March 10, 1999

Mr. Martin L. Bowling, Jr.
Recovery Officer - Techn[illegible] Services
Northeast Nuclear Energy Company
c/o Ms. Patricia A. Loftus
Director - Regulatory Affairs
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SUBJECT: ISSUANCE OF AMENDMENT - MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2 (TAC NO. MA4361)

Dear Mr. Bowling:

The Commission has issued the enclosed Amendment No. 229 to Facility Operating License No. DPR-65 for the Millstone Nuclear Power Station, Unit No. 2, in response to your application dated December 10, 1998, as supplemented by letter dated February 19, 1999.

The amendment allows implementation of a change to the Final Safety Analysis Report regarding post-loss-of-coolant accident long term core cooling.

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,
/S/
Stephen Dembek, Project Manager
Project Directorate I-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosures: 1. Amendment No. 229 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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Unit 2

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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. 229
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 December 10, 1998, as supplemented by letter dated February 19, 1999, 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.

2. Accordingly, changes to the Final Safety Analysis Report to reflect the revised method for ensuring boron precipitation can be prevented, post-loss-of-coolant accident, as set forth in the licensee's December 10, 1998, and February 19, 1999, letters are authorized.

3. This license amendment is effective as of the date of issuance, and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Elinor G. Adensam

Elinor G. Adensam, Director
Project Directorate I-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: March 10, 1999

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 229

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 December 10, 1998, as supplemented by letter dated February 19, 1999, the Northeast Nuclear Energy Company, et al. (NNECO, or the licensee), submitted a license amendment request to implement changes to the Millstone Nuclear Power Station, Unit No. 2, Final Safety Analysis Report (FSAR) regarding a revised method for ensuring boron precipitation can be prevented following a loss-of-coolant accident (LOCA). The supplemental submittal provided additional information that did not change the staff's proposed no significant hazards consideration determination.

2.0 BACKGROUND

Within 8 to 10 hours following a LOCA, if the reactor coolant system (RCS) has not been re-filled then simultaneous hot and cold leg injection is to be established to provide core flushing to preclude boron precipitation. The 8 to 10 hour time frame is used as the decision point since it provides ample time to initiate simultaneous hot and cold leg injection prior to the occurrence of boric acid precipitation. Boron precipitation can occur when reactor coolant boron concentrations increase due to liquid boiloff. This can result in increased reactor core heating due to solidified boron interfering with heat transfer from the fuel rods to the coolant. The preferred (primary) method for hot leg injection is with one low pressure safety injection (LPSI) pump injecting by way of the shutdown cooling (SDC) system warmup and return piping, past valves 2-SI-400, 2-SI-709, 2-SI-651, and 2-SI-652, into the RCS hot leg (see Figure 1 in the licensee's December 10, 1998, submittal). Cold leg injection for the preferred method is provided by LPSI flow diverted through at least one of the four LPSI injection lines (See Figure 1) and high pressure safety injection (HPSI) flow to the cold legs (see Figure 2 in the licensee's December 10, 1998, submittal). If the preferred method cannot be established due to a single failure, the alternative (backup) method of simultaneous hot and cold leg

injection is to be used. The alternative method for hot leg injection is with HPSI flow from one HPSI pump to the charging line to the pressurizer auxiliary spray line to the pressurizer surge line to the hot leg (See Figure 2). Cold leg injection for the alternative method is accomplished by LPSI flow (See Figure 1). Adequate flow to preclude boron precipitation as well as long term cooling is provided by either the preferred LPSI or alternative HPSI hot leg injection methods.

