

REACTIVITY CONTROL SYSTEMS

BORATION CONTROL

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.3 The moderator ^{the} temperature coefficient (MTC) shall be within the limits specified in the CORE OPERATING LIMITS REPORT (COLR). The maximum upper limit shall be less positive than $0 \Delta k/k/^\circ F$.

APPLICABILITY: Beginning of cycle life (BOL) limit - MODES 1 and 2* only**.
End of cycle life (EOL) limit - MODES 1, 2, and 3 only**.

ACTION:

- a. With the MTC more positive than the BOL limit specified in the COLR, operation in MODES 1 and 2 may proceed provided:
 1. Control rod withdrawal limits are established and maintained sufficient to restore the MTC to less positive than the BOL limit specified in the COLR, within 24 hours or be in HOT STANDBY within the next 6 hours. These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6;
 2. The control rods are maintained within the withdrawal limits established above until a subsequent calculation verifies that the MTC has been restored to within its limit for the all rods withdrawn condition; and
 3. A Special Report is prepared and submitted to the Commission, pursuant to Specification 6.8.2, within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits, and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.
- b. With the MTC more negative than the EOL limit specified in the COLR, be in HOT SHUTDOWN within 12 hours.

$+0.5 \times 10^{-4} \Delta k/k/^\circ F$ for all the rods withdrawn, beginning of cycle life (BOL), for power levels up to 70% RATED THERMAL POWER with a linear ramp to $0 \Delta k/k/^\circ F$ at 100% RATED THERMAL POWER.

*With k_{eff} greater than or equal to 1.

**See Special Test Exceptions Specification 3.10.3.

REACTIVITY CONTROL SYSTEMS

CASES

BORATION CONTROL

Insert "B 3/4.1.1.3"

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT (Continued)

The surveillance requirements for measurement of the MTC at the beginning and near the end of the fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, the MTC is measured as required by Surveillance Requirement 4.1.1.3.a. A measurement bias is derived from the difference between test measurement and test prediction. All predicted values of MTC for the cycle are conservatively corrected based on measurement bias. The corrected predictions are then compared to the maximum upper limit of Technical Specification 3.1.1.3. Control rod withdrawal limits are established, if required, to assure all corrected values of predicted MTC will be less positive than the maximum upper limit required by Technical Specification 3.1.1.3.

the limit specified in the COLR, and

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 551° F. This limitation is required to ensure: (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor vessel is above its minimum RT_{MDT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boron Injection System ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include: (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid transfer pumps, and (5) an emergency power supply from OPERABLE diesel generators.

With the RCS in MODES 1, 2, or 3, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT from expected operating conditions after xenon decay and cooldown to 200° F. The maximum expected boron capability requirement occurs at EOL from full power equilibrium xenon conditions and requires 22,000 gallons of 7000 ppm borated water from the boric acid storage tanks or a minimum contained volume of 477,000 gallons of 2000 ppm borated water from the refueling water storage tank (RWST).

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable in MODES 4, 5, and 6 provides assurance that a mass addition pressure transient can be relieved by operation of a single PORV or an RHR suction relief valve.

As a result of this, only one boron injection system is available. This is acceptable on the basis of the stable reactivity condition of the reactor, the emergency power supply requirement for the OPERABLE charging pump and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single injection system becomes inoperable.

ADMINISTRATIVE CONTROLS

6.8.1.6.b. (Continued)

10. YAEC-1855P, "Seabrook Station Unit 1 Fixed Incore Detector System Analysis," October 1992

Methodology for Specification:

- 3.2.1 - AXIAL FLUX DIFFERENCE
- 3.2.2 - Heat Flux Hot Channel Factor
- 3.2.3 - Nuclear Enthalpy Rise Hot Channel Factor

11. YAEC-1624P, "Maine Yankee RPS Setpoint Methodology Using Statistical Combination of Uncertainties - Volume 1 - Prevention of Fuel Centerline Melt," March 1988

Methodology for Specification:

- 3.2.1 - AXIAL FLUX DIFFERENCE
- 3.2.2 - Heat Flux Hot Channel Factor
- 3.2.3 - Nuclear Enthalpy Rise Hot Channel Factor

6.8.1.6.c. The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as SHUTDOWN MARGIN, and transient and accident analysis limits) of the safety analysis are met. The CORE OPERATING LIMITS REPORT for each reload cycle, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, to the NRC Document Control Desk with copies to the Regional Administrator and the Resident Inspector.

Insert "6.8.1.6.b"

Insert "B 3/4.1.1.3"

The cycle specific upper MTC limit in the COLR is determined during the design of each cycle. The upper MTC limit provides assurance of compliance with the ATWS Rule and the basis for the Rule by limiting core damage frequency from an ATWS event below the target of 1.0×10^{-5} per reactor year established in SECY-83-293.

