December 20, 1988

Docket No. 50-423

DISTRIBUTION	
Docket File	DHagan
NRC & Local PDRs	EJordan
Gray File	BGrimes
SVarga	TMeek(4)
BBoger	WJones
SNorris	EButcher
DJaffe	ACRS(10)
OGC	GPA/PA
	ARM/LFMB

Mr. Edward J. Mroczka
Senior Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Dear Mr. Mroczka:

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. 69588)

The Commission has issued the enclosed Amendment No. 29 to Facility Operating License No. NPF-49 for Millstone Nuclear Power Station, Unit No. 3, in response to your application dated October 5, 1988.

The amendment changes Technical Specification (TS) 3/4.1.1.3, "Moderator Temperature Coefficient," to allow a more negative moderator temperature coefficient in the Limiting Condition for Operation, TS 3.1.1.3b, and in the associated Surveillance Requirement, TS 4.1.1.3b.

A copy of the related Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's bi-weekly Federal Register notice.

Sincerely,

/s/

David H. Jaffe, Project Manager
Project Directorate I-4
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 29 to NPF-49
2. Safety Evaluation

cc w/enclosures:
See next page

LA:PDI-4	PM:PDI-4	D:PDI-4	OGC
SNorris	DJaffe	JStolz	MYoung
12/9/88	12/9/88	12/9/88	12/14/88

8812300020 881220
PDR ADOCK 05000423
P PDC

cc:

Gerald Garfield, Esquire
Day, Berry and Howard
Counselors at Law
City Place
Hartford, Connecticut 06103-3499

W. D. Romberg, Vice President
Nuclear Operations
Northeast Utilities Service Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Kevin McCarthy, Director
Radiation Control Unit
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06106

Bradford S. Chase, Under Secretary
Energy Division
Office of Policy and Management
80 Washington Street
Hartford, Connecticut 06106

S. E. Scace, Station Superintendent
Millstone Nuclear Power Station
Northeast Nuclear Energy Company
Post Office Box 128
Waterford, Connecticut 06385

C. H. Clement, Unit Superintendent
Millstone Unit No. 3
Northeast Nuclear Energy Company
Post Office Box 128
Waterford, Connecticut 06385

Ms. Jane Spector
Federal Energy Regulatory Commission
825 N. Capitol Street, N.E.
Room 8608C
Washington, D.C. 20426

Burlington Electric Department
c/o Robert E. Fletcher, Esq.
271 South Union Street
Burlington, Vermont 05402

R. M. Kacich, Manager
Generation Facilities Licensing
Northeast Utilities Service Company
Post Office Box 270
Hartford, Connecticut 06141-0270

D. O. Nordquist
Manager of Quality Assurance
Northeast Nuclear Energy Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Regional Administrator
Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

First Selectmen
Town of Waterford
Hall of Records
200 Boston Post Road
Waterford, Connecticut 06385

W. J. Raymond, Resident Inspector
Millstone Nuclear Power Station
c/o U. S. Nuclear Regulatory Commission
Post Office Box 811
Niantic, Connecticut 06357

M. R. Scully, Executive Director
Connecticut Municipal Electric
Energy Cooperative
268 Thomas Road
Groton, Connecticut 06340

Michael L. Jones, Manager
Project Management Department
Massachusetts Municipal Wholesale
Electric Company
Post Office Box 426
Ludlow, Massachusetts 01056

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.*

DOCKET NO. 50-423

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 29
License No. NPF-49

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Northeast Nuclear Energy Company, et al. (the licensee) dated October 5, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

*Northeast Nuclear Energy Company is authorized to act as agent and representative for the following Owners: Central Maine Power Company, Central Vermont Public Service Corporation, Chicopee Municipal Lighting Plant, City of Burlington, Vermont, Connecticut Municipal Electric Light Company, Massachusetts Municipal Wholesale Electric Company, Montaup Electric Company, New England Power Company, The Village of Lyndonville Electric Department, Western Massachusetts Electric Company, and Vermont Electric Generation and Transmission Cooperative, Inc., and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-49 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 29 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz, Director
Project Directorate I-4
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: December 20, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 29

FACILTIY OPERATING LICENSE NO. NPF-49

DOCKET NO. 50-423

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf pages are provided to maintain document completeness.

