December 21, 2000

Mr. R. G. Lizotte
Master Process Owner - Assessment
c/o Mr. David A. Smith
Northeast Nuclear Energy Company
P. O. Box 128
Waterford, CT 06385-0128

SUBJECT: MILLSTONE NUCLEAR POWER STATION, UNIT NOS. 2 AND 3 - ISSUANCE OF AMENDMENT RE: 4160-VOLT ELECTRICAL CROSS-TIE LINE (TAC NOS. MA9853 AND MA9855)

Dear Mr. Lizotte:

The Commission has issued the enclosed Amendment Nos. 252 and 190 to Facility Operating License Nos. DPR-65 and NPF-49 for the Millstone Nuclear Power Station, Unit Nos. 2 and 3 (MP2 & MP3), respectively, in response to your application dated August 25, 2000.

This amendment documents the staff's approval of the implementation of a plant modification to support the replacement of the existing Millstone Nuclear Power Station, Unit 1 to MP2 4160-volt cross-tie with a new MP3 to MP2 4160-volt cross-tie. This amendment also authorizes you to incorporate changes to the description of the facilities in the Final Safety Analysis Report, as described in your application dated August 25, 2000, and evaluated in the enclosed Safety Evaluation.

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,

/RA/

Jacob I. Zimmerman, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosures: 1. Amendment No. 252 to DPR-65
2. Amendment No. 190 to NPF-49
3. Safety Evaluation

cc w/encls: See next page

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NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

DOCKET NO. 50-336

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 252
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 August 25, 2000, 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 (FSAR) to reflect the replacement of the existing Millstone Nuclear Power Station, Unit 1 to MP2 4160-volt cross-tie with a new MP3 to MP2 4160-volt cross-tie are authorized.

3. This license amendment is effective as of the date of issuance, and shall be implemented within 60 days of issuance. Implementation of the amendment is the incorporation of changes into the FSAR as described in the licensee's application dated August 25, 2000, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/ B. Buckley for

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: December 21, 2000

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

DOCKET NO. 50-423

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 190
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 August 25, 2000, 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 (FSAR) to reflect the replacement of the existing Millstone Nuclear Power Station, Unit 1 to MP2 4160-volt cross-tie with a new MP3 to MP2 4160-volt cross-tie are authorized.

3. This license amendment is effective as of the date of issuance, and shall be implemented within 60 days of issuance. Implementation of the amendment is the incorporation of changes into the FSAR as described in the licensee's application dated August 25, 2000, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/ B. Buckley for

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: December 21, 2000

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 252 AND 190

TO FACILITY OPERATING LICENSE NOS. DPR-65 AND NPF-49

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-336 AND 50-423

1.0 INTRODUCTION

By letter dated August 25, 2000, the Northeast Nuclear Energy Company, et al. (NNECO/licensee), submitted an amendment request to modify the Final Safety Analysis Report (FSAR) for Millstone Nuclear Power Station, Unit Nos. 2 and 3 (MP2 and MP3). The amendment would authorize changes to the MP2 and MP3 FSAR to reflect the modification to support the replacement of the existing Millstone Unit 1 (MP1) to MP2 4160-volt cross-tie with a new MP3 to MP2 4160-volt cross-tie.

2.0 BACKGROUND

MP1 is being decommissioned. To support this activity, several modifications are required to modify/eliminate MP1 systems that are shared or common to MP2 and MP3. One such modification is the replacement of existing MP1 to MP2 4160-volt cross-tie with a new MP3 to MP2 4160-volt cross-tie. The licensee evaluated the new design utilizing the criteria of 10 CFR 50.59. This evaluation has determined that four aspects of the new design and associated implementation involve unreviewed safety questions (USQs). One USQ pertains to MP2 and deals with the demonstration of the integrity and load carrying capacity of the new MP3 to MP2 4160-volt cross-tie connection. The three other USQs pertain to MP3. They involve: (1) an additional 3 MVA load on the MP3 electrical distribution system by the MP3 to MP2 4160-volt cross-tie; (2) utilizing the MP3 normal station service transformer (NSST) as an alternate source of alternating current (AC) power for MP2, by maintaining breaker 13T and its associated disconnect switches open; and (3) increasing the short circuit fault levels on MP3 electrical distribution system when a very specific set of plant conditions exist at MP3. Therefore, by letter dated August 25, 2000, NNECO requested the staff to review the four USQs proposed for MP2 and MP3.

