ATTACHMENT 1

UNIT 1

SPECIFICATION

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3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} > 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The **SHUTDOWN MARGIN** shall be equal to or greater than the limit line of Figure 3.1-1b.

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

ACTION:

With the **SHUTDOWN MARGIN** less than the limit line of Figure 3.1-1b, immediately initiate and continue boration at ≥ 40 gpm of 2300 ppm boric acid solution or equivalent until the required **SHUTDOWN MARGIN** is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The **SHUTDOWN MARGIN** shall be determined to be equal to or greater than the limit line of Figure 3.1-1b:

a. Within one hour after detection of an inoperable CEA(s)+ and at least once per 12 hours thereafter while the CEA(s)+ is inoperable. If the inoperable CEA is ~~immovable or~~ untrippable, the above required **SHUTDOWN MARGIN** shall be increased by an amount at least equal to the withdrawn worth of the ~~immovable or~~ untrippable CEA(s)+.

b. When in **MODES** 1 or 2#, at least once per 12 hours by verifying that CEA group withdrawal+ is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in **MODE** 2##, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position+ is within the limits of Specification 3.1.3.6.

d. Prior to initial operation above 5% **RATED THERMAL POWER** after each fuel loading, by consideration of the factors of e below, with the CEA groups+ at the Transient Insertion Limits of Specification 3.1.3.6.

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* Adherence to Technical Specification 3.1.3.6 as specified in Surveillance Requirements 4.1.1.1.1 assures that there is sufficient available shutdown margin to match the shutdown margin requirements of the safety analyses.

** See Special Test Exception 3.10.1.

\# With $K_{eff} \geq 1.0$.

\## With $K_{eff} < 1.0$.

\+ Excluding the center CEA during Cycle 10.

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN - $T_{avg} \leq 200^{o}F$

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be $\geq$ 3.0% Δ k/k, and when pressurizer level is less than

APPLICABILITY: MODE 5

~~a. Pressurizer level $\geq$ 90 inches from bottom of the pressurizer.~~
~~b. Pressurizer level < 90 inches from bottom of the pressurizer,~~ and all sources of non-borated water $\leq$ 88 gpm.

shall be

ACTION:

a. With the SHUTDOWN MARGIN < 3.0% Δ k/k, immediately initiate and continue boration at $\geq$ 40 gpm of 2300 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.
b. With the pressurizer drained to $\leq$ 90 inches and all sources of non-borated water > 88 gpm, immediately suspend all operations involving positive reactivity changes while the SHUTDOWN MARGIN is increased to compensate for the additional sources of non-borated water or reduce the sources of non-borated water to $\leq$ 88 gpm.

SURVEILLANCE REQUIREMENTS

4.1.1.2.1 The SHUTDOWN MARGIN shall be determined to be $\geq$ 3.0% Δ k/k:

a. Within one hour after detection of an inoperable CEA(s)+ and at least once per 12 hours thereafter while the CEA(s)+ is inoperable. If the inoperable CEA+ is ~~immovable or~~ untrippable, the above required SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the ~~immovable or~~ untrippable CEA(s)+.
b. At least once per 24 hours by consideration of the following factors:
   1. Reactor coolant system boron concentration,
   2. CEA position,
   3. Reactor coolant system average temperature,
   4. Fuel burnup based on gross thermal energy generation,
   5. Xenon concentration, and
   6. Samarium concentration.

4.1.1.2.2 With the pressurizer drained to $\leq$ 90 inches determine:

a. Within one hour and every 12 hours thereafter that the level in the reactor coolant system is above the bottom of the hot leg nozzles, and
b. Within one hour and every 12 hours thereafter that the sources of non-borated water are $\leq$ 88 gpm or the shutdown margin has been increased to compensate for the additional non-borated water sources.

+ Excluding the center CEA during Cycle 10.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

CEA POSITION

LIMITING CONDITION FOR OPERATION

3.1.3.1 The CEA Motion Inhibit and all shutdown and regulating CEAs+ shall be OPERABLE with each CEA of a given group positioned within 7.5 inches (indicated position) of all other CEAs in its group.

APPLICABILITY: MODES 1* and 2*

ACTION:

a. With one or more CEAs+ (regulating or shutdown) inoperable due to being ~~immovable as a result of excessive friction or mechanical interference or known to be~~ untrippable, be in at least HOT STANDBY within 6 hours.

b. With the CEA Motion Inhibit inoperable, within 6 hours either:

1. Restore the CEA Motion Inhibit to OPERABLE status, or

2. ~~Place and maintain the CEA drive system mode switch in either the "Off" or any "Manual Mode" position and~~ fully withdraw all CEAs in groups 3 and 4 and withdraw the CEAs+ in group 5 to less than 5% insertion, or

3. Be ~~in at least~~ HOT STANDBY.

c. With one (regulating) CEA inoperable+ due to causes other than addressed by ACTION a, above, and inserted beyond the Long Term Steady State Insertion Limits but within its above specified alignment requirements, operation in MODES 1 and 2 may continue for up to 7 days per occurrence ~~with a total accumulated time of~~ ≤ 14 days per calendar year.

d. With one CEA (regulating or shutdown) inoperable+ due to causes other than addressed by ACTION a, above, but within its above specified alignment requirements and either fully withdrawn or within the Long Term Steady State Insertion Limits if in CEA group 5, operation in MODES 1 and 2 may continue.

