negative pressure in the auxiliary building. These doors may be opened for personnel use provided established administrative controls are maintained. The footnote was added in amendment 124 to DPR-58 and amendment 111 to DPR-74. In the NRC's Safety Evaluation Report, the staff found that the operation of the doors met the intent of Standard Review Plan, Sections 9.4.2, "Spent Fuel Pool Area Ventilation System," and 15.7.4, "Radiological Consequences of Fuel Handling Accidents," and was, therefore, acceptable.

Description and Bases of the Requested Revision

The Licensee proposes to remove "roll-up" from the description of the drumming room door. The door has been replaced by a door having a different design. The function of the door has not changed. The replacement door provides a ventilation barrier as required by the analysis used in support of the previous amendment request. In addition, the name of the door is changed to "south door of the auxiliary building crane bay" because it more accurately describes the door's current use.

3. Proposed Change to Figure 5.6-3

Description and Bases of the Current Requirement

T/S 5.6.1.1.c.3 includes equations for equivalent reactivity criteria for Region 2 and Region 3 in the spent fuel storage racks. The equations are graphically depicted in Figure 5.6-3. Either the equations or graph may be used to verify that fuel is stored in the appropriate region.

Description and Bases of the Requested Revision

The Licensee proposes to delete Figure 5.6-3 because the information is redundant to the equations provided in T/S 5.6.1.1.c.3. It is normal practice to use the equations rather than the source plot in Figure 5.6-3; therefore, the redundant curves are not necessary. The fuel storage requirements are not changed.

4. Proposed Change to Reference in T/S 6.3.1

Description and Bases of the Current Requirement

T/S 6.3.1, "Facility Staff Qualifications," includes a requirement that the operations superintendent must hold or have held a senior operator license as specified in

T/S 6.2.2.h. The requirement provides assurance that operational activities are directed by an individual who has an appropriate level of knowledge.

Description and Bases of the Requested Revision

The Licensee proposes to change the referenced section from 6.2.2.h to 6.2.2.g to correct an administrative error that was introduced in previous amendments. Section 6.2.2.h describes the senior operator license requirement. Section 6.2.2.g no longer exists because it had been relabeled as 6.2.2.h; however, the corresponding reference in T/S 6.3.1 was not changed at that time. This request corrects the error. The statement describing the senior operator license in 6.3.1 is deleted because the requirement is provided in detail in 6.2.2.h. The statement is not consistent with the requirements in 6.2.2.h because of a previous administrative error. The change provides a clear reference to the current T/S for qualifications.

5. Proposed Deletion of Obsolete Notes

Description and Bases of the Current Requirement

For unit 1, T/S 4.0.6 allows extensions for certain surveillances required to be performed on or before July 31, 1987, and until the end of the cycle 9-10 refueling outage. T/S 4.0.7 allows extensions for certain surveillances required to be performed on or before April 1, 1989, until the end of the cycle 10-11 refueling outage. These extensions were granted to accommodate scheduled work at the time.

For unit 2, T/S 4.0.6 allows extensions for certain surveillances required to be performed on or before March 31, 1986, until the end of the cycle 5-6 refueling outage. T/S 4.0.7 allows extensions for certain surveillances required to be performed on or before July 1, 1988, until the end of the cycle 6-7 refueling outage. These extensions were granted to accommodate scheduled work at the time.

For unit 2, T/S 4.0.8 allows extensions for certain surveillances required to be performed on or before August 13, 1994, and designated as 18-month or 36-month surveillances (or required as outage-related surveillances under the provisions of T/S 4.0.5). T/S 4.0.8 also affected the initiation date established during the unit 2 1994 refueling outage. Similarly, T/S 4.0.9 allowed surveillances that must be performed on or before September 7, 1994, and are designated as 18-month surveillances to be delayed until just prior to core reload in the unit 2 cycle 9-10 refueling outage. Each affected surveillance is modified by a note stating that the provisions of T/S 4.0.8 or T/S 4.0.9 (as appropriate) are applicable. These extensions were granted to accommodate scheduled work at the time.

