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

FPL

June 18, 2010

L-2010-127
10 CFR 50.73

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

Re: St. Lucie Unit 1 and 2
Docket No. 50-335
Reportable Event: 2010-003
Date of Event: May 5, 2010

Unanalyzed Condition Resulting from Alignment of Non-Essential CCW Header under Certain Accident Scenarios

The attached Licensee Event Report 2010-003 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Respectively,

for R. Anderson

Richard L. Anderson
Site Vice President
St. Lucie Plant

RLA/dlc

Attachment

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
St. Lucie Unit 1 and 2	05000335	1 OF 5

4. TITLE
Unanalyzed Condition Resulting from Alignment of Non-Essential CCW Header Under Certain Accident Scenarios

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	05	2010	2010	- 003 -	00	06	18	2010	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE: 1

10. POWER LEVEL: 100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☒ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Donald L. Cecchett - Licensing Engineer	772-467-7155

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	CC	HX	-	YES					

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

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

On May 5, 2010, St. Lucie Units 1 and Unit 2 were operating in Mode 1 at 100 percent power when the Onsite Review Group (ORG) validated the Station analysis that the condition discovered on August 7, 2009, was reportable. During a NRC Component Design Basis Inspection (CDBI), the inspection team questioned the operating philosophy of restoring a non-essential component cooling water (CCW) header to an essential header following a safety injection actuation signal (SIAS) for the purpose of sampling of the steam generators for activity and cooling of the reactor coolant pump (RCP) seals. Re-alignment of the non-essential CCW header following a large break loss-of-coolant accident (LBLOCA) for Unit 2 results in an unanalyzed condition that significantly degraded plant safety. Realignment of the non-essential CCW header following a LBLOCA, both Units 1 and 2 could result in the failure of 2 or more trains in different systems from properly completing their safety function if a failure were to occur on the non-essential CCW header.

The cause of the event was determined to be an inadequate EOP procedure review.

Corrective actions included revisions to emergency operating procedures (EOPs) to preclude alignment of the non-essential CCW header (N-header) to the essential CCW header, and issuance of a Standing Order providing guidance to the operating crews.

NARRATIVE

Description of the Event

On May 5, 2010, St. Lucie Unit 1 and Unit 2 were operating in Mode 1 at 100% power when the ORG validated the Station analysis that the condition discovered on August 7, 2009, was reportable. During a NRC CDBI, the inspection team questioned the operating philosophy of restoring a non-essential CCW [EIIS:CC] header to an essential header following a SIAS [EIIS:IB] to allow sampling of the steam generators for activity and cooling of the RCP [EIIS:AB] seals. This configuration results in an unanalyzed condition that significantly degraded plant safety for Unit 2 and results in the failure of 2 or more trains in different systems from properly completing their safety function if a failure were to occur on the non-essential CCW header for both Units 1 and 2.

Cause of the Event

The cause of the event was determined to be an inadequate EOP procedure review.

In 1992 a major philosophy change was incorporated into EOP procedures changes to incorporate training, operating experience (OE,) INPO enhancements, and human factor improvements documented over the previous year. Technical Staff reviews of the procedures at the time determined the proposed changes did not constitute a change to the UFSAR, and subsequent reviews by the ORG approved the changes. The procedures, as written, are in agreement with CEN-152, Combustion Engineering Emergency Procedure Guideline which is written to a "standard Combustion Engineering" design. Sections of the EOPs that could potentially put the plant outside of the design basis were reserved for plant specific instructions that should have been identified by the 50.59 process. The 50.59 process at the time did not identify the error nor did the ORG identify any concerns. Additionally the ORG determined that the changes were within the design basis.

Analysis of the Event

During the NRC CDBI, an inspector identified that Unit 1 Emergency Operating Procedure, 1-EOP-99, "Appendices/Figures/Tables/Data Sheets, Appendix A, "Sampling Steam Generators" and Appendix J, "Restoration of CCW and CBO to the RCPs" provides instructions to align the non-essential CCW header to the essential CCW header. Appendix A is used to align CCW in order to sample the steam generators. Appendix J is used to align CCW to provide cooling to the RCP seals. Both Units have a precaution statement in Appendix A and J which states, "Under SIAS conditions the CCW 'N' header should only be aligned to ONE essential header. This will maintain train separation while safeguards signals are still present." This precaution statement implies that both essential CCW headers are available, however a failure of one diesel generator would result in the loss of one of the essential CCW headers. Therefore, implementation of 1-EOP-99, Appendix A and J to align the non-essential CCW to an essential CCW header when only one essential header is available, under certain accident scenarios ,could potentially place the plant in an unanalyzed condition.

The safety-related functions performed by the CCW system include cooling of containment safety related components and reactor decay heat removal, cooling of

NARRATIVE

Unit 2 control room under certain accident conditions, and cooling of safety related components associated with achieving safe shutdown coincident with a loss-of-off-site power (LOOP.)

CCW system quality related functions during normal operation include RCP cooling, Unit 2 control room air conditioners, containment fan coolers and the spent fuel pool heat exchanger.

Evaluations

The effects on the ability of the structures, systems, components (SSC) to perform its specified safety function during times in which Operators would realign the non-essential CCW header was evaluated based on scenarios from simulator exercises. Situations where Operators would realign the non-essential CCW header included response to LOCA events and a main steam line break (MSLB).

The non-essential CCW header is designed to be automatically isolated from the two essential CCW headers by valve closure on a SIAS. Each essential CCW header has a pump and heat exchanger designed to supply the minimum safety feature requirements during shutdown or design basis accident conditions. Two scenarios for Unit 1 and Unit 2 were investigated to determine the impact of realigning the non-essential CCW header following a large break LOCA.

