

January 21, 2000

Mr. John Paul Cowan
Vice President, Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Licensing (SA2A)
Crystal River Energy Complex
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: CRYSTAL RIVER UNIT 3 - REVISION 1 TO SAFETY EVALUATION REPORT
ADDRESSING THERMO-LAG RELATED AMPACITY DERATING ISSUES

Dear Mr. Cowan:

During the course of an ampacity derating review at another plant we became aware that Florida Power Corporation had adopted a zero ampacity derating factor for those ampacity tests that resulted in a negative ampacity derating indication. This action was apparently based, in part, on an interpretation of the original U.S. Nuclear Regulatory Commission (NRC) Safety Evaluation (SE) dated November 14, 1997. Although the NRC, in conjunction with its contractor, Sandia National Laboratories, completed our review of your test program results, the application of the ampacity derating parameters were not addressed in the original SE. The enclosed revised safety evaluation is being issued to provide greater clarification on this issue. The revised portion of the SE is indicated by the vertical line in the margin. As stated in our original safety evaluation, there are no ampacity derating issues of the type identified in Generic Letter 92-08 for Crystal River, Unit 3.

If you have any questions concerning this issue, please contact me at (301) 415-1495.

Sincerely,
Original signed by:
L. A. Wiens, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosure: Revised Safety Evaluation

cc w/enclosure: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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Sincerely,

A handwritten signature in black ink, appearing to read "L. A. Wiens".

L. A. Wiens, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FLORIDA POWER CORPORATION

GENERIC LETTER 92-08 AMPACITY DERATING ISSUES

CRYSTAL RIVER, UNIT 3

DOCKET NO. 50-302

1.0 BACKGROUND

By letter dated July 3, 1997, Florida Power Corporation (FPC) (the licensee) submitted a response to the NRC Request for Additional Information (RAI) related to Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," for Crystal River Nuclear Plant, Unit 3.

The licensee conducted tests to derive ampacity derating factors for selected fire barriers installations at Crystal River, Unit 3. The subject tests were performed consistent with the guidance provided in Draft 16 of the Institute of Electrical and Electronic Engineers (IEEE) Standard P848, "Procedure for the Determination of Ampacity Derating of Fire Protected Cables." The test specimens were six fire barrier systems enclosing the following raceway types: (1) 1" conduits, (2) 4" conduits, and (3) a 4" by 24" cable tray. The following fire barrier systems were tested: (1) a one-hour Thermal Sciences Inc. (TSI) Thermo-Lag 330-1 system with nominal 5/8" thickness; (2) a three-hour TSI Thermo-Lag 330-1 system with nominal 1" and 1/4" thickness; (3) a one-hour Mecatiss MPF-60 upgrade system overlapping the one-hour TSI system; (4) a three-hour Mecatiss MPF-180 upgrade system overlapping the three-hour TSI system; (5) a one-hour Mecatiss MST-1 stand-alone system; and (6) a three-hour Mecatiss MTS-3 stand-alone system.

Each of the 1" conduits had a single, 4/C, 19AWG, 600 V light power or control cable installed during the tests. Similarly, the 4" conduits utilized a tightly wrapped bundle of 12, 3/C, 6AWG, 600V cables (a total of 36 individual conductors). The 4" by 24" cable trays each had three layers of the 3/C, 6AWG cable installed during the tests. Overall, all of the provisions of IEEE P848 were consistently observed during the licensee tests. The licensee transmitted the subject test results for staff review in its submittal dated June 26, 1996.

The staff RAI dated May 22, 1997, had identified a number of open issues and concerns requiring clarification by the licensee. The licensee's submittal dated July 3, 1997, contained the response to staff questions regarding its ampacity test results. The staff evaluation of the ampacity test results for Crystal River Nuclear Plant, Unit 3 follows.

2.0 EVALUATION

After reviewing the licensee's submittals and Sandia National Laboratories (SNL) Technical Letter Report (see Attachment 2), the staff agrees with the SNL analyses and conclusions. The ampacity derating test program questions, the licensee's response, and the staff's evaluation of the responses follow.

ENCLOSURE

2.1 Ampacity Derating Test Review

- Question 1

Sandia National Laboratories (SNL) has noted that the test ampacity value for the 4" conduit protected by the MTS-1 fire barrier system is questionable. The subject test result which was submitted in the Underwriters Laboratory (UL) report entitled, "Ampacity Test Investigation of Raceway Fire Barriers for Conduit and Cable Tray Systems," is believed to have a false high ampacity test value similar to the false high indications which were identified by UL in Test Article 1 and 2, 1" conduit - baseline tests. The basis for this finding by SNL is discussed in Section 3.3.1 of the SNL Letter Report dated March 7, 1997, (Attachment 2). You are requested to comment on the subject finding and to discuss the impact of the alternate ampacity derating value (33%) as calculated by SNL on the existing ampacity margin for the 4" conduit protected by the MTS-1 fire barrier system. Further, you are requested to provide the available ampacity margins (i.e., after application of derating factors) for all applicable electrical raceways which are protected by fire barriers.

