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SUBJECT: Submits response to NRC 980423 RAI re GL 92-08, "Thermo-Lag 330-1 Fire Barriers." Calculations referenced in response are attached.

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Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

June 26, 1998

L-98-175
10 CFR 50.4
10 CFR 50. 54 (f)

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50- 389
Request for Additional Information Response
Generic Letter 92-08

The Florida Power and Light Company (FPL) supplemental response to Generic Letter 92-08, *Thermo-Lag 330-1 Fire Barriers,* for St. Lucie Units 1 and 2 is attached.

By letter dated April 23, 1998, the NRC provided a request for additional information (RAI) for St. Lucie Units 1 and 2 and Turkey Point Units 3 and 4. The NRC, in conjunction with its contractor, Sandia National Laboratories, after reviewing FPL letters L-96-335 dated December 19, 1996, L-96-211 dated August 27, 1996, and L-96-28 dated February 12, 1996, had identified several issues related to ampacity derating factors. Only NRC request 2.1 was applicable to St. Lucie Units 1 and 2. Attachment 1 is the response the NRC request 2.1. The response to NRC request 2.2 is specific to Turkey Point Units 3 and 4 and will be provided under separate cover.

The calculations referenced in the response are attached. Attachment 2 is FPL Calculation, PSL-BFSM-98-005, Revision 0, *Electrical Cable Ampacity Correction Factors for Thermo-Lag Fire Barriers.* Attachment 3 is FPL Calculation, PSL-0FJE-96-001, Revision 2, *Cable Derating in Conduits with Fire Barrier Coatings.* Please contact us if there are any questions about this response.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

230079

Attachments

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

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NRC Request 2.1.a:

The licensee is requested either to consider more recent ampacity derating test data compiled by Florida Power Corporation (FPC) for Crystal River, Unit 3 (Reference 2) or the applicable modified TUEC ADF [ampacity derating factor] values as stated in the subject staff Safety Evaluation (Reference 3) as the basis for 1-hour conduit ADF values.

Response to Request 2.1.a:

FPL Engineering performed a review of the FPC Crystal River ampacity derating test as recommended in the NRC request for additional information[1] (RAI). This review concluded that the baseline data of the FPC Crystal River fire barrier derating tests was applicable to the St. Lucie Plant. Thermo-Lag baseline configurations used at Crystal River were determined to be consistent with the original St. Lucie fire barrier installations. The upgraded fire barrier installations of the FPC test are not applicable to St. Lucie Plant fire barriers because the upgraded configurations used layers of Mecatiss® material over base layers of Thermo-Lag. St. Lucie Plant performed upgrades to fire barriers using only layers of Thermo-Lag 330-1 and 770-1 material over base layers of Thermo-Lag.

To address the St. Lucie installation configurations, the baseline information from the FPC Crystal River derating tests was used in a new heat transfer calculation, PSL-BFSM-98-005[2], which extrapolated ampacity correction factors (ACF) to account for bounding St. Lucie upgraded Thermo-Lag material thickness.

These new ACF values were incorporated in the St. Lucie ampacity derating calculation, PSL-0FJE-96-001[3], Revision 2, to determine the effect on cable margins. The results of using the FPC baseline values extrapolated for St. Lucie and the IEEE "no sun - 0 ft/s" air velocity, support the original assumptions and demonstrated that the installed cables at St. Lucie Plant have adequate ampacity margin.

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1 Frederick J. Hebdon (NRC) to T. F. Plunkett, *Second Request for Additional Information - Generic Letter 92-08, Thermo-Lag 330-1 Fire Barriers - St. Lucie Plant, Unit 1 and 2 (TAC No. M82809)*, dated April 23, 1998.

2 FPL Calculation, PSL-BFSM-98-005, Revision 0, *Electrical Cable Ampacity Correction Factors for Thermo-Lag Fire Barriers.*

3 FPL Calculation, PSL-0FJE-96-001, Revision 2, *Cable Derating in Conduits with Fire Barrier Coatings.*

NRC Request 2.1.b:

The staff finds that the licensee's use of the Institute of Electrical and Electronics Engineers "no sun - 2 ft/s" conduit baseline ampacity limits in its Calculation PSL-0FJE-001 is contrary to the accepted practice in nuclear power plant ampacity assessments for general indoor applications. It is recommended that: (1) baseline ampacity be assessed on the basis of the "no sun - 0 ft/s" condition, or (2) an explicit justification be provided for the assumption that all cables will be subject to continuous air flow of at least 2 ft/s velocity.

Response to Request 2.1.b:

Calculation PSL-0FJE-96-001, for cable ampacity derating in St. Lucie Unit 1 and 2, was originally performed based on normal operating conditions for the plant. All areas in both units containing conduits protected with Thermo-Lag fire barriers are indoor areas which are provided with continuous ventilation. The original revisions of the calculation used the IEEE standard for cables with air flow indoors. For additional conservatism, a review of the IEEE standard and revision of the ampacity derating calculation was performed using the "no sun - 0 ft/s" cable ampacity capacity for this response.

Based on the cable types used in protected conduits, use of the more conservative IEEE values may reduce the cable ampacity as much as 4.4% to as little as 3.4% for affected cables.

The "no sun - 0 ft/s" values were included in Revision 2 of the ampacity derating calculation and demonstrated that adequate margin exists as discussed in 2.1.a above.

NRC Request 2.1.c:

The licensee in calculation PTN-BFJM-96-005, has assumed that inductive heat losses are not relevant to the SLP applications. However, this does ignore the fact that the TUEC tests did experience apparent problems with inductive heating that will be reflected in the test data. As recommended in Item 2.1.a above, the licensee is requested to consider (1) the use of more recent ampacity derating test data obtained by FPC for Crystal River, Unit 3[4]; or (2) the applicable modified TUEC ADF values, as stated in the subject staff Safety Evaluation (Reference 1), as the basis for conduit ADF values.

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[4] Florida Power Corporation Ampacity Derating Tests for Crystal River Unit 3, *Ampacity Test Investigation of Raceway Fire Barriers for Conduit and Cable Tray Systems*, Underwriters Laboratory Report No. 95NK17030, File NC1973.

Response to Request 2.1.c:

The effects of cable inductive heat losses on the heat transfer calculation were originally assumed insignificant in Calculation PTN-BFJM-96-005 as identified in the RAI. This was an appropriate assumption for extrapolating baseline heat transfer values across the fire barrier material. However, for conservatism as recommended in the RAI, the FPC Crystal River derating test results have been used in the new St. Lucie plant heat transfer calculation, PSL-BFSM-98-005, to calculate new ACFs.

Inductive heating and heat losses are more appropriately applied to cable ampacity derating calculations. Calculation PSL-0FJE-96-001, Revision 0, included inductive heating and losses. Methodology step 3.9 obtains derating factors for multiple power cables in the same conduit from EPRI standards. Multiple energized power conductors in the same conduit is the source of inductive heating. The cable per conduit (C/C) factor adds a derating factor of 1.0 for one to three (1 - 3) energized conductors, a factor of 0.8 for four to six (4 - 6) energized conductors, and a factor of 0.7 for seven to twenty-four (7 - 24) energized conductors in the same conduit. The mutual inductance and inductive heat losses of a complete three phase (3 ⌀) or single phase (1⌀) cable tend to cancel out or be sufficiently small so as to be negligible.

FPL Conclusions

The responses to the NRC requests provided above and calculations performed for the RAI provide assurance of the cable ampacity margin for protected cables in St. Lucie Unit 1 and 2.