

March 30, 1992

Docket No. 50-336

Distribution:

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Dear Mr. Opeka:

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. M80649)

The Commission has issued the enclosed Amendment No. 155 to Facility Operating License No. DPR-65 for Millstone Nuclear Power Station, Unit No. 2, in response to your application dated June 14, 1991.

The amendment changes the Millstone Unit 2 Technical Specifications to clarify the requirement for an explicit azimuthal power tilt correction to the total unrodded integrated radial peaking factor. These changes will allow either full-core or octant-symmetric based incore detector monitoring system power distribution analyses.

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

Sincerely,

/s/

Guy S. Vissing, Senior Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

- 1. Amendment No. 155 to DPR-65
- 2. Safety Evaluation

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Unit 2

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

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. 155
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 June 14, 1991, 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.155 , 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



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: March 30, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 155

FACILITY OPERATING LICENSE NO. DPR-65

DOCKET NO. 50-336

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.

Remove

1-6
3/4 2-9
3/4 2-10
3/4 3-30
3/4 3-31
B 3/4 2-1
B 3/4 2-2

Insert

1-6
3/4 2-9
3/4 2-10
3/4 3-30
3/4 3-31
B 3/4 2-1
B 3/4 2-2

DEFINITIONS

ENGINEERING SAFETY FEATURE RESPONSE TIME (Continued)

performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

PHYSICS TESTS

1.28 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 13.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR - F_T^T

1.29 The TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR is the ratio of the peak pin power to the average pin power in an unrodded core. This value includes the effect of AZIMUTHAL POWER TILT.

SOURCE CHECK

1.30 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to radiation.

RADIOLOGICAL EFFLUENT MONITORING AND OFFSITE DOSE CALCULATION MANUAL (REMOCM)

1.31 A RADIOLOGICAL EFFLUENT MONITORING MANUAL shall be a manual containing the site and environmental sampling and analysis programs for measurements of radiation and radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures to individuals from station operation. An OFFSITE DOSE CALCULATION MANUAL shall be a manual containing the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints. Requirements of the REMOCM are provided in Specification 6.16.

RADIOACTIVE WASTE TREATMENT SYSTEMS

1.33 RADIOACTIVE WASTE TREATMENT SYSTEMS are those liquid, gaseous and solid waste systems which are required to maintain control over radioactive material in order to meet the LCOs set forth in these specifications.

PURGE - PURGING

1.34 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the containment.

POWER DISTRIBUTION LIMITS

TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR - F_r^T

LIMITING CONDITION FOR OPERATION

3.2.3 The calculated value of F_r^T shall be within the limit specified in the CORE OPERATING LIMITS REPORT. The F_r^T value shall include the effect of AZIMUTHAL POWER TILT.

APPLICABILITY: MODE 1*.

ACTION:

With F_r^T exceeding its limit within 6 hours either:

- a. Reduce THERMAL POWER to bring the combination of THERMAL POWER and F_r^T to within the limit and withdraw the full length CEAs to or beyond the Long Term Steady State Insertion Limits of Specification 3.1.3.6; or
- b. Be in at least HOT STANDBY.

SURVEILLANCE REQUIREMENT

4.2.3.1 The provisions of Specification 4.0.4 are not applicable.

4.2.3.2 F_r^T shall be determined to be within its limit at the following intervals:

- a. Prior to operation above 70 percent of RATED THERMAL POWER after each fuel loading,
- b. At least once per 31 days of accumulated operation in Mode 1, and
- c. Within four hours if the AZIMUTHAL POWER TILT (T_q) is > 0.020 .

4.2.3.3 F_r^T shall be determined by using the incore detectors to obtain a power distribution map with all full length CEAs at or above the Long Term Steady State Insertion Limit for the existing Reactor Coolant Pump Combination.

*See Special Test Exception 3.10.2

POWER DISTRIBUTION LIMITS

AZIMUTHAL POWER TILT - T_q

LIMITING CONDITION FOR OPERATION

3.2.4 The AZIMUTHAL POWER TILT (T_q) shall not exceed 0.02.

APPLICABILITY: MODE 1 above 50% of RATED THERMAL POWER*.

ACTION:

- a. With the indicated AZIMUTHAL POWER TILT determined to be ≥ 0.02 but ≤ 0.10 , either correct the power tilt within two hours or determine within the next 2 hours and at least once per subsequent 8 hours, that the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR (F_r^I) is within the limit of Specification 3.2.3.
- b. With the indicated AZIMUTHAL POWER TILT determined to be > 0.10 , operation may proceed for up to 2 hours provided that the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR (F_r^I) is within the limits of Specification 3.2.3. Subsequent operation for the purpose of measurement and to identify the cause of the tilt is allowable provided the THERMAL POWER level is restricted to $\leq 20\%$ of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.

SURVEILLANCE REQUIREMENT

- 4.2.4.1 The provisions of Specification 4.0.4 are not applicable.
- 4.2.4.2 The AZIMUTHAL POWER TILT shall be determined to be within the limit by:
 - a. Calculating the tilt at least once per 7 days when the Channel High Deviation Alarm is OPERABLE,

*See Special Test Exception 3.10.2.

