



Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

November 24, 2003

L-2003-288  
10 CFR § 50.73

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

Re: St. Lucie Unit 1  
Docket No. 50-335  
Reportable Event: 2003-003-00  
Date of Event: September 25, 2003  
Fire Seals Inoperable Due to  
Inadequate Qualification Testing

The attached Licensee Event Report 2003-003 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

A handwritten signature in black ink, appearing to read 'WJ', is written over a horizontal line.

William Jefferson, Jr.  
Vice President  
St. Lucie Nuclear Plant

WJ/KWF  
Attachment

Handwritten initials 'JEDR' in black ink, located in the bottom right corner of the page.

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

<b>1. FACILITY NAME</b> St. Lucie Unit 1	<b>2. DOCKET NUMBER</b> 05000335	<b>3. PAGE</b> Page 1 of 5
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**4. TITLE**  
Fire Seals Inoperable Due to Inadequate Qualification Testing

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	25	2003	2003	- 003	- 00	11	24	2003	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 1	<b>10. POWER LEVEL</b> 100	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)</b>								
		<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)					
		<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)					
		<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 73.71(a)(4)					
		<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(5)					
		<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> OTHER					
		<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A					
		<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)						
		<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)						
		<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
		<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						

**12. LICENSEE CONTACT FOR THIS LER**

NAME Kenneth W. Frehafer, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (772) 467 - 7748
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	-	PEN	X999	NO	-	-	-	-	-

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>	MONTH	DAY	YEAR

**16. ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On September 25, 2003, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. FPL determined that 16 cable tray fire penetration seals were inoperable due to inadequate qualification testing methods. The documented test results do not provide an adequate basis for qualification of the barriers as three-hour fire barriers. Condition reports were initiated for these conditions and fire impairments were logged against the affected fire seals in accordance with the St. Lucie Fire Protection Program.

The apparent lack of detail during the initial St. Lucie Unit 1 10 CFR 50, Appendix R licensing activities led to this condition.

Compensatory fire watches were verified to be in place at the time of discovery in the affected fire areas. FPL is evaluating corrective actions to resolve the identified condition.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**Description of the Event**

On September 25, 2003, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. Quality Assurance (QA) personnel were conducting a scheduled triennial fire protection audit. The audit team included two qualified fire protection engineers. Their review of the Gold Bond qualification fire test reports for 16 one-sided marinite board cable tray penetration seals [EIIS:PEN] concluded that the fire test was inconclusive based on the following:

- The type of the cable used in the tested configuration was not identified and therefore cannot be compared to the cables installed in St. Lucie Unit 1.
- The test described burning cables but did not identify which side of the penetration the burning was occurring. It was probable that the fire was on the exposed side but it is not so stated.
- After the test was started, the 6th and 7th configurations of the test penetration were modified by adding Cerafelt. Therefore, a steady state condition was not maintained throughout the test.
- Per the original test criteria of ASTM E-119-73, cotton was to be at the penetration from the start of the test. On tested configuration number 7, the cotton was not placed at the penetration until 85 minutes into the test at which time the cotton ignited at 88 minutes (i.e. 3 minutes later) versus the required 180 minutes.
- For tested configuration number 6, the cotton ignited at 135 minutes versus the required 180 minutes.

In addition to the above, the Gold Bond test report for the subject penetrations indicated that the test was an "exploratory" test, not an official fire test. The 16 penetrations in question are designated 430-BW-159-001, 430-BW-159-002, 430-BW-159-003, 430-BW-159-004, 430-BW-161-002, 430-BW-161-003, 430-BW-162-003, 430-BW-162-004, 430-BW-162-005, 430-BW-167-001, 195-S-003, 195-S-004, 195-01B-001, 195-01B-002, 195-01B-003, and 430-S-004.

A condition report was initiated and, in accordance with the Fire Protection program, fire impairments were logged against the 16 fire penetration seals. FPL verified that no new fire watches were required to cover the affected fire areas/zones and the subject penetrations were included in the fire impairment log.

