CATEGORY 1

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FACIL:50-389 St. Lucie Plant, Unit 2, Florida Power & Light Co. 05000389
AUTH.NAME AUTHOR AFFILIATION
FREHAFER,K.W. Florida Power & Light Co.
STALL,J.A. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 99-004-01:on 990415,as found cycle 10 PSV setpoints were outside TS limits.Caused by manufacturing process defect. All three PSVs were replaced with pre-tested valves during cycle 11 refueling outage.With 990630 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
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FPL

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

June 30, 1999

L-99-148
10 CFR § 50.73

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

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 1999-004-01
Date of Event: April 15, 1999
As Found Cycle 10 Pressurizer Safety Valve
Setpoints Outside Technical Specification Limits

The attached revision to Licensee Event Report 1999-004 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

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

JAS/EJW/KWF
Attachment

IE22

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

9907070215 990630
PDR ADOCK 05000389
S PDR

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

As Found Cycle 10 Pressurizer Safety Valve Setpoints Outside Technical Specification Limits

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
04	15	1999	1999	- 004 -	01	06	30	1999	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	050

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		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	TELEPHONE NUMBER (Include Area Code)
Kenneth W. Frehafer, Licensing Engineer	(561) 467 - 7748

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
X	AB	RV	C710	YES	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

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

On April 15, 1999, St. Lucie Unit 2 was in Mode 1 at approximately 50 percent reactor power. Wyle Labs informed FPL of unsatisfactory test results for the code pressurizer safety valves (PSVs) removed during the cycle 11 refueling outage. Wyle Labs was contracted to perform the offsite pressurizer safety valve testing and the testing was conducted within the required time restraints.

Technical Specification 3.4.2.1 requires the PSVs to lift at 2500 psia (+/-1 percent). The as found settings of the removed St. Lucie Unit 2 pressurizer safety valves were from 1.6 to 3.8 percent high, outside the Technical Specification tolerance limit of +/- 1 percent.

The cause of the highest failed pressurizer safety valve test was a manufacturing process defect, and all pressurizer safety valves experienced mechanical setpoint drift over the operating cycle.

There is no past or present operability concern as the subject pressurizer safety valves were removed and replaced with pre-tested valves during the St. Lucie Unit 2 cycle 11 refueling outage. There was no affect on the health and safety of the public during past St. Lucie Unit 2 cycle 10 power operations because the limiting overpressure analyses remain bounded when actual St. Lucie Unit 2 cycle 10 operational parameters were considered.

Description of the Event

On April 15, 1999, St. Lucie Unit 2 was in Mode 1 at approximately 50 percent reactor power. Wyle Labs informed FPL of unsatisfactory test results for the code pressurizer safety valves (PSVs) [EIIS:AB:RV] removed during the cycle 11 refueling outage.

In accordance with the inservice testing (IST) program, pressure relief devices are tested per ANSI/ASME OM-1987, Part 1, "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices." Section 1.3.3, "Test Frequency, Class 1 Pressure Relief Devices," of the code requires testing within 12 months of removal from service when the surveillance requirements are satisfied by installing a full complement of pre-tested valves. Wyle Labs was contracted to perform the testing and the testing was conducted within the required time restraints.

Technical Specification 3.4.2.1 requires the PSVs to lift at 2500 psia (+/-1 percent). The as found settings of the Unit 2 PSVs were outside the Technical Specification tolerance limit of +/- 1 percent. As shown below, the deviation ranged from 1.6 to 3.8 percent high for the three valves.

Valve	Serial Number	Set Pressure	Acceptable Range	As Found Set Pressure	Result
V1200	N84217-00-0005	2500 psia	2475-2525 psia	2539.7 psia	1.6% High
V1201	N84217-00-0008	2500 psia	2475-2525 psia	2593.7 psia	3.8% High
V1202	N84217-00-0007	2500 psia	2475-2525 psia	2567.7 psia	2.7% High

No present operability concern exists, as the PSVs were all removed and replaced with pre-tested valves during the St. Lucie Unit 2 cycle 11 (SL2-11) refueling outage under work orders (WO) 98001961, 98001960, and 98001959.

Cause of the Event

The cause of the 3.8 percent high pressurizer safety valve setting was an inadequate manufacturing process and mechanical setpoint drift. The cause of the other high settings was mechanical setpoint drift.