One scenario considered failure of one CCW pump and the other considered a LOOP with failure of one emergency diesel generator. The same two scenarios for Unit 1 and Unit 2 were investigated to determine the impact of realigning the non-essential CCW header following a MSLB.

It was concluded the Unit 1 Emergency Operating Procedure, 1-EOP-99, "Appendices/Figures/Tables/Data Sheets and Unit 2 Emergency Operating Procedure, 2-EOP-99, "Appendices/Figures/Tables/Data Sheets" each have Appendices A and J that provided instructions to align the non-essential CCW header to an essential CCW header after SIAS. A design basis LOCA coincident with a LOOP and a loss-of-diesel results in automatic isolation of the non-essential CCW header from the two essential CCW headers and concurrent failure of one essential CCW header. This realignment configuration would place Unit 1 and Unit 2 outside its design bases, however for the period of time of concern neither Unit entered this configuration and consequently did not require notification of the NRC.

The limiting design basis accidents for containment temperature and pressure are MSLB and LOCA. If either Unit experienced a MSLB or LOCA with the non-essential CCW header isolated from two essential CCW headers, and only one of the essential CCW headers Operable, then EOP-99 would direct realignment of the non-essential CCW header to the Operable essential CCW header. Aligning the non-essential CCW header under these conditions could divert CCW flow from the containment cooling systems and degrade the heat removal paths. The earliest realignment of the non-essential CCW header under MSLB conditions is 7 minutes into the event. In this case, containment peak pressure and temperature results are unaffected because blow-down from the rupture is complete within approximately two minutes for Unit 1 and 154 seconds for Unit 2. Therefore, MSLB is not a concern for either unit.

For a large break LOCA on Unit 1, the non-essential CCW header alignment affects containment heat removal in the long-term, but does not affect the blow-down or re-flood mass and energy releases. The initial peak in CCW temperature occurs when the containment fan coolers (CFCs) are actuated at approximately 30 seconds. This is

NARRATIVE

well before the alignment of the non-essential CCW header therefore, this peak is unaffected.

The additional heat load from the non-essential CCW header is significant and results in a higher CCW heat exchanger outlet temperature once the header is aligned. Two scenarios for Unit 1 were investigated to determine the impact of realigning the non-essential CCW header following a large break LOCA. One, for 13 minutes for failure of one CCW pump and one for 23 minutes for a LOOP with failure of one emergency diesel generator. The CCW "second peak" temperature is higher and occurs following the recirculation actuation signal. Each scenario was determined to be bounded by containment pressure and temperature analysis and not affected by realignment of the nonessential CCW header.

Analysis of Unit 2 for LOCA CCW temperature was more complex than Unit 1 due to limitations imposed by the control room air conditioning system. A spectrum of scenarios considering three break locations with minimum and maximum SI delivery was considered. Realignment of the non-essential CCW header following a large break LOCA for the period of concern would have resulted in an unanalyzed condition that significantly degraded plant safety in accordance with 10 CFR 50.73(a)(2)(ii). While this condition is reportable for Unit 2 because Control Room cooling is adversely affected, the existing long-term containment pressure and temperature response is not affected.

At the time of discovery this condition would not have prevented fulfillment of a safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident.

Procedural instructions of 2-EOP-99 to align the non-essential CCW header to an essential CCW header constitutes a procedural error that could result in the failure of 2 or more trains in different systems (e.g., HPSI and containment spray) from properly completing their safety function. If a postulated deterministic failure on the non-essential CCW header results in the failure of the attached essential header, then the reporting requirements of 10 CFR 50.73(a)(2)(ix) apply.

Since realignment of the non-essential CCW header following a large break LOCA results in an unanalyzed condition that significantly degraded plant safety, this condition on Unit 2 is reportable in accordance with 10 CFR 50.73(a)(2)(ii).

Realignment of the non-essential CCW header following a large break LOCA could have resulted in the failure of 2 or more trains in different systems from properly completing their safety function if a failure were to occur on the non-essential CCW header, therefore this condition on Unit 1 and Unit 2 is reportable in accordance with 10 CFR 50.73(a)(2)(ix).

Analysis of Safety Significance

This condition is a legacy issue due to an inadequate review of the affects of a procedure change. At the time the procedure changes were incorporated, it was determined that the changes were within the design basis due to the 50.59 screening and the ORG review not identifying potential problems. Improvements to the 50.59 Process and ORG continuing training on potential design basis changes have minimized the potential for similar events.

NARRATIVE

Corrective Actions

The following corrective actions resulted from the root cause evaluation. The corrective and supporting actions were entered into the Site Correction Action Program (CAP). Any changes to the proposed actions will be managed under CAP.

1. Issued a Standing Order that provides guidance to the operating crews about the need to keep the non-essential headers isolated from the essential headers when sub-cooling is lost during 1-EOP-3, "Loss of Coolant Accident LOCA" or 1-EOP-15 "Excess Steam Demand."
2. Issued CAUTION tag for each Control Room QSPDS console to ensure that Operators know to isolate the non-essential CCW header if sub-cooling is lost during 1-EOP-3, "Loss of Coolant Accident LOCA" or 1-EOP-15 "Excess Steam Demand."
3. Issued CAUTION tags for each Control Room QSPDS console to ensure that Operators know to isolate the non-essential CCW header if sub-cooling is lost during 1-EOP-3, "Loss of Coolant Accident LOCA" or 1-EOP-15 "Excess Steam Demand."
4. Revise 1/2-EOP-99, "Appendices/Figures/Tables/Data Sheets" to resolve the issue that aligning the non-essential CCW header (N-header) to the essential CCW header as specified in Appendices A & J is outside the design basis.

Similar Events

A review of condition reports for the last 3 years for procedures causing the potential for the plant to be outside of its design basis did not identify any similar events.

Failed Components

None