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Docket Number 50-346

License Number NPF-3

Serial Number 2577

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United States Nuclear Regulatory Commission
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Subject: Final Closeout Regarding Resolution of Thermo-Lag 330-1 Issues
(TAC No. M85542 and M82809)

Ladies and Gentlemen:

This letter provides written confirmation, as required by Nuclear Regulatory Commission (NRC) Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated December 17, 1992 (Toledo Edison Log Number 3916), that the corrective actions relating to Thermo-Lag 330-1 for the Davis-Besse Nuclear Power Station (DBNPS) have been completed. This letter also confirms completion of actions required by the Confirmatory Order Modifying License for the DBNPS, issued by the NRC on June 22, 1998 (Toledo Edison Log Number 5291). The details are provided in the enclosure to this letter.

In a February 20, 1996 letter (Toledo Edison Serial Number 2358), Toledo Edison notified the NRC of its decision to replace installed Thermo-Lag with alternate materials. The NRC staff was updated by telephone calls on November 5, 1997, March 12, 1998, and June 1, 1998 of the status of the specific Thermo-Lag replacements and the reanalysis of fire hazards. The details of these items are discussed in the enclosure. This enclosure also updates the NRC staff on the related issues of the qualifications of the alternate materials used in place of Thermo-Lag and the ampacity derating for the circuits protected by fire barriers.

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The NRC staff was notified by conference call on December 23, 1998 that fieldwork for Plant Modification 95-0056 was completed on December 22, 1998. Following subsequent completion of administrative requirements associated with the plant modification, all compensatory measures which were established while Thermo-Lag 330-1 resolution activities were ongoing, were secured.

Should you have any questions or require additional information, please contact Mr. James L. Freels, Manager - Regulatory Affairs, at (419) 321-8466.

Very truly yours,

John K. Wood

MKL/laj

Enclosure

cc: J. E. Dyer, Regional Administrator, NRC Region III
A. G. Hansen, NRC/NRR Project Manager
K. S. Zellers, NRC Region III, Acting DB-1 Senior Resident Inspector
Utility Radiological Safety Board

Docket Number 50-346
License Number NPF-3
Serial Number 2577
Enclosure

FINAL CLOSEOUT

REGARDING

RESOLUTION

OF

THERMO-LAG 330-1 ISSUES

This letter is submitted pursuant to 10 CFR 50.54(f). The attachment provides written confirmation, as required by Nuclear Regulatory Commission (NRC) Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated December 17, 1992 (Toledo Edison Log Number 3916), that the corrective actions relating to Thermo-Lag 330-1 for the Davis-Besse Nuclear Power Station (DBNPS) have been completed. The attachment also confirms completion of actions required by the Confirmatory Order Modifying License for the DBNPS, issued by the NRC on June 22, 1998 (Toledo Edison Log Number 5291).

I, John K. Wood, state that (1) I am Vice President - Nuclear of the FirstEnergy Nuclear Operating Company, (2) I am duly authorized to execute and file this certification on behalf of the Toledo Edison Company and The Cleveland Electric Illuminating Company, and (3) the statements set forth herein are true and correct to the best of my knowledge, information and belief.

By: John K. Wood
John K. Wood, Vice President - Nuclear

Affirmed and subscribed before me this 25th day of January, 1999.

Nora Lynn Flood
Notary Public, State of Ohio - Nora Lynn Flood
My commission expires September 4, 2002.

FINAL CLOSEOUT

REGARDING

RESOLUTION

OF

THERMO-LAG 330-1 ISSUES

I. Background

NRC Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated December 17, 1992 (Toledo Edison Log Number 3916), requested additional information to verify that Thermo-Lag 330-1 fire barrier systems manufactured by Thermal Science, Incorporated (TSI) comply with the NRC's requirements. The GL identified three general areas of concern: the fire endurance capability of Thermo-Lag 330-1 fire barriers; the ampacity derating of cables enclosed in Thermo-Lag 330-1 fire barriers; and the evaluation and application of the results of tests conducted to determine the fire endurance ratings and the ampacity derating factors of Thermo-Lag 330-1 fire barriers.

