North Atlantic

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The Northeast Utilities System

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April 15, 1994

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: (a) Facility Operating License No. NPF-86, Docket No. 50-443

(b) North Atlantic letter NYN-92125, dated September 25, 1992, "Licensee Event Report (LER) No. 92-013-00: Tornado Design of Plant Doors", T. C. Feigenbaum to USNRC

(c) North Atlantic letter NYN-92146, dated October 23, 1992, "Tornado Design of Plant Doors", T. C. Feigenbaum to USNRC

(d) North Atlantic letter NYN-94043, dated April 15, 1994, "Licensee Event Report (LER) No. 94-006-00: Unanalyzed Tornado Loading on Ventilation Damper/Ductwork and Metal Partitions", T.C. Feigenbaum to USNRC

Subject: Tornado Design of Plant Structures

Gentlemen:

North Atlantic Energy Service Corporation (North Atlantic) notified the NRC in September 1992, that certain Seabrook Station tornado doors were designed to the criteria for a site specific tornado and not to the criteria for the design basis tornado defined in Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants" [Reference (b)].

The site specific tornado was defined by North Atlantic based on the methodology presented in NUREG/CR-3058, "A Methodology for Tornado Hazard Probability Assessment", using recently published extreme wind speed probability studies presented in NUREG/CR-2639, "Historical Extreme Winds for the United States - Atlantic and Gulf of Mexico Coastlines". North Atlantic revised the Seabrook Station Updated Final Safety Analysis Report (UFSAR) to include the site specific tornado criteria.

During the subsequent evaluation of this condition, North Atlantic performed a comprehensive reevaluation of plant design features relative to tornado design criteria. This reevaluation included a thorough inspection of the existing plant barrier drawings and plant walkdowns. As reported to the NRC in October 1992 [Reference(c)], certain heating, ventilation, and air conditioning (HVAC) components and Diesel Generator Building metal partitions were identified during this reevaluation that were based on the site specific tornado criteria. These components had not been evaluated to determine if they could meet the criteria associated with the generic tornado defined in Regulatory Guide 1.76.

On March 14 and 15, 1994, the Civil Engineering and Geosciences Branch Chief and the Seabrook Project Manager visited Seabrook Station to discuss NRC concerns regarding the use of the site specific tornado criteria (260mph maximum wind speed) as the design basis for certain Seabrook Station structural

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components. The NRC's position is that a design basis tornado with a maximum wind speed of 290 mph would be more appropriate. During this visit North Atlantic demonstrated that the six tornado doors cited in References (b) and (c) can currently meet the criteria for the original design basis tornado as defined in Regulatory Guide 1.76 and the Seabrook Station UFSAR (360 mph maximum wind speed), either through subsequent upgrade or reevaluation. In addition, North Atlantic stated that while some additional evaluation was needed, it was confident that the HVAC components, and the Diesel Generator Building partitions, would also meet the criteria for the 360 mph tornado as defined in Regulatory Guide 1.76. North Atlantic also stated that all future design modifications would comply with the Regulatory Guide 1.76 criteria.

During the NRC visit North Atlantic committed to provide an explanation of the additional analysis that demonstrates the HVAC components and partition walls meet the criteria for the design basis tornado defined in Regulatory Guide 1.76; to delete the criteria for the site specific tornado from the Seabrook Station UFSAR; and to evaluate whether a 10CFR50.72 notification should be made to address the HVAC components and partition walls.

The status of these commitments is as follows:

(1) North Atlantic has completed the additional evaluation of the Diesel Generator Building partitions and HVAC ductwork and dampers. This analysis demonstrates that all of these components can meet the criteria for the design basis tornado defined in Regulatory Guide 1.76 and the Seabrook Station UFSAR (360 mph maximum wind speed). Details concerning this analysis are presented in Enclosure 1. With these components capable of meeting the criteria of the design basis tornado, there are no Seabrook Station components designed to the criteria of the site specific tornado.

(2) North Atlantic is preparing a change to the Seabrook Station UFSAR to delete the site specific tornado criteria. This change will be included in Revision 3 of the UFSAR.

(3) North Atlantic has determined that, since subsequent evaluation indicated that the plant is capable of meeting the criteria of the design basis tornado, the initial lack of an evaluation of the Diesel Generator partitions and HVAC ductwork and dampers does not meet the criteria for reporting per 10CFR50.72. However, a Licensee Event Report has been submitted per 10CFR50.73 [Reference (d)].

Should you require any further information regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,

Ted C. Feigenbaum

TCF:MJM/act
Enclosure

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ENCLOSURE TO NYN-94044

ADDITIONAL ENGINEERING ANALYSIS OF DIESEL GENERATOR BUILDING PARTITIONS AND HVAC DUCTWORK AND DAMPERS

Diesel Generator Building Partitions

The tornado pressure drop venting analysis of the Diesel Generator Building is documented in Yankee Atomic Electric Calculation SBC-530, Tornado Venting-Diesel Generator Building, Revision 0, October 1992. The analysis was performed to determine pressure differentials that could develop between various internal building compartments during the Design Basis Tornado defined in the Seabrook Station UFSAR.

