

October 24, 2000

MEMORANDUM TO: Loren R. Plisco, Director
Division of Reactor Projects
Region II

FROM: Suzanne C. Black, Deputy Director */RA/*
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: NRR RESPONSE TO TASK INTERFACE AGREEMENT (TIA) 2000-16,
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 - REVIEW OF
ADDITIONAL INFORMATION PROVIDED BY LICENSEE FOR
RESOLUTION OF FIRE PROTECTION INSPECTION FIRE BARRIER
QUALIFICATION ISSUES (TAC NO. MB0056)

By memorandum dated September 25, 2000 (TIA 2000-16), you requested technical assistance from the Office of Nuclear Reactor Regulation (NRR) to review a September 15, 2000, letter from Carolina Power & Light Company (CP&L) related to the adequacy of the fire barriers separating Switchgear Room A, Cable Room A, and Cable Room B at the Harris plant. In its letter, CP&L addressed some of the conclusions NRR made in its August 1, 2000, response to TIA 99-028. Specifically, the licensee provided additional information that it believed may alter NRR's conclusions.

NRR has completed a review of TIA 2000-16, as documented in the attached response. Based on its review, the staff concluded that the licensee's September 15, 2000, letter did not provide any additional technical information to change the conclusions NRR made in its August 1, 2000, response to TIA 99-028. However, the staff has not had the opportunity to review the fire test reports that the licensee references in its letter. The staff has requested that the licensee provide the referenced reports for review. After reviewing the referenced reports, NRR will provide you with an update to this TIA response.

TIA 2000-16 and TAC No. MB0056 will remain open for the review of the fire test reports.

Docket No. 50-400

Attachment: As stated

cc w/attachment: A. R. Blough, Region I
G. E. Grant, Region III
K. E. Brockman, Region IV

CONTACT: R. Laufer, DLPM/PDII
301-415-1373

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* no major changes to response

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OFFICIAL RECORD

RESPONSE TO REGION II TASK INTERFACE AGREEMENT (TIA) 2000-16

REVIEW OF LICENSEE'S SEPTEMBER 15, 2000, RESPONSE TO TIA 99-028

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 (SHNPP)

1.0 BACKGROUND

By memorandum dated August 1, 2000, the Office of Nuclear Reactor Regulation (NRR) provided its response to Task Interface Agreement (TIA) 99-028 which concluded that:

The licensee has not clearly demonstrated that the as-installed Thermo-Lag fire barriers and associated penetration seals are adequate to withstand the hazards associated with the area(s) to protect important equipment from fire damage. The use of Thermo-Lag in this application appears to conflict with the NRC's fire protection requirements as specified in General Design Criterion (GDC) 3, of Appendix A to 10 CFR Part 50. The licensee's evaluation did not provide the staff with an adequate technical basis on which to conclude that the change to the current licensing basis will not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire as required by the plant's fire protection license condition.

By letter dated September 15, 2000, Carolina Power & Light Company, the licensee, responded to five of the eleven technical issues discussed in the TIA response. By memorandum dated September 25, 2000, Region II requested that NRR review the licensee's September 15 letter to determine if the additional information changes the conclusions documented in the August 1, 2000, TIA response.

The eleven technical issues addressed in the August 1, 2000, TIA response include:

- Deviations from the plant's licensing basis (LB) for providing a 3-hour-rated barrier and the guidance provided in Chemical Engineering Branch (CMEB) 9.5.1 Technical Positions C.5.a.(1)(b), C.7.c, and C.7.d, which specify that a 3-hour-rated barrier should be provided for this configuration.
- The compliance with the plant's LB that requires that interior finishes are noncombustible, or are listed by a nationally recognized testing laboratory, or have a flame-spread, smoke and fuel contribution of 25 or less, and the guidance specified in Appendix A to APCS 9.5-1, which specifies this performance criteria.
- The requirement in GDC-3 that specifies that noncombustible and heat-resistant materials be used whenever practical throughout the plant.
- The toxicity of Thermo-Lag when used in this unique configuration.
- The effect of the Thermo-Lag on the performance of penetration seals installed in the barriers.

- The use of the thermal performance criteria specified in Generic Letter (GL) 86-10, Supplement 1 for electrical raceway fire barriers, for structural fire barriers separating fire areas.
- The pressure of the test furnace relative to its environment and the ignition of cotton waste during the fire test.
- The non-symmetrical wall configuration.
- The risk significance of a potential fire barrier failure.
- The non-standard hose stream tests conducted on the test assemblies.
- The ability of the plant fire brigade to preclude a failure of the barrier based on a visual inspection of the Thermo-Lag during a fire event.

2.0 DISCUSSION

In its September 15, 2000, letter, the licensee states that the following evaluations addressed the adequacy of the Thermo-Lag fire barriers at SHNPP:

- Field verification of Thermo-Lag thickness.
- Performance of fire endurance tests.
- Performance of “detailed evaluations” of the fire test results.
- Penetration seal upgrades.
- Performance of fire modeling of the Thermo-Lag enclosures.
- Performance of an analysis of the Thermo-Lag barriers versus the acceptance criteria specified in GL 86-10, Supplement 1.
- Fire detection system upgrades.

