



November 1, 1999

L-99-238
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: 1999-005-00
Date of Event: October 5, 1999
Pressurizer Pressure Instrumentation
Cable Separation Outside Appendix R Design Bases

The attached Licensee Event Report 1999-005 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 "J. A. Stall", is written over the typed name.

J. A. Stall
Vice President
St. Lucie Nuclear Plant

JAS/EJW/KWF
Attachment

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

Handwritten initials "IE22" 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.

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St. Lucie Unit 1

DOCKET NUMBER (2)

05000335

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TITLE (4)

Pressurizer Pressure Instrumentation Cable Separation Outside Appendix R Design Bases

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	05	1999	1999	- 005	- 00	11	01	1999	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		000	20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)	50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)	X		50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	Kenneth W. Frehafer, Licensing Engineer	TELEPHONE NUMBER (include Area Code)	(561) 467 - 7748
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	NA	NA	NA	NO	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 5, 1999, St. Lucie Unit 1 was in Mode 6 during a refueling outage. FPL engineers finished their initial assessment of the inside containment Appendix R cable separation walkdowns. This walkdown was planned as part of the continuing safe shutdown analysis validation effort.

The assessment results showed that pressurizer pressure instrumentation did not meet the required 10 CFR 50 Appendix R cable separation criteria inside containment at the penetration area where the cables for pressurizer pressure transmitters PT-1102B and D pass over the penetrations for PT-1102A and C.

FPL determined that this 10 CFR 50 Appendix R noncompliance does not adversely affect the fire protection program, and that the pressurizer pressure instrumentation remains operable with respect to the required safe shutdown functions. Modifications required to place the field condition within design basis conditions will require extensive engineering, procurement and construction time, and are planned to be performed during the next St. Lucie Unit 1 refueling outage.

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

Description of the Event

On October 5, 1999, St. Lucie Unit 1 was in Mode 6 during a refueling outage. FPL engineers finished their initial assessment of the inside containment Appendix R cable separation walkdowns. This walkdown was planned as part of the continuing safe shutdown analysis (SSA) validation effort. The results of the walkdown were evaluated to the following separation requirements:

- 7 feet horizontal and on different floor elevations (exemption K1) , or
- 20 feet horizontal with no intervening combustibles (III.G.2.d) , or
- separated by a radiant energy shield (III.G.2.f)

The first requirement is based on the correspondence submitted to the NRC in support of exemption K1. Specifically, letter L-83-488 dated September 16, 1983, called out specific separation for cables in cable trays. This letter stated that redundant cables in cable trays were separated by 7 to 11 feet horizontally and run at different elevations (i.e. one cable in a tray at El. 18 feet with the redundant cable in a tray at El. 45 feet. The exceptions to this are the power operated relief valves (PORVs) which were stated to be on the same elevation (45 feet) and protected by lower trays which act as radiant energy shields. The SER that approved exemption K1 stated that redundant cable trays were separated by a horizontal distance of more than 7 feet and run at different elevations. The UFSAR does not have these requirements, but it is clear from the SER that the NRC approval was based on these requirements. Therefore, FPL conservatively applied these requirements for cable separation in containment.

The assessment results showed that the pressurizer pressure instrumentation did not meet the required cable separation criteria for some areas of containment. FPL letter L-83-488 stated that redundant pressurizer pressure transmitters are located on elevations 23 and 62 feet with cables routed in separate trays on the 18 and 45 feet elevation with greater than 7 feet horizontal separation. It appears that this is generally true except for the penetration area where the cables for pressurizer pressure transmitters [EIIS:AB:PT] PT-1102B and D pass over the penetrations for PT-1102A and C. Additionally, pressurizer control system pressurizer pressure transmitters 1100X and 1100Y also lack cable separation. Therefore the requirements for exemption K1 are not met.

FPL determined that this 10 CFR 50 Appendix R noncompliance does not adversely affect the fire protection program, and that the pressurizer pressure instrumentation remains operable with respect to the required safe shutdown functions. Modifications required to place the field condition within design basis conditions will require extensive engineering, procurement and construction time, and will be performed during the next scheduled refueling outage.

