Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

May 23, 2003

Docket No. 50-336
B18898

RE: 10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Power Station, Unit No. 2
Technical Specifications Change Request 2-15-02
Changes In Technical Specifications Related To Reactivity Control Systems, Power Distribution Limits, And Special Test Exceptions
Response To The Second Request For Additional Information

By letter dated August 14, 2002,[1] Dominion Nuclear Connecticut, Inc. (DNC) proposed to amend Operating License DPR-65 by incorporating changes into the Millstone Unit No. 2 Technical Specifications. The proposed amendment would revise Technical Specifications related to Reactivity Control Systems, Power Distribution Limits, and Special Test Exceptions.

By letter dated January 28, 2003,[2] a Request For Additional Information (RAI) was received from the Nuclear Regulatory Commission (NRC) staff, which contained nine questions related to the aforementioned license amendment request. DNC provided a response to the RAI dated January 28, 2003, by a letter dated March 11, 2003.[3]

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(1) J. A. Price letter to the Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 2, Technical Specifications Change Request 2-15-02, Changes In Technical Specifications Related To Reactivity Control Systems, Power Distribution Limits, And Special Test Exceptions," dated August 14, 2002.

(2) R. Ennis (NRC) letter to J. A. Price, "Request For Additional Information, Reactivity Control Systems, Power Distribution Limits, and Special Test Exceptions, Millstone Power Station, Unit No. 2 (TAC No. MB6108)," dated January 28, 2003.

(3) J. A. Price letter to the Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 2, Technical Specifications Change Request 2-15-02, Changes In Technical Specifications Related To Reactivity Control Systems, Power

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By a facsimile dated April 15, 2003,[4] a second RAI was received from the NRC staff, which contained five questions related to the aforementioned license amendment request. During a telephone conference with the NRC staff on April 23, 2003, three more questions were added.

By letter dated May 16, 2003,[5] DNC retracted the response to Question No. 2 in the first RAI, dated January 28, 2003.

Attachment 1 provides a revised response to Question No. 2 in the first RAI, dated January 28, 2003, combined with the response to Question No. 1 in the second RAI, dated April 15, 2003. Attachment 1 also provides the DNC response to the other four questions received in the second RAI dated April 15, 2003, and the three questions received during the April 23, 2003, conference call. Attachment 2 provides the marked-up original retyped pages, and Attachment 3 provides the retyped pages, as described in the RAI response.

Additionally, a subsequent review of Index page XIV, which was received as part of Millstone Unit No. 2, Amendment 274, showed two typographical errors in the page numbering of sections 3/4.9.16 and 3/4.9.17. Since this Index page is also impacted by the proposed changes in the aforementioned license amendment request, a corrected Index page is provided in Attachment 3.

We consider that the additional information provided in this letter does not affect our original conclusions regarding the Safety Summary or Significant Hazards Consideration included in the DNC August 14, 2002, letter.

Distribution Limits, And Special Test Exceptions, Response to Request For Additional Information," dated March 11, 2003.

(4) R. Ennis (NRC) facsimile to R. Joshi, "Issues for Discussion in Upcoming Telephone Conference Regarding Proposed Amendment to Technical Specifications, Reactivity Control Systems, Power Distribution Limits, and Special Test Exceptions, Millstone Power Station, Unit No. 2, Docket No. 50-336," dated April 15, 2003.

(5) J. A. Price letter to the Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 2, Technical Specifications Change Request 2-15-02, Changes In Technical Specifications Related To Reactivity Control Systems, Power Distribution Limits, And Special Test Exceptions, Retraction of Response To Question No. 2 in The First Request For Additional Information," dated January 28, 2003.

There are no regulatory commitments contained in this letter.

If you should have any questions regarding this submittal, please contact Mr. Ravi Joshi at (860) 440-2080.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

W. R. Matthews
Senior Vice President – Nuclear Operations

Sworn to and subscribed before me

this 23rd day of May, 2003

Notary Public

My Commission expires 3-31-04

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Unit No. 2
Millstone Senior Resident Inspector

Director
Bureau of Air Management
Monitoring and Radiation Division
Department of Environmental Protection
79 Elm Street
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Attachment 1

Millstone Power Station, Unit No. 2

Technical Specifications Change Request 2-15-02
Changes In Technical Specifications Related To Reactivity Control Systems,
Power Distribution Limits, And Special Test Exceptions
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Question 2 from RAI No 1:

"In Attachment 1, Page 3 of your submittal, you state that Conditions D and Required Action D.1 in the proposed revision to TS 3/4.1.3.1 covers the deletion of current SR 4.1.1.1.1a. However, SR 4.1.1.1.1a applies when rods are immovable or untrippable, and proposed TS 3/4.1.3.1, Condition D, only applies when the rods are untrippable. What is the difference between immovable and untrippable? How do you account for immovable rods? Furthermore, your current SR 4.1.1.1.1a requires that you increase SDM by an amount equal to the withdrawn worth of the inoperable rod, but your proposed TSs do not contain this requirement. Provide justification for this change."

Question 1 from RAI No 2:

"Your RAI response dated March 11, 2003, does not fully answer Question 2. Specifically your current TSs (CTS) Limiting Condition for Operation (LCO) 3.1.3.1 and Surveillance Requirement (SR) 4.1.1.1.1.a contain action statements for control element assemblies (CEAs) that are immovable but trippable. Your proposed LCO 3.1.3.1 states that all CEAs shall be OPERABLE. TS 1.6 indicates that the CEAs would be inoperable when they or any support system were incapable of performing their specified functions. In automatic control, a function of the CEAs would be to move in order to regulate core reactivity. An immovable CEA would, therefore, be considered inoperable. However, your proposed LCO 3.1.3.1 no longer contains action statements for rods that are immovable but trippable. Therefore, following your TS logic, an immovable but trippable CEA would require your plant to enter LCO 3.0.3 for shutdown. Your CTS, on the other hand, allow for operation of up to 7 days in this condition. Do you intend to force your plant into TS 3.0.3 for an immovable but trippable CEA? If not, provide a justification for removal of the operation limits for immovable but trippable CEAs."