Toledo Edison (TE) initially responded to GL 92-08 on April 16, 1993 (TE Serial Number 2132). The NRC issued subsequent requests for additional information regarding GL 92-08 on December 21, 1993 (TE Log Number 4125), September 15, 1994 (TE Log Number 4398), December 23, 1994 (TE Log Number 4464), and October 11, 1995 (TE Log Number 4627). Toledo Edison responded on February 11, 1994 (TE Serial Number 2201), December 8, 1994 (TE Serial Number 2258), March 22, 1995 (TE Serial Number 2282), June 13, 1995 (TE Serial Number 2298), and November 8, 1995 (TE Serial Number 2339).

As detailed in the above-referenced correspondence, the DBNPS investigated a variety of options to resolve the issues raised by GL 92-08, including, through participation in various industry-wide initiatives, the option of upgrading/ qualifying existing Thermo-Lag 330-1 installations. The following provides an update to the letters previously submitted to the NRC on Thermo-Lag replacements, qualifications of alternate fire barrier materials used, ampacity deratings, and completion of actions under the Confirmatory Order of June 22, 1998.

II. Thermo-Lag Replacement Plans

In a February 20, 1996 letter (TE Serial Number 2358), TE notified the NRC of its decision to replace installed Thermo-Lag with alternate materials, and described a phased approach, culminating in overall completion in the fourth quarter of 1998.

The following alternate materials were selected to replace Thermo-Lag 330-1: 3M Interam E50 Series Flexible Mat for circuits; Mandoval Fendolite for structural steel; and Eternit Promat-H calcium silicate cement board or 3M Interam E50 Series Flexible Mat for fire dampers.

A detailed listing of affected plant areas by room number was provided in the attachment to the TE letter dated June 13, 1995 (TE Serial Number 2298).

As discussed in communications with the NRC staff on November 5, 1997, March 12, 1998, and June 1, 1998, for several Thermo-Lag installations where further analysis showed that fire barrier protection was no longer required, the Thermo-Lag fire barrier was abandoned in place in lieu of removing it. Details on locations where Thermo-Lag is abandoned in place are provided in Section V below. The DBNPS does not consider this a change in the intent of the original plan, which was to eliminate reliance on Thermo-Lag 330-1.

III. Qualifications of Alternate Materials

A. Fire Endurance

Each fire barrier installation configuration is qualified through performance testing to the fire and hose stream testing requirements of American Society for Testing and Materials (ASTM) E 119, "Fire Testing of Building Construction and Materials," and, for electrical raceways, as specified by NRC Generic Letter 86-10 Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area," dated March 25, 1994 (TE Log Number 4173). In general, the installation configuration was designed to be in accordance with previously tested configurations. The structural steel fireproofing was in accordance with Underwriters Laboratory fire resistance designs. The electrical raceway protection was done to 3M-sponsored testing. For several plant-specific fire barrier configurations, confirmatory fire testing was required and was successfully conducted. The associated fire endurance test reports are available onsite for NRC review.

B. Combustibility

As described in a February 7, 1997 letter to the NRC (TE Serial Number 2434), the 3M Interam E50 Series base material has passed the ASTM E-136, "Behavior of Materials in a Vertical Tube Furnace at 750°F," testing requirements for noncombustible materials. This material has also passed the ASTM E-84, "Surface Burning Characteristics of Building Materials," testing requirements for surface flame spread, with a flame spread rating of 0.7. The February 1997 letter concluded, based on these satisfactory test results, that the material is acceptable for the construction of radiant energy shields, as utilized in the containment vessel.

Copies of the applicable test reports were provided to the NRC under cover letter dated April 25, 1997 (TE Serial Number 2459).

C. Ampacity Derating

The February 20, 1996 letter (TE Serial Number 2358) recognized that ampacity derating is an important consideration and noted that a strategy for addressing this issue was being developed in parallel with implementation of the overall Thermo-Lag resolution strategy.

Toledo Edison provided the NRC with an evaluation of ampacity issues related to Thermo-Lag 330-1 fire barriers in a letter dated June 26, 1996 (TE Serial Number 2381). The evaluation concluded that there is adequate margin to accommodate the ampacity derating due to application of Thermo-Lag 330-1, from the time it was installed to the time it is eventually removed, such that the insulation properties of the protected cables are not adversely impacted. On October 9, 1996 (TE Log Number 4927), the NRC requested further clarification and discussion of information provided by the June 26, 1996 letter. Toledo Edison responded to this request on November 5, 1996 (TE Serial Number 2410), reaffirming the conclusions of the June 1996 letter. In response to further discussions with the NRC staff, TE agreed to incorporate additional conservatism into the ampacity calculations. Based on these revised calculations, an updated evaluation was provided to the NRC by letter dated September 10, 1997 (TE Serial Number 2474). The September 10, 1997 letter reaffirmed the conclusions of the June 26, 1996 letter. On January 20, 1999 (TE Log Number 5404), the NRC issued a safety evaluation concluding that the ampacity derating analysis results are acceptable and there are no significant safety hazards associated with the application of ampacity derating methodology at the DBNPS.