Remove	Insert
3/4 1-4	3/4 1-4
3/4 1-5	3/4 1-5
B3/4 1-1	B3/4 1-1
B3/4 1-2	B3/4 1-2

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

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

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.6% $\Delta k/k$ is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal. A 1.6% $\Delta k/k$ SHUTDOWN MARGIN is required to provide protection against a boron dilution accident.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the value of this coefficient remains within the limiting condition assumed in the FSAR accident and transient analyses.

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison.

The most negative MTC, value equivalent to the most positive moderator density coefficient (MDC), was obtained by incrementally correcting the MDC used in the FSAR analyses to nominal operating conditions.

MODERATOR TEMPERATURE COEFFICIENT (Continued)

These corrections involved: (1) a conversion of the MDC used in the FSAR safety analyses to its equivalent MTC, based on the rate of change of moderator density with temperature at RATED THERMAL POWER conditions, and (2) subtracting from this value the largest differences in MTC observed between EOL, all rods withdrawn, RATED THERMAL POWER conditions, and those most adverse conditions of moderator temperature and pressure, rod insertion, axial power skewing, and xenon concentration that can occur in normal operation and lead to a significantly more negative EOL MTC at RATED THERMAL POWER. These corrections transformed the MDC value used in the FSAR safety analyses into the limiting MTC value of -47.5 pcm/°F. The MTC value of -40.0 pcm/°F represents a conservative MTC value at a core condition of 300 ppm equilibrium boron concentration, and is obtained by making corrections for burnup and soluble boron to the limiting MTC value of -47.5 pcm/°F.

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.

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. This limitation is required to ensure: (1) the moderator temperature coefficient is within it analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the P-12 interlock is above its setpoint, (4) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (5) the reactor vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

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

With the RCS average temperature above 200, 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

SHUTDOWN MARGIN - T_{avg} LESS THAN OR EQUAL TO 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be greater than or equal to 1.6% Δk/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.6% Δk/k, immediately initiate and continue boration at greater than or equal to 33 gpm of a solution containing greater than or equal to 6300 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.6% Δk/k:

a. Within 1 hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod is immovable or untrippable, the SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable control rod(s); and

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

   1) Reactor Coolant System boron concentration,

   2) Control rod position,

   3) Reactor Coolant System average temperature,

   4) Fuel burnup based on gross thermal energy generation,

   5) Xenon concentration, and

   6) Samarium concentration.

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.3 The moderator temperature coefficient (MTC) shall be:

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

b. Less negative than -4.75×10^{-4} Δk/k/°F for the all rods withdrawn, end of cycle life (EOL), RATED THERMAL POWER condition.

APPLICABILITY: Specification 3.1.1.3a. - MODES 1 and 2* only**.
Specification 3.1.1.3b. - MODES 1, 2, and 3 only**.

ACTION:

a. With the MTC more positive than the limit of Specification 3.1.1.3a. above, 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 above limits 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 6.9.2, 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 limit of Specification 3.1.1.3b. above, be in HOT SHUTDOWN within 12 hours.

---

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

**See Special Test Exceptions Specification 3.10.3.

4.1.1.3 The MTC shall be determined to be within its limits during each fuel cycle as follows:

a. The MTC shall be measured and compared to the BOL limit of Specification 3.1.1.3a., above, prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading; and

b. The MTC shall be measured at any THERMAL POWER and compared to -4.0×10^{-4} $\Delta k/k/°F$ (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm. In the event this comparison indicates the MTC is more negative than -4.0×10^{-4} $\Delta k/k/°F$, the MTC shall be remeasured, and compared to the EOL MTC limit of Specification 3.1.1.3b., at least once per 14 EFPD during the remainder of the fuel cycle.