Combined Response:

Difference between "immovable" and "untrippable":

Dominion Nuclear Connecticut, Inc. (DNC) has been unable to locate any definitive basis document discussing an intended difference between the terms "immovable" and "untrippable" as used in Current Technical Specification (CTS) Surveillance Requirment (SR) 4.1.1.1.1a. We note that the term "immovable" also appears in the required ACTIONs of CTS 3.1.3.1 but its usage is not consistent with that of SR 4.1.1.1.1a. Notably, CTS ACTION 3.1.3.1c allows

continued operation for up to 7 days for any inoperable but trippable CEA so long as it is within the alignment requirement of LCO 3.1.3.1. In contrast, CTS 4.1.1.1.1a requires boration and resultant shutdown for the same condition if the CEA is declared "immovable" for reasons other than being untrippable. The lack of definitive guidance as to whether any meaningful difference should be applied in establishing compliance with SR 4.1.1.1.1a was, in part, motivation for the proposed change requested by DNC.

CTS SR 4.1.1.1.1 requires verification that Shutdown Margin (SDM) is within limits at the frequencies and conditions described in items 'a' through 'd'. Item 'a' requires SDM verification as directed by 4.1.1.1.1, immediately upon declaring a CEA "inoperable." The balance of item 'a' requires boration for the worth of an inoperable CEA when the inoperable CEA is determined to be either "immovable or untrippable." Based on recent discussions with the NRC staff and a lack of definitive guidance relating to the definition of "immovable", DNC has adopted a conservative standard that requires completion of CTS SR 4.1.1.1.1a in its entirety if a CEA is declared inoperable for any reason. Additional guidance has been provided to the operations staff regarding conditions affecting CEA OPERABILITY. The basis for this guidance is discussed below.

<u>Accounting for "immovable" rods:</u>

The approach to classifying CEA malfunctions at Millstone Unit No. 2 is documented in Abnormal Operating Procedure (AOP) 2556, "CEA Malfunctions." The guidance of this procedure does not address the condition of a CEA being "immovable" beyond identifying failure of a CEA to respond to a demand for motion as an entry condition. Instead, the approach is to determine whether a CEA is "trippable" or "untrippable" with the distinction based on whether the cause of the malfunction is related to control system failure. While it is possible to trip individual CEAs during operation at power, this is highly undesirable due to the impact on core power distribution. In the case of CEA malfunctions caused by control system failure, the associated CEA remains trippable. In this case, the SDM is verified by ensuring that CEAs are withdrawn above the power dependent insertion limit or fully withdrawn in the case of shutdown CEAs. If the SDM requirements are not met, emergency boration is directed. If the cause of a CEA malfunction is not associated with control system failure, the CEA is declared untrippable and emergency boration is directed by the AOP.

<u>Justification of the change and relationship of CTS ACTIONs for "inoperable and immovable":</u>

As previously discussed, CTS SR 4.1.1.1.1 requires verification that SDM is within limits at the frequencies and conditions described in items 'a' through 'd'. Item 'a' requires SDM verification as directed by 4.1.1.1.1, immediately upon detection of an inoperable CEA. The balance of item 'a' requires boration for the

worth of an inoperable CEA when the inoperable CEA is determined to be either "immovable or untrippable." This requirement is applicable in MODEs 1 through 4. The Proposed Technical Specification (PTS) 3.1.1.1 and associated SR 4.1.1.1 are applicable in MODEs 3 through 5 and make no reference to inoperable CEAs and/or the terms "immovable or untrippable". The balance of CTS 4.1.1.1.1a requirements previously applicable in MODEs 1 and 2 are addressed under PTS 3.1.3.1, 3.1.3.5 and 3.1.3.6 as discussed below.

It should be noted that Millstone Unit No. 2 CEA control is a manual function only. For the CTS and PTS, a CEA would be declared inoperable based on application of the definition of OPERABLE – OPERABILITY. Thus, any condition capable of preventing a CEA from performing a function credited in the analyses and evaluations documented in the Final Safety Analysis Report (FSAR) would require the associated CEA to be declared inoperable. Any condition that could preclude CEA insertion (i.e., trippability) on a reactor trip signal satisfies this criterion. The inability to move a CEA due to an electrical or control system action or malfunction, or as consequence of being transferred to the 'hold bus' would not impact CEA OPERABILITY as "trippability" is retained for these conditions. Consequently, entry into LCO 3.0.3 would not be required.

In addition to loss of "trippability" as discussed above, CTS 3.1.3.1 and 3.1.3.5 include ACTION requirements that direct CEAs to be declared inoperable and SDM to be verified under CTS 3.1.1.1, when misaligned (or inserted below SD CEA insertion limits) and alignment (or SD CEA insertion limits) cannot be restored within the required time frame. If SDM requirements are not met, then the CTS 3.1.1.1 directs initiation of boration within 15 minutes to restore SDM to within the limit. In the limiting case, the net result of this action would be the initiation of a rapid shutdown approximately 75 minutes after detection of a misalignment (or SD CEA below insertion limit) which exceeded the LCO limits. PTS 3.1.3.1, 3.1.3.5, and 3.1.3.6 also contain specific ACTIONs that direct shutdown of the unit when misaligned CEAs cannot be restored in the required time. The ACTION requirements of PTS 3.1.3.1, 3.1.3.5 and 3.1.3.6, arrive at the same end state as CTS 3.1.1.1 and SR 4.1.1.1.1a but allow a maximum of 120 minutes before action to shut down is initiated.

While less restrictive, the difference in the time (i.e., 45 minutes) to initiate action to shutdown under the PTS is minor and justified on the basis that industry experience indicates that operations to restore from a misaligned condition are more effectively managed within this timeframe. The 2-hour Allowed Outage Time (AOT) is acceptable because of the low probability that a Design Basis Accident (DBA) or anticipated transient, which would require the CEAs to perform their safety function, will occur simultaneously. Additionally, elimination of the CTS 3.1.1.1 and SR 4.1.1.1.1a requirement to borate is justified in that the end-state of the required ACTION is the same. Rapid

shutdown using boration as required by the CTS represents a significant and undesirable operational challenge to the unit.

As previously discussed, failures of the control system can result in CEA failure to respond to a motion demand. Likewise, action by the control system can inhibit CEA motion by design when significant alignment discrepancies are detected. CEAs placed on the 'hold' bus to support maintenance or restoration from a misalignment condition will also not respond to motion demand. These conditions do not however, affect CEA OPERABILITY. Control system action, including failure or the act of placing CEAs on the 'hold' bus, cannot prevent CEA insertion into the core on a reactor trip signal.

The assertion that the control system conditions discussed above do not fall within the scope of the LCO and/or the definition of OPERABILITY, for both the CTS and PTS, can be validated by screening the control system function against the four criteria for inclusion of items into Technical Specifications noted in 10 CFR 50.36(c)(2)(ii):

<u>Criterion 1</u>

Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

The ability to move CEAs upon demand is a non-safety function of the control element drive system. The control function of the control element drive system is not related to an instrument that is used to detect, and indicate in the control room, an abnormal degradation of the reactor coolant pressure boundary. Therefore, the non-safety function of the control element drive system does not meet Criterion 1.