The staff notes this information was considered in the August 1, 2000, TIA response, and notes that no new information on the above “evaluations” was provided in the licensee’s recent letter. The licensee also states that the fire test reports, which have not been provided for NRR review, can be made available. The licensee has been requested to submit the applicable test reports and any other supporting technical information for staff review.

The licensee’s September 15 letter cites the acceptance criteria in GL 86-10, Supplement 1, for electrical raceway barriers as applicable to the structural barriers installed in the cable spreading rooms and switchgear rooms at SHNPP. The staff reiterates its previous position that the use of the acceptance criteria specified in GL 86-10, Supplement 1, for raceway fire barriers is inappropriate for wall, floor, and ceiling assemblies. As stated in GL 86-10, Supplement 1, the appropriate fire endurance test acceptance criteria for fire barrier walls, floors, ceilings, and freestanding equipment enclosures are specified in National Fire Protection Association Standard 251 and American Society for Testing Materials Standard E-119.

The staff also notes that while the fire detection system upgrades implemented by the licensee enhance the fire protection provided in these areas, these improvements will not impact the performance of the fire barrier assembly during a fire event and are therefore not pertinent to the determination of the barrier's adequacy for a particular fire hazard.

As stated in the August 1, 2000, TIA response, the effectiveness of the penetration seal upgrades conducted by the licensee has not been demonstrated by fire test. The staff guidance concerning penetration seals provided in Section C.5.a.(3) of BTP CMEB 9.5-1 states that openings through fire barriers for pipe, conduit, and cable trays, which separate fire areas, should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. Without relevant test data to support the licensee's determination of the adequacy of the penetration seal design, the actual fire rating of the penetration seals installed in the Thermo-Lag fire barriers is indeterminate.

Concerning the fire modeling used by the licensee in its evaluation, the staff notes that it provided industry an alternative method for qualifying fire barriers in NUREG-1547, "Methodology for Developing and Implementing Alternative Temperature-Time Curves for Testing the Fire Resistance of Barriers for Nuclear Power Plant Applications." This effort was completed with the assistance of the staff from the Building and Fire Research Laboratory of the National Institute of Standards and Technology. The licensee's fire modeling efforts in this case, as provided in calculation FP-0109, are significantly less robust than the methods proposed by the staff in NUREG-1547, and as such cannot be accepted by the staff as adequate to qualify the Thermo-Lag fire barriers at SHNPP.

The licensee responded to the staff concern regarding the apparent noncompliance with GDC 3 by citing, in part, the discussion published by the staff in NUREG-1552, "Fire Barrier Penetration Seals," that was used as the technical basis to support the revision of Section III.M of Appendix R to 10 CFR Part 50, which eliminated the requirement for noncombustible penetration seals. The entire quote from NUREG-1552 states:

GDC 3 states that noncombustible and heat resistant materials shall be used whenever practical throughout the unit, particularly in locations such as the containment and the control room. However, GDC 3 does not preclude the use of combustible materials. Examples of combustible materials that are installed in nuclear power plants are cable insulation, diesel generator fuel oil, turbine-generator lubricating and hydraulic control fluids, reactor coolant pump lubricating oils, charcoal and other filters, and flammable gases and liquids. In general, when such materials are properly managed, are accounted for in the plant design and operation, and are incorporated as integral components of the plant fire protection program, including the fire hazards analysis, they are acceptable.

Note that the staff discussion does not include the use of combustible materials for the construction of structural fire barriers, which was the subject of the August 1, 2000, TIA response. The staff further states in NUREG-1552:

For the typical nuclear power plant design, silicone-based penetration seal materials contribute only a little to the overall combustible load in terms of both quantity of material and surface area. For example, in many nuclear power plant fire areas, the surface

area of the penetration seals is much less than the surface area of the cable jackets in the vicinity of the seals.

In the configuration at SHNPP, the Thermo-Lag barriers contribute significantly to both the quantity of combustible material and the exposed surface area, unlike the penetration seals, which are a small fraction of the total exposed surface area and fire barrier mass. The staff also notes that Section III.G.2. f of Appendix R to 10 CFR Part 50 specifies that noncombustible radiant energy shields be provided for the separation of redundant trains located inside containment. This requirement was not changed with the revision to Section III.M of Appendix R cited by the licensee. In a December 27, 1995, letter, the licensee committed to replace the partial height Thermo-Lag barrier located on elevation 261' of the reactor auxiliary building due to the combustibility concerns identified by the staff in Information Notice 95-27. In addition, as noted by the staff in the August 1, 2000, TIA response, noncombustible construction materials such as concrete, masonry, and gypsum are typically used for the construction of walls, floors, and ceilings. Therefore, the extrapolation by the licensee of the technical basis for acceptance by the staff of combustible penetration seal materials to combustible floor, wall, and ceiling assemblies is inappropriate. The licensee has not addressed how the use of noncombustible materials, in this specific application, is impractical as required by GDC 3.

3.0 CONCLUSION

The licensee has not provided any additional technical information in its letter of September 15, 2000, to change the conclusions the staff made in its August 1, 2000, response to TIA 99-028.