August 13, 1996

Mr. Ted C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer
Northeast Utilities Service Company
c/o Mr. Terry L. Harpster
Director - Nuclear Licensing Services
P.O. Box 128
Waterford, CT 06385

SUBJECT: ISSUANCE OF ONE-TIME AMENDMENT RELATING TO BORON CONCENTRATION IN THE REACTOR COOLANT SYSTEM DURING MODE 6 OPERATION - MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2 (TAC NO. M95501)

Dear Mr. Feigenbaum:

The Commission has issued the enclosed Amendment No. 201 to Facility Operating License No. DPR-65 for the Millstone Nuclear Power Station, Unit No. 2, in response to your application dated July 3, 1996.

The amendment removes, on a one-time basis during the cycle 13 mid-cycle core offload/reload activities, the Technical Specification (TS) requirement that the boron concentration in all filled portions of the reactor coolant system be uniform. The requested change also adds a footnote indicating that it is acceptable for the boron concentration of the water volumes in the steam generators and the connecting piping to be as low as 1300 parts per million. The TS Bases is also updated to reflect the one-time TS changes.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

(Original Signed By)

Daniel G. McDonald, Senior Project Manager
Northeast Utilities Project Directorate
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosures: 1. Amendment No. 201 to DPR-65
2. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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2. Safety Evaluation

cc w/encls: See next page

cc:

Lillian M. Cuoco, Esq.
Senior Nuclear Counsel
Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270

Mr. John Buckingham
Department of Public Utility Control
Electric Unit
10 Liberty Square
New Britain, CT 06051

Mr. Kevin T. A. McCarthy, Director
Monitoring and Radiation Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Mr. Allan Johanson, Assistant Director
Office of Policy and Management
Policy Development and Planning Division
80 Washington Street
Hartford, CT 06106

Mr. S. E. Scace, Vice President
Nuclear Reengineering Implementation
Northeast Utilities Service Company
P.O. Box 128
Waterford, CT 06385

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

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

Mr. P. D. Swetland, Resident Inspector
Millstone Nuclear Power Station
c/o U.S. Nuclear Regulatory Commission
P.O. Box 513
Niantic, CT 06357

Mr. D. B. Miller, Jr.
Senior Vice President
Nuclear Safety and Oversight
Northeast Utilities Service Company
P.O. Box 270
Waterford, CT 06141-0270

P. M. Richardson, Nuclear Unit Director
Millstone Unit No. 2
Northeast Nuclear Energy Company
P.O. Box 128
Waterford, CT 06385

Charles Brinkman, Manager
Washington Nuclear Operations
ABB Combustion Engineering
12300 Twinbrook Pkwy, Suite 330
Rockville, MD 20852

Mr. E. A. DeBarba
Vice President - Nuclear Technical
Services
Northeast Utilities Service Company
P.O. Box 128
Waterford, CT 06385

Mr. F. C. Rothen
Vice President - Nuclear Work Services
Northeast Utilities Service Company
P.O. Box 128
Waterford, CT 06385

Ernest C. Hadley, Esq.
1040 B Main Street
P.O. Box 549
West Wareham, MA 02576

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NORTHEAST NUCLEAR ENERGY COMPANY

THE CONNECTICUT LIGHT AND POWER COMPANY

THE WESTERN MASSACHUSETTS ELECTRIC COMPANY

DOCKET NO. 50-336

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 201
License No. DPR-65

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 July 3, 1996, 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.

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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. DPR-65 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 201, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Phillip F. McKee, Director
Northeast Utilities Project Directorate
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: August 13, 1996

ATTACHMENT TO LICENSE AMENDMENT NO. 201

FACILITY OPERATING LICENSE NO. DPR-65

DOCKET NO. 50-336

Replace the following pages of the Appendix A, Technical Specifications, with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

| Remove | Insert |
|---|---|
| 3/4 9-1 | 3/4 9-1 |
| B 3/4 9-1 | B 3/4 9-1 |
| --- | B 3/4 9-1a* |

* overflow page - no change

## 3/4.9 REFUELING OPERATIONS

### 3/4.9.1 BORON CONCENTRATIONS

**LIMITING CONDITION FOR OPERATION**

3.9.1 With the reactor vessel head unbolted or removed, the boron concentration of the Reactor Coolant System** and the refueling canal shall be maintained sufficient to ensure that the more restrictive of following reactivity conditions is met:

a. Either a $K_{eff}$ of 0.95 or less, or

b. A boron concentration of greater than or equal to 1720 ppm.

APPLICABILITY: MODE 6*.