<u>Criterion 2</u>

A process variable, design feature, or operating restriction that is an initial condition of a Design Basis Accident (DBA) or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

The ability to move CEAs upon demand is a non-safety function of the control element drive system. The ability to move CEAs upon demand is not required by Reactor Protection System or Engineered Safety Features Actuation System functions. Insertion of CEAs by action of gravity following removal of power from the drive motor is the function credited as an initial condition of a DBA or transient analysis documented in the FSAR. Movement of CEAs using the non-safety control system is not an initial condition of a DBA or transient analysis, nor does it represent a process variable, design feature, or operating restriction

that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Therefore, the non-safety function of the control element drive system does not meet Criterion 2.

Criterion 3

A structure, system, or component (SSC) that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Insertion of CEAs by action of gravity following removal of power from the drive motor is the function credited for mitigation of DBA and transient analyses documented in the FSAR. Therefore, the trippability of CEAs is part of the primary success path, which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. However, the ability to move CEAs using the non-safety control system is not required to fulfill this function. In fact this function is directly defeated by the action of the reactor protection system to open the reactor trip breakers in support of gravity insertion of the CEAs. Therefore, the non-safety function of the control element drive system does not meet Criterion 3.

Criterion 4

A SSC, which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The ability to move CEAs upon demand given a manual control signal has not been shown to be risk significant to public health and safety by either operating experience or probabilistic safety assessment. The function of the non-safety control system is not a SSC requiring risk review/unavailability monitoring. This is justified on the basis that there is no failure within the non-safety control system that can by itself prevent CEA insertion upon a reactor trip signal. Therefore, the control (non-safety) function of the control element drive system does not meet Criterion 4.

On the basis of the evaluation provided above, DNC concludes that control system actions, including failure or the act of placing CEAs on the 'hold' bus, do not meet the standard for being addressed within the Technical Specifications. Likewise, such control system actions do not constitute a condition of inoperability for the affected CEA(s). For this reason as well, minor misalignment (i.e., <10 steps) of CEA's resulting from a control system failure can be addressed using administrative guidance provided through plant procedures.

Question 2:

"Your RAI response dated March 11, 2003, does not fully answer Question 3. Why is it necessary to increase your initial SR 4.1.1.1.2 requirement of 31 effective full power days (EFPDs) to 60 EFPDs? What is the safety significance of this change? Provide a safety justification."

Response:

It is noted that proposed SR 4.1.1.2 adds a new surveillance requirement to verify that the overall core reactivity balance is within ±1% Δk/k of predicted values prior to entering MODE 1 after fuel loading. The second surveillance is not required to be performed until after 60 Effective Full Power Days (EFPDs) following fuel loading, after the predicted reactivity values have been adjusted (normalized).

The PTS 4.1.1.2 actually moves up the performance of the first surveillance from 31 EFPDs to prior to MODE 1 entry following refueling and is therefore more conservative than CTS 4.1.1.1.2. There is no safety significance associated with this change based upon the following:

1. The addition of the new SR to perform the reactivity balance prior to entering MODE 1 after fuel loading, and

2. Slow rate of reactivity changes due to fuel burnup during the first 60 EFPDs following refueling.

Question 3:

"Your RAI response dated March 11, 2003, to question 4 indicates that the verification of shutdown margin (SDM) in SR 4.1.1.1.1c is not necessary because the core reload design process calculates the SDM when the rods are at their insertion limits. By this logic, SR 4.1.1.1.1c was never necessary in the life of the plant. If not, what is the purpose of SR 4.1.1.1.1c? If you delete SR 4.1.1.1c, how will this purpose be satisfied? What is the safety significance of the deletion?"

Response:

Validation of CEA worth during startup physics testing after refueling ensures the validity of the safety analyses. One of the principle purposes of performing this surveillance during startup testing is to validate predicted CEA worths with actual test data. Predicting CEA worth is an important part of the SDM calculations. CTS SR 4.1.1.1.1c is conducted to verify that adequate SDM exists prior to initial operation above 5% rated thermal power after each refueling. If startup testing validates that the control rod worths are within the acceptance criteria and all CEAs are above the TS required CEA Insertion Limits, then shutdown margin is verified.

Adequate SDM is important to ensure acceptable safety analysis results. Adequate SDM is verified by applying Nuclear Regulatory Commission (NRC) approved core design and analytic methods in conjunction with appropriate CEA related TS requirements. These calculations verify that required SDM is available with the CEAs at the Transient Insertion Limits throughout different power levels and periods during the operating cycle. The TS ensure that adequate SDM is maintained by compliance with the TS LCO's & SR's for trippability of CEAs, CEA drop time requirements, Shutdown CEA Insertion Limits and Regulating CEA Insertion Limits.

The deletion of SR 4.1.1.1.1c will not alter the continued use of NRC approved core design and analysis methods to calculate SDM. The deletion of SR 4.1.1.1.1c will not alter the TS cited above that ensure that the CEAs are available for trip reactivity insertion consistent with the safety analysis. The deletion of SR 4.1.1.1.1c will not alter the continued need to validate control rod worths during startup physics testing. Additionally, validation of control rod worth through startup testing is performed consistent with TS 6.9.1.8. Thus, independent of SR 4.1.1.1.1c, the purpose of the SR will continue to be satisfied.

There is no safety significance associated with this deletion. SDM will continue to be verified in the same manner using the approved core design and analytic methods, the CEA related TS cited above are still required and approved startup physics testing methods will still be utilized. The removal of SR 4.1.1.1.1c is consistent with NUREG-1432.

Question 4:

"Your RAI response dated March 11, 2003, to question 5 indicates that the wording difference between the proposed and current LCO 3.1.3.1 does not change its requirements. However, in the original LCO 3.1.3.1, the maximum separation of any CEA with respect to any other CEA would be 10 steps. In the proposed LCO, on the other hand, this difference could be up to 20 steps (i.e., one CEA 10 steps below group position and one CEA 10 steps above group position). With this condition, you would still be in compliance with the TS but would be less conservative. Provide a justification for this change."

Response:

As a result of the telephone conversations between the NRC staff and DNC, the wording of PTS 3.1.3.1 LCO has been changed to be consistent with the CTS LCO and corresponding ACTION Statements. Attachment 2 contains the marked up pages, and Attachment 3 contains the retyped pages of the revised PTS 3/4.1.3.1.