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* See Special Test Exceptions 3.10.2 and 3.10.4.
\+ Excluding the center CEA during Cycle 10.

LIMITING CONDITION FOR OPERATION (Continued)

e. With one ~~or more~~ CEAs+ misaligned from any other CEAs in its group by ~~more than 7.5 inches but~~ less than 15 inches, operation in MODES 1 and 2 may continue, provided that ~~within one hour~~ the misaligned CEA(s) is ~~either~~:

1. ~~Restored to OPERABLE status~~ within its ~~above~~ specified alignment requirements; ~~or~~

2. Declared inoperable. After declaring the CEA+ inoperable operation in MODES 1 and 2 may continue for up to 7 days per occurrence with a total accumulated time of ≤ 14 days per calendar year provided all of the following conditions are met:

   a. The THERMAL POWER level shall be reduced to ≤ 70% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination within one hour; if negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used.

   b. Within one hour after reducing the THERMAL POWER as required by a) above, the remainder of the CEAs+ in the group with the inoperable CEA+ shall be aligned to within 7.5 inches of the inoperable CEA+ while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

f. With one CEA+ misaligned from any other CEA+ in its group by 15 inches or more, operation in MODES 1 and 2 may continue, provided that the misaligned CEA+ is ~~positioned~~ restored to within its ~~7.5 inches of the other CEAs+ in its group in accordance with~~ specified alignment requirements within the time allowance shown in Figure 3.1-3. The pre-misaligned F_r^T value used to determine the allowable time to realign the CEA+ from Figure 3.1-3 shall be the latest measurement taken within 5 days prior to the CEA misalignment. If no measurements were taken within 5 days prior to the misalignment, ~~a pre-misaligned F_r^T of 1.65 shall be assumed~~.

g. With one CEA+ ~~misaligned from any other CEA+ in its group by 15 inches or more~~ at the conclusion of the time allowance permitted in ~~Figure 3.1-3~~ immediately start to implement the following actions:

1. If the THERMAL POWER level prior to the misalignment was greater than 50% of RATED THERMAL POWER, THERMAL POWER shall be reduced to less than the greater of:

+ Excluding the center CEA during Cycle 10.

LIMITING CONDITION FOR OPERATION

a) 50% of RATED THERMAL POWER

b) 75% of the THERMAL POWER level prior to the misalignment

within one hour after exceeding the time allowance permitted by ~~Figure 3.1-3.~~ Actions e, f or h.

2. If the THERMAL POWER level prior to the misalignment was ≤ 50% of RATED THERMAL POWER, maintain THERMAL POWER no higher than the value prior to the misalignment.

If negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used. Within one hour after establishing the appropriate THERMAL POWER as required above, either:

1. Restore the CEA+ to within ~~the above~~ its specified alignment requirements, or

2. Declare the CEA+ inoperable. After declaring the CEA inoperable, POWER OPERATION may continue for up to 7 days per occurrence with a total ~~accumulated~~ time of ≤ 14 days per calendar year provided the remainder of the CEAs+ in the group with the inoperable CEA are aligned to within 7.5 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

Replace with INSERT "A"

h. With more than one CEA+ inoperable or misaligned from any other CEA in its group by 15 inches (indicated position) or more, be in at least HOT STANDBY within 6 hours.

~~i.~~ For the purposes of performing the CEA+ operability test of ~~TS 4.1.3.1.2,~~ if the CEA has an inoperable position indication ~~channel~~, the alternate indication system (pulse counter or voltage dividing network) will be used to monitor position. If a direct position indication (full out reed switch or voltage dividing network) cannot be restored within ten minutes from the commencement of CEA motion, or CEA withdrawal exceeds the surveillance testing insertion by > 7.5 inches, the position of the CEA shall be assumed to have been > 15 inches from its group at the commencement of CEA motion.

Move to SR 4.1.3.1.2

+ Excluding the center CEA during Cycle 10.