INSTRUMENTATION

INCORE DETECTORS

LIMITING CONDITION FOR OPERATION

3.3.3.2 The incore detection system shall be OPERABLE with at least one OPERABLE detector segment in each core quadrant on each of the four axial elevations containing incore detectors and as further specified below:

- a. For monitoring the AZIMUTHAL POWER TILT:

At least two quadrant symmetric incore detector segment groups at each of the four axial elevations containing incore detectors in the outer 184 fuel assemblies with sufficient OPERABLE detector segments in these detector groups to compute at least two AZIMUTHAL POWER TILT values at each of the four axial elevations containing incore detectors.

- b. For recalibration of the excore neutron flux detection system:

1. At least 75% of all detector segments,
2. A minimum of 9 OPERABLE incore detector segments at each detector segment level, and
3. A minimum of 2 OPERABLE detector segments in the inner 109 fuel assemblies and 2 OPERABLE segments in the outer 108 fuel assemblies at each segment level.

- c. For monitoring the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR or the linear heat rate:

1. At least 75% of all incore detector locations,
2. A minimum of 9 OPERABLE incore detector segments at each detector segment level, and
3. A minimum of 2 OPERABLE detector segments in the inner 109 fuel assemblies and 2 OPERABLE segments in the outer 108 fuel assemblies at each segment level.

An OPERABLE incore detector segment shall consist of an OPERABLE rhodium detector constituting one of the segments in a fixed detector string.

An OPERABLE incore detection location shall consist of a string in which at least three of the four incore detector segments are OPERABLE.

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION (Continued)

An OPERABLE quadrant symmetric incore detector segment group shall consist of a minimum of three OPERABLE rhodium incore detector segments in 90° symmetric fuel assemblies.

APPLICABILITY: When the incore detection system is used for:

- a. Monitoring the AZIMUTHAL POWER TILT,
- b. Recalibration of the excore neutron flux detection system, or
- c. Monitoring the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR or the linear heat rate.

ACTION:

With the incore detection system inoperable, do not use the system for the above applicable monitoring or calibration functions. The provisions of specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENT

- 4.3.3.2 The incore detection system shall be demonstrated OPERABLE:
- a. By performance of a CHANNEL CHECK within 24 hours prior to its use and at least once per 7 days thereafter when required for:
 1. Monitoring the AZIMUTHAL POWER TILT.
 2. Recalibration of the excore neutron flux detection system.
 3. Monitoring the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR or the linear heat rate.
 - b. At least once per 18 months by performance of a CHANNEL CALIBRATION operation which exempts the neutron detectors but includes all electronic components. The neutron detectors shall be calibrated prior to installation in the reactor core.

3/4.2 POWER DISTRIBUTION LIMITS

BASES

3/4.2.1 LINEAR HEAT RATE

The limitation on linear heat rate ensures that in the event of a LOCA, the peak temperature of the fuel cladding will not exceed 2200°F.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System and the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and are capable of verifying that the linear heat rate does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring the AXIAL SHAPE INDEX with two OPERABLE excore neutron flux detectors and verifying that the AXIAL SHAPE INDEX is maintained within the allowable limits of Figure 3.2-2 using the Power Ratio Recorder. The power dependent limits of the Power Ratio Recorder are less than or equal to the limits of Figure 3.2-2. In conjunction with the use of the excore monitoring system and in establishing the AXIAL SHAPE INDEX limits, the following assumptions are made: 1) the CEA insertion limits of Specifications 3.1.3.2, 3.1.3.5 and 3.1.3.6 are satisfied, 2) the flux peaking augmentation factors are as shown in Figure 4.2-1, 3) the AZIMUTHAL POWER TILT restrictions of Specification 3.2.4 are satisfied, and 4) the TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTOR does not exceed the limits of Specification 3.2.3.

The Incore Detector Monitoring System continuously provides a direct measure of the peaking factors and the alarms which have been established for the individual incore detector segments ensure that the peak linear heat rates will be maintained within the allowable limits of Figure 3.2-1. The setpoints for these alarms include allowances, set in the conservative directions, for 1) flux peaking augmentation factors as shown in Figure 4.2-1, 2) a measurement-calculational uncertainty factor of 1.07, 3) an engineering uncertainty factor of 1.03, 4) an allowance of 1.01 for axial fuel densification and thermal expansion, and 5) a THERMAL POWER measurement uncertainty factor of 1.02. Note the Items (1) and (4) above are only applicable to fuel batches "A" through "L".

3/4.2.3 and 3/4.2.4 TOTAL UNRODDED INTEGRATED RADIAL PEAKING FACTORS F_r^T AND AZIMUTHAL POWER TILT - T_q

The limitations on F_r^T and T_q are provided to 1) ensure that the assumptions used in the analysis for establishing the Linear Heat Rate and Local power Density - High LCOs and LSSS setpoints remain valid during operation at the various allowable CEA group insertion limits, and, 2) ensure that the assumptions used in the analysis establishing the DNB Margin LCO, and Thermal Margin/Low Pressure LSSS setpoints remain valid during operation at the various allowable CEA group insertion limits. If F_r^T or T_q exceed their basic limitations, operation may continue under the additional restrictions imposed by the ACTION statements since these additional restrictions provide adequate provisions to assure that the assumptions used in establishing the Linear Heat Rate, Thermal Margin/Low Pressure and Local Power Density - High LCOs and LSSS

POWER DISTRIBUTION LIMITS

BASES

setpoints remain valid. An AZIMUTHAL POWER TILT > 0.10 is not expected and if it should occur, subsequent operation would be restricted to only those operations required to identify the cause of this unexpected tilt.