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.4 The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be greater than or equal to 551°F.

APPLICABILITY: MODES 1 and 2* **.

ACTION:

With a Reactor Coolant System operating loop temperature (T_{avg}) less than 551°F, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.4 The Reactor Coolant System temperature (T_{avg}) shall be determined to be greater than or equal to 551°F:

a. Within 15 minutes prior to achieving reactor criticality, and

b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System T_{avg} is less than 561°F with the T_{avg}-T_{ref} Deviation Alarm not reset.

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

**See Special Test Exceptions Specification 3.10.3.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 29

TO FACILITY OPERATING LICENSE NO. NPF-49

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

DOCKET NO. 50-423

INTRODUCTION

By letter dated October 5, 1988 (Ref. 1), Northeast Nuclear Energy Company (NNECO) made application to amend the Technical Specifications (TS) of Millstone Nuclear Power Station, Unit 3 (Millstone 3). The proposed changes would modify (1) the most negative moderator temperature coefficient (MTC) limiting condition for operation (LCO), TS 3.1.1.3b, (2) the associated surveillance requirements (SR), TS 4.1.1.3b and (3) the affected Bases. The purpose of this LCO and SR is to ensure that the most negative MTC at end-of-cycle (EOC) remains within the bounds of the Millstone 3 safety analysis, in particular, for those transients and accidents that can lead to a moderator temperature decrease (cooldown) or, equivalently, a moderator density increase. The limiting event for this class of events is the steamline break accident. Transients other than cooldown events are also affected by the most negative MTC.

The Millstone 3 SR involves an MTC measurement at any thermal power within 7 effective full power days (EFPD) after reaching an equilibrium primary coolant boron concentration of 300 ppm. After corrections are made, the measured value is compared to the all rods out (ARO), hot full power (HFP) core condition SR limits. In the event that the measured MTC is more negative than the SR limit, then the MTC must be remeasured and compared with the EOC MTC LCO value at least once per 14 EFPD during the remainder of the cycle. The Millstone 3 LCO and SR values for the most negative MTC are conservative (less negative) when compared to the value of the MTC (actually moderator density coefficient (MDC) which is simply related to the MTC) which is used in the safety analysis.

Millstone 3 is currently in Cycle 2. NNECO anticipates that the measured value of MTC required near EOC will result in an MTC that will be more negative than the SR limit. This will then require NNECO to make MTC measurements once every 14 EFPD until the EOC 2. Failure to meet the SR MTC does not necessarily mean that either the most negative MTC that would occur near EOC 2 would be exceeded or that the safety analysis MTC would be exceeded. NNECO states that these additional MTC measurements, if needed to comply with the SR, would be an undue burden to the plant.

NNECO proposes to change the LCO (TS 3.1.1.3b) most negative MTC value from -40 pcm/°F to -47.5 pcm/°F, where a pcm is equal to a reactivity of 10-5. The SR (TS 4.1.1.3b) would be changed from -31 pcm/°F to -40 pcm/°F. These changes would remove about 2.5 pcm/°F from the difference between the SR and the EOC LCO MTC values. These values would still be bounded by the Millstone 3 safety analysis values of the MTC of -55.5 pcm/°F for four loop and -52.5 pcm/°F for three loop operation. These changes apply to the current and future reload cycles of Millstone 3 and are supported by an evaluation provided in a Westinghouse topical report (Ref. 2) submitted by Reference 1.

The staff's review of these proposed changes to the most negative MTC LCO, SR, and associated Bases follows.