INSERT "A"

calendar year provided that within one hour after declaring the CEA inoperable, the remainder of the CEAs+ in the group with the inoperable CEA are aligned to within 7.5 inches of the inoperable CEA while: a) maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; for a regulating CEA, and with the **THERMAL POWER** level ~~shall be~~ restricted pursuant to Specification 3.1.3.6 during subsequent operation, or b) maintaining the remainder of the CEAs in a shutdown group withdrawn to at least 129 inches.

h. With more than one CEA+ (regulating or shutdown) ~~inoperable or~~ misaligned and each misaligned CEA is within 15 inches of ~~from~~ any other CEA in its group ~~by 15 inches~~ (indicated position) ~~or more, be in at least HOT STANDBY within 6 hours~~ restore the misaligned CEAs to within their specified alignment requirements within one hour, otherwise immediately declare the misaligned CEAs inoperable and implement Action i. If only one CEA (regulating or shutdown) remains misaligned at the end of one hour, implement Action g.

~~h~~i. With more than one CEA+ (regulating or shutdown) inoperable or with more than one CEA (regulating or shutdown) misaligned and any one or more of the misaligned CEAs is 15 inches (indicated position) or more from any other CEA in its group, be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each CEA+ shall be determined to be within 7.5 inches (indicated position) of all other CEAs in its group at least once per 12 hours except during time intervals when the Deviation Circuit and/or CEA Motion Inhibit are inoperable, then verify the individual CEA positions at least once per 4 hours.

4.1.3.1.2 Each CEA+ not fully inserted shall be determined to be OPERABLE by inserting it at least 7.5 inches at least once per 31 days.

4.1.3.1.3 The CEA Motion Inhibit shall be demonstrated OPERABLE at least once per 31 days by a functional test which verifies that the circuit maintains the CEA group overlap and sequencing requirements of Specification 3.1.3.6 and that the circuit also prevents any CEA from being misaligned from all other CEAs in its group by more than 7.5 inches (indicated position).+

INSERT from old Action i

+ Excluding the center CEA during Cycle 10.

REACTIVITY CONTROL SYSTEMS

SHUTDOWN CEA INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.3.5 All shutdown CEAs shall be withdrawn to at least 129.0 inches.

APPLICABILITY: MODES 1 and 2*#.

ACTION:

With ~~a maximum of~~ one or more shutdown CEA(s) withdrawn, except for surveillance testing pursuant to Specification 4.1.3.1.2, to less than 129.0 inches, ~~within one hour either:~~ consider the CEA(s) misaligned,

~~a. Withdraw the CEA to at least 129.0 inches, or~~

~~b. Declare the CEA inoperable~~ and immediately apply Specification 3.1.3.1*, Actions e, f, h, or i, as appropriate.

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each shutdown CEA shall be determined to be withdrawn to at least 129.0 inches:

a. Within 15 minutes prior to withdrawal of any CEAs+ in regulating groups during an approach to reactor criticality, and

b. At least once per 12 hours thereafter.

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* See Special Test Exception 3.10.2.

\# With $K_{eff} \geq 1.0$.

\+ Excluding the center CEA during Cycle 10.

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.

The most limiting SHUTDOWN MARGIN requirement at beginning of cycle is determined by the requirements of several transients, including Boron Dilution and Steam Line Rupture. The SHUTDOWN MARGIN requirements for these transients are relatively small and nearly the same. However, the most limiting SHUTDOWN MARGIN requirement at end of cycle comes from just one transient, the Steam Line Rupture event. The requirement for this transient at end of cycle is significantly larger than that for any other event at that time in cycle and, also, considerably larger than the most limiting requirement at beginning of cycle.

The variation in the most limiting requirement with time in cycle has been incorporated into Technical Specification 3.1.1.1, in the form of a specified SHUTDOWN MARGIN value which varies linearly from beginning to end of cycle. This variation in specified SHUTDOWN MARGIN is conservative relative to the actual variation in the most limiting requirement. Consequently, adherence to Technical Specification 3.1.1.1 provides assurance that the available SHUTDOWN MARGIN at anytime in cycle will exceed the most limiting SHUTDOWN MARGIN requirement at that time in cycle. ← INSERT "B"

In MODE 5, the reactivity transients resulting from any event are minimal and do not vary significantly during the cycle. Therefore, the specified SHUTDOWN MARGIN in MODE 5 via Technical Specification 3.1.1.2 has been set equal to a constant value which is determined by the requirement of the most limiting event at any time during the cycle, i.e., Boron Dilution with the pressurizer level less than 90 inches and the sources of non-borated water restricted. Consequently, adherence to Technical Specification 3.1.1.2 provides assurance that the available SHUTDOWN MARGIN will exceed the most limiting SHUTDOWN MARGIN requirement at any time in cycle.

stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3% Δk/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires either boric acid solution from the boric acid tanks, the requirements of which are met by Specification 3.1.2.7, or 9,844 gallons of 2300 ppm borated water from the refueling water tank.

