



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 176

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 7, 1998, as supplemented by letter dated January 22, 1999, Northeast Nuclear Energy Company, et al. (NNECO or the licensee) submitted a request for approval of a proposed amendment to Chapter 15 of the Millstone Nuclear Power Station, Unit No. 3 Final Safety Analysis Report (FSAR). The proposed change would revise the analysis for the design basis loss of coolant accident (LOCA) to include the dose contribution from a previously unevaluated radioactivity release pathway to the environment. The January 22, 1999, letter provided clarifying information that did not change the staff's initial proposed no significant hazards consideration determination or expand the scope of the application as noticed in the Federal Register (63 FR 35991).

During a design basis review, the licensee identified a potential pathway for post accident back-leakage of highly radioactive containment sump water from the Recirculation Spray System (RSS) to the Refueling Water Storage Tank (RWST). Since the RWST is vented to the atmosphere, this pathway could contribute to an inadvertent release of radioactivity not previously accounted for in offsite dose calculations. Previously, the licensee had assumed no radiological consequences due to back-leakage. This revision adds the dose from RWST back-leakage to the LOCA analysis, as documented in the FSAR.

2.0 EVALUATION

The staff reviewed the inputs and assumptions to the licensee's offsite and control room dose calculations and found the licensee's analyses to be acceptable. The staff performed confirmatory bounding calculations using licensee assumptions for the LOCA dose contribution from RWST back-leakage and received comparable results. The licensee performed a mechanical calculation to model the back-leakage to the RWST then performed leakage testing of the identified pathways and compared the results. Since the leakage testing confirmed the mechanical calculation, the licensee used the assumed values in the mechanical calculation to perform the dose calculation. The licensee's calculation modeled the back-leakage as increasing over time from 0.1 gpm to 0.9 gpm.

The staff also reviewed the inputs and assumptions to the licensee's X/Q calculations and found the licensee's analysis to be acceptable. The licensee used the Regulatory Guide 1.145 methodology to calculate the low population zone X/Q values. The staff compared these results with prior staff calculations using this methodology and found the results to be similar. For the RWST control room X/Q values, the licensee applied values calculated for a postulated release from the containment building. The X/Q values for a release from the containment were calculated using the diffuse source option of the Murphy-Campe methodology. A release from the RWST is not expected to be diffuse at the point of release. However, the physical arrangement of the RWST, containment, and other buildings, and the control room air intake should cause an RWST release to experience enhanced dispersion due to greater travel distance and travel around and/or over several buildings, including the containment building, prior to reaching the control room air intake. Therefore, the staff has found the control room X/Q values to be acceptable for this dose assessment.

To perform the confirmatory calculation, the staff calculated the doses corresponding to the bounding leakage cases by assuming a constant 0.1 gpm leakage from 8.5 to 270 hours for the minimum case and a constant 0.9 gpm leakage from 8.5 to 270 hours for the maximum case. Staff results bounded the results of the licensee's more detailed calculation. Staff assumptions and results are tabulated below.

**Table 1
RWST Back-leakage LOCA Dose Contribution Results**

<u>Thyroid dose</u>	<u>Staff calculated</u>		<u>Licensee</u>
	<u>0.1 gpm</u>	<u>0.9 gpm</u>	<u>variable leakage</u>
LPZ (Low Population Zone)	0.575 rem	5.19 rem	2.1 rem
CR (Control Room)	0.133 rem	1.20 rem	0.9 rem

**Table 2
Staff Calculation Assumptions**

Core Power	3636 MWth	
RWST back-leakage duration	8.5 to 720 hours	
Leak rate		
Minimum case	0.1 gpm	
Maximum case	0.9 gpm	
RWST average breathing rate	9.1 cfm	
Iodine decontamination factor (DF)	100	
Atmospheric dispersion factors (sec/m ³)		
	Low Population Zone X/Q	Control Room X/Q
8-24 hours	1.99E-05	8.53E-04
24-96 hours	8.66E-06	4.32E-04
96-720 hours	2.63E-06	8.03E-05

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 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 (63 FR 35991). Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register on October 28, 1999 (64 FR 58106). Accordingly, based on the environmental assessment, the staff has determined that the issuance of the amendment will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

The contribution to the LOCA dose to the thyroid from the RWST back-leakage as calculated by the licensee is small (2.1 rem at the LPZ and 0.9 rem at the Control Room). When added to the licensee's previously calculated doses, the affected LOCA doses to the thyroid are 11 rem at the LPZ and 12 rem at the Control Room. These results meet the acceptance criteria in 10 CFR Part 100 for the offsite dose consequences and in 10 CFR Part 50, Appendix A, General Design Criterion 19 for the control room. All other offsite and control room doses were unchanged. The staff concludes that the licensee's LOCA dose calculations are acceptable.

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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