Cause of the Event

The cause of this event is the fact that the original design basis was not adequately documented when the information was submitted to the NRC. Reliance on this information resulted in the SSA not considering several aspects of equipment and cable separation within containment. The source of the design basis is not clear. Current procedures require better documentation and would have alleviated these concerns should they have been in effect at the time the original work was performed.

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Analysis of the Event

The condition noted above is reportable with respect to 10 CFR 50.73(a)(2)(ii)(B) as "Any event or condition that resulted in... the nuclear power plant... being in a condition that was outside the design basis of the plant." The walkdown results document that pressurizer pressure instrumentation cabling does not meet the design bases for cable separation as delineated in the UFSAR and in letters to the NRC demonstrating Appendix R compliance. The lack of separation at the penetration area does not meet the requirements of Appendix R III.G.2 nor the requirements of exemption K1.

Although this condition was discovered when St. Lucie Unit 1 was shutdown during a refueling outage, this condition was not corrected prior to the unit restart from the Fall 1999 refueling outage. As this would result in operation of the plant outside its design bases, FPL conservatively notified the NRC of this condition prior to restart in accordance with 10 CFR 50.72(b)(1)(iii)(B) on October 14, 1999, prior to unit restart.

Analysis of Safety Significance

Fire protection for nuclear plants is based on the defense in depth concept. The above concerns affect only the third tier, Appendix R design features (i.e., cable separation) of the fire protection program. The first two echelons (prevention of fires and prompt detection and suppression of fires that do occur) remain intact. The lack of cable separation does not eliminate fire protection defense in depth, but instead is considered a degradation in the ability to safely shutdown should a fire occur that could not be controlled. However, as outlined below, the probability for such a fire inside containment during power operation is remote.

As stated in the correspondence for approved exemption K1, the combustible loading for containment is low and in the area where the lack of separation occurs consists of mostly cable insulation which has a high ignition temperature. All non-IEEE 383 cables are covered with a fire retardant coating. The containment has a large volume with a high ceiling, which would dissipate the hot gases from a fire to the upper area of containment away from the affected area. The basic statement contained within exemption K1 is that the possibility of a fire in containment is remote and that any fire would not affect anything except for a small localized area. The containment is inspected prior to operation for items that could impact sump operability; therefore, the potential for transient combustibles is precluded. In addition, the containment is a radiation control area as well as a foreign material exclusion area with very limited access during power operation. The possibility of introducing new transient combustibles is very small. The area of concern is from column line 1 to 7 (radiant energy shield) outside the biological shield wall. This area has fire detectors that would provide prompt notification of a fire to the control room. Sufficient fire fighting equipment is available to extinguish any potential fire. Therefore, any fire that is postulated to occur should not cause significant damage and any damage is expected to be localized.

10 CFR 50 Appendix R III.G.2 states that cable separation protects required safe shutdown equipment from maloperation of equipment of the redundant train or associated circuits. This maloperation is defined as being caused by hot shorts, open circuits, or shorts to ground. In the event of a postulated fire inside containment, circuit failures could cause the pressure transmitters to spuriously provide abnormal signals to the reactor protection system (RPS) high pressurizer pressure bistable trip units, the thermal margin/low pressure bistable trip units,

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Analysis of Safety Significance (cont'd)

the engineered safety features actuation system (ESFAS) cabinet for use in the safety injection and diverse scram system actuation logic, low-low alarm function, and pressurizer pressure control system. In addition, control room indication of pressurizer pressure could be compromised.

Spurious Equipment Operation Considerations

PT-1102A, PT-1102B, PT-1102C and PT-1102D are safety related narrow range (1500 - 2500 psia) pressurizer transmitters for the pressurizer pressure measurement loops. The narrow range pressurizer pressure instrument loops provide a signal to the RPS high pressurizer pressure bistable trip units, the thermal margin/low pressure bistable trip units, the ESFAS cabinet for use in the safety injection and diverse scram system actuation logic, low-low alarm function, and control room indication. In addition, cables for the pressurizer transmitters, which are input to the pressurizer pressure control system, are routed in the same manner as the other pressurizer pressure transmitters. For design basis accident mitigation (UFSAR Chapter 15), the pressurizer pressure transmitters are not impacted and remain operable.

