BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. One boric acid makeup tank and at least one associated heat tracing circuit with the tank contents in accordance with Figure 3.1-1.

b. The refueling water storage tanks with:

1. A minimum borated water volume of 9970 gallons above the ECCS suction connection,

2. A minimum boron concentration of 1720 ppm, and

3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

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

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 of the tank, and

3. Verifying the boric acid makeup 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 when the outside air temperature is less than 40°F or greater than 100°F.

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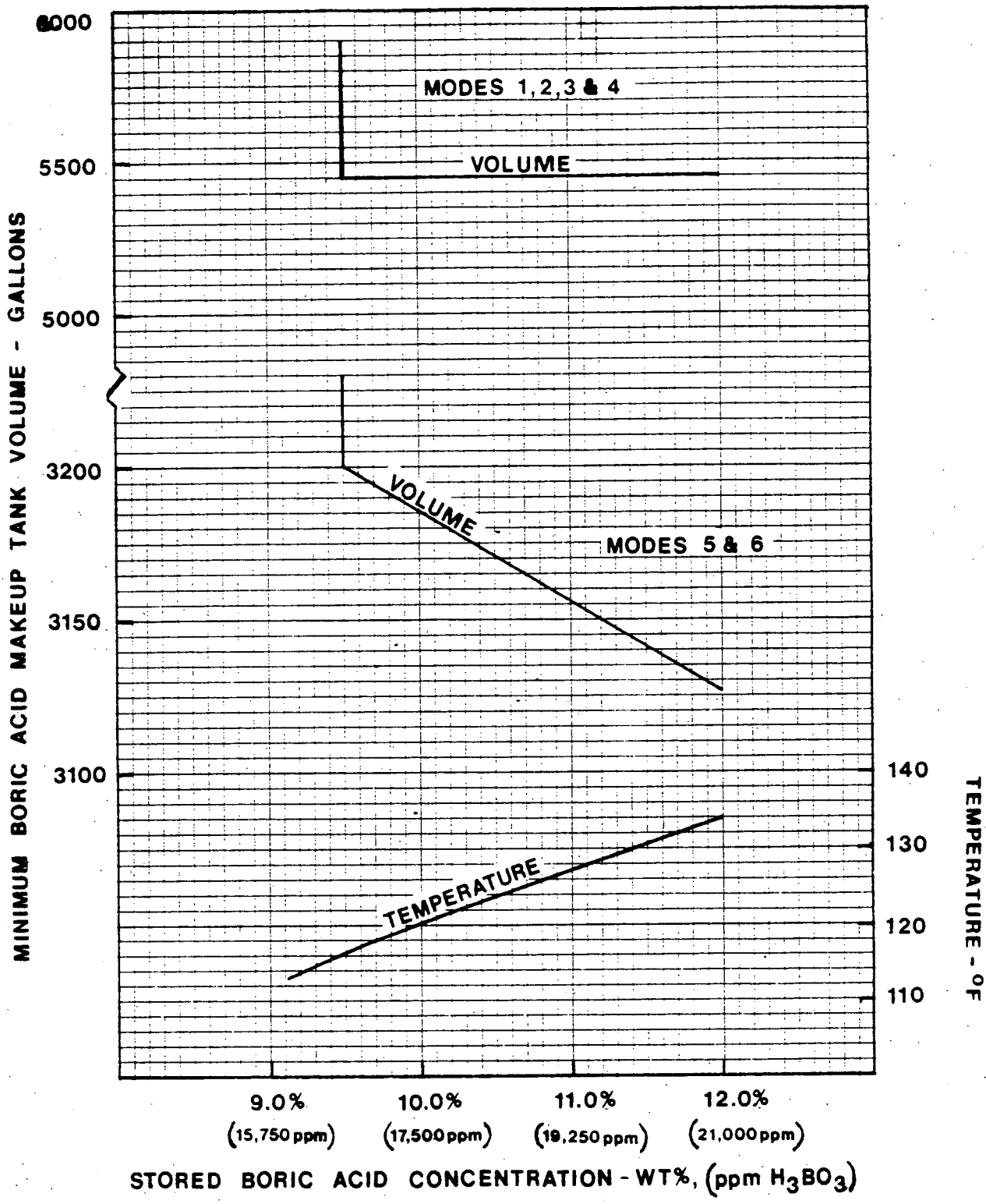

Figure 3.1-1

MINIMUM BORIC ACID STORAGE TANK VOLUME AND MINIMUM TEMPERATURE BEFORE PRECIPITATION AS A FUNCTION OF STORED BORIC ACID H_3BO_3 CONCENTRATION

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 Each of the following borated water sources shall be OPERABLE:

a. At least one boric acid makeup tank and at least one associated heat tracing circuit with the contents of the tanks in accordance with Figure 3.1-1, and

b. The refueling water storage tank with:

1. A minimum contained borated water volume of 362,800 gallons above the ECCS suction connection,
2. Between 1720 and 2300 ppm of boron, and
3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the above required boric acid makeup tank inoperable, restore the tank to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 2% delta k/k at 200°F; restore the above required boric acid makeup tank to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

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

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in the water,
2. Verifying the contained borated water volume of the water source, and
3. Verifying the boric acid makeup tank solution temperature.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 100°F.