The June 26, 1996 TE letter also recognized that ampacity derating is an important consideration for circuits protected by fire barriers utilizing the replacement material (3M Interam). The letter stated that test data would be used to confirm that there is adequate margin to accommodate the ampacity derating due to the application of the alternate material, and that applicable plant-specific calculations would be revised. The letter further stated that these activities would be conducted in conjunction with the plant modification process for the fire barrier replacement activities, and as such, would be completed in the fourth quarter of 1998. These calculations were completed on schedule and demonstrate that the raceway installations protected by the replacement fire barrier material are acceptable from an ampacity standpoint.

The associated calculations are available onsite for NRC review.

IV. Management Meeting and Issuance of Confirmatory Order

On April 3, 1997, TE met with the NRC staff to discuss Thermo-Lag resolution progress. Toledo Edison described the resolution strategy in detail, including the approach for the ampacity issue, and reaffirmed the commitment to complete the program no later than the end of the fourth quarter of 1998. A meeting summary issued by the NRC on April 16, 1997 (TE Log Number 5041) stated the NRC conclusion that the licensee is applying appropriate management attention to the Thermo-Lag issues, is making progress towards the overall resolution of the issues, and has established an acceptable schedule.

On August 11, 1997 (TE Log Number 5115), the NRC summarized the TE plans to eliminate reliance on Thermo-Lag as a fire barrier material via circuit modifications, fire hazard re-analysis, removal of Thermo-Lag, and installation of alternate fire barrier materials, with program completion scheduled to be completed by the end of the fourth quarter of 1998. The letter stated that based on its review, the NRC had determined that TE had provided the information requested in GL 92-08 and that the actions tracked by TAC No. M85542 are complete. The letter noted, however, that there remain open items involving the ampacity derating of Thermo-Lag 330-1, which emerged as a result of the GL 92-08 review, and that the resolution of these ampacity derating issues are being treated generically and are being tracked by TAC No. M82809. The letter requested that, in accordance with GL 92-08, the NRC be advised, in writing, when the actions described in the TE submittals have been implemented.

On May 4, 1998 (TE Log Number 5260), the NRC requested consent to issuance of a Confirmatory Order Modifying License ("Order") for the DBNPS to confirm the schedule for completion of the corrective actions associated with Thermo-Lag

resolution. Toledo Edison consented to the Order on June 11, 1998 (TE Serial Number 2544). The TE letter stated that remaining activities (fire testing and physical modifications) will be completed at the DBNPS by December 31, 1998, and emphasized that this schedule is consistent with the completion date originally provided to the NRC in its February 20, 1996 letter, and later provided during the April 3, 1997 meeting with the NRC staff. On June 22, 1998 (TE Log Number 5291), the NRC issued the Order, confirming the schedule for the fire barrier corrective actions as described in the licensee submittals to the NRC dated February 20, 1996, April 24, 1996, June 26, 1996, November 5, 1996, and September 10, 1997, and as presented at the licensees' meeting with the NRC staff on April 3, 1997.

V. Implementation of Thermo-Lag Replacement Plans

Field installation of the alternate materials commenced during the third quarter of 1996 under Plant Modification 95-0056.

The February 20, 1996 letter (TE Serial Number 2358) mentioned plans to submit additional information in support of a 10 CFR 50 Appendix R exemption request dated May 18, 1990 (TE Serial Number 1809). This exemption request was based, in part, on the existence of radiant energy shields that separate redundant trains of safe shutdown circuits within the containment annulus. The February 1996 letter noted that these radiant energy shields are constructed, in part, of Thermo-Lag 330-1 material, and that this material would be replaced as part of the overall Thermo-Lag resolution effort. In a letter dated April 24, 1996 (TE Serial Number 2373), TE withdrew the May 1990 exemption request, stating that alternative approaches were being evaluated for achieving compliance with 10 CFR 50 Appendix R for the containment annulus.