3.0 EVALUATION

MP2 does not have an independent power source to mitigate a loss of offsite power (LOP), onsite power, or a station blackout (SBO). MP2 relies on the MP1 emergency diesel generator (EDG) which is a Class 1E source made available to MP2 by cross-tying electrical buses 14H and 24E. The new design entails the replacement of the existing MP1 to MP2 4160-volt cross-tie connection with a new MP3 to MP2 4160-volt cross-tie connection.

Title 10 of the *Code of Federal Regulations* (10 CFR), Appendix A, General Design Criterion (GDC) 17, "Electric Power Systems" describes the requirements related to onsite and offsite power systems. The offsite power system must be available via two separate and electrically independent connections to the onsite electrical distribution system. One offsite circuit must be immediately available to mitigate the effects of design basis accident conditions.

The new 4160-volt cross-tie connection will provide power from MP3 bus 34A or 34B to MP2 bus 24E. This new design will meet the requirements for an alternate source of offsite power by providing power from either the MP3 reserve station service transformer (RSST) or the MP3 NSST. The new design will also provide a source of onsite AC power to meet the 10 CFR Part 50, Appendix R, "Fire Protection for Nuclear Power Facilities Operating Prior to January 1, 1979," requirement and an alternate source of AC power from the MP3 SBO diesel generator (DG) to supply power to MP2 during an SBO event via bus 24E.

The USQs are evaluated as follows:

MP2 - USQ No. 1

A test will be performed to demonstrate the new MP3 to MP2 cross-tie connection integrity, and verify load carrying capacity. This test will utilize a temporary overcurrent protection scheme while the non-Class 1E MP33 SBO DG is paralleled to the Class 1E MP2 4160-volt system. The off-normal electrical configuration required to perform the test, and the reliance on a special overcurrent scheme to assure MP2 4160-volt system operability creates the possibility of a different malfunction than previously analyzed.

The licensee will perform a test to verify the ability of the crosstie to supply approximately 3 MVA of power from MP3 to MP2. The test to verify this new electrical circuit is expected to be performed while MP2 is operating. Therefore, the test will require parallel operation of the MP3 SBO DG (2260 kilo-watts electric (kWe) at 0.8 power factor) with the MP2 4160-volt electrical distribution system. The configuration that will be required for this test is very similar to the configuration that exists when an MP2 EDG is paralleled to its respective bus during a monthly surveillance test. The major difference between the two configurations is that the MP3 SBO DG and its connection path are non-Class 1E. Thus, the protective relays associated with the MP3 SBO DG cannot be credited to provide adequate isolation during a design basis event. To provide a Class 1E electrical isolation scheme for the test, the MP2 bus 24E breaker (breaker A505) to the MP3 supply breaker will be temporarily modified to perform this test. The existing MP2 overcurrent relays for this breaker only have inverse-time-overcurrent protection. These relays will be replaced with Class 1E relays that have both inverse-time and instantaneous overcurrent protection.

The staff has reviewed the proposed change and finds it acceptable because while the MP3 SBO DG is paralleled with the MP2 4160-volt electrical distribution system, the replacement Class 1E overcurrent relay will provide instantaneous isolation (open Bus 24E breaker A505) for any condition during which the MP3 SBO DG may attempt to provide additional power (such as a large motor start or loss of normal power at MP2), or for any fault or overload condition experienced while connected to the non-Class 1E supply (MP3 SBO DG). In addition, should a fault occur in the MP3 SBO DG or the associated cross-tie cabling, it will be isolated immediately and should not affect the operability of the MP2 safety-related 4160-volt system. Further, if a loss of normal power occurs at MP2 during the test, the undervoltage relays at MP2 will respond and isolate the M3 SBO DG as designed. The staff concludes that performance of this test is safe and will not adversely impact the health and safety of the public.

