NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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June 13, 1984

Docket No. 50-423
B11221

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) B. J. Youngblood to W. G. Counsil, Draft SER for Millstone Nuclear Power Station, Unit 3, dated December 20, 1983.

(2) W. G. Counsil letter to B. J. Youngblood, NRC-ASB Review Meeting (March 14, 1984), dated March 27, 1984.

(3) W. G. Counsil letter to B. J. Youngblood, Responses to DSER Open Items, dated May 11, 1984.

(4) W. G. Counsil letter to B. J. Youngblood, Responses to DSER Open Items, dated May 15, 1984.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit 3
Transmittal of Responses to Requests
for Additional Information and Draft SER Open Items

On May 29, 1984 R. Joshi, licensing engineer, Northeast Nuclear Energy Company (NNECO) met with your Mr. R. Goel, Auxiliary Systems Branch (ASB) at the NRC offices in Bethesda, Maryland, for the primary purpose of (1) discussing the status of final input to the Safety Evaluation Report (SER) sections where the ASB has primary responsibility and (2) discussing his concerns/questions on recently submitted responses (Reference 2, 3, 4) to the Draft SER open items contained in Reference (1).

Attachment I provides the status of those Draft SER open items. During the meeting, Mr. Goel indicated an additional open item (ASB-21) that was not originally included in Reference (1) and requested NNECO to provide a response to that open item. Enclosed is NNECO's response to the new open item (ASB-21) concerning measures taken to prevent fan blades from becoming missiles inside and outside containment. This response should fully resolve the staff's concern regarding the open item.

A001

If there are any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

W. G. Counsil
W. G. Counsil
Senior Vice President

W. F. Fee
By: W. F. Fee
Executive Vice President
Engineering & Operations

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. F. Fee, who being duly sworn, did state that he is Executive Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Judith Flamm
Notary Public

My commission expires March 31, 1988.

ATTACHMENT I

Status of the NRC-ASB Draft SER Open Items

Item No.	Description	Status
ASB-1	Water into Service Water Pumphouse Pump Shaftways	Closed
ASB-2	Failure due to Non-Seismic Category I Equipment	Closed
ASB-3	Analysis for Internally Generated Missiles Inside Containment	Closed
ASB-4	Analysis for Internally Generated Missiles Outside Containment	Confirmatory
ASB-5	Sump Pump Monitoring Instruments	Closed
ASB-6	Common Leakage Equivalent	Closed
ASB-7	Technical Specifications	Confirmatory
ASB-8	Spent Fuel Pool Storage Gates	Closed
ASB-9	Spent Fuel Pool Decay Heat Loads	Confirmatory(1)
ASB-10	Overhead Heavy Load Handling System	(2)
ASB-11	Measure to Limit Crane Movement	(2)
ASB-12	Safety-Related Equipment on Lowest Elevation	Closed
ASB-13	Plant Floor Drainage Drawings	Closed
ASB-14	Emergency Air Pressurization System	Closed
ASB-15	Dust Accumulation in Diesel Generator Building	Closed
ASB-16	Condenser Circulating Water Pit	Closed
ASB-17	Spent Fuel Storage Material in Pool and Neutron Absurber	Closed
ASB-18	AFW Reliability Study	Confirmatory
ASB-19	Technical Specifications	Confirmatory
ASB-20	Circulatory Water System	Closed

(1) NRC Staff requires additional information to perform an independent decay heat load calculation,

(2) The NRC Staff has not completed review of the information submitted via letter dated May 15, 1984.

Open Items
Auxiliary Systems Branch

ASB-21 - Internally Generated Missiles (Inside and Outside Containment)

Based on recent experience with fan fracture resulting in a missiles, the staff requires further justification from the applicant that adequate protection is provided.

Response (6/84):

Refer to the revised FSAR Sections 3-5.1.1 and 3-5.1.2.

to contain the missile and prevent it from impacting safety related items.

Centrifugal pumps and fans located outside the containment in areas containing safety related components have been evaluated for missiles caused by overspeed or failure. The maximum no-load speed of these centrifugal pumps and fans is equivalent to the maximum operating speed of their motors. Consequently, no overspeed is expected and missiles associated with centrifugal pumps and fans outside the containment are not postulated. However the auxiliary feedwater pump turbine is located and oriented within a concrete cubicle to prevent any generated missiles from affecting other safety systems, such as the motor-driven auxiliary feedwater pumps, in adjacent cubicles.