2.0 EVALUATION

2.1 Methodology

The current method used to determine the most negative MTC is described in the Westinghouse Standard Technical Specifications (STS) in Bases Section 3/4.1.1.3 (Ref. 3). The method is based on incrementally correcting the conservative MDC used in the safety analysis to obtain the most negative MTC value or, equivalently, the most positive MDC at nominal HFP core conditions. The corrections involve subtracting the incremental change in the MDC, which is associated with a core condition of all rods inserted (ARI), to an ARO core condition. The MTC is then equal to the MDC times the rate of change of moderator density with temperature at rated thermal power conditions. This STS method of determining the most negative MTC LCO value results in an ARO MTC which is significantly less negative than the MTC used in the safety analysis and may even be less negative than the best estimate EOC ARO MTC for extended burnup reload cores. This has the potential for requiring the plant to be placed in a hot shutdown condition by TS 3.1.1.3 even though substantial margin to the safety analysis MDC exists. This problem with the current STS method is caused by adjusting the MDC from a HFP ARI to a HFP ARO condition in defining the most negative MTC. The HFP ARI condition is not allowed by TS on control rod positions for allowable power operation in which the shutdown banks are completely withdrawn from the core and the control banks must meet rod insertion limits (RIL).

In Reference 2 Westinghouse provides for Millstone 3 an alternative method for adjusting the safety analysis MDC to obtain a most negative MTC. This method is termed the Most Negative Feasible (MNF) MTC. The MNF MTC method seeks to determine the conditions for which a core will exhibit the most negative MTC value that is consistent with operation allowed by the TS. For example, the MNF MTC method would not require the conversion assumption of the ARI HFP condition but would require the conversion assumption that all control rod banks are inserted the maximum amount permitted by the TS. Westinghouse uses the MNF MTC method to determine EOC MTC sensitivities to those design and operational parameters that directly impact the MTC in such a way that the sensitivity to one parameter is independent of the assumed values for the other parameters. The parameters considered with this MNF MTC method include:

1. soluble boron concentration in the coolant
2. moderator temperature and pressure
3. control rod insertion
4. axial power shape
5. xenon concentration

The MNF MTC approach uses this sensitivity information to derive an EOC ARO HFP TS MTC value based on the safety analysis value of the MDC.

This MNF MTC method has, according to Westinghouse, a number of advantages over the previous method for determining the most negative MTC LCO value. The MNF MTC method MTC will be sufficiently negative so that repeated MTC measurements from a 300 ppm core condition to EOC would not be required. The MNF MTC method does not change the safety analysis moderator feedback assumption. The safety analysis value of MDC is unchanged. The MNF MTC method is a conservative and reasonable basis to assume for an MTC value of a reload core prior to a transient and is consistent with plant operation defined by other TS. Finally, the MNF MTC method retains the SR on MTC at the 300 ppm core condition to verify that the core is operating within the bounds of the safety analysis.

Westinghouse determined the sensitivity of the above parameters on the EOC MTC for five different reload designs representative of 17x17 four loop plants. These reload designs included various fuel designs, discharge burnups, cycle lengths, and operating temperatures expected to envelope future reload designs for Millstone 3. The soluble boron concentration was not used in the sensitivity analysis because the EOC HFP ARO MTC TS value is assumed to be at 0 ppm of boron, the definition of EOC and because the most negative MTC occurs at 0 ppm of boron in the coolant.

The sensitivity study did not include the radial power distribution which can vary under normal operation and can affect the MTC. The operational activities that affect the radial power distribution do so through the movement of control rods and activities that affect the xenon concentration. The allowed changes in the radial power distribution are implicitly included in the MTC sensitivity to control rod insertion and xenon concentration.

In Reference 3 Westinghouse states that the SR MTC value would be obtained in the same manner as currently described in the STS Bases. The SR MTC value is obtained from the EOC HFP ARO MTC value by making corrections for burnup and boron at a core condition of 300 ppm of boron.