ACTION:

With the requirements of the above specification not satisfied, within 15 minutes suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at greater than or equal to 40 gpm of boric acid solution at or greater than the required refueling water storage tank concentration (ppm) until $K_{eff}$ is reduced to less than or equal to 0.95 or the boron concentration is restored to greater than or equal to 1720 ppm, whichever is the more restrictive. The provisions of Specification 3.0.3 are not applicable.

**SURVEILLANCE REQUIREMENTS**

4.9.1.1 The more restrictive of the above two reactivity conditions shall be determined prior to:

a. Removing or unbolting the reactor vessel head, and

b. Withdrawal of any full length CEA in excess of 3 feet from its fully inserted position within the reactor pressure vessel.

4.9.1.2 The boron concentration of the reactor coolant system** and the refueling canal shall be determined by chemical analysis at least once per 72 hours.

4.9.1.3 The boron concentration in the cold leg side of the steam generators shall be determined to be greater than or equal to 1300 ppm prior to entering MODE 6.

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*The reactor shall be maintained in MODE 6 whenever the reactor vessel head is unbolted or removed and fuel is in the reactor vessel.

**For the Cycle 13 mid-cycle core offload activities, it is acceptable for the boron concentration of the water volumes in the steam generators and connecting piping to be as low as 1300 ppm.

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: 1) the reactor will remain subcritical during CORE ALTERATIONS, and 2) sufficient boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the accident analyses.

For the Cycle 13 mid-cycle core offload activities, the boron concentration of the water volumes in the steam generators and connecting piping may be as low as 1300 ppm. During REFUELING and/or CORE ALTERATIONS, the water volumes in the steam generators and connecting piping are stagnant and do not readily mix with the water in the reactor vessel. The water volumes in the pressurizer and connecting piping, shutdown cooling system (including reactor vessel and connecting piping), and refueling pool shall be maintained greater than 1950 ppm.

A boron dilution analysis has been performed which accounts for dilution of the shutdown cooling system with the water volumes from the steam generators and connecting piping. This analysis demonstrates that, in the unlikely event in which all of the water in the steam generators and connecting piping mixes with the water in the shutdown cooling system, the resulting shutdown cooling system boron concentration will remain greater than the required refueling boron concentration.

The surveillance requirement to verify that the boron concentration in the steam generators is greater than 1300 ppm prior to entering MODE 6 is consistent with the assumptions of the boron dilution calculation. The sample points are only located on the cold leg side of the steam generators. These sample points are representative of the water volumes in the steam generators (both hot and cold legs) and their connecting piping, based on the fact that uniform mixing of these water volumes at a boron concentration of approximately 1320 ppm had occurred prior to shutting off the reactor coolant pumps. In March 1996, the reactor coolant system was drained and subsequently refilled with water having a boron concentration greater than or equal to 1320 ppm. The boron concentration of the water in the steam generators and connecting piping is greater than 1300 ppm.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the source range neutron flux monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

The requirement that the spent fuel pool bulk temperature be maintained below 140°F ensures that high water temperature will not degrade resin in the spent fuel pool demineralizers and that the temperature and humidity above the pool are compatible with personnel comfort and safety requirements. Additionally, the requirement ensures that the design temperature of the fuel pool cooling system, liner/building structures, and racks are not exceeded.

The requirement for the reactor to remain in MODE 5 or 6 until the most recent 1/3 core offload has decayed 504 hours ensures that alternate cooling is available during this time to cool the spent fuel pool should a failure occur in the spent fuel pool cooling system. The shutdown cooling (SDC) system is a high capacity system; that is, one train is sufficient to cool both the core and the spent fuel pool should a failure occur in the spent fuel pool cooling system within 504 hours from reactor shutdown.

3/4.9.4 CONTAINMENT PENETRATIONS

The requirements on containment penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

3/4.9.5 COMMUNICATIONS

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity condition during fuel or CEA movement within the reactor pressure vessel.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 201

TO FACILITY OPERATING LICENSE NO. DPR-65

NORTHEAST NUCLEAR ENERGY COMPANY

THE CONNECTICUT LIGHT AND POWER COMPANY

THE WESTERN MASSACHUSETTS ELECTRIC COMPANY

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

## 1.0 INTRODUCTION

By letter dated July 3, 1996, the Northeast Nuclear Energy Company (the licensee) submitted a request for changes to the Millstone Nuclear Power Station, Unit No. 2, Technical Specifications (TSs). The requested changes would remove the requirement that the boron concentration in all filled portions of the reactor coolant system be "uniform." The requested change would only be applicable during the cycle 13 mid-cycle reactor fuel offload/reload activities.