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

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 a CEA ejection accident are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by ~~additional restrictions~~ which ensure that the original criteria are met. ← INSERT "C"

The ACTION statements applicable to ~~a stuck or~~ untrippable CEA and to a large misalignment (≥ 15 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and ~~in the event of a stuck or~~ untrippable CEA, the loss of SHUTDOWN MARGIN. ← INSERT "D"

For small misalignments (< 15 inches) of the CEAs, there is 1) a small degradation in the peaking factors relative to those assumed in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 2) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 3) a small effect on the available SHUTDOWN MARGIN, and 4) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the small misalignment of a CEA permits a one hour time interval during which attempts may be made to restore the CEA to within its alignment requirements prior to initiating a reduction in THERMAL POWER. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

Revised by NRC Letter dated 09/11/91.

Overpower margin is provided to protect the core in the event of a large misalignment (≥ 15 inches) of a single regulating or shutdown CEA. However, this misalignment would cause distortion of the core power distribution. The reactor protective system would not detect the degradation in radial peaking factors and since variations in other system parameters (e.g., pressure and coolant temperature) may not be sufficient to cause trips, it is possible that the reactor could be operating with process variables less conservative than those assumed in generating LCO and LSSS setpoints. The ACTION statement associated with a large CEA misalignment requires prompt action to realign the CEA to avoid excessive margin degradation. If the CEA is not realigned within the given time constraints, action is specified which will preserve margin, including reductions in THERMAL POWER.

For a single CEA misalignment, the time allowance to realign the CEA (Figure 3.1-3) is permitted for the following reasons:

1. The margin calculations which support the power distribution LCOs for DNBR are based on a steady-state F_T^J as specified in Technical Specification 3.2.3.

2. When the actual F_T^J is less than the Technical Specification value, additional margin exists.

3. This additional margin can be credited to offset the increase in F_T^J with time that will occur following a CEA misalignment due to xenon redistribution.

INSERT "E"

The requirement to reduce power level after the time limit of Figure 3.1-3 is reached offsets the continuing increase in F_T^J that can occur due to xenon redistribution. A power reduction is not required below 50% power. Below 50% power there is sufficient conservatism in the DNB power distribution LCOs to completely offset any, or any additional, xenon redistribution effects.

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

INSERT "F"

BASES

Operability of the CEA position indicators is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the rod block circuit. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the OPERABILITY and the ACTION statements applicable to inoperable CEA position indicators permit continued operations when positions of CEAs with inoperable indicators can be verified by the "Full In" or "Full Out" limits.

CEA positions and OPERABILITY of the CEA 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 LCOs are satisfied.

The surveillance requirements affecting CEAs with inoperable position indication channels allow 10 minutes for testing each affected CEA. This time limit was selected so that 1) the time would be long enough for the required testing, and 2) if all position indication were lost during testing, the time would be short enough to allow a power reduction to 70% of maximum allowable thermal power within one hour from when the testing was initiated. The time limit ensures CEA misalignments occurring during CEA testing are corrected within the time requirements required by existing specifications.

The maximum CEA drop time restriction is consistent with the assumed CEA drop time used in the safety analyses. Measurement with $T_{avg} \geq 515°F$ 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.

The LSSS setpoints and the power distribution LCOs were generated based upon a core burnup which would be achieved with the core operating in an essentially unrodded configuration. Therefore, the CEA insertion limit specifications require that during MODES 1 and 2, the full length CEAs be nearly fully withdrawn. The amount of CEA insertion permitted by the Steady State Insertion Limits of Specification 3.1.3.6 will not have a significant effect upon the unrodded burnup assumption but will still provide sufficient reactivity control. The Transient Insertion Limits of Specification 3.1.3.6 are provided to ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels; however, long term operation at these insertion limits could have adverse effects on core power distribution during subsequent operation in an unrodded configuration.

INSERT "B"

Without the specified SHUTDOWN MARGIN available, immediate boration is required (by Specifications 3/4.1.1.1 or 3/4.1.1.2) that is at least equivalent to boration from the refueling water tank, at its minimum boric acid concentration, via a charging pump, at its minimum flow rate. For example, lower flow rates with higher boric acid concentrations could also provide the equivalent boration, but should be verified as equivalent prior to use.

INSERT "C"

A regulating or shutdown CEA is considered to be misaligned if it is more than 7.5" from any other CEA in its group, however, a shutdown CEA is also considered to be misaligned if it is withdrawn to less than 129" even if it is within 7.5" of all other CEAs in its group. For the purposes of the Technical Specifications, a dual assembly, connected to a single CEA drive mechanism, is considered to be a single CEA (e.g., dual shutdown CEAs connected to a single drive mechanism).

INSERT "D"

A CEA is considered untrippable when it is known that the CEA would not be insertable in response to a Reactor Protection System signal or is known to be immovable due to excessive friction or mechanical interference.

INSERT "E"

4. If an F_r^T measurement has not been taken recently (within 5 days), a pre-misaligned value of 1.70 is assumed and no time for realignment is permitted.

INSERT "F"

There are five different operating modes for control of CEAs; Off, Manual Individual, Manual Group, Manual Sequential and Automatic. The Manual Sequential mode is applicable to only the regulating CEAs and the Automatic mode is disabled and not used for both regulating and shutdown CEAs.