The staff has reviewed the assumptions and basis for the MNF MTC method described above and concludes that they are acceptable because they will result in conservative most negative MTC LCO and SR values that could result from allowed operation of Millstone 3 from nominal conditions and because the MTC measurement at 300 ppm of boron core condition will assure, using the SR value of MTC, that the safety analysis MDC will not be exceeded.

2.2 Millstone 3 Accident Analysis MDC Assumption

Westinghouse uses an MDC for performing accident analyses. For events sensitive to maximum moderator feedback, a constant value of the MDC of 0.43 delta k/gm/cc is assumed throughout the analysis. For Millstone 3 at HFP and full flow nominal operating conditions (4 loop operation), the temperature and pressure are 590.5°F and 2250 psia, respectively. At these conditions the MTC, equivalent to the MDC of 0.43 delta k/gm/cc, is -55.47 pcm/°F. We will refer to this MTC as the safety analysis MTC. For Millstone 3 at 75% of rated thermal power and nominal flow corresponding to 3 loop operation, the temperature and pressure are 582.7°F and 2250 psia, respectively. At these conditions the MTC, equivalent to the MDC of 0.43 delta k/gm/cc, is -52.46 pcm/°F.

Based on its review, the staff concludes that the evaluation of the MTC from the MDC, as discussed above, is acceptable because it conforms to the relationship of MTC to MDC, that is, the MTC is equal to the MDC times the rate of change of density with temperature at the nominal pressure and temperature of the coolant.

2.3 Sensitivity Results

Millstone 3 TS 3.2.5 provides the LCO values of the Departure From Nucleate Boiling (DNB) parameters, reactor coolant system average temperature (T_{avg}) and pressurizer pressure. For 4 loop operation the minimum allowable indicated pressurizer pressure is 2226 psia and a maximum allowable T_{avg} is 591.2°F. These values have accounted for instrumentation uncertainties of 21 psi in the pressure and 2°F in the T_{avg} measurements. Thus, the safety analysis assumes a maximum allowable T_{avg} of 593.2°F and a minimum pressurizer pressure of 2205 psia. The current nominal design T_{avg} for Millstone 3 is 587.1°F so that the safety analysis represents a 6.1°F maximum allowable increase in T_{avg} nominal conditions. The current nominal design pressure is 2250 psia so that the safety analysis represents a 45 psi maximum allowable decrease from nominal pressurizer pressure. Based on these maximum allowed system variations, a maximum allowable limit is placed on the moderator density variation. Using the sensitivity of the MTC to temperature and pressure, derived from the analysis of the five reload designs, Westinghouse obtained for Millstone 3 a bounding delta MTC (a proprietary value) associated with these maximum allowable coolant temperature and pressure deviations from nominal conditions.

Millstone 3 TS 3.1.1.3 requires an ARO configuration in the evaluation of the MTC. TS 3.1.3.5 requires that all shutdown banks be withdrawn from the core during normal power operation (that is, while in Modes 1 and 2). TS 3.1.3.6 limits control bank insertion by Rod Insertion Limits (RIL) in Modes 1 and 2. All control rods can be inserted at hot zero power (HZP) coincident with a reactor trip. In general, greater control rod insertion results in a more negative MTC assuming that all other parameters are held constant. However, greater control rod insertion will also cause a reduction in core power and

T_{avg} which causes the MTC to become more positive. This effect is more pronounced at lower powers with the positive change being more important than the negative change in the MTC. Based on this line of reasoning, Westinghouse determined that the most negative MTC configuration will occur at HFP with control rods inserted to the RIL. Westinghouse analyzed four reload core designs, using a bounding value of Control Bank D insertion at HFP with no soluble boron in the coolant. This analysis for Millstone 3 gave a bounding delta MTC (a proprietary value) associated with the control bank inserted to the RIL.