Question 5:

"Your RAI response dated March 11, 2003, to question 8 appears to be inaccurate in that you state the plant could operate for up to 6 hours at 100% power with F_r^T *outside* its limit when in LCO 3.2.4b. However, LCO 3.2.4b states that you can only operate for 2 hours F_r^T *inside* its limit while $T_q > 0.10$ (with F_r^T outside its limits, you would have to enter TS 3.0.3). After the 2 hour period, you must reduce power to less than or equal to 20% of maximum allowable thermal power. Clarify your safety justification given the above information and given that the Standard TSs only allow 1 hour to verify F_r^T. Furthermore, with $T_q > 0.10$, your current TS 3.2.4b only allows continuous operation at 20% power or below. However, your proposed TS 3.2.4.b.3 would allow continuous operation at 50% power or below with $T_q > 0.10$. Provide a safety justification for this change."

Response:

The RAI response for PTS 3.2.4b was written for a very specific case, which was considered the most likely scenario, in that the Total Unrodded Integrated Radial Peaking Factor (F_r^T) value is confirmed to be outside its limit when power is ≤ 50% within 2 hours of $T_q > 0.10$. In the specific case presented in the RAI response, since power is ≤ 50% within the required time period, the requirements of PTS 3.2.4 no longer apply since the applicability for LCO 3.2.4 is MODE 1 above 50% power. However, if the F_r^T value exceeds its LCO limit, the ACTION requirements of LCO 3.2.3 do apply. LCO 3.2.3 requires that within 6 hours either:

- F_r^T is within the power dependent F_r^T limits and CEAs are withdrawn above the Long Term Steady State Insertion Limits,

- Plant is in HOT STANDBY (MODE 3).

If, for example, per PTS 3.2.4.b, T_q is > 0.10, and F_r^T is determined within 2 hours to be outside its LCO 3.2.3 limit, and power is still > 50%, then the plant must be brought to a MODE or condition in which the LCO does not apply, and 3.2.3 ACTION requirements stated above would still apply. Once power was reduced to = 50%, TS 3.2.4 would no longer apply, but the TS 3.2.3 ACTIONs would still apply.

With regard to the 2-hour time period allowed per PTS 3.2.4 ACTION 'b.1.' for verification of F_r^T, it was noted that NUREG-1432 allows 1 hour. Our justification for maintaining the 2-hour time period is:

1. The only event above 50% power, which could cause tilt to be > 0.10 is a misaligned CEA by more than 20 steps or a dropped CEA. A time period of 2 hours is allowed to restore the CEA within alignment requirements and insertion limits, thus 2 hours ensures consistency with the CEA TS.

2. The only event above 50% power, which could cause tilt to be > 0.10 is a misaligned CEA by more than 20 steps or a dropped CEA. A single misaligned or dropped CEA is an analyzed event, which includes the adverse peaking factors associated with this event. Cycle specific calculations are performed to ensure that this analysis remains valid. The combination of the analysis of this CEA misalignment/drop event, and the 2-hour time limit to recover the CEA, ensures that fuel is protected during this 2-hour time period of the event. Thus, operation for the first 2 hours while recovering the CEA is an operation in an analyzed condition. If more than one CEA is misaligned by ≥ 20 steps, that would be an operation outside an analyzed condition and PTS 3.1.3.1D would require the plant to be in MODE 3 within 6 hours.

The justification for the change to PTS 3.2.4.b.3, to allow continuous operation at 50% power or below (vs. the ≤ 20% power allowed by the CTS) is the fact that LCO 3.2.4 applies to MODE 1 above 50% power. Below 50% power, there is no specific safety analysis assumption or input for T_q. The specific safety analysis core power distribution parameter input is F_r^T (which includes T_q). Therefore, as long as the F_r^T is being maintained within its power dependent limits (as required by LCO 3.2.3), then the plant can safely operate continuously at power levels up to 50% power.

<u>Question 6:</u>

"PTS 3.1.1.2 has an ACTION statement that allows 7 days to continue operation, if PTS SR 4.1.1.2 is not met. CTS SR 4.1.1.1.2 has no specific ACTION statement for failure to meet CTS SR 4.1.1.1.2. Provide a safety justification for the 7 days of additional operation allowed by the PTS."

<u>Response:</u>

CTS ACTIONs require boration to restore SDM if the core reactivity balance requirement of SR 4.1.1.1.2 is not met. PTS 3.1.1.2 will require that an evaluation be performed to determine if the reactor core is acceptable for continued operation, and to establish appropriate operating restrictions. This change allows time to evaluate the reactivity anomaly effect on the entire core design and safety analysis rather than just focusing only on SDM as the CTS do. The AOT of 7 days has been specifically approved by the NRC staff on August 11, 1997, as described in Industry/TSTF Standard Technical Specification Change Traveler TSTF-142. The justification stated in TSTF-142 for a 7-day AOT is as follows:

> "Predicted versus measured reactivity anomaly evaluation is a very complex proposition. Data would have to be gathered, transmitted to the core design organization (which may be an offsite vendor, which would require additional administrative ACTIONs), evaluation by the vendor and implementation of appropriate controls put in place based on the data. Design codes, while increasingly more accurate, are more tailored to specific refueling cycles.

Therefore, they take more time to set up for evaluations. If Boron-10 depletion may be a contributing factor, an RCS sample would likely be drawn and sent to an offsite laboratory for analysis. It is unlikely that this could be accomplished in 72 hours."

And

"The proposed 7 day period is acceptable because of the conservatisms used in designing the reactor core and performing the safety analyses and the low probability of a DBA or anticipated transient approaching the core design limits occurring during the 7 day period."

This change is acceptable because the ACTIONs to perform an evaluation will ensure appropriate corrective actions are taken rather than immediately borating, which may not resolve all the issues associated with the reactivity anomaly. As described below, SDM will still be met during this 7-day allowable period of continued operation. This AOT is also consistent with NUREG-1432.

MODEs 1 and 2:

PTS 3.1.1.2 is applicable in MODEs 1 and 2. There will still be adequate SDM in MODEs 1 and 2 during the 7-day AOT allowed by the PTS 3.1.1.2 ACTION statement. Any change in core reactivity outside the ± 1% $\Delta k/k$ limit will be manifested in a different boron concentration than predicted. Changes in the critical boron concentration in MODEs 1 and 2 will not have any significant effect on CEA worths and SDM. This is because boron changes of this magnitude have negligible effect on CEA worth. If the reactivity anomaly causes small changes in core power distributions, there could be a change in control rod worths and SDM. However, changes in core power distributions, which are within the TS limits, are allowable, and conservatisms in the CEA worth and SDM calculations ensure that SDM will be met. If the cause of the reactivity anomaly causes gross core power distribution changes that reach TS LCO limits, then the TS ACTION requirements for peaking factors, azimuthal power tilt, linear heat rate and axial shape index will be applied. It is also important to note that violations of the ± 1% $\Delta k/k$ limit are extremely rare, and if they do occur, they would typically happen at initial startup testing (MODE 2) following refuel. Typical startup testing response, if this happened, would require resolution with the safety analysis prior to proceeding.