A licensee evaluation for the preferred and alternative injection methods determined that both are susceptible to single failures. A LOCA coincident with a loss of a Facility Z1 power source could prevent the opening of valve 2-SI-651 (See Figure 1). This would prevent the use of the LPSI pumps and the SDC system for the preferred hot leg injection method. In addition, a Facility Z1 power loss could disable HPSI pump P41A and preclude the closing of HPSI header valves 2-SI-617, 2-SI-627, 2-SI-637, and 2-SI-647 (See Figure 2) which need to be closed to ensure adequate net positive suction head (NPSH) when using the HPSI method of hot leg injection. A Facility Z1 power loss could also preclude the opening of HPSI suction and discharge cross-connect valves 2-SI-411 and 2-SI-655 (See Figure 2), respectively. The opening of these two valves is required for the use of the HPSI swing pump P41B which can be used as an operating replacement for HPSI pump P41A. A LOCA coincident with a loss of a Facility Z2 alternating current (AC) power source could preclude the opening of 2-SI-652 and thus prohibit the use of the LPSI pumps and the SDC system for the preferred hot leg injection method. In addition, a Facility Z2 direct current (DC) power source loss would preclude the opening of auxiliary spray line valve 2-CH-517 and the closing of charging header supply valve 2-CH-519 (See Figure 2). Operation of these valves is required for use of the HPSI method of hot leg injection.

Since important valves in both the preferred and alternative injection methods could be disabled by failure or loss of a single power source, the licensee has proposed plant modifications to preclude disabling these valves due to single power source failure concerns.

The requested amendment addresses the above-identified single failure problem in the licensee's plan to prevent boron precipitation following a LOCA in which the RCS is not refilled. The amendment provides the following:

1. Alternate Z2 electrical power to valve 2-SI-651 in the RCS hot leg injection pipe,

2. Alternate Z1 electrical power to valve 2-CH-517 in the pressurizer auxiliary spray pipe,

3. Alternate Z1 electrical power to valve 2-CH-519 in the charging system header,

4. Test jacks at the respective motor control centers for determining valve position of 2-SI-615, 2-SI-625, 2-SI-635, and 2-SI-645 in the cold leg injection piping, and

5. Bypass capability of the low pressure open permissive for 2-SI-651.

3.0 EVALUATION

3.1 Evaluation of Electrical Considerations

Millstone Unit No. 2 has various components that can be supplied from alternate sources during normal plant operation. These components are classified as Facility Z5 and are defined in the FSAR as spare units of emergency equipment that can be transferred from one power source to another. The FSAR description of spare units notes that the components can be aligned to either one of two buses depending on which redundant piece of equipment is out of service. Valves 2-SI-651, 2-CH-517, and 2-CH-519 do not meet the design requirement for Z5 components since these valves are not installed spares. Thus, changing the power feed to these valves is not allowed during normal operation and the alternate power supplies for these valves are to be used only after a LOCA to mitigate various single power source failures.

As illustrated in Figure 3 of the licensee's December 10, 1998, submittal, the alternate power source for valve 2-SI-651 is provided by the Facility Z2 motor control center (MCC) B61. A spare breaker from MCC B61 is cross tied into the circuitry for valve 2-SI-651. The Facility Z1/Z2 power feeds are cross connected by way of manual disconnect switches. The manual disconnect switches are equipped with Kirk Key interlocks to ensure only one disconnect switch can be closed at a time. This type of cross connect scheme is identical to the existing scheme used for the 480-volt swing charging pump and service water strainer motors. Additionally, aligning valve 2-SI-651 to its alternate power supply is annunciated in the main control room. In addition, a local control panel is installed near MCC B51 (see Figure 3) to house the motor starter and the bypass and local control switch required to open valve 2-SI-651 upon a loss of Facility Z1 power. An open permissive for SDC isolation valve 2-SI-651 prevents the opening of the valve when RCS pressure is above 280 pounds per square inch absolute (psia). This permissive is implemented by a Facility Z1 power relay that must be energized to open valve 2-SI-651. During a postulated LOCA and the loss of a Facility Z1 power source, this relay may not be energized and thus prevents the valve from being opened. Regarding this concern, a local control switch is installed on the local control panel to bypass the disabled permissive and allow the valve to be operated locally. Bypassing the open permissive for this valve is also annunciated in the main control room. The open permissive for the upstream valve 2-SI-652 (See Figure 1) would continue to be available. The alarm for when valve 2-SI-651 is open and RCS pressure is above 280 psia could also be disabled upon a complete loss of Facility Z1 power although position indication for this valve would be available at the local control panel by way of Facility Z2 power. The main control room alarm for upstream valve 2-SI-652, which operates the same as the disabled alarm for valve 2-SI-651, would be available.

