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February 3, 1983

Mr. Robert Gilbert
Project Manager
Operating Reactors Branch No. 5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Subject: Dresden 2
SEP Topic: III-4.A, Tornado Missiles

NRC Docket 50-237

Dear Mr. Gilbert:

10CFR50 (GDC 2), as implemented by Regulatory Guide 1.117, prescribe structures, systems, and components should be designed to withstand the effects of a tornado, including tornado missiles, without loss of capability to perform their safety functions. The NRC staff has identified safety-related systems that are not protected against the effects of tornadoes; including tornado-generated missiles, because of the large number and random direction of potential missiles that could result from a tornado as well as the need to consider the single-failure criterion. The following response address the concerns of the NRC staff:

Item 1: The staff has determined that the service water supply for two ventilation systems necessary for safe shutdown is not protected from tornado missiles. These systems are (1) the control room ventilation system and (2) the auxiliary electrical room ventilation system.

Response 1:

(1) Control Room Ventilation System

Portions of the Service Water System necessary for safe operation of the control room ventilation system are located in a non-tornado-missile- protected section of the cribhouse. The upgrade of the control room ventilation is being conducted per NUREG-0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability Requirements," which states that all licensees should provide assurance that the habitability systems will operate under all postulated conditions. Implementation of the TMI Action Plan is being conducted independently of the SEP.

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(2) Auxiliary Electrical Equipment Room Ventilation System

The auxiliary electrical equipment room houses equipment and systems essential for safe shutdown, including the reactor protection system motor-generators and instrumentation, the engineered safety system generators, and essential relays and switchgear. The station service water system supplies the ventilation system for this area. Portions of the service water system are located in a non-tornado missile protected section of the cribhouse. Attachment 1 provides a Probabilistic Analysis of Tornado Missile Hazard at Dresden Nuclear Power Station. The probability of striking the cribhouse is conservatively estimated to be 2.96×10^{-6} per year. However, this by no means implies that the pumps and piping systems installed inside the cribhouse will result in having such a probability of being damaged by tornado missiles In fact, shielding strength of the exterior concrete block walls was not taken into consideration in modeling the cribhouse. This factor would reduce the probability even further.

Item 2: Diesel Generator Ventilation

The diesel generator air intake and exhaust systesm are not protected from tornado missiles. Damage to the intake or exhaust system could result in diesel generator failure.

(1) Diesel Generator 2 (DG 2)

The DG 2 air intake and exhaust systems are located on the main floor of the turbine building above the tornado-protected area. Loss of DG 2 air intake would not result in loss of function because air can be drawn from inside the turbine building below the main floor. However, loss of the DG 2 exhaust could result in loss of function if the exhaust were to fill the DG intake area and thus result in choking of the DG.

(2) Diesel Generator 2/3 (DG 2/3)

DG 2/3 is located in a separate reinforced concrete structure south of the Unit 3 reactor building. The air intake and exhaust units are located on the roof of that building and are not protected from tornado missiles. Loss of either air intake or exhaust could result in loss of DG 2/3 caused by choking from lack of air or inundation with exhaust fumes.

Response 2:

Per Attachment 1, the probablity of a tornado missile striking the diesel generator exterior intake, exhaust and silencers for the unit 2/3 swing diesel and Unit 2 diesel generator were conservatively estimated to be 1.65×10^{-7} and 2.25×10^{-7} respectively.

According to the Regulatory Guide 1.76, the safety-related structure must be designed to withstand a maximum tornado windspeed interval of 295 to 360 mph. The maximum tornado windspeed interval used for this study is 277-300 mph. This windspeed interval corresponds to F- scale tornado intensity 6. Windspeeds exceeding 300 mph contribute insignificantly to the total probability of strike on a target. Also, Table 2-1 of Attachment 1 indicates for a F-6 tornado intensity, the probability of occurrence for the Dresden site is 4.35×10^{-7}. Therefore, it is concluded that no design provisions are needed to shield these targets.

