



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 164

TO FACILITY OPERATING LICENSE NO. NPF-49

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

DOCKET NO. 50-423

1.0 INTRODUCTION

By letter dated May 9, 1997, as supplemented August 4, 1998, the Northeast Nuclear Energy Company, et al. (the licensee), submitted a request for changes to the Millstone Nuclear Power Station, Unit No. 3 Technical Specifications (TS). The requested changes would revise the shutdown margin requirements and add TS 3/4.3.5 to provide the limiting condition for operation (LCO) and surveillance requirements for the shutdown margin monitors (SMMs). The amendment would also make administrative changes and revise the associated Bases section. The August 4, 1998, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

The basic function of the SMM is to measure the neutron flux during reactor shutdown conditions. The purpose of the SMM is to identify any statistically significant increase in count rate that would indicate a loss of reactor shutdown margin. The Final Safety Analysis Report (FSAR), Chapter 15, boron dilution event analysis is performed to define minimum shutdown margin requirements. These shutdown margin requirements ensure that minimum time requirements are met for the time from alarm/indication to loss of shutdown margin. The alarm setpoint is selected to provide the operator with sufficient time to stop an unplanned loss of shutdown margin. The licensee's current boron dilution event analysis credits the alarm function for Modes 3, 4, and 5.

The SMM continuously monitors the neutron count rate and multiplies the count rate by the alarm ratio in order to determine the alarm set point. The alarm ratio is determined by the position of a switch on the SMM. The alarm set point is in turn determined (updated) so that the lowest previous value is used for monitoring purposes.

License Amendment No. 60, dated March 11, 1991, placed requirements for the SMMs in the TS. In the associated safety evaluation (SE), the NRC staff stated in item (6) that the shutdown margin for Modes 3, 4, and 5 have been added and show the shutdown margin as a

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function of critical boron concentration. For these shutdown modes, boron dilution analyses were performed to define the minimum shutdown margin requirements. Results of the analyses showed that the minimum time intervals available to the operator before a loss of shutdown margin occurs met those required by Standard Review Plan (SRP) Section 15.4.6. As required by the SRP, the minimum time intervals were calculated from the time an alarm alerts the operator to a dilution, not from the time the dilution begins. The SMMs, which provided the alarm, were discussed in item (27) of the SE.

In item (27) of the SE, the staff stated that for cycle 4, two SMMs, one per train, were added to the design. These monitors measure the count rate obtained from the GAMMA-METRICS wide range neutron-flux monitoring system and provide an alarm when the count rate increases by an amount equal to the alarm ratio set into the monitors. These monitors provide an alarm only and will not perform a protective function such as a reactor trip. These monitors serve to meet the requirements of SRP 15.4.6 for redundant alarms to alert the operator of any unplanned boron dilution event and were credited in the cycle 4 boron dilution safety analyses during shutdown conditions. The alarm setpoint of 2.0 corresponds to a doubling of the neutron flux and a 10-second delay for alarm response was assumed. Based on these considerations, and on the addition of a quarterly surveillance requirement in Table 4.3-1 to verify the correct alarm setting for the SMM, the proposed changes were found to be acceptable.

In a license amendment request dated June 3, 1996, the licensee identified that the count rate seen by the SMMs was declining due to an extended outage and that at a certain value the SMMs would have to be declared inoperable. Therefore, the licensee proposed changes to the TS to allow the plant to change operational modes with the SMMs inoperable, while continuing to comply with the LCO action statements. In the SE associated with License Amendment No. 131, dated November 14, 1996, the staff stated that these action statements must be performed to ensure safety and are stated below:

- (a) All positive reactivity operations via dilution and rod withdrawal must be suspended.

This action statement is intended to stop any planned dilution of the reactor coolant system. Typically, the SMMs play no role in monitoring core reactivity during plant heatup, and the alarm setpoint is routinely reset during plant heatup due to the increasing count rate. On the other hand, during plant cooldowns, as the count rate decreases, the baseline count rate is continually lowered automatically by the SMMs.

- (b) All dilution flow paths must be isolated and placed under administrative control (locked closed). Also, the shutdown margin surveillance frequency must be increased from 24 hours to every 12 hours.

This action is intended to provide redundant protection and defense in depth to the SMMs. In this configuration, a boron dilution event is prevented and is the basis for not requiring a boron dilution event analysis in Mode 6. Since the occurrence of a boron dilution event is prevented, the SMMs are not required to be operable.

Based on the staff's review, the proposed change to allow Millstone Unit 3 to change modes with inoperable SMMs was found to be acceptable.

### 3.0 EVALUATION

The proposed TS consists of a reanalysis of the boron dilution event, which was recently performed by Westinghouse. The reanalysis assumed additional SMM time delays (and, therefore, lower initial count rates), which were greater than those assumed in the current analysis of record for the Mode 3, 4, and 5 conditions. The licensee picked a delay time and a count rate that was equivalent to about 3-4 months after shutdown as the input variables for the reanalysis. The reanalysis, with increased SMM delay times, result in revised shutdown margin/boration requirements, which are more limiting than the current requirements; however, they provide operating margin in allowing the SMM to be considered operable at lower initial count rates. The use of the revised shutdown margin requirements and the lower allowed count rate continue to assure that the operator will have at least 15 minutes to mitigate the consequences of a boron dilution event. The reanalysis resulted in new (more restrictive) curves for Modes 3, 4, and 5 (Figures 3.1-1, 3.1-2, 3.1-3, 3.1-4, 3.1-5) of shutdown margin vs. reactor coolant system critical boron concentration.