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3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 520°F. This limitation is required to ensure (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the protective instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid makeup pumps, (5) associated heat tracing systems, and (6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 2.0% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid makeup tanks in the allowable concentrations and volumes of Specification 3.1.2.8 or 81,970 gallons of 1720 ppm borated water from the refueling water tank. However, for the purpose of consistency the minimum required volume of 362,800 gallons above ECCS suction connection in Specification 3.1.2.8 is identical to the more restrictive value of Specification 3.5.4.

With the RCS temperature below 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 changes in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 2% delta k/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires either 9970 gallons of 1720 ppm borated water from the refueling water tank or boric acid solution from the boric acid makeup tanks in accordance with the requirements of Specification 3.1.2.7.

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DESCRIPTION AND SAFETY ANALYSIS OF PROPOSED CHANGE NPF-10/15-184

This is a request to revise Technical Specification 3/4.10.1, "Special Test Exceptions - Shutdown Margin."

Description

The proposed change revises Technical Specification (T.S.) 3/4.10.1, "Special Test Exceptions - Shutdown Margin." T.S. 3.10.1 allows shutdown margin to be reduced to less than the normal operating shutdown margin requirements during the performance of low power physics tests, provided that certain conditions are met. As one of these conditions, Surveillance Requirement 4.10.1.2 requires that all control element assemblies (CEA's) not fully inserted in the core be demonstrated to be capable of full insertion when tripped from at least the 50% withdrawn position within 24 hours prior to reducing shutdown margin to less than the normal operating requirements. The proposed change will allow this surveillance to be performed within the past seven days instead of within the past 24 hours. This will enable low power physics testing to be completed without an additional trip to verify CEA insertability.

Low power physics tests are performed to verify core physics predictions. One of the test sequences measures CEA worths and may involve the reduction of shutdown margin as permitted by T.S. 3.10.1. Prior to initial criticality for performance of the low power physics tests, rod drop testing is performed to demonstrate CEA insertability. The reactor is brought critical and stabilized at the test plateau (approximately 10^{-2}% power). The most logical sequence for lower power physics testing has CEA worth measurements made last. Since approximately five days would have elapsed from when the hot rod drop tests were last performed, the reactor would have to be tripped again to demonstrate CEA insertion capability and satisfy the current 24 hour criteria. The proposed change will eliminate the necessity for an additional trip during low power physics test by requiring CEA insertability to be verified within seven days prior to reducing shutdown margin instead of within 24 hours.

Existing Technical Specifications:

Unit 2: See Attachment "A"
Unit 3: See Attachment "C"

Proposed Technical Specifications:

Unit 2: See Attachment "B"
Unit 3: See Attachment "D"

Safety Analysis

The proposed change described above shall be deemed to involve a significant hazards consideration if there is a positive finding in any of the following areas:

1. Will operation of the facility in accordance with the proposed change involve a significant increase in the probability or consequences of a previously evaluated accident?

   Response: No

   The previously analyzed accidents which potentially could be affected by the proposed change are those which involve overcooling of the reactor coolant system (RCS). Because of the negative moderator temperature coefficient, cooldown results in a reactivity increase. Because of this, a post trip return to power may be experienced during events involving overcooling of the RCS if insufficient negative reactivity is inserted via the CEA's. Calculation of shutdown margin excludes the contribution of the highest reactivity worth CEA which is assumed to remain fully withdrawn from the core on a reactor trip. Since shutdown margin is reduced during low power physics tests, surveillance 4.10.1.2 provides added assurance that the maximum amount of negative reactivity is available for insertion should an overcooling event occur. The proposed change may reduce the amount of assurance provided by this surveillance. To quantify the impact of the proposed change, a probabalistic study was conducted. The study considered the configuration of components utilized in CEA insertion and electronic/electrical failures that could result in a stuck CEA.

   Results of the study of the configuration of the components that are utilized in CEA insertion have shown that there would be no significant increase in the probability of stuck CEA as there is no significant change in the geometry of these components over a 7 day period of time. Components studied include the fuel assembly (including the effects of foreign material that could get trapped in the gap between the control rod and guide tube), CEA, extension shaft, CEDM (and scramability with respect to the proposed extended time period), and upper guide structure.