MODEs 3, 4 and 5:

Both the PTS and CTS have virtually identical ACTION statements if SDM is not met. It should also be noted that PTS SR 4.1.1.2 is applicable in MODEs 1 and 2, while CTS SR 4.1.1.1.2 is applicable in MODEs 1, 2, 3 and 4. Since the ± 1%

Δk/k SR can only be checked in MODEs 1 and 2, it is appropriate that PTS 3.1.1.2 applicability be MODEs 1 and 2.

Question 7:

"PTS 3.1.3.4 is applicable in MODEs 1 and 2, and requires 4 pumps to be operating. PTS SR 4.1.3.4 has no specific requirements for number of operating pumps, and this SR is performed prior to MODEs 1 / 2 entry. Provide a safety justification of the deletion of CTS 3.1.3.4 ACTION b, which provided an action if the SR was met with less than 4 RCPs in operation."

Response:

SR 4.1.3.4 shall be changed to read as follows:

"The CEA drop time shall be demonstrated through measurement with $T_{avg} \geq 515°F$, and all reactor coolant pumps operating prior to reactor criticality:"

Deletion of CTS ACTION 3.1.3.4b is acceptable since the changes to SR 4.1.3.4 specify the plant conditions required to perform the CEA drop time measurements. The revised SR ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Question 8:

a) "PTS 3.1.3.5 ACTION A.1 allows 2 hours to restore the shutdown CEA within limits. CTS 3.1.3.5 ACTION a, allows 1 hour to restore the shutdown CEA to within limits. Provide a safety justification for the change from 1 hour to 2 hours.
b) PTS 3.1.3.5 ACTION A is for 'One or more shutdown CEAs not within limit.' CTS 3.1.3.5 ACTION a is for 'With a maximum of 1 shutdown CEA withdrawn...' Provide a safety justification for the change in action statement from 1 shutdown CEA, to 'one or more shutdown CEAs.'
c) CTS 3.1.3.5 ACTION b is proposed to be deleted. Provide a safety justification for this deletion."

Response:

a) The change to increase the time allowed to restore shutdown CEA(s) within limits from 1 hour to 2 hours is acceptable based on the following:

   A 2-hour AOT allows the operator adequate time to restore the shutdown CEAs to within limits in an orderly manner. The 2-hour AOT is acceptable because of the low probability of a concurrent DBA or anticipated transient which would require the CEAs to perform their safety function. The 2-hour AOT is also consistent with the AOT in PTS 3.1.3.1 Action A, and PTS 3.1.3.6 Action A1.

Both the Shutdown CEAs and Regulating CEAs have as the basis for their insertion limits, ensuring adequate SDM, limiting ejected CEA worth and maintaining core power distributions. Both the Shutdown CEAs and Regulating CEAs should therefore have the same AOT requirement if an insertion limit is not met. CTS 3.1.3.1 and CTS 3.1.3.6 both use a 2-hour AOT, while current TS 3.1.3.5 uses a 1-hour AOT. Therefore, use of a 2-hour AOT in PTS 3.1.3.5 will make these TS consistent.

It should also be noted that SDM is unaffected by the change from 1 hour to 2 hours for this AOT, provided the affected CEA remains trippable and inserted CEA worth remains unaffected by a boron dilution. Prior to entering this ACTION statement, the shutdown CEAs were fully withdrawn. If a shutdown CEA(s) is then inserted into the core, its potential negative reactivity is added to the core as it is inserted. Thus, SDM is not adversely affected provided that a dilution has not occurred which would otherwise negate the inserted CEA worth. The likelihood of dilution taking place is considered to be very low given that multiple undetected failures (i.e., inadvertent CEA insertion coupled with indication failure) would have to exist for the operator to respond to an unexplained power reduction in that manner. Also, the use of 2 hours for this AOT is consistent with NUREG-1432.

b) The change from a "maximum of one shutdown CEA" to "one or more shutdown CEAs" is acceptable based on the following:

If more than 1 Shutdown CEA was below 176 steps, CTS 3.1.3.5 does not address this situation, since the current Action statement only addresses 1 shutdown CEA below 176 steps. Therefore, LCO 3.0.3 would apply, which would require action be initiated within 1 hour to place the Unit in HOT STANDBY within the next 6 hours.

If more than 1 Shutdown CEA was below 176 steps, PTS 3.1.3.5 Action A1 would require the shutdown CEA(s) be restored within 2 hours, or otherwise be in HOT STANDBY within the next 6 hours.

Thus the only difference between PTS 3.1.3.5 and CTS 3.1.3.5 for multiple shutdown CEAs below the insertion limit, is one hour to initiate action (CTS) vs. two hours to restore the shutdown CEA within limits (PTS). Therefore, the answer to this question is the same as the answer to question 8(a) regarding why one hour vs. two hours is acceptable.

It should also be noted that SDM is unaffected by multiple CEAs below the insertion limit, so long as the affected CEAs remain trippable. Prior to entering this ACTION statement, the shutdown CEAs were fully withdrawn. If multiple shutdown CEA(s) are then inserted into the core, their potential negative

reactivity is added to the core as they are inserted. Thus, SDM is not adversely affected so long as the associated CEAs remain trippable and provided that a dilution has not occurred which would otherwise negate worth of the inserted CEAs. The likelihood of dilution taking place is considered to be very low given that multiple undetected failures (i.e., inadvertent CEA insertion coupled with indication failure) would have to exist for the operator to respond to an unexplained power reduction in that manner.

The AOT of two hours is consistent with PTS 3.1.3.1 Action A for multiple rod misalignments of > 10 steps, but < 20 steps. Also, it should be noted that PTS 3.1.3.1 Action D still applies. Therefore, if there are multiple CEAs ≥ 20 steps misaligned, there is no allowed AOT, and action D1 requires to be in MODE 3 within 6 hours.