The tornado pressure drop parameters associated with the design basis tornado are defined in Section 2.3.1.2 of the Seabrook Station UFSAR. They include a maximum pressure drop of 3.0 psi with a rate of pressure drop of 2.0 psi per second. Other design basis tornado parameters used in the analysis include:

- maximum wind speed of 360 mph
- rotational speed of 290 mph
- translational speed of 70 mph
- radius of maximum wind speed of 150 feet

The Diesel Generator Building is divided into various compartments by metal partition walls. The larger compartments are connected to the outside by large air intake openings. The smaller compartments are connected to the outside by exhaust openings. Since each compartment vents at a different location around the building, differential pressures develop from compartment to compartment. A computer venting model was used to evaluate these compartments. The model was used to pass the design basis tornado over the Diesel Generator Building for various directions of tornado travel centered on different portions of the building. For each run a pressure time history was developed for each compartment. The maximum pressure differential between compartments was then determined.

The results of the tornado pressure drop venting modeling showed that the maximum pressure differential across the metal partitions separating the various compartments for the design basis tornado would be 1.4 psi. Even though these compartments are well vented to the outside, the pressure differential develops due to the physical separation of the venting locations. The lag in the tornado pressure drop time history at the two vent openings as the tornado traverses the Diesel Generator Building produces a difference in the compartment depressurizations which produces the pressure differential across the metal partitions. The 1.4 psi load is for the metal partition separating the two air intake and exhaust silencer cubicles. The openings to the outside for these cubicles are about 90 feet apart. Openings of all other adjacent cubicles are less than 90 feet apart and would experience pressure differentials closer to 1.0 psi.

It should be noted that these metal partitions are not required for structural integrity of the Diesel Generator Building but must withstand the effects of the design basis tornado so as not to cause damage to any safety related system. The structural integrity of partition walls between cubicles was analyzed in Yankee Atomic Calculation SBC-531, Revision 2 for the applied load due to differential pressure. Results of the analysis show that while there may be some load distortion in the partition, the walls will remain intact and will not impact any safety related equipment.

HVAC COMPONENTS

Tornado wind pressure coefficients for the dampers listed in Table 1 were determined in accordance with Seabrook Station UFSAR Section 3.3, "Wind and Tornado Loading". Per Section 3.3, the tornado wind velocity can be transformed into a static pressure load using procedures described in either ANSI A58.1-1972, "Building Code Requirements for Minimum Design Loads in Buildings and Other Structures", or American Society of Civil Engineers Paper Number 3269, "Wind Forces on Structures, Final Report, Task Committee on Wind Forces of the Committee on Loads and Stresses of the Structural Division Transactions" (ASCE Volume 126, Part II, 1961, pp. 1124-1198).

The dampers listed in Table 1 are all located internally within the structures, i.e. they are not located near the outside exterior walls of the structures. However, these dampers could be subject to increased internal pressure due to tornado winds striking the exterior building wall openings. These internal pressure fluctuations could cause any open dampers to close and result in a pressure load across the closed damper. Some of the dampers which are normally closed could also be subjected to similar pressure loadings. These pressure loads vary as a function of damper location and orientation with respect to the tornado wind speeds and directions outside the building.

For each damper a representative pressure coefficient was selected based on the damper configuration and location. The pressure coefficients reflect consideration for tornado wind induced pressures on both sides of the closed dampers, exterior missile shields protecting the building opening from direct wind, and tornado dampers within the ductwork system. The selected wind pressure coefficients are listed in Table 1.

The product of the wind pressure coefficient and the design basis tornado velocity pressure of 2.3 psi (stagnation pressure for a 360 mph tornado wind speed) yields the pressure load across the damper. Selection of the wind pressure coefficients for the dampers is documented in Yankee Atomic Calculation SBC-531, "Tornado Barrier Evaluation", Revision 2.

The results of the analysis showed that the maximum pressure differential across the closed dampers would be about 2.2 psi for the tornado pressure drop transient associated with the design basis tornado.

Using these applied pressure loads, a standard elastic analysis of damper components was performed. This analysis concluded that all damper assemblies were capable of sustaining postulated tornado pressure loads without damage or loss of function. This analysis is documented in North Atlantic Calculation C-S-1-14014, Revision 0. Similarly, an analysis of ductwork associated with the pressurized dampers was performed which evaluated combined membrane and bending stresses of the sheet metal panels supported on an elastic frame. All stresses were found to be within allowable limits as documented in North Atlantic Calculation C-S-1-14015, Revision 0.

The above analyses demonstrate the ability of the HVAC dampers, ductwork, and metal partitions previously qualified to the site specific tornado criteria to meet the criteria for the design basis tornado as defined in Regulatory Guide 1.76 and the Seabrook Station Updated Final Safety Analysis Report.