ATTACHMENT 2

UNIT 2

SPECIFICATION

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3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - Tavg ≥ 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The **SHUTDOWN MARGIN** shall be equal to or greater than the limit line of Figure 3.1-1b.

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

ACTION:

With the **SHUTDOWN MARGIN** less than the limit line of Figure 3.1-1b, immediately initiate and continue boration at ≥ 40 gpm of 2300 ppm boric acid solution or equivalent until the required **SHUTDOWN MARGIN** is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The **SHUTDOWN MARGIN** shall be determined to be equal to or greater than the limit line of Figure 3.1-1b:

a. Within one hour after detection of an inoperable CEA(s) and at least once per 12 hours ~~thereafter~~ while the CEA(s) is inoperable. If the inoperable CEA is ~~immovable or~~ untrippable, the above required **SHUTDOWN MARGIN** shall be increased by ~~an~~ amount at least equal to the withdrawn worth of the ~~immovable or~~ untrippable CEA(s).

b. When in **MODES** 1 or 2#, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in **MODE** 2##, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

d. Prior to initial operation above 5% **RATED THERMAL POWER** after each fuel loading, by consideration of the factors of (e) below, with the CEA groups at the Transient Insertion Limits of Specification 3.1.3.6.

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* Adherence to Technical Specification 3.1.3.6 as specified in Surveillance Requirements 4.1.1.1.1 assures that there is sufficient available shutdown margin to match the shutdown margin requirements of the safety analyses.

** See Special Test Exception 3.10.1.

\# With $K_{eff} \geq 1.0$.

\## With $K_{eff} < 1.0$.

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN - $T_{avg} \leq 200^{\circ}F$

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be $\geq$ 3.0% $\Delta k/k$, and when pressurizer level is less than

APPLICABILITY: MODE 5

~~a. Pressurizer level $\geq$ 90 inches from bottom of the pressurizer.~~

~~b. Pressurizer level~~ $\leq$ 90 inches from bottom of the pressurizer, ~~and~~ all sources of non-borated water, $\leq$ 88 gpm.

shall be

ACTION:

a. With the SHUTDOWN MARGIN < 3.0% $\Delta k/k$, immediately initiate and continue boration at $\geq$ 40 gpm of 2300 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

b. With the pressurizer drained to $\leq$ 90 inches and all sources of non-borated water > 88 gpm, immediately suspend all operations involving positive reactivity changes while the SHUTDOWN MARGIN is increased to compensate for the additional sources of non-borated water or reduce the sources of non-borated water to $\leq$ 88 gpm.

SURVEILLANCE REQUIREMENTS

4.1.1 2.1 The SHUTDOWN MARGIN shall be determined to be $\geq$ 3.0% $\Delta k/k$:

a. Within one hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is ~~immovable or~~ untrippable, the above required SHUTDOWN MARGIN shall be ~~increased by~~ an amount at least equal to the withdrawn worth of the ~~immovable or~~ untrippable CEA(s).

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

1. Reactor coolant system boron concentration,
2. CEA position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

4.1.1 2.2. With the pressurizer drained to $\leq$ 90 inches determine:

a. Within one hour and every 12 hours thereafter that the level in the reactor coolant system is above the bottom of the hot leg nozzles, and

b. Within one hour and every 12 hours thereafter that the sources of non-borated water are < 88 gpm or the shutdown margin has been increased to compensate for the additional sources of non-borated water.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES
CEA POSITION

LIMITING CONDITION FOR OPERATION

3.1.3.1 The CEA Motion Inhibit and all shutdown and regulating CEAs shall be **OPERABLE** with each CEA of a given group positioned within 7.5 inches (indicated position) of all other CEAs in its group.

APPLICABILITY: MODES 1* and 2*

ACTION:

a. With one or more CEAs (regulating or shutdown) inoperable due to being ~~immovable as a result of excessive friction or mechanical interference or known to be~~ untrippable, be in at least **HOT STANDBY** within 6 hours.

b. With the CEA Motion Inhibit inoperable, within 6 hours either:

1. Restore the CEA Motion Inhibit to **OPERABLE** status, or

2. ~~Place and maintain the CEA drive system mod. switch in either the "Off" or any "Manual Mode" position and~~ fully withdraw all CEAs in groups 3 and 4 and withdraw the CEAs in group 5 to less than 5% insertion, or

3. Be in at least **HOT STANDBY**.

c. With one (regulating) CEA inoperable due to causes other than addressed by ACTION a, above, and inserted beyond the Long Term Steady State Insertion Limits but within its above specified alignment requirements, operation in **MODES** 1 and 2 may continue for up to 7 days per occurrence with a total accumulated time of ≤ 14 days per calendar year.

d. With one (regulating or shutdown) CEA inoperable due to causes other than addressed by ACTION a, above, but within its above specified alignment requirements and either fully withdrawn or within the Long Term Steady State Insertion Limits if in CEA group 5, operation in **MODES** 1 and 2 may continue.