   Results of the study of electronic/electrical failures that could cause a CEA to be stuck show that failures of the feature that controls the movement of the CEA's is not time related. Power is required to engage or disengage grippers which control the movement of the CEA. Since the CEA's will always insert by gravity upon loss of power, the probability of a stuck CEA cannot be increased as a result of an electrical malfunction.

   Based on the probabilistic analysis, the probability of an RCS overcooling event with a stuck CEA increases from 5.0×10^{-8} to 2.3×10^{-7} when the requirement for trip testing is extended from 24

hours to 7 days. Although this scenario is not a core melt scenario, for comparison purposes it should be noted that the change in probability, 1.8×10^{-7}, is approximately three orders of magnitude below the core melt safety goal proposed by the NRC in NUREG-0880. This respresents a negligible increase to the risk to the public. Therefore, the proposed change does not significantly increase the probability or consequences of previously evaluated accidents.

2. Will operation of the facility in accordance with this proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   There is no possibility of a new or different kind of accident occurring since the FSAR accident analysis already assumes a hypothetical stuck CEA, and the proposed amendment does not result in any change to the facility.

3. Will operation of the facility in accordance with this proposed amendment involve a significant reduction in a margin of safety?

   Response: No

   Operation of the facility in accordance with this proposed amendment does not involve a significant reduction in a margin of safety since the change does not significantly affect the probability or consequences of any previously evaluated accident.

The Commission has provided guidance concerning the application of the standards for determining whether a significant hazards consideration exists by providing certain examples (48 FR 14870) of amendments that are considered not likely to involve significant hazards considerations. Example (vi) relates to a change which either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan (SRP): for example a change resulting from the application of a small refinement of a previously used calculational model or design method.

In this case, SRP Section 14.2, "Initial Test Program" and SRP Sections 15.1.1, 15.1.2, 15.1.3, 15.1.4 and 15.1.5 which relate to Reactor Coolant System (RCS) overcooling events provide the pertinent acceptance criteria. SRP Section 14.2 refers to Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants." R.G. 1.68 outlines the elements of an acceptable startup test program including requirements for CEA worth measurements during low power physics testing. The proposed change will facilitate CEA worth measurements and is consistent with R.G. 1.68 and SRP Section 14.2.

The proposed change does not affect the consequences of RCS overcooling events evaluated in accordance with SRP Section 15.1.1 through 15.1.5. Because of a negative moderator temperature coefficient, RCS overcooling results in a reactivity increase. Because of this, a post trip return to power may be experienced in overcooling events if insufficient negative reactivity is inserted via the CEA's. Since shutdown margin is reduced during CEA worth measurements, T.S. 4.10.1.2 provides added assurance that all CEA's are trippable. By increasing the period during which shutdown margin may be reduced following performance of surveillance requirement 4.10.1.2, the proposed change may result in an insignificant reduction in the assurance provided. The resultant increase in the probability of a stuck CEA coincident with an overcooling event has been calculated to be 1.8×10^{-7}. The proposed change has no effect on the consequences of overcooling events since it does not affect the amount by which shutdown margin may be reduced. Because the consequences of these events are not increased, the SRP acceptance criteria continue to be satisfied.

The proposed change satisfies the SRP acceptance criteria and therefore is similar to example (vi).

Safety and Significant Hazards Determination

Based on the above discussion, the proposed change does not involve a significant hazards consideration in that it does not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. In addition, it is concluded that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (2) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

PWS:3746F

ATTACHMENT "A"

UNIT 2 EXISTING SPECIFICATION

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

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

APPLICABILITY: MODES 2 and 3*

ACTION:

a. With any full length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length CEAs fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length and part length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

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

*Operation in MODE 3 shall be limited to 6 consecutive hours.

ATTACHMENT "B"

UNIT 2 PROPOSED SPECIFICATION

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

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

APPLICABILITY: MODES 2 and 3*

ACTION:

a. With any full length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length CEA's fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length and part length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each CEA not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 7 days prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

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*Operation in MODE 3 shall be limited to 6 consecutive hours.

ATTACHMENT "C"

UNIT 3 EXISTING SPECIFICATION

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

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

APPLICABILITY: MODES 2 and 3*.

ACTION:

a. With any full length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length CEAs fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length and part length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

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

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*Operation in MODE 3 shall be limited to 6 consecutive hours.

ATTACHMENT "D"

UNIT 3 PROPOSED SPECIFICATION

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

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

APPLICABILITY: MODES 2 and 3*

ACTION:

a. With any full length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length CEA's fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length and part length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each CEA not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 7 days prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

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*Operation in MODE 3 shall be limited to 6 consecutive hours.