Using the separation criteria per exemption K1, a fire in the penetration area of containment at elevation 23 feet-0 would affect pressurizer transmitters PT-1102A (cable 10372A*-MA), PT-1102B (cable 10373A*-MB), PT-1102C (cable 10374A*-MC) and PT-1102D (cable 10375A*-MD). The identified cables provide the interface between the protection system pressurizer pressure transmitters and the remaining portions of each instrument loop. Depending on the cable failure mode the pressure signals could fail either high or low.

If two or more channels failed in the high direction, the following actions would occur:

- A reactor trip on high pressurizer pressure would occur.
- PORV open signals would be generated. Spurious operation of PORVs is precluded by placing the PORV control switches in override and by isolation of PORV block valves V1402 and V1404. These actions are currently in the response to fire procedure for an in-containment fire.

If two or more channels failed in the low direction, the following actions would occur:

- A reactor trip on thermal margin/low pressure (TM/LP) would occur.
- Safety injection and containment isolation would actuate. The response to fire procedure currently contains compensatory measures for a spurious safety injection actuation system (SIAS) signal.

In addition, the same fire could potentially affect pressure transmitters PT-1100X and PT-1100Y that provide input to the pressurizer pressure control system.

Damage to PT-1100X and PT-1100Y could potentially cause spurious operation of the pressurizer spray valves and/or pressurizer heaters. In the event that this control is lost, manual control will be used for the pressurizer heaters and the appropriate reactor coolant pumps (RCPs) will be stopped to prevent excessive spray flow. These manual actions are addressed in the SSA.

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Analysis of Safety Significance (cont'd)

Loss of Pressurizer Pressure Indication Considerations

Interpreting the protection requirements for cable trays carrying pressurizer pressure instrument cables in the same manner as described and accepted for high/low pressure interface cable trays yields the following:

- Between column lines 1 and 5, as well as between column lines 6 and 7, cable trays M120, C120 and L120 are located below cable tray L131, which contains the cable for PT-1104 (low range), PT 1102D (high range) and PT-1108 (wide range). Thus, these circuits would be considered functional post fire.
- Between column lines 1 and 6, high range (PT-1102C) and wide range (PT-1108) meet the separation requirements.
- Between column lines 1 and 7 the cable trays for redundant wide range and low range pressurizer pressure indication are greater than 7 feet apart and above the 45 feet elevation. This is over 25 feet from the floor elevation. No credible fire can affect the cables in these trays in an open environment such as containment; thus this indication will be available.

Based on the above, the probability of a fire causing significant damage such that all pressurizer pressure indication is impaired is very low. It is clear from the preceding discussion that the loss of all pressurizer pressure indication is not credible. However, the St. Lucie Unit 1 fire response procedure was revised to provide the operators with the following alternative primary system pressure indication in the incredible event all pressurizer pressure indication is lost:

- Charging line pressure indication PIA-2212 (0-3000 psia), or
- Primary sample line pressure gauge, PI-5510 (0-3000 psia).

Conclusion

In summary, the safety significance of this condition is very low as is the probability of a fire in containment. Should a fire occur, spurious equipment operation due to postulated failures of pressurizer pressure instrumentation is already addressed in the St. Lucie Unit 1 SSA. Additionally, in the incredible event that all pressurizer pressure indication is lost, alternate means of reactor coolant system (RCS) pressure indication are available. Therefore, this event had no adverse impact on the health and safety of the public.

Corrective Actions

1. FPL will design and implement modifications for the pressurizer pressure instrumentation cabling to resolve the cable separation issue during the next scheduled refueling outage (SLI-17) for St. Lucie Unit 1.
 2. A temporary change to procedure 1-ONP-100.01, "Response to Fire," was issued prior to the startup of Unit 1 from the Fall 1999 refueling outage to provide additional means of obtaining pressurizer pressure in the event of an in-containment fire
- Additional Information

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Failed Components Identified

None

Similar Events

The following LERs were submitted for fire protection deficiencies discovered during St. Lucie fire protection self-assessment activities.

1. LER 50-335/1998-004, "Emergency Lighting Units Not Provided for Alternate Shutdown Access/Egress Routes."
2. LER 50-335/1998-005, "Conditions Identified Outside Appendix R Design Basis."
3. LER 50-389/1998-001, "Outside Design Basis Based on Appendix R Safe Shutdown Analysis."
4. LER 50-389/1998-007, "Appendix R Reverification Identified Potential Cable Failure Modes."