MP3 - USQ No. 1

The MP3 to MP2 4160-volt cross-tie will impose up to an additional 3 MVA load on MP3. As a result, the minimum required acceptable switchyard voltage for MP3 will increase from 334 kV to 337 kV. The margin between the minimum switchyard voltage (345 kV) and the minimum acceptable switchyard voltage will decrease from 11 kV to 8 kV. This is a reduction in the operating margin for MP3. The analysis performed by the licensee to support the new design shows that, with a minimum voltage of 337 kV in the switchyard, MP3 will remain connected to offsite power.

The current minimum switchyard voltage requirement for MP3 is 334 kV as stated in Supplement 4 to NUREG-1031, Safety Evaluation Report (SER) related to the operation of MP3. The SER states:

> In a letter dated November 12, 1985, the applicant explained that the grid voltage at the Millstone switchyard is nominally held at 357 kV. If the voltage drops below this value, corrective action is taken to restore it. The minimum voltage that would be seen at the switchyard under these circumstances would be 345 kV. This is much higher than the minimum voltage (334 kV) necessary to maintain adequate safety bus voltage levels when operating on the reserve station service transformer.

The staff has reviewed the proposed change and finds it acceptable because the minimum voltage protection assures that acceptable starting and running voltages are present for the safety systems that may be required to operate should a loss-of-coolant-accident occur at MP3 while MP2 is being supplied with the safe shutdown load of 3 MVA from either the MP3 RSST or the MP3 NSST. Thus, the MP3 offsite connection will not be tripped when the offsite power is available. In addition, this is in accordance with GDC 5, “Sharing of Structures, Systems, and Components,” and Regulatory Guide (RG) 1.81, “Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants.”

GDC 5 requires that structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units. RG 1.81 describes a method acceptable to the NRC staff for complying with the NRC’s requirements with respect to the sharing for multi-unit nuclear power plants.

MP3 - USQ No. 2

To utilize the MP3 NSST as an alternate source of AC power for MP2, breaker 13T (in the 345 kV switchyard) and its associated disconnect switches will have to be maintained opened. In the event that MP3 was utilizing the MP3 NSST as the sole offsite AC power source when shut down, opening breaker 13T increases the probability that MP3 could lose offsite power. As a result, opening the 13T breaker will increase the probability of a malfunction of equipment important to safety. However, the proposed design change will allow the MP3 RSST (or the MP3 NSST, if the MP3 RSST is unavailable) to provide the alternate offsite source for MP2 to meet GDC 17 requirements. During MP3 refueling outages, it is expected that the MP3 RSST will be removed from service to perform required maintenance. If the MP3 RSST is not available, MP2 will need to credit the MP3 NSST as the second offsite power supply for GDC 17 compliance.

The connection for the MP3 NSST is between 345 kV breakers 13T and 14T. This connection point only provides 1 breaker separation (13T) between the MP2 RSST and the MP3 NSST. If breaker 13T is closed, this arrangement does not provide adequate separation between the two offsite sources as required by GDC 17. A failure of the 13T breaker, or a fault in the offsite power supply with a failure of the 13T breaker to trip, could cause a simultaneous loss of both MP2 offsite circuits. To prevent this, breaker 13T must be opened when the MP3 RSST is taken out of service to restore the required separation between the two MP2 offsite sources. If breaker 13T is not opened, MP2 will not be able to credit the MP3 NSST as the second offsite source. This will require MP2 to enter the action requirements contained in Technical Specification 3.8.1.1 (restore two separate and independent offsite power sources within 72 hours or shut down MP2).

Opening breaker 13T when MP3 is shut down represents a degradation in the reliability of the offsite supply for MP3. A failure such as a fault on the 345 kV line that connects between breakers 14T and 15T (Southington line circuit) would cause a LOP for MP3 if breaker 13T is open. If breaker 13T is closed and a fault occurs in the 345 kV line, the MP3 NSST would remain energized by the “North” bus. Therefore, opening the 13T breaker to allow MP2 to meet GDC 17 requirements increases the probability of a LOP at MP3 when shut down.