overspeed conditions in

INSERT 1

INSERT 2

410.7

INSERT 3

The motor-generator that provides power to the control rod drive mechanisms (CRDM) is located outside the containment. The flywheel on this component has been evaluated as a potential missile. The fabrication specifications of the motor-generator-set-flywheel control the material to meet ASTM-A533-70, Grade B, Class I with inspections per MIL-I-45208A and flame cutting and machining operations governed to prevent flaws in the material. Nondestructive testing consisting of nilductility (ASTM-E-208), Charpy V-notch (ASTM-A593), ultrasonic (ASTM-A577 and A578), and magnetic particle (ASME Section III, NB2545) is performed on each flywheel material lot. In addition to these requirements, stress calculations are performed consistent with guidelines of ASME Section III, Appendix A, to show the combined stresses due to centrifugal forces and the shaft interference fit shall not exceed one-third of the yield strength at normal operating speed (1,800 rpm) and likewise, shall not exceed two-thirds of the yield strength at 25 percent overspeed. However, no overspeed is expected for the following reason: the flywheel weighs approximately 1,300 pounds and has dimensions of 35.36 inches in diameter and 4.76 inches in width. The flywheel, mounted on the generator shaft and directly coupled to the motor shaft, is driven by a 200 hp, 1,800 rpm synchronous motor. The torque developed by the motor is insufficient for overspeed. Therefore, there are no credible missiles from the CRDM motor-generator flywheel.

Evaluation of missiles being generated from the emergency generator enclosure concluded that there is no need to evaluate missile generation. Safety related emergency generators are located in a structure designed for tornado missile protection; consequently, missiles from the diesel engines are considered unable to penetrate this structure. The essential diesel generator systems are redundant and separated so that a missile generated by one diesel engine will not affect the other. Doors are offset from the generators' axes precluding the possibility of missiles exiting from the doorway of the structure.

3.5.1.2 Internally Generated Missiles (Inside Containment)

The design bases are such that missiles generated within the reactor containment will not cause loss of function in any redundant

Insert 1

Fans are further evaluated for missile generation under normal operating speeds due to fatigue failure or manufacturing defects. Fan fragments are postulated only where a credible single failure mechanism results in fragmentation. Such fragments have been shown either to lack sufficient energy to penetrate the fan housing or to result in acceptable interactions with essential targets. In this assessment the fragments are assumed to be unimpeded by any flexible connections between the fan housing and attached ducting.

Insert 2

The auxiliary feedwater pump turbine is equipped with redundant overspeed detection devices and a regularly tested turbine trip valve, as such overspeed in the turbine is considered credible only up to the trip setting at ten percent over rated speed. At this speed there exist substantial margins between the energy available in the fragments generated from the turbine-driven pump and the energy required to escape the pump casing; therefore missiles are not postulated from the pump component. Missiles are postulated from the turbine component.

Insert 3

A review of the missile trajectories within the turbine cubicle indicates that no essential systems or components are adversely affected by the turbine missiles.

engineered safety feature nor radiation release or damage the containment boundary.

In addition, a missile accident which is not caused by a LOCA shall not initiate a LOCA. Table 3.5-2 identifies the structures, systems, and components inside the containment whose failure could lead to offsite radiological consequences or which are required for safe plant shutdown to a cold condition assuming an additional single failure.

Equipment inside the containment has been evaluated for potential missile generation. As a result of this review, the following information concerns potential missile sources and systems which require protection from internally generated missiles inside the containment.

3.5.1.2.1 Missile Selection and Description

Failure of the reactor vessel, steam generators, pressurizer, and reactor coolant pump casings leading to missile generation are not considered credible because of the combination of material characteristics, inspections, quality control during fabrication, erection, and operation, conservative design, and prudent operation as applied to the particular component.

The reactor coolant pump flywheel is not considered a source of missiles for the reasons discussed in Section 5.4.1. Nuts and bolts are of negligible concern because of the small amount of stored elastic energy.

Centrifugal pumps, fans, and air compressors (centrifugal and axial) located inside the containment have been evaluated for missiles associated with overspeed failure. The maximum no-load speed of these centrifugal pumps, fans, and air compressors is equivalent to the operating speed of their motors. Therefore, no overspeed is expected and missiles associated with centrifugal pumps, fans, or air compressors within the containment are not postulated. INSERT A

Overspeed conditions in

The following nuclear steam supply system components are considered to have a potential for missile generation inside the reactor containment:

1. Control rod drive mechanism housing plug, drive shaft, and the drive shaft and drive mechanism latched together

2. Valves

3. Temperature and pressure sensor assemblies

4. Pressurizer heaters

Gross failure of a control rod mechanism housing, sufficient to allow a control rod to be rapidly ejected from the core, is not considered credible for the following reasons:

Insert A

Fans are further evaluated for missile generation under normal operating speeds due to fatigue failure or manufacturing defects. Fan fragments are postulated only where a credible single failure mechanism results in fragmentation. Such fragments have been shown either to lack sufficient energy to penetrate the fan housing or to result in acceptable interactions with essential targets. In this assessment the fragments are assumed to be unimpeded by any flexible connections between the fan housing and attached ducting.