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* See Special Test Exceptions 3.10.2 and 3.10.4.

LIMITING CONDITION FOR OPERATION (Continued)

e. With one ~~or more~~ CEAs misaligned from any other CEA in its group by ~~more than 7.5 inches but~~ less than 15 inches, operation in MODES 1 and 2 may continue, provided that ~~within one hour~~ the misaligned CEA(s) is ~~either:~~

1. Restored to ~~OPERABLE status~~ within its ~~above~~ specified alignment requirements, ~~or~~ within one hour, otherwise implement Action g.

2. Declared inoperable. After declaring the CEA inoperable, operation in MODES 1 and 2 may continue for up to 7 days per occurrence with a total accumulated time of ≤ 14 days per calendar year provided all of the following conditions are met:

   a. The THERMAL POWER level shall be reduced to ≤ 70% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination within one hour; if negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used.

   b. Within one hour after reducing the THERMAL POWER as required by (a) above, the remainder of the CEAs in the group with the inoperable CEA shall be aligned to within 7.5 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the THERMAL POWER level shall be restricted pursuant to specification 3.1.3.6 during subsequent operation.

f. With one CEA misaligned from any other CEA in its group by 15 inches or more, operation in MODES 1 and 2 may continue, provided that the misaligned CEA is ~~positioned within 7.5 inches of the other CEAs in its group in accordance with~~ the time allowance determined by the Better Axial Shape Selection System (BASSS) or, if the BASSS time allowance is unavailable, the time allowance shown in Figure 3.1-3. If Figure 3.1-3 is used, the pre-misaligned FI value used to determine the allowable time to realign the CEA from Figure 3.1-3 shall be the latest measurement taken within 5 days prior to the CEA misalignment. If no measurements were taken within 5 days prior to the misalignment, ~~a pre-misaligned FI of 1.70 shall be assumed~~ immediately implement Action g.

g. With one CEA ~~misaligned from any other CEA in its group by 15 inches or more~~ at the conclusion of the ~~permitted~~ time allowance, immediately start to implement the following actions:

   1. If the THERMAL POWER level prior to the misalignment was greater than 50% of RATED THERMAL POWER, THERMAL POWER shall be reduced to less than the greater of:

LIMITING CONDITION FOR OPERATION

a) 50% of **RATED THERMAL POWER**

b) 75% of the **THERMAL POWER** level prior to the misalignment

within one hour after exceeding the ~~permitted~~ time allowance. Permitted by Actions e, f or h.

2. If the **THERMAL POWER** level prior to the misalignment was ≤ 50% of **RATED THERMAL POWER**, maintain **THERMAL POWER** no higher than the value prior to the misalignment.

If negative reactivity insertion is required to reduce **THERMAL POWER**, boration shall be used. Within one hour after establishing the appropriate **THERMAL POWER** as required above, either:

1. Restore the CEA to within ~~the above~~ its specified alignment requirements, or

2. Declare the CEA inoperable. After declaring the CEA inoperable, **POWER OPERATION** may continue for up to 7 days per occurrence with a total accumulated time of ≤ 14 days per calendar year provided the remainder of the CEAs in the group with the inoperable CEA are aligned to within 7.5 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the **THERMAL POWER** level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

Replace with INSERT "A"

k. With more than one CEA inoperable or misaligned from any other CEA in its group by 15 inches (indicated position) or more, be in at least **HOT STANDBY** within 6 hours.

g. For the purposes of performing the CEA operability test, ~~of TS 4.1.3.1.2~~, if the CEA has an inoperable position indication channel, the alternate indication system (pulse counter or voltage dividing network) will be used to monitor position. If a direct position indication (full out reed switch or voltage dividing network) cannot be restored within ten minutes from the commencement of CEA motion, or CEA withdrawal exceeds the surveillance testing insertion by > 7.5 inches, the position of the CEA shall be assumed to have been > 15 inches from its group at the commencement of CEA motion.

move to SR 4.1.3.1.2

INSERT "A"

calendar year provided that within one hour after declaring the CEA inoperable, the remainder of the CEAs+ in the group with the inoperable CEA are aligned to within 7.5 inches of the inoperable CEA while; a) maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; for a regulating CEA, and with the **THERMAL POWER** level ~~shall be~~ restricted pursuant to Specification 3.1.3.6 during subsequent operation, or b) maintaining the remainder of the CEAs in a shutdown group withdrawn to at least 129 inches.

h. With more than one CEA+ (regulating or shutdown) ~~inoperable or~~ misaligned and each misaligned CEA is within 15 inches of ~~from~~ any other CEA in its group ~~by 15 inches~~ (indicated position) ~~or more, be in at least **HOT STANDBY** within 6 hours~~ restore the misaligned CEAs to within their specified alignment requirements within one hour, otherwise immediately declare the misaligned CEAs inoperable and implement Action i. If only one CEA (regulating or shutdown) remains misaligned at the end of one hour, implement Action g.