The surveillance requirements for verifying that F_T and T_a are within their limits provide assurance that the actual values of F_T and T_a do not exceed the assumed values. Verifying F_T after each fuel loading prior to exceeding 75% of RATED THERMAL POWER provides additional assurance that the core was properly loaded.

3/4.2.6 DNB MARGIN

The limitations provided in this specification ensure that the assumed margins to DNB are maintained. The limiting values of the parameters in this specification are those assumed as the initial conditions in the accident and transient analyses; therefore, operation must be maintained within the specified limits for the accident and transient analyses to remain valid.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 155

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 June 14, 1991 (Ref. 1), Northeast Nuclear Energy Company (NNECO/licensee) submitted proposed Technical Specification (TS) changes to Facility Operating License No. DPR-65 for the Millstone Nuclear Power Station, Unit No. 2 (Millstone-2). The proposed changes would modify the requirement for including an explicit azimuthal power tilt correction to the total unrodded integrated radial peaking factor (F_r). This would cover either full-core or octant-symmetric based incore detector monitoring system measured power distribution analyses.

Specifically, the changes would affect the following TS definition, Limiting Condition for Operation (LCO), Surveillance Requirement (SR) and BASES sections:

Definition 1.29	Unrodded Integrated Radial Peaking Factor- F_r
TS 3/4.2.3	Power Distribution Limits _T Total Integrated Radial Peaking Factor - F_r
TS 3/4.2.4	Power Distribution Limits, Azimuthal Power Tilt- T_q
TS 3/4.3.3	Instrumentation, Incore Detectors
B 3/4.2	Power Distribution Limits, Bases

2.0 EVALUATION

The current INCA method (Ref. 2) used to analyze in-core detector data and to infer the measured core power distribution, the radial peaking factors and the linear heat generation rate was provided by Combustion Engineering (CE), the original fuel vendor. INCA assumes octant symmetric loading and operation of the reactor core. This assumption allows the reflection of all in-core

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instruments into one core octant, with symmetric detector readings being averaged to a single value. This representative octant must then be corrected for the azimuthal power tilt by using a calculated factor to explicitly account for the peak pin power in the full core. Millstone-2 TS 1.18 defines the azimuthal power tilt (T_a) as the maximum difference between the power generated in any core quadrant (upper or lower) and the average power of all quadrants in that half (upper or lower) of the core divided by the average power of all quadrants in that half (upper or lower) of the core. Since the basic INCA method determines the detailed power distribution for only one core octant, an estimate of the individual quadrant powers must be constructed. INCA performs this by first determining the ratio of measured-to-predicted detector powers (for each operable detector) and then fitting these ratios to an multi-term trigonometric fit as a function of core radius and azimuthal angle at each of the axial detector levels. This radial curve fit is then used to construct an estimate of the measured power distribution for each location in the full core. From this estimated full-core power distribution, the quadrant power integrals and then the quadrant power tilt ratios are calculated.

The planned replacement of INCA with the INPAX in-core detector monitoring system (Ref. 3) will allow the measured power distribution to be directly determined on a full-core basis, thus including any measured azimuthal power tilt. The current Power Distribution Limits TSs contained in the LCO, SR and BASES sections state or assume that F_c includes the measured tilt, T_a . This definition will be retained. The proposed revisions will only serve to modify the TS to clarify the requirement that any calculated F_c value must include the effect of the azimuthal power tilt. Since the proposed TS changes do not change any limits and simply support the future use of full-core methods that can more accurately monitor actual power asymmetries, they are acceptable to the staff. These changes are similar to that provided for other CE plants (e.g. St. Lucie-1) which have phased in improved full-core analysis codes.

Based on the above, the staff concludes that the proposed revision to the azimuthal power tilt correction requirement is acceptable, thus allowing the use of either full-core or octant-symmetric based incore detector monitoring systems. Note that neither the TS change request nor this safety evaluation address the uncertainty analysis required to qualify a specific incore system for application to Millstone Unit 2.

3.0 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.

4.0 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 (56 FR 31440). 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.

5.0 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.

6.0 REFERENCES

1. Letter from E.J. Mroczka (NNECO) to USNRC, "Proposed change to Technical Specifications - Total Unrodded Integrated Radial Peaking Factor," dated June 14, 1991.
2. T.G. Ober, W.B. Terney, G.H. Marks, "INCA Method of Analyzing In-Core Detector Data in Power Reactors," CENPD-145-P, April 1975.
3. G.R. Correll, "INPAX-II: A Reactor Power Distribution Monitoring Code," XN-NF-83-09, 1983.

Principal Contributor: E. Kendrick

Date: March 30, 1992