The May 1990 exemption request involved three separate radiant energy shields, each protecting a single electrical penetration, penetrations P1P3B, P2P5F, and P2C5G. These installations were addressed as follows:

- The radiant energy shields for P1P3B and P2C5G were replaced with 3-hour rated fire barriers constructed using the 3M Interam material.

- A re-evaluation of the analyses for the circuits protected by the radiant energy shield for penetration P2C5F was performed. A pilot-operated relief valve (PORV) circuit was relocated under Plant Modification 96-0036 from penetration P2P5F to penetration P2C5G. This relocation, in conjunction with the re-analyses of the remaining circuits eliminated the need for fire barrier protection for penetration P2P5F.

Although not mentioned in the February 1996 letter, the May 1990 letter also requested an exemption regarding redundant trains of pressurizer level indication, one train located in the containment annulus and the other in auxiliary building room 314 (Mechanical Penetration Room No. 4), neither of which were protected by a fire barrier. In order to resolve this issue, a 3-hour rated fire barrier constructed using 3M Interam material was installed in the containment annulus to protect penetration PBL4E.

The resolution of the Thermo-Lag 330-1 issues did not require replacement with alternate materials in all cases:

- Control circuitry for the Component Cooling Water (CCW) pumps was modified under Plant Modification 96-0005, eliminating the need for fire barriers in rooms 313 (Mix Tanks and Hatch Area) and 328 (CCW Heat Exchanger and Pump Room). Thermo-Lag fire barriers in room 313 were abandoned in place. Some Thermo-Lag fire barriers in room 328 were removed and some were abandoned in place. Where Thermo-Lag fire barriers were abandoned in place, the seismic adequacy was evaluated. In addition, the weight of the material was included in the combustible loading calculations for the applicable areas.

- A fire hazards re-evaluation determined that fire barriers on columns in rooms 110 (Auxiliary Building Corridor), 113A (Decay Heat Exchanger Hatch Area), and 114 (Miscellaneous Waste Monitor Tank and Pump Room) were no longer required. The Thermo-Lag fire barriers were removed but not replaced. In addition an evaluation determined that portions of the fire barrier protection on the structural steel beams in rooms 325 (High Voltage Switchgear AC Room No. 1), 400 (Equipment Hatch Area Passage), 401 (Fuel Handling Exhaust Unit Room), and 404 (Spent Fuel Pool Corridor) were unnecessary. Since removal of all of the Thermo-Lag in these locations was difficult or impractical, some portions were abandoned in place. Where Thermo-Lag fire barriers were abandoned in place, the seismic adequacy was evaluated. In addition, the weight of the material was included in the combustible loading calculations for the applicable areas.

- A re-evaluation of the analyses of the circuits for "swing" components Containment Air Cooler (CAC) Fan 3 and Service Water (SW) Pump 3 determined that these components need not be credited, and therefore fire barriers for the related circuits are no longer required. The Thermo-Lag fire barriers on conduits related to these "swing" components in rooms 53 (Service Water Pump and Valve Room No. 2), 217 (Core Flood Tank No. 2 Area), 317 (Containment Hatch Area), 410 (East Passage Penetration Area), and 427 (Electrical Penetration Room No. 2) were removed but not replaced.

- As described earlier, a PORV circuit was relocated under Plant Modification 96-0036 from penetration P2P5F to penetration P2C5G. This relocation, in conjunction with the re-analyses of the remaining circuits routed through penetration P2P5F, eliminated the need for fire barrier protection for penetration P2P5F in room 127 (Containment Annulus). This penetration was previously protected by a radiant energy shield, which was removed.

- Breaker BF1194 for High Pressure Injection Pump 1-2 Recirculation Stop-Check Valve HP-31 was depowered, therefore the valve can no longer spuriously close due to a fire. Consequently, the fire barriers for the related circuits in rooms 105 (ECCS Pump Room No. 1) and 113A (Decay Heat Exchanger Hatch Area) were no longer required, and were removed.

VI. Final Completion of Activities

Fieldwork for Plant Modification 95-0056 was completed on December 22, 1998. Following subsequent completion of administrative requirements associated with the plant modification, all compensatory measures which were established while Thermo-Lag 330-1 resolution activities were ongoing, were secured.