~~h~~i. With more than one CEA+ (regulating or shutdown) inoperable or with more than one CEA (regulating or shutdown) misaligned and any one or more of the misaligned CEAs is 15 inches (indicated position) or more from any other CEA in its group, be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each CEA shall be determined to be within 7.5 inches (indicated position) of all other CEAs in its group at least once per 12 hours except during time intervals when the Deviation Circuit and/or CEA Motion Inhibit are inoperable, then verify the individual CEA positions at least once per 4 hours.

4.1.3.1.2 Each CEA not fully inserted shall be determined to be **OPERABLE** by inserting it at least 7.5 inches at least once per 31 days. ← INSERT old Action b.

4.1.3.1.3 The CEA Motion Inhibit shall be demonstrated **OPERABLE** at least once per 31 days by a functional test which verifies that the circuit maintains the CEA group overlap and sequencing requirements of Specification 3.1.3.6 and that the circuit also prevents any CEA from being misaligned from all other CEAs in its group by more than 7.5 inches (indicated position).

SHUTDOWN CEA INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.3.5 All shutdown CEAs shall be withdrawn to at least 129.0 inches.

APPLICABILITY: MODES 1 and 2*#.

ACTION:

With ~~a maximum of~~ one or more shutdown CEA withdrawn, except for surveillance testing pursuant to Specification 4.1.3.1.2, to less than 129.0 inches, ~~within one hour either:~~ consider the CEA(s) misaligned,

~~a. Withdraw the CEA to at least 129.0 inches, or~~

~~b. Declare the CEA inoperable~~ and immediately apply Specification 3.1.3.1; Action e, f, h or i, as appropriate.

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each shutdown CEA shall be determined to be withdrawn to at least 129.0 inches:

a. Within 15 minutes prior to withdrawal of any CEAs in regulating groups during an approach to reactor criticality, and

b. At least once per 12 hours thereafter.

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*See Special Test Exception 3.10.2.

#With $K_{eff} \geq 1.0$

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.

The most limiting **SHUTDOWN MARGIN** requirement at beginning of cycle is determined by the requirements of several transients, including Boron Dilution and Steam Line Rupture. The **SHUTDOWN MARGIN** requirements for these transients are relatively small and nearly the same. However, the most limiting **SHUTDOWN MARGIN** requirement at end of cycle comes from just one transient, the Steam Line Rupture event. The requirement for this transient at end of cycle is significantly larger than that for any other event at that time in cycle and, also, considerably larger than the most limiting requirement at beginning of cycle.

The variation in the most limiting requirement with time in cycle has been incorporated into Technical Specification 3.1.1.1, in the form of a specified **SHUTDOWN MARGIN** value which varies linearly from beginning to end of cycle. This variation in specified **SHUTDOWN MARGIN** is conservative relative to the actual variation in the most limiting requirement. Consequently, adherence to Technical Specification 3.1.1.1 provides assurance that the available **SHUTDOWN MARGIN** at any time in cycle will exceed the most limiting **SHUTDOWN MARGIN** requirement at that time in cycle. ← "INSERT "B"

In **MODE** 5, the reactivity transients resulting from any event are minimal and do not vary significantly during the cycle. Therefore, the specified **SHUTDOWN MARGIN** in **MODE** 5 via Technical Specification 3.1.1.2 has been set equal to a constant value which is determined by the requirement of the most limiting event at any time during the cycle, i.e., Boron Dilution with the pressurizer level less than 90 inches and the sources of non-borated water restricted. Consequently, adherence to Technical Specification 3.1.1.2 provides assurance that the available **SHUTDOWN MARGIN** will exceed the most limiting **SHUTDOWN MARGIN** requirement at any time in cycle.

stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3% Δk/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires either boric acid solution from the boric acid tanks, the requirements of which are met by Specification 3.1.2.7, or 9,844 gallons of 2300 ppm borated water from the refueling water tank.

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

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 a CEA ejection accident are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met. ← INSERT "C"

The ACTION statements applicable to ~~1 stuck or~~ untrippable CEA and to a large misalignment (≥ 15 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and ~~in the event of a stuck or~~ untrippable CEA, the loss of SHUTDOWN MARGIN. ← INSERT "D"

For small misalignments (< 15 inches) of the CEAs, there is 1) a small degradation in the peaking factors relative to those assumed in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 2) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 3) a small effect on the available SHUTDOWN MARGIN, and 4) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the small misalignment of a CEA permits a one hour time interval during which attempts may be made to restore the CEA to within its alignment requirements prior to initiating a reduction in THERMAL POWER. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

Revised by NRC Letter dated 09/11/91.