In addition, a second reanalysis was conducted by Westinghouse with SMM delay times, which are more conservative than that used in the reanalysis previously stated. The results of these reanalysis were used to develop the necessary additional boration values, which will be included in Specification 3/4.3.5. This specification directs the boration of the reactor coolant system above the shutdown margin requirements in Figures 3.1-1 to 3.1-5 in order to allow for the SMM to be considered operable for count rates that are lower than allowed by implementation of only the Figures 3.1-1 to 3.1-5 requirements. The additional boration values included in TS 3/4.3.5 are 150 parts per million (ppm) for Mode 3 (to be added to Figures 3.1-1 and 3.1-2), and 350 ppm for Modes 4 and 5 (to be added to Figures 3.1-3, 3.1-4, and 3.1-5). This accounts for the case where a shutdown (or outage) would last longer than the 3-4 months and allows the SMM to be operable at a lower count rate.

The minimum count rate and associated SMM alarm ratio settings will be included in the core operating limit report (COLR). If the count rate went below the applicable minimums, the SMM would have to be declared inoperable. If future changes to the minimum count rate and associated SMM alarm ratio settings as described in the COLR were made, the licensee would have to inform the NRC staff of the change. The proposed changes will continue to assure that the operator has a minimum of 15 minutes from the alarm to loss of shutdown margin during an assumed boron dilution event and also allow the SMM to be considered operable for lower initial count rates.

#### 3.1 Technical Specification Changes

##### TS 3.1.1.1.2 and 3.1.1.2

The licensee proposed to add a footnote in TS 3.1.1.1.2 and 3.1.1.2 to note that additional shutdown margin requirements are given in newly created TS 3/4.3.5. The staff finds the addition of the footnote acceptable.

#### TS Figures 3.1-1 to 3.1-5

The licensee proposed revised curves based on the reanalyses of the boron dilution event for Modes 3, 4, and 5. The revised shutdown margin/boration requirements are more limiting than the current requirements and they provide operating margin in allowing the SMM to be considered operable at lower initial count rates. The staff finds the revised curves conservative and acceptable.

#### TS Tables 3.3-1 and 4.3-1

The licensee proposed to delete the references to the SMMs in TS Tables 3.3-1 and 4.3-1. The requirements for the SMMs are provided in the newly created TS 3/4.3.5 (see below). Therefore, the staff finds the changes acceptable.

#### TS 3/4.3.5

Proposed TS 3/4.3.5 would contain all the LCOs, applicability, action requirements, and all the surveillance requirements for the SMMs. The LCO refers to the COLR in order to specify the minimum count rate/alarm ratio requirements for SMM operability. These requirements are a function of the shutdown margin, which is established (requirements of Figures 3.1-1 to 3.1-5 or additional boration as discussed previously and contained in TS 3.3.5.b). The proposed TS includes the actions and surveillance requirements that are based on the current requirements listed in TS Tables 3.3-1 and 4.3-1. The proposed TS also includes a footnote to make the specification treatment of the valves consistent with the Mode 6 and Mode 5 loops drained requirements. The staff finds the proposed changes acceptable in that the TS will continue to assure that the SMMs are operable and that the operator has a minimum of 15 minutes from the alarm to loss of shutdown margin during an assumed boron dilution event to stop the event Pursuant to SRP 15.4.6.

#### TS Bases

The staff has reviewed the changes to the associated TS Bases sections and has no objection to the wording.

#### 3.2 Licensee Commitments Relied Upon

The boron dilution event analysis is documented in FSAR Chapter 15.4.6. The proposed TS changes are based on the Westinghouse reanalysis of the boron dilution event. As such, the reanalysis will become the "analysis of record" for the boron dilution event in Modes 3, 4, and 5. In a letter dated August 4, 1998, the licensee committed that (1) Millstone Unit 3 will incorporate into TS 6.9.1.6 references to the shutdown margin analysis methods reviewed and approved by the NRC; and (2) the proposed change to TS 6.9.1.6 will be submitted to the NRC within 90 days of the NRC's decision on the proposed license amendment dated May 9, 1997. The NRC staff finds this commitment and schedule acceptable and has placed it in Appendix C of the Millstone Unit 3 Facility Operating License. The licensee must notify the staff, in writing, when the condition in Appendix C is satisfied.

### 3.3 Overall

The NRC staff has reviewed the information submitted by the licensee and, based on the preceding evaluation, has concluded that the requested TS changes are acceptable, and satisfy the staff's positions and requirements in these areas.

### 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 (62 FR 33129 dated June 18, 1997). 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.

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Date: **October 21, 1998**