For unit 2, Table 4.4-2 and T/S 3.3.3.1 include a note stating that the T/S will not be effective until after the 1982 refueling outage.

For unit 1 and unit 2, surveillance requirements 4.4.12.1 and 4.4.12.2 are modified by notes stating that the surveillance requirements will be performed the next time the unit enters modes 5 or 6 following the issuance of the technical specification, and after the appropriate plant procedures have been written.

Description and Bases of the Requested Revision

For unit 1 and unit 2, T/S 4.0.6 and 4.0.7 are deleted because they no longer apply. Surveillances are scheduled in accordance with the applicable T/Ss. The references to 4.0.6 and 4.0.7 that indicated when the provision was applicable were deleted in previous amendments.

For unit 2, T/S 4.0.8 and 4.0.9 are deleted because they no longer apply. Surveillances are scheduled in accordance with the applicable T/Ss. References to T/S 4.0.8 are also deleted from the following: Table 4.3-1, functional units 7 through 11; Table 4.3-2, functional units 1.d, 4.d, and 6.d; Table 4.3-6A, instruments 5 through 8; Table 4.3-10, items 2, 3, 11, 15, and 16; surveillance requirement (SR) 4.4.6.1.b; SR 4.4.11.1.d; SR 4.5.3.1; SR 4.6.2.2c; SR 4.6.3.1.2; SR 4.6.5.9; SR 4.7.3.1.b; SR 4.7.4.1.b; SR 4.7.5.1.e.2.a; SR 4.7.5.1.e.2.b; SR 4.7.7.1.a; and SR 4.8.1.2. References to T/S 4.0.9 are deleted from SR 4.8.2.3.2.d and SR 4.8.2.4.2.

For unit 2, the notes for T/S 3.3.3.1 and Table 4.4-2 are deleted. The provision has expired and it is no longer required to be included.

For unit 1 and unit 2, the notes for surveillance requirements 4.4.12.1 and 4.4.12.2 are deleted. Plant procedures 01-OHP-4030.STP.56 and 02-OHP-4030.STP.56 were developed to perform the surveillance. The surveillances are performed routinely as required, and the exception allowed in the footnote is no longer applicable.

The exceptions that were granted in all of these notes are no longer applicable. Therefore, deleting the notes is considered to be an administrative change.

6. Proposed Changes to T/S Surveillance Requirement 4.7.3.1

Description and Bases of the Current Requirement

Unit 1 T/S surveillance requirement 4.7.3.1.d requires verification that the component cooling water system cross-tie valves can cycle full travel.

Unit 2 T/S surveillance requirement 4.7.3.1 includes two requirements to demonstrate operability of the component cooling water loops. A third requirement is included in surveillance requirement 4.7.3.2. These surveillances support demonstration that the system is operable.

Description and Bases of the Requested Revision

For unit 1, a clarification is proposed to indicate that the cross-tie valves are the unit cross-tie valves. The change is consistent with the equivalent unit 2 requirement and is not intended to affect which valves are included in the surveillance.

For unit 2, as described above, the Licensee proposes to add a new surveillance requirement, 4.7.1.3.c, to demonstrate operability by verifying pump performance pursuant to T/S 4.0.5. This change is consistent with the corresponding surveillance for unit 1. In amendment 164 to DPR-58 and amendment 149 to DPR-74, the NRC approved changes requiring that all safety-related pumps in the T/S be tested at a frequency specified in T/S 4.0.5. T/S 4.0.5 states that safety-related pumps shall be tested in accordance with ASME Code, Section XI, unless written relief has been granted. The proposed change is consistent with the changes approved in those amendments. Additionally, SR 4.7.3.2 is renumbered as 4.7.3.1.d for consistency with unit 1. This requirement supports demonstrating that the system is operable, and it is appropriate to include it with the related requirements.