The use of the words "one or more shutdown CEAs" in PTS 3.1.3.5 Action A is consistent with NUREG-1432.

c. CTS 3.1.3.5 Action b requires that a shutdown CEA be declared inoperable and directs entry into CTS 3.1.3.1, if the affected CEA is not withdrawn to within insertion limits within 1 hour. Based on recent discussions with the NRC staff and a lack of definitive guidance relating to the definition of "immovability", DNC has adopted a conservative standard that requires completion of CTS SR 4.1.1.1.1a in its entirety if a CEA is declared inoperable. This position is discussed in detail in response to question 1. Consequently, if a CEA is declared inoperable under CTS 3.1.3.5 ACTION 'b', the requirement of CTS 3.1.1.1 and SR 4.1.1.1.1a would be completed. This would result in a rapid shutdown of the unit approximately 75 minutes after identification of the condition.

   PTS 3.1.3.5 replaces the requirement to declare the CEA inoperable if not restored within 1 hour, with a requirement that the unit be brought to Mode 3 (Hot Shutdown) if the shutdown CEA is not returned to within the required insertion limits within 2 hours. This would result in a more controlled shutdown of the unit in approximately 120 minutes after identification of the condition.

   The ACTION requirement of PTS 3.1.3.5 therefore achieves the same end state as CTS 3.1.3.5, (unit shutdown through CTS 3.1.1.1 and SR 4.1.1.1.1a as a consequence of the directed action to declare the CEA inoperable) but allows an additional 45 minutes to take corrective action and exit the AOT before action to shut down the unit is initiated.

   The PTS AOT of 2 hours, while less restrictive, is justified on the basis of industry experience that indicates operations to restore an out of limit condition are more effectively managed within this timeframe. The 2 hour AOT of PTS 3.1.3.5 is also acceptable because of the low probability of a concurrent DBA or

anticipated transient, which is the only time that the CEAs would be required to perform their safety function. Additionally, elimination of the CTS requirement to borate is justified given that the end state of the required ACTION of the CTS and PTS is the same and rapid shutdown using boration as required by the CTS represents a significant undesirable operational challenge to the unit. The PTS Allowed Completion Time of 6 hours to reach Mode 3 is reasonable and justified given that operating experience indicates this time frame supports timely shutdown of the unit in an orderly manner from full power conditions without unnecessarily challenging plant systems. This approach is also consistent with NUREG-1432.

Docket No. 50-336
B18898

Attachment 2

Millstone Power Station, Unit No. 2

Technical Specifications Change Request 2-15-02
Changes In Technical Specifications Related To Reactivity Control Systems, Power Distribution Limits, And Special Test Exceptions
Response To The Second Request For Additional Information
Marked Up Original Retyped Pages

INDEX

BASES

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

CEA POSITION

LIMITING CONDITION FOR OPERATION

with each CEA of a given group positioned

all other CEAs in its

3.1.3.1 All CEAs shall be OPERABLE ~~and aligned to~~ within 10 steps (indicated position) of ~~their respective~~ group, and the CEA Motion Inhibit and the CEA Deviation Circuit shall be OPERABLE.

APPLICABILITY: MODES 1[1] and 2[1].

ACTION:

from all other CEAs in

INOPERABLE EQUIPMENT	REQUIRED ACTION
A. One or more CEAs trippable and misaligned from its group by > 10 steps and < 20 steps. OR One CEA trippable and misaligned from its group by > 20 steps.	A.1 Reduce THERMAL POWER to < 70% of the maximum allowable THERMAL POWER within 1 hour and restore CEA(s) misalignment within 2 hours or otherwise be in MODE 3 within the next 6 hours.
B. CEA Motion Inhibit inoperable.	B.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group within 1 hour and every 4 hours thereafter, and restore CEA Motion Inhibit to OPERABLE status within 6 hours or otherwise be in MODE 3 within the next 6 hours. OR B.2[2] Place and maintain the CEA drive system mode switch in either the "off" or "manual" position, and withdraw all CEAs in group 7 to ≥ 172 steps within 6 hours or otherwise be in MODE 3 within the next 6 hours.

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(1) See Special Test Exception 3.10.2

(2) Performance of Action B.2 is allowed only when not in conflict with either Required Action A.1 or C.1.

ACTION (Continued):

C. CEA Deviation Circuit inoperable.	C.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group within 1 hour and every 4 hours thereafter or otherwise be in MODE 3 within the next 6 hours.
D. One or more CEAs untrippable. OR Two or more CEAs misaligned by ~~>~~ $\geq$ 20 steps.	D.1 Be in MODE 3 within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group at least once per 12 hours AND within 1 hour following any CEA movement larger than 10 steps.

4.1.3.1.2 Verify CEA freedom of movement (trippability) by moving each individual CEA that is not fully inserted into the reactor core 10 steps in either direction at least once per 92 days.

4.1.3.1.3 Verify the CEA Deviation Circuit is OPERABLE at least once per 92 days by a functional test of the CEA group Deviation Circuit which verifies that the circuit prevents any CEA from being misaligned from all other CEAs in its group by more than 10 steps (indicated position).

4.1.3.1.4 Verify the CEA Motion Inhibit is OPERABLE 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 prevents regulating CEAs from being inserted beyond the Transient Insertion Limits specified in the CORE OPERATING LIMITS REPORT:

a. Prior to each entry into MODE 2 from MODE 3, except that such verification need not be performed more often than once per 31 days, and

b. At least once per 6 months.

REACTIVITY CONTROL SYSTEMS

CEA DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The individual CEA drop time, from a fully withdrawn position, shall be $\leq$ 2.75 seconds from when electrical power is interrupted to the CEA drive mechanism until the CEA reaches its 90 percent insertion position with:

a. $T_{avg} \geq 515°F$, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

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

SURVEILLANCE REQUIREMENTS

4.1.3.4 The CEA drop time shall be demonstrated through measurement ✗ prior to reactor criticality:

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

b. For specifically affected individual CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs, and

c. At least once per 18 months.

With $T_{avg} \geq 515°F$, and all reactor coolant pumps operating

3/4.1.3 MOVEABLE CONTROL ASSEMBLIES (Continued)

A CEA may become misaligned, yet remain trippable. In this condition, the CEA can still perform its required function of adding negative reactivity should a reactor trip be necessary. If one or more CEAs (regulating or shutdown) are misaligned by > 10 steps and < 20 steps but trippable, or one CEA is misaligned by > 20 steps but trippable, continued operation in MODES 1 and 2 may continue, provided, within 1 hour, the power is reduced to < 70% RATED THERMAL POWER, and within 2 hours CEA alignment is restored. If negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used. Regulating CEA alignment can be restored by either aligning the misaligned CEA(s) to within 10 steps of its group or aligning the misaligned CEA's group to within 10 steps of the misaligned CEA. A Regulating CEA is considered fully inserted when either the Dropped Rod indication or lower Electrical Limit indication lights on the core mimic display are illuminated. A Regulating CEA is considered to be fully withdrawn when withdrawn ≥ 176 steps. Shutdown CEA alignment can only be restored by aligning the misaligned CEA(s) to within 10 steps of its group.