The ANSI/ASME OM-1987, Part 1, code requires that a cause determination be performed and corrective actions implemented for any valve exceeding its nameplate setpressure by 3 percent or greater. Only one valve, V1201 (S/N N84217-00-0008), exceeded this 3 percent threshold and is the first new block body valve to exceed this criteria. Investigation into this failure indicates that it was caused by an inadequate manufacturing process. Specifically, the spring coil was not perfectly flat and resulted in misalignment of the load train (loading of the disc from the spring assembly). This caused minor scoring of the internal guides that resulted in a larger opening force (which corresponds to a higher as found setpressure). Eight of the nine new block body valves have been inspected or overhauled since they were originally purchased, and no similar manufacturing defects have been noted.

Additionally, based on the limited historical block body pressurizer safety valve testing data, the actual drift over one operating cycle averages 1.4 percent and the prevalent trend is upward. All three Unit 2 valves exhibited an upward setpoint drift. The three valves tested following the St. Lucie Unit 1 cycle 15 refueling outage did not display this upward trend.

Analysis of the Event

FPL reviewed NUREG-1022, Revision 1, "Event Reporting Guidelines 10 CFR 50.72 and 50.73," and determined that this event is reportable under 10 CFR 50.73(a)(2)(i)(B) as "any operation or condition prohibited by the plant's Technical Specifications." Although discrepancies found in Technical Specification surveillance tests should be assumed to occur at the time of the test, the existence of multiple sequential test failures involving safety valves may be an indication that the discrepancies arose over a period of time. Therefore, the condition may have existed during plant operation.

Analysis of Safety Significance

As described in the UFSAR, Section 5.4.13.2, the reactor coolant system (RCS) is protected against overpressure by protective and control devices such as the pressurizer spray system, the power operated relief valves, and the high-pressure reactor trip. In addition to these features, three ASME Code PSVs ensure that RCS piping and components are protected from overpressure in accordance with ASME code requirements. No present operability concern exists, as the PSVs were all removed and replaced with pre-tested valves during the cycle 11 refueling outage.

An assessment of the accident analyses was performed to determine if the setpoint deviations could have led to the violation of overpressurization limits during the operation of cycle 10. The function of pressurizer safety valves in the safety analyses is to mitigate the consequences of overpressurization events by limiting peak pressure below the acceptance limits. The limiting overpressurization events are in the category of "Decrease in Heat Removal by the Secondary System." The limiting events in this category affected by deviations in PSV setpoints are the feedline break and loss of condenser vacuum analyses.

Feedline Break

A revised feedline break analysis has recently been performed for St. Lucie Unit 2 as part of the reload process improvement (RPI) to be implemented for cycle 12. The RPI is described in FPL Letter L-98-308, "St. Lucie Unit 2, Docket No. 50-389, Proposed License Amendment, Cycle 12 Reload Process Improvement." The feedline break analysis of letter L-98-308 bounds the operation of cycle 10, the current cycle and anticipated future cycles. The revised feedline break analysis, which used a conservative PSV setpoint of 2575 psia, showed acceptable results with respect to the overpressurization criteria for primary and secondary systems. Since the average as-found setpressure of the PSVs to be evaluated is 2568 psia (i.e., <2575 psia), the results of the assessment bounds cycle 10 operation with these as-found setpoints (a lower PSV setpoint would open the valves earlier helping in the mitigation of the overpressurization event).

Loss of Condenser Vacuum

This is the limiting pressurization event for St. Lucie Unit 2. Similar to the feedline break analysis, a revised loss of condenser vacuum analysis has recently been performed for St. Lucie Unit 2 as part of the RPI to be implemented for cycle 12. This analysis bounds the operation of cycle 10, the current cycle and anticipated future cycles. The revised loss of condenser vacuum analysis, which used a PSV setpoint of 2550 psia, showed acceptable results with respect to the overpressurization criteria for primary and secondary systems. Since the average as-

Analysis of Safety Significance (cont'd)

found setpressure of the PSVs to be evaluated here is 2568 psia (>2550 psia), the inputs and assumptions of the analysis were evaluated to determine the impact of as-found set pressures that could have existed during cycle 10 operation (a higher PSV setpoint would open the valves later adversely impacting the mitigation of the overpressurization event).