In February of 1996, Unit No. 2 was shut down due to operability problems. During plant cooldown, the boron concentration of the reactor coolant system (RCS) was increased to approximately 1320 parts per million (ppm) to maintain a safe shutdown margin of at least 5 percent for Mode 5. In mid-March of 1996, it was discovered that a low pressure safety injection (LPSI) system valve could not be closed and several attempts to close the valve failed. The licensee determined that the shutdown cooling system (SCS), which shares some of its components with the LPSI system, had to be removed from service in order to isolate flow through the failed valve and allow repairs to be performed.

The licensee also determined that the safest repair option available is to offload the reactor fuel to the spent fuel pool. Since the failure of the LPSI system valve was not known and the need for fuel offloading was not anticipated at the time of shutdown, the RCS was not borated to 1720 ppm boron concentration required in Mode 6 for offloading/reloading fuel. This led the licensee to submit a one-time TS change request for this cycle to allow for the isolation and repair of the failed LPSI valve.

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## 2.0 EVALUATION

TS 3.9.1 requires that during operation in Mode 6 with the reactor vessel head unbolted or removed, the boron concentration of all filled portions of the reactor coolant system (RCS) and the fueling canal shall be maintained uniform and sufficient to ensure that, a) either a Keff of 0.95 (which is 5 percent subcritical) or less exists, or b) that a boron concentration greater than or equal to 1720 ppm exists, whichever is the more restrictive.

As noted above, the licensee proposes to revise TS 3.9.1 to allow a one-time change during the current mid-cycle 13 shutdown, which will not require uniform boration and will allow the water volumes in the steam generators and the connecting piping to be as low as the Mode 5 requirement of 1300 ppm. The TS Bases will also be modified to reflect and explain the changes. This is needed because the SCS was aligned for decay heat removal and the reactor coolant pumps (RCPs) were shut off, prior to the decision in which it was determined that it would be necessary to place the unit in Mode 6 to allow the offloading of the reactor fuel. With the RCPs shut off, the uniform mixing of the boron in the steam generators and the steam generators cold leg piping is ineffective. However, as the licensee noted, the coolant in other active regions of the RCS, the shutdown cooling loop, and the reactor vessel core regions are easily mixed and borated to the higher concentration required for Mode 6, which is 1720 ppm.

The change to TS 3.9.1 will require that the active regions of the RCS, the shutdown cooling loop, and the reactor vessel core region be borated to a boron concentration greater than 1950 ppm. To minimize the stagnant volume of water in the RCS before entering into Mode 6, the licensee will drain the RCS level to approximately 36 inches below the reactor vessel flange, borate the active regions to 1950 ppm, and refill the RCS. Analysis by the licensee showed that this approach ensures that the core will remain at least 5 percent subcritical during offloading/reloading activities.

The licensee performed a calculation that demonstrated that a boron concentration of 1950 ppm will be sufficient to ensure that, in the unlikely event that the stagnant lower concentration borated water in the cold leg regions of the steam generator and piping, mixes with the higher borated water while the SCS is operating, the final mixed boron concentration will be greater than that required for Mode 6.

The licensee analyzed the potential impact of the non-uniform boron concentration on the Final Safety Analysis Report (FSAR) Chapter 14 events. The only accident impacted by the proposed one-time TS change is the boron dilution accident. This analyzed accident assumes a dilution rate of 88 gpm (two charging pumps) and an initial boron concentration corresponding to a Keff of at least 0.95. It is stipulated in the FSAR that the operator has 30 minutes from the initiation of the event to take action to preclude reactor core criticality.

TS 3.9.1 requirements ensure that the initial conditions assumed in the analysis of the boron dilution event are preserved. The new analysis conducted by the licensee for the proposed TS change indicates that there is at least 30 minutes for the operator to respond to a boron dilution event.

The licensee next addressed the possibility of loss of shutdown cooling flow. With loss of shutdown cooling flow, the RCS temperature would likely increase, and eventually, the RCS coolant in the core would begin to boil. As the water level in the RCS decreases due to boiling, the 1300 ppm borated water in the cold legs and steam generators, will eventually find its way into the vessel core region unmixed. This unmixed water, at a 1300 ppm boron concentration, would still be sufficient to maintain the core greater than 5 percent subcritical (with all the rods inserted) without operator intervention. Thus, under these conditions the consequences of losing the shutdown cooling flow are acceptable with regard to maintaining subcriticality margin.

## 3.0 SUMMARY

Therefore, based on the details provided above, the staff has determined that the proposed one-time changes to TS 3/4.9.1 are acceptable during the current cycle 13 mid-cycle core offload/reload activities necessary to implement repairs on the failed LPSI valve. The staff has also determined that the modified TS Bases adequately reflect the one-time TS change.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Connecticut State official was notified of the proposed issuance of the amendment. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The 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 surveillance requirements. The NRC 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 issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (61 FR 36583). 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.

## 6.0 CONCLUSION

The Commission has 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: T. Attard

Date: August 13, 1996