Xenon redistribution in the core starts to occur as soon as a CEA becomes misaligned. Reducing THERMAL POWER ensures acceptable power distributions are maintained. For small misalignments (< 20 steps) of the CEAs, there is:

a. A small effect on the time dependent long term power distributions relative to those used in generating LCOs and limiting safety system settings (LSSS) setpoints;

b. A negligible effect on the available SHUTDOWN MARGIN; and

c. A small effect on the ejected CEA worth used in the accident analysis.

With a large CEA misalignment (> 20 steps), however, this misalignment would cause distortion of the core power distribution. This distortion may, in turn, have a significant effect on the time dependent, long term power distributions relative to those used in generating LCOs and LSSS setpoints. The effect on the available SHUTDOWN MARGIN and the ejected CEA worth used in the accident analysis remain small. Therefore, this condition is limited to a single CEA misalignment, while still allowing 2 hours for recovery.

In both cases, a 2 hour time period is sufficient to:

a. Identify cause of a misaligned CEA;

b. Take appropriate corrective action to realign the CEAs; and

c. Minimize the effects of xenon redistribution.

If a CEA is untrippable, it is not available for reactivity insertion during a reactor trip. With an untrippable CEA, meeting the insertion limits of LCO 3.1.3.5 and LCO 3.1.3.6 does not ensure that adequate SHUTDOWN MARGIN exists. With one or more CEAs untrippable the plant is transitioned to MODE 3 within 6 hours.

3/4.1.3 MOVEABLE CONTROL ASSEMBLIES (Continued)

The CEA motion inhibit permits CEA motion within the requirements of LCO 3.1.3.6, "Regulating Control Element Assembly (CEA) Insertion Limits," and the CEA deviation circuit prevents regulating CEAs from being misaligned from other CEAs in the group. With the CEA motion inhibit inoperable, a time of 6 hours is allowed for restoring the CEA motion inhibit to OPERABLE status, or placing and maintaining the CEA drive switch in either the "off" or "manual" position, fully withdrawing all CEAs in group 7 to < 5% insertion. Placing the CEA drive switch in the "off" or "manual" position ensures the CEAs will not move in response to Reactor Regulating System automatic motion commands. Withdrawal of the CEAs to the positions required in the Required Action B.2 ensures that core perturbations in local burnup, perking factors, and SHUTDOWN MARGIN will not be more adverse than the Conditions assumed in the safety analyses and LCO setpoint determination. Required Action B.2 is modified by a Note indicating that performing this Required Action is not required when in conflict with Required Actions A.1 or C.1.

Continued operation is not allowed in the case of more than one CEA misaligned from any other CEA in its group by ≥ 20 steps, or one or more CEAs untrippable. This is because these cases are indicative of a loss of SHUTDOWN MARGIN and power distribution changes, and a loss of safety function, respectively.

Operability of the CEA position indicators (Specification 3.1.3.3) is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the CEA Motion Inhibit and CEA deviation block circuit. The CEA "Full In" and "Full Out" limit Position Indicator channels 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 ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limit Position Indicator channels.

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 LCO's are satisfied.

The maximum CEA drop time permitted by Specification 3.1.3.4 is the assumed CEA drop time used in the accident 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.

For Information Only

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

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 CEAs be nearly fully withdrawn. The amount of CEA insertion permitted by the Long Term 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. The PDIL alarm, CEA Motion Inhibit and CEA deviation circuit are provided by the CEAPDS computer.

The control rod drive mechanism requirement of specification 3.1.3.7 is provided to assure that the consequences of an uncontrolled CEA withdrawal from subcritical transient will stay within acceptable levels. This specification assures that reactor coolant system conditions exist which are consistent with the plant safety analysis prior to energizing the control rod drive mechanisms. The accident is precluded when conditions exist which are inconsistent with the safety analysis since deenergized drive mechanisms cannot withdraw a CEA. The drive mechanisms may be energized with the boron concentration greater than or equal to the refueling concentration since, under these conditions, adequate SHUTDOWN MARGIN is maintained, even if all CEAs are fully withdrawn from the core.

Attachment 3

Millstone Power Station, Unit No. 2

Technical Specifications Change Request 2-15-02
Changes In Technical Specifications Related To Reactivity Control Systems,
Power Distribution Limits, And Special Test Exceptions
Response To The Second Request For Additional Information
Retyped Pages

BASES

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

CEA POSITION

LIMITING CONDITION FOR OPERATION

3.1.3.1 All CEAs shall be OPERABLE with each CEA of a given group positioned within 10 steps (indicated position) of all other CEAs in its group, and the CEA Motion Inhibit and the CEA Deviation Circuit shall be OPERABLE.

APPLICABILITY: MODES 1[1] and 2[1].

ACTION:

INOPERABLE EQUIPMENT	REQUIRED ACTION
A. One or more CEAs trippable and misaligned from all other CEAs in its group by > 10 steps and < 20 steps. OR One CEA trippable and misaligned from all other CEAs in its group by ≥ 20 steps.	A.1 Reduce THERMAL POWER to < 70% of the maximum allowable THERMAL POWER within 1 hour and restore CEA(s) misalignment within 2 hours or otherwise be in MODE 3 within the next 6 hours.
B. CEA Motion Inhibit inoperable.	B.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group within 1 hour and every 4 hours thereafter, and restore CEA Motion Inhibit to OPERABLE status within 6 hours or otherwise be in MODE 3 within the next 6 hours. OR B.2[2] Place and maintain the CEA drive system mode switch in either the "off" or "manual" position, and withdraw all CEAs in group 7 to ≥ 172 steps within 6 hours or otherwise be in MODE 3 within the next 6 hours.

(1) See Special Test Exception 3.10.2

(2) Performance of Action B.2 is allowed only when not in conflict with either Required Action A.1 or C.1.

ACTION (Continued):

C. CEA Deviation Circuit inoperable.	C.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group within 1 hour and every 4 hours thereafter or otherwise be in MODE 3 within the next 6 hours.
D. One or more CEAs untrippable. OR Two or more CEAs misaligned by ≥ 20 steps.	D.1 Be in MODE 3 within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 Verify the indicated position of each CEA to be within 10 steps of all other CEAs in its group at least once per 12 hours AND within 1 hour following any CEA movement larger than 10 steps.