**Cause of the Event**

The one-sided marinite board penetration fire testing conducted by Gold Bond was performed in 1975. In 1976, as a result of the Browns Ferry fire, the NRC issued Branch Technical Position (APCSB) 9.5-1, "Fire Protection Program." On February 24, 1977, the NRC issued Appendix A to Branch Technical Position APCS 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976." Appendix A to Branch Technical Position 9.5-1 provided guidance regarding cable and cable tray penetration seals in that the seals should provide protection equivalent to the associated fire barrier, and as a minimum meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including the hose stream test.

On May 11, 1976, the NRC requested by letter that FPL conduct an examination to compare existing fire protection provisions at St. Lucie Unit 1 with the guidelines in Standard Review Plan 9.5-1. FPL, using the guidance from Appendix A to Branch Technical

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Position 9.5-1, responded on March 31, 1977 to the NRC request. FPL described the Gold Bond test for penetration fire seals. FPL described the Gold Bond test as "conducted in accordance with the standard methods of ASTM E119-73, with exception of the hose stream test... The test demonstrated that, for the three-hour test period, each fire stop design contained the fire, i.e., the fire did not pass through the fire stop." The NRC issued a Safety Evaluation Report with Amendment 33 to the Operating License on August 17, 1979. In the SER, the NRC recognized that "tests of the typical types of electrical cable penetrations were conducted at Florida Power & Light's Material Test Laboratory and at outside test facilities... The testing program included tests in accordance with the requirements of ASTM E119-73 with exception of the hose stream test nozzle. The tests demonstrated that the fire barrier penetrations would resist the passage of fire for at least 3 hours and no water penetrated the test wall during the hose stream tests."

Extensive search through historical microfilm was performed, but FPL test reports or insights into decisions and discussions involving the NRC were not found. FPL was unable to determine what the NRC reviewed or what additional testing was performed at FPL's Material Test Laboratory and provided to the NRC. Therefore, it is unclear what the bases were for utilizing the Gold Bond fire tests as the qualifying tests for cable tray penetration fire seals at St. Lucie. What is clear from a review of the Gold Bond test report, and other records from that era, is that the documentation requirements in the 1970's were not as stringent as are required today.

**Analysis of the Event**

Per NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73," Revision 2, Section 3.2.4, missing fire barriers such that the required degree of separation for redundant safe shutdown trains is lacking are reportable as an unanalyzed condition that significantly degraded plant safety. At the time of discovery 1-hour roving fire watches for the affected areas were already in place for other reasons (and had been in place for some time). Therefore, this event was not reportable under 10 CFR 50.72, but is reportable under 10 CFR 50.73(a)(2)(ii)(B) as an LER.

**Analysis of Safety Significance**

The extent of condition review concluded that the fire qualification test reports for remaining St. Lucie cable tray fire penetration seals were valid. This review also concluded that there were no references to the subject Gold Bond test report as the qualifying test report for any cable tray penetration fire stops on Unit 2.

These penetrations are part of barriers that provide separation between redundant trains required for safe shutdown of the plant in the event of a fire. The affected fire barriers are the walls between the following fire areas:

- Fire Area/Zone B/57, Cable Spread Room to Fire Area/Zone Z/83, Reactor Auxiliary Building West Stairwell (Block Wall 167)
- Fire Area/Zone B/57, Cable Spread Room to Fire Area/Zone A/60, "A" Switchgear Room (Block Wall 162)
- Fire Area/Zone A/60, "A" Switchgear Room to Fire Area/Zone E/61, HVAC Equipment Area (Block Wall 159)
- Fire Area/Zone A/60, "A" Switchgear Room to Fire Area/Zone C56, "B" Switchgear Room (Block Wall 161)

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- Fire Area/Zone C/55W, Main Hallway West (EL. 19.50'), Cable Loft Area to Fire Area/Zone O/36, Main Hallway (EL. -0.50')
- Fire Area/Zone C55W, Main Hallway West (EL. 19.50'), Cable Loft Area to Fire Area/Zone D/78, "B" Electrical Penetration Room (West)
- Fire Area/Zone B/57, Cable Spread Room to Fire Area/Zone C/55W, Main Hallway West (EL. 19.50'), Cable Loft Area (EL. 28.67')