Overpower margin is provided to protect the core in the event of a large misalignment (≥ 15 inches) of a single regulating or shutdown CEA. However, this misalignment would cause distortion of the core power distribution. The reactor protective system would not detect the degradation in radial peaking factors and since variations in other system parameters (e.g., pressure and coolant temperature) may not be sufficient to cause trips, it is possible that the reactor could be operating with process variables less conservative than those assumed in generating LCO and LSSS setpoints. The **ACTION** statement associated with a large CEA misalignment requires prompt action to realign the CEA to avoid excessive margin degradation. If the CEA is not realigned within the given time constraints, action is specified which will preserve margin, including reductions in **THERMAL POWER**.

For a single CEA misalignment, the time allowance to realign the CEA (Figure 3.1-3 or as determined by BASSS) is permitted for the following reasons:

1. The margin calculations which support the power distribution LCOs for DNBR are based on a steady-state F_r^I as specified in Technical Specification 3.2.3.

2. When the actual F_r^I is less than the Technical Specification value, additional margin exists.

3. This additional margin can be credited to offset the increase in F_r^I with time that will occur following a CEA misalignment due to xenon redistribution.

INSERT "E"

The requirement to reduce power level after the time limit of Figure 3.1-3 or the time limit determined by BASSS is reached offsets the continuing increase in F_r^I that can occur due to xenon redistribution. A power reduction is not required below 50% power. Below 50% power there is sufficient conservatism in the DNB power distribution LCOs to completely offset any, or any additional, xenon redistribution effects.

The **ACTION** statements applicable to misaligned or inoperable CEAs include requirements to align the **OPERABLE** CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

INSERT "F"

BASES

Operability of the CEA position indicators is required to determine CEA positions and thereby ensur compliance with the CEA alignment and insertion limits and ensures proper operation of the rod block circuit. The CEA• "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the OPERABILITY and the ACTION statements applicable to inoperable CEA position indicators permit continued operations when positions of CEAs with inoperable indicators can be verified by the "Full In" or "Full Out" limits.

CEA positions and OPERABILITY of the CEA 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 LCOs are satisfied.

The surveillance requirements affecting CEAs with inoperable position indication channels allow 10 minutes for testing each affected CEA. This time limit was selected so that 1) the time would be long enough for the required testing, and 2) if all position indication were lost during testing, the time would be short enough to allow a power reduction to 70% of maximum allowable thermal power within one hour from when the testing was initiated. The time limit ensures CEA misalignments occurring during CEA testing are corrected within the time requirements required by existing specifications.

The maximum CEA drop time restriction is consistent with the assumed CEA drop time used in the accident analyses. Measurements with $T_{avg} \geq 515^{\circ}$ 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.

The LSSS setpoints and the power distribution LCOs were generated based upon a core burnup which would be achieved with the core operating in an essentially unrodded configuration. Therefore, the CEA insertion limit specifications require that during MODES 1 and 2, the full length CEAs be nearly fully withdrawn. The amount of CEA insertion permitted by the Steady State Insertion Limits of Specification 3.1.3.6 will not have a significant effect upon the unrodded burnup assumption but will still provide sufficient reactivity control. The Transient Insertion Limits of Specification 3.1.3.6 are provided to ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels; however, long term operation at these insertion limits could have adverse effects on core power distribution during subsequent operation in an unrodded configuration.

INSERT "B"

Without the specified SHUTDOWN MARGIN available, immediate boration is required (by Specifications 3/4.1.1.1 or 3/4.1.1.2) that is at least equivalent to boration from the refueling water tank, at its minimum boric acid concentration, via a charging pump, at its minimum flow rate. For example, lower flow rates with higher boric acid concentrations could also provide the equivalent boration, but should be verified as equivalent prior to use.

INSERT "C"

A regulating or shutdown CEA is considered to be misaligned if it is more than 7.5" from any other CEA in its group, however, a shutdown CEA is also considered to be misaligned if it is withdrawn to less than 129" even if it is within 7.5" of all other CEAs in its group. For the purposes of the Technical Specifications, a dual assembly, connected to a single CEA drive mechanism, is considered to be a single CEA (e.g., dual shutdown CEAs connected to a single drive mechanism).

INSERT "D"

A CEA is considered untrippable when it is known that the CEA would not be insertable in response to a Reactor Protection System signal or is known to be immovable due to excessive friction or mechanical interference.

INSERT "E"

4. If an F_r^T measurement has not been taken recently (within 5 days), a pre-misaligned value of 1.70 is assumed and no time for realignment is permitted.

INSERT "F"

There are five different operating modes for control of CEAs; Off, Manual Individual, Manual Group, Manual Sequential and Automatic. The Manual Sequential mode is applicable to only the regulating CEAs and the Automatic mode is disabled and not used for both regulating and shutdown CEAs.