4.1.3.1.2 Verify CEA freedom of movement (trippability) by moving each individual CEA that is not fully inserted into the reactor core 10 steps in either direction at least once per 92 days.

4.1.3.1.3 Verify the CEA Deviation Circuit is OPERABLE at least once per 92 days by a functional test of the CEA group Deviation Circuit which verifies that the circuit prevents any CEA from being misaligned from all other CEAs in its group by more than 10 steps (indicated position).

4.1.3.1.4 Verify the CEA Motion Inhibit is OPERABLE 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 prevents regulating CEAs from being inserted beyond the Transient Insertion Limits specified in the CORE OPERATING LIMITS REPORT:

a. Prior to each entry into MODE 2 from MODE 3, except that such verification need not be performed more often than once per 31 days, and

b. At least once per 6 months.

CEA DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The individual CEA drop time, from a fully withdrawn position, shall be $\leq$ 2.75 seconds from when electrical power is interrupted to the CEA drive mechanism until the CEA reaches its 90 percent insertion position with:

a. $T_{avg} \geq 515°F$, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

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

SURVEILLANCE REQUIREMENTS

4.1.3.4 The CEA drop time shall be demonstrated through measurement with $T_{avg} \geq 515°F$, and all reactor coolant pumps operating prior to reactor criticality:

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

b. For specifically affected individual CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs, and

c. At least once per 18 months.

3/4.1.3 MOVEABLE CONTROL ASSEMBLIES (Continued)

A CEA may become misaligned, yet remain trippable. In this condition, the CEA can still perform its required function of adding negative reactivity should a reactor trip be necessary. If one or more CEAs (regulating or shutdown) are misaligned by > 10 steps and < 20 steps but trippable, or one CEA is misaligned by ≥ 20 steps but trippable, continued operation in MODES 1 and 2 may continue, provided, within 1 hour, the power is reduced to < 70% RATED THERMAL POWER, and within 2 hours CEA alignment is restored. If negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used. Regulating CEA alignment can be restored by either aligning the misaligned CEA(s) to within 10 steps of all other CEAs in its group or aligning the misaligned CEA's group to within 10 steps of the misaligned CEA. A Regulating CEA is considered fully inserted when either the Dropped Rod indication or lower Electrical Limit indication lights on the core mimic display are illuminated. A Regulating CEA is considered to be fully withdrawn when withdrawn ≥ 176 steps. Shutdown CEA alignment can only be restored by aligning the misaligned CEA(s) to within 10 steps of its group.

Xenon redistribution in the core starts to occur as soon as a CEA becomes misaligned. Reducing THERMAL POWER ensures acceptable power distributions are maintained. For small misalignments (< 20 steps) of the CEAs, there is:

a. A small effect on the time dependent long term power distributions relative to those used in generating LCOs and limiting safety system settings (LSSS) setpoints;

b. A negligible effect on the available SHUTDOWN MARGIN; and

c. A small effect on the ejected CEA worth used in the accident analysis.

With a large CEA misalignment (≥ 20 steps), however, this misalignment would cause distortion of the core power distribution. This distortion may, in turn, have a significant effect on the time dependent, long term power distributions relative to those used in generating LCOs and LSSS setpoints. The effect on the available SHUTDOWN MARGIN and the ejected CEA worth used in the accident analysis remain small. Therefore, this condition is limited to a single CEA misalignment, while still allowing 2 hours for recovery.

In both cases, a 2 hour time period is sufficient to:

a. Identify cause of a misaligned CEA;

b. Take appropriate corrective action to realign the CEAs; and

c. Minimize the effects of xenon redistribution.

If a CEA is untrippable, it is not available for reactivity insertion during a reactor trip. With an untrippable CEA, meeting the insertion limits of LCO 3.1.3.5 and LCO 3.1.3.6 does not ensure that adequate SHUTDOWN MARGIN exists. With one or more CEAs untrippable the plant is transitioned to MODE 3 within 6 hours.

3/4.1.3 MOVEABLE CONTROL ASSEMBLIES (Continued)

The CEA motion inhibit permits CEA motion within the requirements of LCO 3.1.3.6, "Regulating Control Element Assembly (CEA) Insertion Limits," and the CEA deviation circuit prevents regulating CEAs from being misaligned from other CEAs in the group. With the CEA motion inhibit inoperable, a time of 6 hours is allowed for restoring the CEA motion inhibit to OPERABLE status, or placing and maintaining the CEA drive switch in either the "off" or "manual" position, fully withdrawing all CEAs in group 7 to < 5% insertion. Placing the CEA drive switch in the "off" or "manual" position ensures the CEAs will not move in response to Reactor Regulating System automatic motion commands. Withdrawal of the CEAs to the positions required in the Required Action B.2 ensures that core perturbations in local burnup, perking factors, and SHUTDOWN MARGIN will not be more adverse than the Conditions assumed in the safety analyses and LCO setpoint determination. Required Action B.2 is modified by a Note indicating that performing this Required Action is not required when in conflict with Required Actions A.1 or C.1.

Continued operation is not allowed in the case of more than one CEA misaligned from any other CEA in its group by $\geq$ 20 steps, or one or more CEAs untrippable. This is because these cases are indicative of a loss of SHUTDOWN MARGIN and power distribution changes, and a loss of safety function, respectively.

Operability of the CEA position indicators (Specification 3.1.3.3) is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the CEA Motion Inhibit and CEA deviation block circuit. The CEA "Full In" and "Full Out" limit Position Indicator channels 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 ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limit Position Indicator channels.

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 LCO's are satisfied.

The maximum CEA drop time permitted by Specification 3.1.3.4 is the assumed CEA drop time used in the accident 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.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

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 CEAs be nearly fully withdrawn. The amount of CEA insertion permitted by the Long Term 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. The PDIL alarm, CEA Motion Inhibit and CEA deviation circuit are provided by the CEAPDS computer.

The control rod drive mechanism requirement of specification 3.1.3.7 is provided to assure that the consequences of an uncontrolled CEA withdrawal from subcritical transient will stay within acceptable levels. This specification assures that reactor coolant system conditions exist which are consistent with the plant safety analysis prior to energizing the control rod drive mechanisms. The accident is precluded when conditions exist which are inconsistent with the safety analysis since deenergized drive mechanisms cannot withdraw a CEA. The drive mechanisms may be energized with the boron concentration greater than or equal to the refueling concentration since, under these conditions, adequate SHUTDOWN MARGIN is maintained, even if all CEAs are fully withdrawn from the core.