FPL originally submitted details of the fire endurance testing performed on cable tray fire stops to the NRC Staff per FPL letter L-77-102 dated March 31, 1977. In response to a request for additional information regarding the fire stops, FPL provided sketches per FPL letter L-78-315 dated September 29, 1978. The NRC documented that the cable tray fire stops met the objectives and were acceptable per NRC letter dated August 17, 1979. The basis for the acceptable was the fact that the tests demonstrated that, for the three-hour test period, each fire stop design contained the fire (i.e., the fire did not pass through the fire stop). Testing of the horizontal cable tray fire stops was conducted in accordance with the requirements of ASTM E119, with the exception of the hose stream test nozzle.

In accordance with accepted fire protection practice, the combustible fire loading of a zone can be used to judge the adequacy of the fire area boundary barriers. Each fire loading increment of 80,000 Btu per sq. ft. indicates the need for an additional one hour of fire rating for the barriers. The relative fire hazard of a zone may be considered as low if the combustible fire loading is below 80,000 Btu per sq. ft., moderate if below 160,000 Btu per sq. ft., and high if above 160,000 Btu per sq. ft.

The following is a summary of the combustible loading for the affected fire area/zones:

<u>Area/Zone</u>	<u>Description</u>	<u>Fire Loading</u>	<u>Rating</u>
B/57	Cable Spread Room (CSR)	241.13 x 10 <sup>3</sup> Btu/sq.ft.	High
Z/83	RAB West Stairwell	84.96 x 10 <sup>3</sup> Btu/sq.ft.	Moderate
A/60	"A" Switchgear Room	136.64 x 10 <sup>3</sup> Btu/sq.ft.	Moderate
E/61	HVAC Equipment Area	89.38 x 10 <sup>3</sup> Btu/sq.ft.	Moderate
C/56	"B" Switchgear Room	45.17 x 10 <sup>3</sup> Btu/sq.ft.	Low
C/55W	Main Hallway West (EL 19.50')	106.48 x 10 <sup>3</sup> Btu/sq.ft.	Moderate
O/36	Main Hallway (EL -0.50')	148.99 x 10 <sup>3</sup> Btu/sq.ft.	Moderate
D/78	"B" Electrical Pen Room	174.88 x 10 <sup>3</sup> Btu/sq.ft.	High

The CSR and the "B" Electrical Penetration Room have high combustible loadings. The principle combustible loading for the CSR and "B" Electrical Penetration Room is cable insulation (220.9 x 10<sup>3</sup> and 138.50 x 10<sup>3</sup> Btu/sq.ft., respectively). The CSR has an installed automatic suppression system (Halon 1301). In addition, previous fire modeling performed for the CSR, without taking credit for automatic suppression, demonstrated that for the maximum expected fire scenario, the room does not reach "flashover" conditions (932 to 1,112 degrees Fahrenheit). Although there is no automatic suppression system in the "B" Electrical Penetration Room, there are few ignition sources in the room. In addition, all the zones are provided with ionization type smoke detection. These detectors will initiate an alarm in the Control Room and indicate locally should a fire occur.

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Based upon the above, FPL's initial assessment of the subject fire stops is that they are expected to be capable of providing a sufficient barrier based upon the functionality of the fire stop (i.e., not pass fire after three hours of a ASTM E119 test) when due consideration is given to the combustible loadings and/or ignition sources in the affected fire areas. Although FPL considers that the preliminary safety significance of this issue is low, the issue will be further developed as part of the corrective actions associated with the fire stops.

**Corrective Actions**

1. Compensatory fire watches were posted against the inoperable fire barriers in accordance with the St. Lucie Fire Protection program.
2. FPL is evaluating the corrective actions necessary to correct the condition.

**Additional Information**

Failed Components Identified

Various field-implemented cable tray fire penetration seals qualified under Gold Bond fire test report WP-387.

Similar Events

None