Insert "6.8.1.6.b"

12. NYN-95048, Letter from T.C. Feigenbaum (NAESCO) to USNRC, "License Amendment Request 95-05: Positive Moderator Temperature Coefficient", May 30, 1995

Methodology for Specification:

3.1.1.3 - Moderator Temperature Coefficient

III. RETYPE OF LAR 95-05 PROPOSED CHANGES

See attached retype of proposed changes to Technical Specifications. The attached retype reflects the currently issued version of Technical Specifications. Pending Technical Specification changes or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed retype. The enclosed retype should be checked for continuity with Technical Specifications prior to issuance.

Revision bars are provided in the right hand margin to designate a change in the text.

REACTIVITY CONTROL SYSTEMS

BORATION CONTROL

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.3 The moderator temperature coefficient (MTC) shall be within the limits specified in the COLR. The maximum upper limit shall be less positive than $+0.5 \times 10^{-4} \Delta k/k/^\circ F$ for all the rods withdrawn, beginning of cycle life (BOL), for power levels up to 70% RATED THERMAL POWER with a linear ramp to $0 \Delta k/k/^\circ F$ at 100% RATED THERMAL POWER.

APPLICABILITY: Beginning of cycle life (BOL) limit - MODES 1 and 2* only**. End of cycle life (EOL) limit - MODES 1, 2, and 3 only**.

ACTION:

- a. With the MTC more positive than the BOL limit specified in the COLR, operation in MODES 1 and 2 may proceed provided:
 1. Control rod withdrawal limits are established and maintained sufficient to restore the MTC to less positive than the BOL limit specified in the COLR, within 24 hours or be in HOT STANDBY within the next 6 hours. These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6;
 2. The control rods are maintained within the withdrawal limits established above until a subsequent calculation verifies that the MTC has been restored to within its limits for the all rods withdrawn condition; and
 3. A Special Report is prepared and submitted to the Commission, pursuant to Specification 6.8.2, within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits, and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.
- b. With the MTC more negative than the EOL limit specified in the COLR, be in HOT SHUTDOWN within 12 hours.

*With k_{eff} greater than or equal to 1.

**See Special Test Exceptions Specification 3.10.3.

REACTIVITY CONTROL SYSTEMS

BASES

BORATION CONTROL

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT (Continued)

The surveillance requirements for measurement of the MTC at the beginning and near the end of the fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

The cycle specific upper MTC limit in the COLR is determined during the design of each cycle. The upper MTC limit provides assurance of compliance with the ATWS Rule and the basis for the Rule by limiting core damage frequency from an ATWS event below the target of 1.0×10^{-5} per reactor year established in SECY-83-293.

Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, the MTC is measured as required by Surveillance Requirement 4.1.1.3.a. A measurement bias is derived from the difference between test measurement and test prediction. All predicted values of MTC for the cycle are conservatively corrected based on measurement bias. The corrected predictions are then compared to the maximum upper limit of Technical Specification 3.1.1.3. Control rod withdrawal limits are established, if required, to assure all corrected values of predicted MTC will be less positive than the limit specified in the COLR, and the maximum upper limit required by Technical Specification 3.1.1.3.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 551° F. This limitation is required to ensure: (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor vessel is above its minimum RT_{NOT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boron Injection System ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include: (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid transfer pumps, and (5) an emergency power supply from OPERABLE diesel generators.

With the RCS in MODES 1, 2, or 3, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT from expected operating conditions after xenon decay and cooldown to 200°F. The maximum expected boron capability requirement occurs at EOL from full power equilibrium xenon conditions and requires 22,000 gallons of 7000 ppm borated water from the

REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.2 BORATION SYSTEMS (Continued)

boric acid storage tanks or a minimum contained volume of 477,000 gallons of 2000 ppm borated water from the refueling water storage tank (RWST).

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable in MODES 4, 5, and 6 provides assurance that a mass addition pressure transient can be relieved by operation of a single PORV or an RHR suction relief valve.

As a result of this, only one boron injection system is available. This is acceptable on the basis of the stable reactivity condition of the reactor, the emergency power supply requirement for the OPERABLE charging pump and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single injection system becomes inoperable.

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT after xenon decay and cooldown from 200° F to 140° F. This condition requires a minimum contained volume of 6500 gallons of 7000 ppm borated water from the boric acid storage tanks or a minimum contained volume of 24,500 gallons of 2000 ppm borated water from the RWST.

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 8.5 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

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

The limitations on OPERABILITY of isolation provisions for the Boron Thermal Regeneration System and the Reactor Water Makeup System in Modes 3, 4, 5, and 6 ensure that the boron dilution flow rates cannot exceed the value assumed in the transient analysis.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

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

REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

within ± 12 steps at 24, 48, 120, and 228 steps withdrawn for the Control Banks and 18, 210, and 228 steps withdrawn for the Shutdown Banks provides assurances that the Digital Rod Position Indicator is operating correctly over the full range of indication. Since the Digital Rod Position Indication System does not indicate the actual shutdown rod position between 18 steps and 210 steps, only points in the indicated ranges are picked for verification of agreement with demanded position.