A review of the RPI analysis determined that several key parameters are modeled conservatively as compared to the actual values applicable for cycle 10 operation. The values used in the RPI analysis and the corresponding cycle 10 values are listed below. Although a higher PSV setpoint would make the consequences worse, other parameters such as a higher initial pressurizer pressure, a lower analysis high pressure trip setpoint, a higher initial primary system temperature, and a less positive (or a negative) moderator temperature coefficient (MTC) would make the event less severe as described below.

- *Initial Pressurizer Pressure & High Pressure Trip Setpoint*:

  Increasing the initial pressure (> 30 psi) and reducing the trip pressure (20 psi) will result in an earlier reactor trip, substantially reducing the heat input into the RCS. An initial pressure of 2220 psia is consistent with the cycle 10 normal operating pressure of 2250 psia minus an uncertainty of 30 psi. Also, the high pressurizer pressure trip value of 2400 psia for this analysis is acceptable for cycle 10 which accounts for an uncertainty of 30 psi on the Technical Specification trip setpoint of 2370 psia. The reduction in heat input into the RCS due to an earlier reactor trip (based on these input changes) is expected to offset any adverse effects of a later opening of PSVs by 18 psi.

- *Initial RCS Temperature*:

  Increasing initial RCS temperature will result in increased heat removal to the secondary system providing some beneficial impact on the calculated peak RCS pressure.

- *Moderator Temperature Coefficient*:

  A less positive or a negative MTC would result in lower reactor power leading to a slower pressure increase up to the time of reactor trip. This reactor power at the trip time is important in determining the final peak pressures. An analysis value of -2 pcm/°F bounds cycle 10 operation which was predicted to have a MTC of < -5 pcm/°F at all times during cycle 10 at hot full power.

The impact of the above parameters was evaluated using RETRAN computer code. RETRAN is maintained by EPRI and is used extensively in the nuclear industry for non-LOCA safety analyses. RETRAN calculations were first done with the key parameter values the same as in the RPI analysis. RETRAN calculations were then repeated with the values changed to the cycle 10 values, as shown below.

Analysis of Safety Significance (cont'd)

Parameter	RPI Value	Cycle 10 Value
Initial Pressurizer Pressure, psia	2180	2220
Initial Core Inlet temperature, °F	535	545
High Pressurizer Pressure Trip setpoint, psia	2420	2400
Pressurizer safety Valve Opening Pressure, psia	2550	2568
Moderator Temperature Coefficient (MTC), pcm/°F	+3.0	-2.0
Initial Core Thermal Power, MWth	2754	2754

It was found that the impact of the higher PSV setpoints is more than offset by the parameter changes reflecting cycle 10 operation. The peak pressures for this event during cycle 10 operation thus would have remained bounded by the UFSAR analysis values.

RETRAN calculations showed that the peak RCS pressure is reduced by approximately 10 to 30 psi using cycle 10 specific conditions with as-found PSVs setpoints. The input changes addressed above have an insignificant impact on the peak secondary pressure.

Conclusion

As discussed above, the limiting overpressure events were bounded once the actual St. Lucie Unit 2 cycle 10 operational parameters were considered in the analyses. Therefore, FPL concludes that the as found PSV setpoints did not adversely affect the health and safety of the public during past cycle 10 operation.

Additionally, setpoint drift averaged 1.4 percent in the upward direction over an operating cycle. In order to conservatively evaluate the potential impact of this potential setpoint drift on the St. Lucie Unit 1 and 2 operating cycles, the as left settings of the six installed pressurizer code safeties were evaluated. The current analyses of record for St. Lucie Units 1 and 2 bound the expected average pressurizer code safety setpoint drift.

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

Corrective Actions

1. All three St. Lucie Unit 2 PSVs were replaced with pre-tested valves during the cycle 11 refueling outage (SL2-11) via work orders (WO) 98001961, 98001960, and 98001959. The removed valves will be overhauled and retested at Wyle Labs
2. FPL is developing a long term action plan to address potential pressurizer safety setpoint drift.

Additional Information

Failed Components Identified

Component: pressurizer safety valve

Manufacturer: Crosby

Model: HB-86-BP, forged block body design, size 3K6, assembly N84217

Similar Events

None