7. Proposed Change to Degraded Bus Voltage Instrumentation

Description and Bases of the Current Requirement

Table 3.3-3 provides engineered safety features actuation system instrumentation. Functional unit 8.b provides instrumentation requirements for the 4 kV bus degraded voltage (loss of power). There are three channels per bus total. Two channels per bus are required to be operable in modes 1, 2, 3, and 4, and two channels per bus are required to trip. These requirements provide assurance that the actuation will occur when required.

Description and Bases of the Requested Revisions

The Licensee proposes to add clarifying information to reflect the configuration of the instrumentation used to detect degraded voltage. Three channels are installed on buses T11A and T11D for unit 1 and on buses T21A and T21D for unit 2. This instrumentation is not installed on buses T11B or T11C for unit 1 or on buses T21B or T21C for unit 2. Because of this design, the requirements for functional unit 8.b of Table 3.3-3 may not be clear. The proposed changes add references to the buses with the appropriate instrumentation. This is similar to functional unit 6.b,

which has instrumentation requirements for 4 kV bus loss of voltage.

Degraded grid voltage relays are installed to sense degraded grid voltage at the 4kV safety buses and, on a two-out-of-three coincident logic with a two-minute time delay, trip open the reserve feed breakers and start the diesel generators. The instrumentation was installed in response to a letter from D. K. Davis, Acting Chief of Operating Reactors Branch No. 2 - Division of Operating Reactors, to Indiana & Michigan Electric Company, dated June 3, 1977. This letter addressed the susceptibility of the safety-related electrical equipment at Cook Plant to sustained degraded voltage conditions at the offsite power systems and interaction between the offsite and onsite emergency power systems.

AEP:NRC:0268, dated December 17, 1979, provides the response to that letter. Attachment 7 to AEP:NRC:0268 describes a proposed modification to install 4 kV safety bus undervoltage protection at buses A and D for unit 1 and unit 2. The proposed modification was reviewed and documented in EG&G Idaho, Incorporated's Technical Evaluation Report (TER). Section 3.2 of the TER includes a detailed description of the proposed modification, which noted that three new undervoltage relays would be installed to protect each of the 4160 V safety trains. The TER also noted that these relays will be on buses T11A and T11D and will be arranged in a two-out-of-three coincidence logic. The conclusion in the TER was that the proposed modifications met the NRC staff position in the June 3, 1977, letter and that the modifications would protect the class 1E equipment from a sustained degraded voltage condition.

The NRC approved the related T/S changes in amendment 39 for DPR-58 and Amendment 22 for DPR-74. In the NRC's Safety Evaluation Reports for the amendments, the NRC concurred with the findings in the TER. The NRC also described the modification as having three undervoltage relays on each of the two 4160 V Class 1E buses.

The proposed change is intended to clarify functional unit 8.b by indicating that the instrumentation is installed only on buses T11A and T11D. Because the design has already been reviewed and approved by the NRC, and the design was installed as described in the TER, the change is considered administrative.

8. Proposed Corrections to Typographical Errors

Description and Bases of the Requested Revisions

The Licensee proposes to correct two typographical errors that were introduced in amendment 131 to DPR-74 (unit 2). These errors were to portions of the text that were not affected by the amendment. The proposed changes restore the text as it was issued in the previous amendment (amendment 78). The valve number for line d of surveillance requirement 4.5.2.a is changed from IMP-262 to IMO-262. The word "otherwise" is corrected in surveillance requirement 4.5.2.b.

Additional corrections are proposed to change "once" to "one" and "with" to "when" in T/S 3.7.3.1 for unit 1 and "in" to "to" in T/S 3.7.3.1 for unit 2.

These changes are considered editorial and are not intended to impact the requirements.

C. Impact of Previous Submittals

One previous submittal affects some of the pages that are affected by this request. AEP:NRC:0433P was transmitted on March 26, 1997, to request administrative changes. One of those proposed changes was to delete a footnote to T/S 3.9.12 for unit 1 and unit 2. That change is independent of the proposed change to a different footnote to T/S 3.9.12, described in section B.2 of attachment 1 to this request. The T/S pages in attachments 2A, 2B, 3A, and 3B do not reflect the changes proposed in the previous submittal. Both changes will be incorporated based on when each request is approved.