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

The maximum rod drop time restriction is consistent with the assumed rod drop time used in the safety analyses. Measurement with rods at their individual mechanical fully withdrawn position, T_{avg} greater than or equal to 551°F and 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 fully withdrawn position of shutdown and control banks can be varied between 225 and the mechanical fully withdrawn position (up to 232 steps), inclusive. An engineering evaluation was performed to allow operation to the 232 step maximum. The 225 to 232 step interval allows axial repositioning to minimize RCCA wear.

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

For Specification 3.1.3.1 ACTIONS b. and c., it is incumbent upon the plant to verify the trippability of the inoperable control rod(s). Trippability is defined in Attachment C to a letter dated December 21, 1984, from E. P. Rahe (Westinghouse) to C. O. Thomas (NRC). This may be by verification of a control system failure, usually electrical in nature, or that the failure is associated with the control rod stepping mechanism. In the event the plant is unable to verify the rod(s) trippability, it must be assumed to be untrippable and thus falls under the requirements of ACTION a. Assuming a controlled shutdown from 100% RATED THERMAL POWER, this allows approximately 4 hours for this verification.

ADMINISTRATIVE CONTROLS

6.8.1.6.b. (Continued)

10. YAEC-1855P, "Seabrook Station Unit 1 Fixed Incore Detector System Analysis," October 1992

Methodology for Specification:

- 3.2.1 - AXIAL FLUX DIFFERENCE
- 3.2.2 - Heat Flux Hot Channel Factor
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- 3.2.1 - AXIAL FLUX DIFFERENCE
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12. NYN-95048, Letter from T. C. Feigenbaum (NAESCo) to NRC, "License Amendment Request 95-05: Positive Moderator Temperature Coefficient", May 30, 1995

Methodology for Specification:

- 3.1.1.3- Moderator Temperature Coefficient

6.8.1.6.c. The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as SHUTDOWN MARGIN, and transient and accident analysis limits) of the safety analysis are met. The CORE OPERATING LIMITS REPORT for each reload cycle, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, to the NRC Document Control Desk with copies to the Regional Administrator and the Resident Inspector.

IV. DETERMINATION OF SIGNIFICANT HAZARDS FOR LAR 95-05 PROPOSED CHANGES

1. *The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.*

The proposed changes involve the upper limits of MTC imposed by the Technical Specifications and COLR. No changes are made to the design or manner of operation of structures, systems or components. Therefore, the probabilities of events previously evaluated are not increased by the proposed changes.

Each accident and transient identified in the Seabrook Station Updated Safety Analysis Report (UFSAR) has been evaluated for the proposed changes. The results of this evaluation were previously documented in YAEC-1871⁽²⁾, and, with the exception of the consequences of an ATWS, approved in Amendment No. 33^(5,6). The proposed cycle specific upper MTC limit to be placed in the COLR assures that the consequences of an ATWS remain bounded by analysis previously documented in 1979^(8,9). Therefore, it follows that the consequences of previously evaluated accidents, including ATWS, will not be significantly increased by the proposed changes.

2. *The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.*

As described above, the changes proposed in this LAR involve changes in the upper limits of MTC imposed by the Technical Specifications and COLR. Previous evaluations of accidents with the proposed MTC limits were documented in References 2, 8, and 9. No changes are made to the design or manner of operation of structures, systems or components and no new failure mechanisms are introduced. Therefore, the proposed changes do not create the possibility of a new or different accident from any accident previously evaluated.

3. *The proposed changes do not result in a significant reduction in the margin of safety.*

The transient and accident analysis presented in YAEC-1871 and the 1979 ATWS analysis define the margin of safety in the acceptance criteria specified for each event.

The safety analysis presented in YAEC-1871 was performed with the proposed maximum upper MTC limit in Technical Specification 3.1.1.3. Results demonstrate that the acceptance criteria specified for each event are met. The margin of safety identified in the acceptance criteria are not reduced by the proposed change to Technical Specification 3.1.1.3.

The cycle specific HZP, ARO MTC limit in COLR will be adjusted, as required, to assure that the predicted MTC at BOC, ARO, HFP is equal to or more negative than the value used in the 1979 ATWS analysis. This assures that the specified acceptance criteria for a postulated ATWS event at Seabrook Station would be met. The margin of safety defined by the acceptance criteria for ATWS is preserved by the proposed change to the cycle specific upper MTC limit specified in COLR. A discussion of the margin of safety for ATWS, i.e. the ATWS Rule, is added to the Basis of Technical Specification 3.1.1.3.

V. **PROPOSED SCHEDULE FOR LICENSE AMENDMENT ISSUANCE AND EFFECTIVENESS**

North Atlantic requests NRC review of License Amendment Request 95-05 and issuance of a license amendment having immediate effectiveness by December 1, 1995.

VI. ENVIRONMENTAL IMPACT ASSESSMENT

North Atlantic has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental considerations. The proposed changes do not involve a significant hazards consideration, nor increase the types and amounts of effluent that may be released offsite, nor significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, North Atlantic concludes that the proposed change meets the criteria delineated in 10CFR51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.