The staff has reviewed the proposed change and finds it acceptable because a LOP at MP3 due to a fault in the offsite distribution network is a low probability event. The average failure rate for a single unit LOP event occurring in the United States of America is 3.2×10^{-2} per reactor-year. When combined with the expected frequency of removing the MP3 RSST from service of once per MP3 refueling outage, the probability of a LOP at MP3 when shut down as a result of breaker 13T being open is acceptably low. In addition, the licensee has an MP3 shutdown risk program that will evaluate the impact of removing the MP3 RSST from service, and plan accordingly. This will ensure the MP3 RSST will be removed from service when the shutdown risk is determined to be acceptably low. If the MP3 RSST must be removed from service, and plant conditions do not support opening breaker 13T, it will be necessary for MP2 to enter the action requirements of Technical Specification 3.8.1.1 for one inoperable offsite circuit. This will require restoration of the inoperable offsite circuit within 72 hours, or MP2 will be required to shut down. Operation of MP3 with 13T open to allow MP2 compliance with GDC 17 requirements is safe.

MP3 - USQ No. 3

The connection of an additional 3 MVA load onto the MP3 electrical distribution system, when a very specific set of plant conditions exist at MP3, will increase the short circuit fault levels on the MP3 electrical distribution system. The additional contribution from the MP2 loads could increase the fault level to above the switchgear ratings if a fault occurs when MP3 is supplying power to MP2. As a result, the addition of 3 MVA load to the MP3 station service transformers (NSST and RSST) will increase the probability of a malfunction of equipment important to safety. This additional 3 MVA load is comprised mostly of induction motors which contribute to the fault current. The worst case short circuit conditions occur with MP3 at full power, the switchyard at its maximum voltage, and an MP3 EDG paralleled to the bus for surveillance testing. A short circuit under these conditions utilizes 100% of the MP3 switchgear and circuit breaker ratings. The additional contribution from the MP2 loads will increase the fault level to above the switchgear ratings if a worst case fault occurs. Therefore, this also will increase the probability of a malfunction of equipment important to safety.

Although the fault levels could exceed the MP3 switchgear and circuit breaker ratings, it is not expected that the worst case conditions will be frequently established. For the majority of scenarios, this situation can be avoided because the new design allows the 3 MVA of power for MP2 to be supplied by either MP3 bus 34A or 34B. The licensee states that procedural guidance will be provided to select the MP3 bus (34A or 34B) to supply power to MP2 that powers the opposite train from the train associated with the MP3 EDG to be tested.

The staff has reviewed the proposed change and finds it acceptable because the new design allows the 3 MVA of power for MP2 to be supplied by either MP3 bus 34A or 34B. In addition, procedural guidance for operators will be provided to select the MP3 bus (34A or 34B) to supply power to MP2 that powers the opposite train from the train associated with the MP3 EDG to be tested.

In addition, according to the Electrical Power Research Institute (EPRI), the failure rate for the bus failing during operation is $2x10^{-7}$. This is coincident with the short time that the MP3 EDG would be paralleled to the system, the probability of a LOP at MP3 when shutdown as a result of breaker 13T being open is acceptably low. In addition, the event would only affect one MP3 train of safety-related equipment. The other train will be available to function as assumed to mitigate any accidents that may occur. The staff concludes that operation of MP3 while supplying 3 MVA of power to MP2 is safe and will not adversely impact the health and safety of the public.

CONCLUSION

The staff has evaluated the licensee's submittal and concludes that the replacement of the MP1 to MP2 4160-volt cross-tie connection with an MP3 to MP2 4160-volt cross-tie connection is safe. Independence of the MP2 offsite circuits required by GDC 17 will be maintained after the installation. The extra loading imposed by the MP2 safe shutdown loads on the MP3 power supplies is within the MP3 capability to simultaneously supply the worst case MP3 normal and accident loads to comply with GDC 5, and RG 1.81. The new cross-tie will also be credited to provide an alternate onsite AC power source to meet the Appendix R requirements. The cross-tie will provide sufficient load capacity and voltage capability from the MP3 SBO DG to power

the required safe shutdown loads at MP2 to mitigate an SBO event. The staff concludes that the USQs meet the requirements of GDC 5 and GDC 17 and conform to the guidance in RG 1.81 and, therefore, the proposed design for the new cross-tie between MP3 and MP2 is approved.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluent 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 these amendments involve no significant hazards consideration and there has been no public comment on such finding (65 FR 65345). Accordingly, these amendments meet 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 these amendments.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: N. Trehan

Date: December 21, 2000