Item 3: Exterior Tanks

During the August 1981 site visit, the staff identified the condensate storage tanks (CSTs) as external tanks and thus not protected from tornado missiles. Because the CSTs are used in various scenarios for safe shutdown, it is the staff's position that the CSTs should be protected from tornado missiles or the licensee should provide assurance that safe shutdown can be accomplished using missile-protected systems or components.

Response 3:

If a tornado missile penetrates the CST's and causes failure of all non-protected systems or components there still are sufficient back-up systems to safely cooldown the reactor until AC power is restored. The following systems would allow the plant to maintain a safe shutdown condition:

1. Isolation Condenser and Fire Water Systems
2. HPCI

The Isolation Condenser and HPCI would actuate to cool and depressurize the reactor vessel. The isolation condenser can be used thru one of two motor-operated isolation valves powered by 250 volt D.C. Reactor Building MCC#2 (Bus 2A). This system will initiate at 1070 psig (or greater) maintained for 15 seconds and is equivalent to the reactor decay heat rate five minutes after shutdown. With no make-up the water stored above the condenser tubes would be boiled off to the atmosphere in approximately 20 minutes assuming a minimum level requirement of 11,300 gallons of water as required by Technical Specifications. The normal level and high level are 22,500 gallons and 23,000 gallons respectively. Flow through the condenser tubes allow the reactor to be cooled by natural circulation.

Make-Up water to the isolation condenser can be supplied by the fire water system. The fire water system is normally supplied from the Dresden 2 and 3 combined service water system which comprise three service water pumps out of a total of five, but also ties into the Dresden 1 fire water system. Normally, system pressure is maintained by the Dresden 2 and 3 service water system. If these pumps fail, the two Dresden 1 pumps energize automatically to provide water. If pressure continues to fall, the Dresden 1 diesel-driven fire pump will automatically start, but if pressure still drops, the Dresden 2/3 diesel-driven fire pump will automatically start.

The five relief valves would lift momentarily to relieve pressure at approximately 1115 psig by dumping steam to the suppression pool (torus). The relief valves are pilot solenoid operated and powered by an auto-transfer circuit for each valve from 125VDC with remote-manual operating capability. After several minutes, reactor water level may decrease to the level setpoint of the HPCI system. The HPCI system may be initiated upon high drywell pressure at +2psi due to loss of drywell coolers or low-low water level due to blowdown water level shrinkage. HPCI uses steam from the reactor while the turbine exhaust steam goes to the suppression pool (torus). HPCI would inject water into the reactor vessel and would fill to a high water level of 48 inches above instrument zero (191 inches above Top Active Fuel) and would shut-off automatically. Water for HPCI pump would normally be taken from the Contaminated Condensate Storage Tanks (CST) with 90,000 gallons minimum in each tank. However, HPCI is one of the safety systems which can take suction from the suppression pool (torus) which contains a minimum of 850,000 gallons of water. All safety systems that draw water from the CST can also draw from the torus. Until AC power is restored the Isolation Condenser discharge (condensate) DC valve can be throttled to maintain a constant cooldown rate to a temperature of 212^{o}F.

In conclusion Commonwealth Edison feels we can reject heat thru the Isolation Condenser to the outside environment and maintain reactor vessel water level with the HPCI system. Also, the low probabilities of occurrence of a tornado missile striking the diesel generator intake, exhaust and silencers on the Unit 2 turbine building roof, the roof of the Unit 2/3 Diesel Genertor Building and the cribhouse is so small that shielding is not warranted.

Please address any questions you may have concerning this matter to this office.

One (1) signed original and thirty-nine (39) copies of this transmittal have been provided for your use.

Very truly yours,

Thomas J. Rausch

Thomas J. Rausch
Nuclear Licensing Administrator
Boiling Water Reactors

SPPJ:dg
2734D*
cc: RIII Resident Inspector, Dresden
Gregg Cwalina, SEP Integrated Assessment Project Manager (W/attachment)