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Docket No. 50-245

B16194

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 1
Additional Information on Spent Fuel Assembly Handling

The purpose of this letter is for Northeast Nuclear Company (NNECO) to respond to an NRC staff request for information⁽¹⁾ related to a potential inconsistency between the Updated Final Safety Analysis Report (UFSAR) and the Technical Specifications (TS). This potential inconsistency relates to the UFSAR and the TS analysis assumptions with respect to (1) the weight of a spent fuel assembly and its associated handling tool, (2) the impact loads used for the design of the spent fuel storage racks and (3) the maximum loads permitted to be moved over stored fuel in the Spent Fuel Pool (SFP). NNECO requested a one week extension to the 30 day response time due to the depth of our discovery efforts extending beyond the SFP and into the reactor vessel. This required a review of the design for the fuel grapple mast sections. A decision was also made to evaluate drop heights as well as fuel weights to determine the resulting impact forces for fuel handling accidents. Finally, NNECO received the NRC letter more than a week after its issuance date of January 9, 1997, leaving less than three weeks to respond.

The Millstone Unit 1 UFSAR, Section 9.1.2, discusses the design of the spent fuel storage racks, but does not specify the fuel assembly weight used in the design. The detailed design of the racks is presented in the NNECO submittals supporting License Amendments 39⁽²⁾ and 40⁽³⁾ to the plant Operating License. Reference 2 states that a

⁽¹⁾ U. S. Nuclear Regulatory Commission letter to B. D. Kenyon, "Request for Additional Information Regarding Moving a Spent Fuel Assembly and Its Associated Lifting and Handling Components" dated January 9, 1997.

⁽²⁾ D. C. Switzer letter to G. Lear, "Millstone Nuclear Power Station, Unit No. 1 Modifications to Spent Fuel Storage Pool", dated December 3, 1976.

⁽³⁾ E. J. Mroczka letter to NRC, "Millstone Nuclear Power Station, Unit No. 1 Information on Proposed Spent Fuel Rack Modifications", dated May 5, 1988.

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fuel assembly weight of 634 lbs is used for the impact analysis of the spent fuel racks and reference 3 states that a weight of 800 lbs is used for this purpose. The Technical Specifications do not specifically address fuel assembly weights.

Section 15.8 of the UFSAR provides the analysis of the fuel handling accident, comprising the drop of a single fuel assembly into the reactor vessel from a height of approximately 30 ft. The resulting kinetic energy at impact, 17,000 ft-lbs, corresponds to a drop weight of approximately 564 lbs, which is equivalent to a 634 lb (dry weight) fuel assembly, without a fuel channel or handling tool. (The analysis goes on to demonstrate that the radiological consequences of such a drop would be well below the required fraction of 10CFR100 limits.)

In addition, General Electric has performed a proprietary analysis of fuel handling accidents in the reactor vessel generic to their different fuel types. The documented results are contained in the latest GESTAR-II (General Electric Standard Application for Reactor Fuel) document (NEDE-24011-P-A-13-US), which is the NRC-approved licensing basis for all GE fuel types. The GESTAR-II analysis is more limiting in that it assumes a cable break which drops a fuel assembly, three sections of telescoping mast and the grapple head. It calculates the impact energy of the dropped fuel assembly and attached handling equipment to be 40,154 ft-lbs based on a maximum drop of 34 ft. Millstone Unit 1 has a mast design which provides a continued positive attachment of the telescoping mast even after a cable break, therefore the mast weight need not be considered in this analysis. (Millstone Unit 1 has not adopted the updated GESTAR-II fuel handling accident analysis results in the UFSAR, but plans to do so with the implementation of the GE11 fuel design change occurring in the Cycle 16 reload. This will make the UFSAR consistent with the GE licensing basis for the fuel.)