Licensee Response

In its submittal dated July 3, 1997, the licensee did not provide any new information to confirm SNL's concerns regarding the subject test specimen. Rather, the licensee stated that they would accept the use of the Ampacity Derating Factor (ADF) of 33% which estimated by SNL in lieu of the nominal test value of 23%.

Staff Response

The information provided by the licensee fully resolves the staff's concerns.

- Question 2

The subject test report's drawings indicate that the cable trays for baseline ampacity tests did not have solid tray covers, however, the test documentation did not explicitly state that in the tested configuration. You are requested to confirm that the cable tray baseline ampacity tests were all performed in the absence of any solid tray covers having been installed on the test items.

Licensee Response

In its submittal dated July 3, 1997, the licensee stated that the tray covers were present during the baseline test of each cable tray test specimen.

Staff Response

The information provided by the licensee fully resolves the staff's concerns.

2.2 Application of Ampacity Derating Methodology

Although the licensee did not provide the fire barrier enclosed ampacity margins (i.e., after application of derating factors) for all applicable electrical raceways which are protected by fire barriers these parameters are available for onsite review and verification by the staff. The test results for each fire barrier system are summarized in the table below.

Table: Summary of FPC Test Results			
Test Item	Barrier System	ACF (%)	ADF (%)
1" Conduit Tests	1-hr Thermo-Lag	No Result*	No Result*
	3-hr Thermo-Lag	104	-4.26
	MPF-60 Upgrade	83.8	16.2
	MPF-180 Upgrade	84.3	15.7
	MTS-1	81.8	18.2
	MTS-3	77.5	22.5
4" Conduit Tests	1-hr Thermo-Lag	103	-3.31
	3-hr Thermo-Lag	97.3	2.69
	MPF-60 Upgrade	80.1	19.9
	MPF-180 Upgrade	76.5	23.5
	MTS-1**	66.7	33.3
	MTS-3	66.5	33.5
Cable Tray Tests	1-hr Thermo-Lag	59.0	41.0
	3-hr Thermo-Lag	58.6	41.4
	MPF-60 Upgrade	44.4	55.6
	MPF-180 Upgrade	42.1	57.9
	MTS-1	39.7	60.3
	MTS-3	36.1	63.9

*No results reports due to problem with original baseline test and inability to repeat clad test.
 **This value is based on the SNL reanalysis as discussed in 2.2.2 and Appendix A of the SNL Report dated July 3, 1997, (Attachment 2).

Based upon the licensee's adherence to IEEE P848, the industry ampacity derating test procedure and the resolution of the MTS-1 4" conduit test specimen the ampacity derating test results for cables at Crystal River Nuclear Plant, Unit 3, are acceptable.

It should be noted that the negative ampacity derating results which were recorded during the FPC conduit ampacity testing are not unusual and these type of findings have been observed during Tennessee Valley Authority ampacity tests for Watts Bar, Unit 1. Further, as indicated in the Letter from C. Berlinger, NRR Electrical Engineering Branch Chief, to A.K. Gwal, IEEE Task Force 12-45 Chairman, dated October 13, 1994 (Attachment 2), the staff has been extensively involved in the resolution of concerns regarding these anomalies. Contrary to the implication from these negative ampacity derating indications that Thermo-Lag material is a non-insulating material, the staff concludes that the test procedure IEEE P848 has limitations during the testing of small raceway configurations. Therefore, the licensee should select an appropriate (i.e., non-zero positive) substitute ampacity derating value in lieu of the negative ampacity derating test parameters.

3.0 CONCLUSIONS

From the above evaluation, the staff concludes that no significant safety hazards are introduced through use of the licensee's ampacity derating test results. Therefore, the application of Thermo-Lag fire barriers to enclose cables at Crystal River Nuclear Plant, Unit 3 does not represent a safety concern with respect to ampacity. It is recommended however, that the staff evaluation be used in a followup site inspection to verify implementation of the licensee changes to its design documentation.

Attachments: 1. SNL Technical Evaluation Letter
2. C. Berlinger ltr. dtd. 10/13/94

Principal Contributor: Ronaldo V. Jenkins, NRR

Date: **January 21, 2000**