The axial power shape produces changes in the MTC caused primarily by the rate at which the moderator is heated as it flows up the core, with the MTC sensitivity to extremes of axial power shapes being small. This effect can be correlated with the axial flux difference (AFD), which is the difference in the power in the top half of the core minus the power in the lower half of the core. Millstone 3 TS includes limits on the AFD. Westinghouse determined that the more negative the AFD the more negative the MTC. Westinghouse analyzed four of the reload designs and determined the sensitivity of the MTC to AFD. This analysis gave for Millstone 3 a bounding delta MTC (a proprietary value) for an assumed value of AFD.

Although no TS limits exist on either the xenon distribution or concentration, the axial xenon distribution is effectively limited by TS limits on the AFD. The physics of the xenon buildup and decay process limits the xenon concentration. The effect of xenon axial distribution is quantified in the effect of the axial power shape on the MTC, as discussed previously. The effect of the overall xenon concentration on the MTC needs to be evaluated separately. Westinghouse determined that the MTC became more negative with no xenon in the core. Therefore, Westinghouse analyzed the five reload core designs at EOC HFP ARO with no xenon present. This analysis gave for Millstone 3 a delta MTC (a proprietary value) for the xenon concentration factor.

All of the delta MTCs described above are summed to provide a total delta MTC for Millstone 3 four loop operation based on the allowed deviations of the various factors from nominal values. A similar analysis was performed for Millstone 3 for three loop operation where the power level was assumed to be 75% of rated thermal power. Westinghouse determined that the total delta MTC for three loop operation is more positive than the total delta MTC for four loop operation and is therefore bounded by the four loop results.

The staff has reviewed the discussion and analysis of the primary factors of the MNF MTC method and concludes that the results obtained are acceptable because acceptable methods were used to generate the data.

2.4 Millstone 3 EOC MTC TS Value

Using the total delta MTC obtained with the MNF MTC method, Westinghouse determined that the Millstone 3 safety analysis MTC of -55.47 pcm/°F should be increased by the total delta MTC plus an additional amount for conservatism. The resulting EOC HFP ARO MTC for Millstone 3 four loop operation is -47.5

pcm/°F. This value would replace the -40 pcm/°F current TS value. Thus, the determination that an MTC for the EOC HFP ARO reload core is less negative than -47.5 pcm/°F would provide assurance that the safety analysis MTC remains bounding.

Westinghouse also performed an analysis to determine the SR value of the HPF ARO reload core at 300 ppm of boron. Analysis of reload cores similar to Millstone 3 future reload designs resulted in a value of 7.50 pcm/°F to bound the expected difference in MTCs between the 300 ppm of boron core condition to EOC. Thus, the SR MTC value would be -40 pcm/°F as compared to the present TS value of -31 pcm/°F.

Based on the review discussed above, the staff concludes that the proposed changes to TS 3/4.1.1.3b and associated Bases are acceptable for the following reasons:

1. The most negative feasible MTC method considered the important factors affecting the MTC and the limits on these factors.

2. Approved computer codes and methods (in some cases updated versions) were used in the analysis.

3. The MTC measurement of HFP ARO core at or near 300 ppm of boron will provide assurance that the MTC at EOC HFP conditions will be less negative than the safety analysis MTC.

4. Future reloads for Millstone 3 will be analyzed to confirm the most negative MTC Technical Specification and the Surveillance Requirements on MTC at a core condition of 300 ppm of boron.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

4.0 CONCLUSION

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 REFERENCES

1. Letter from E.J. Mroczka (NNECO) to USNRC, dated October 5, 1988.

2. "Safety Evalution Supporting a More Negative EOL Moderator Temperature Coefficient Technical Specification for the Millstone Nuclear Power Station, Unit No. 3," WCAP-11946 (proprietary), WCAP-11951, (nonproprietary), September 1988.

3. "Standard Technical Specifications for Westinghouse Pressurized Water Reactors," NUREG-0452, Revision 4, issued Fall 1981.

Dated: December 20, 1988

Principal Contributor: D. Fieno