The UFSAR does not specify the maximum weight of loads that may be carried over irradiated fuel, however, this is defined in an administrative procedure as 800 lbs. The Technical Specifications do not specifically address movement of loads in or above the spent fuel pool, with the exception of crane mode requirements applicable during the handling of a spent fuel cask. It should be noted that Millstone Maintenance Procedure MP 790.4 contains a restriction on movement of any loads other than spent fuel over the spent fuel pool until a heavy load evaluation is performed by engineering for each load. This restriction was the result of LER 96-016-00, "Heavy Loads Suspended Over Irradiated Fuel", and LER 96-023-00, "New Fuel Assemblies Lifted Over Irradiated Fuel Assemblies Using the Overhead Crane".

A review of the data described above leads to the following conclusions:

1. Different values of fuel assembly weights were used for the Amendment 39 analysis which installed the NUS spent fuel racks and the Amendment 40 analysis which

installed the Holtec racks. NNECO concludes that the apparent inconsistency in fuel assembly weights is due to Holtec's value including a conservative allowance for the weight of a fuel channel (approximately 80 lbs for the fuel channel plus 100 lbs to ensure that the heaviest BWR fuel weight is enveloped). The NUS analysis of the effect of a dropped fuel assembly was slightly non-conservative in that the weight of a fuel channel was not considered in the evaluation. Although not specifically requested by Reference 1, NNECO has also reviewed drop heights associated with the various analyses. A drop height of 24" was used for the NUS analysis and a drop height of 36" was used for the Holtec analysis. It appears that the NUS analysis was non-conservative in that the actual drop distance is 30". The kinetic energy associated with the UFSAR Section 15.8 bounding radiological analysis far exceeds that of either drop. Therefore there is no radiological concern as a result of this discrepancy. NNECO will review the margins available in the structural design of the NUS racks to ascertain the need for additional analysis.

2. In evaluating the impact loads applied to the spent fuel racks, consideration was not given to a potential cable break or brake release on the refueling crane and the resulting uncontrolled descent of mast sections onto the spent fuel racks. The Millstone Unit 1 mast design includes stops which provide positive support for each telescoping section in the event of a cable break, provided the mast reaches its full extension. Consequently, it was not required to consider the mast weight in the UFSAR Section 15.8 analysis of a fuel drop into the reactor core. However, in the case of a cable break over a spent fuel rack, the mast will not reach its full extension before impact occurs. NNECO will review this issue further to determine the basis for not postulating a cable break and the propriety of considering weights of telescoping mast sections in the impact analysis of the racks. In the meantime, an additional restriction will be implemented to ensure that no loads, including fuel, are lifted over the racks using the fuel handling grapple and mast until the cable break issue has been resolved.
3. The 800 lb weight limit for loads carried over irradiated fuel, which is identified as the threshold for the control of heavy loads, is greater than other design basis loads. NNECO will, therefore, further review this issue. The current restrictions on movement of loads other than fuel over the spent fuel pool will remain in place until a comprehensive review of the procedure requirements for moving loads over spent fuel and the NUREG-0612 commitments is completed.

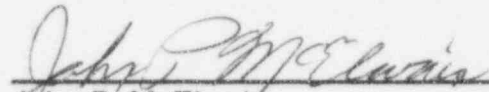
The following are NNECO's commitments identified within this letter. All other statements contained within this letter are for information only.

- B16194-01 NNECO will review the margins available in the structural design of the NUS racks to ascertain the need for additional analysis prior to restart.
- B16194-02 NNECO will adopt the updated GESTAR-II fuel handling accident analysis with the implementation of the GE11 fuel design change occurring in the Cycle 16 reload.
- B16194-03 NNECO will restrict lifting of any loads including fuel over the spent fuel racks with the Millstone Unit No. 1 fuel handling grapple and mast until the resolution of the cable break issue is complete.
- B16194-04 NNECO will continue the current restriction requiring a heavy load evaluation by engineering on movement of loads other than fuel over the spent fuel pool until a comprehensive review of the procedure requirements for moving loads including the maximum allowable load over spent fuel and the NUREG-0612 commitments is completed.

Please contact R. Walpole at (860) 440-2191 if you have any further questions.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY



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