An alternate power source for valves 2-CH-517 and 2-CH-519 is provided by Facility Z1 DC Instrument Panel DV10 as illustrated in Figure 4 of the licensee's December 10, 1998, submittal. A spare breaker from DV10 is cross tied into the circuitry for valves 2-CH-517 and 2-CH-519. These valves are air operated valves which require DC control power. Since these valves only require DC control power, large disconnect switches with Kirk Key interlocks are not required. The Facility Z1 DC power feed is cross connected by way of key lock switches rated to handle the control power load. The keys for these switches are captured in one position to ensure only one power source can be aligned to the valves at a time. Aligning valves 2-CH-517 and 2-CH-519 to the alternate power source is annunciated in the main

control room. The disconnect switch/breaker combination provides double isolation to ensure electrical separation between Facility Z1 and Z2 power sources. The Kirk Key interlock system on the 480-volt three phase disconnect switches assures only one disconnect switch can be closed at a time. Similarly, for the DC circuitry, the key lock switches with the key removable in only one position provides an equivalent level of protection. The alternate power feeder breakers will administratively be kept in the open position. Thus, a single short circuit associated with any isolation component will not compromise the separation between the Facility Z1 and Z2 power sources.

To provide alternate power to valves 2-SI-651, 2-CH-517, and 2-CH-519, new cables and internal wiring are provided. The new cable and wiring routings maintain the required separation. New cables and wiring which are energized during normal operation, are routed in conduits and trays associated with the facility providing normal power. Although, these components are not classified as Z5 components (installed spare components), separation requirements for redundant power routed to the same switch are maintained.

Diesel generator, MCC, and battery loadings are affected by the preceding electrical plant modifications. Aligning the valves to the redundant power source, changes the loading for MCC B61, DV10, Battery 201A, and both diesel generators. However, the slight increase in load does not impact the ability of any of these components to supply the required loads. Breaker coordination for MCC B61 and DV10 are not affected by the modifications. For both MCC B51 and B61, the 100 Ampere (A) charging pump motor breaker is the most limiting breaker. The new breaker in MCC B61 is a 35 A breaker similar to the existing breaker in MCC B51. The new breaker in DV10 is the same size as existing breakers in DV20 which are properly coordinated. Thus, addition of the breakers in MCC B61 and DV10 does not invalidate the existing breaker coordination calculations.

The proposed plant modifications illustrated in Figures 3 and 4 add the capability to provide either Facility Z1 or Z2 safety-related power to valves 2-SI-651, 2-CH-517, and 2-CH-519. The physical connection between the redundant power trains (that is, mechanically interlocked disconnect switches) is consistent with the requirements of the Millstone Unit No. 2 FSAR and Safety Guide 6 "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems." This physical connection between redundant power trains is also similar to that of the current design for the swing battery charger and swing charging pump and service water strainer motors. However, valves 2-SI-651, 2-CH-517, and 2-CH-519 are not designed to be installed spare units of emergency equipment and as such they will only be aligned to the alternate power feed following a LOCA with a single failure in either the Facility Z1 or Z2 power distribution system.

The cables for valve 2-SI-651 will remain routed in Facility Z1 cable trays, conduits, and containment penetrations. Similarly, the cables for valves 2-CH-517 and 2-CH-519 will remain routed in Facility Z2 cable trays, conduits, and containment penetrations. The independence and physical separation of the redundant power systems is provided by a normally open disconnect switch and a normally open circuit breaker wired in series. With this design, no single component failure can result in the redundant power trains being paralleled or routed together during normal operation. Multiple operator errors would be required to align valves 2-SI-651, 2-CH-517, or 2-CH-519 to the alternate power source during normal operation. Additionally control room operators would have to disregard annunciators that indicate the