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

FPL

April 5, 2010

L-2010-056
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: 2010-001
Date of Event: February 04, 2010

Air Intrusion from 1A Containment Instrument Air Compressor into Unit 1 Component Cooling Water (CCW) System

The attached Licensee Event Report 2010-001 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

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	05000335	1 OF 4

4. TITLE
Air Intrusion From 1A Containment Instrument Air Compressor Into Unit 1 Component Cooling Water (CCW) System

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
02	04	2010	2010	- 001 -	00	04	05	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
B	CC	CCL	X999	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 February 4, 2010, St. Lucie Unit 1 was operating in Mode 1 at 100% power when the Onsite Review Group (ORG) concluded that the event that occurred on October 16, 2008, in which air intrusion of the component cooling water (CCW) system from a containment instrument air compressor resulted in an unanalyzed condition that seriously degraded plant safety. Continued degradation of the CCW system post design basis event (DBE) would have led to a loss of safety function.

Evaluation of the CCW system indicated that Operators detected and eliminated the source of the air ingress well in advance of the system becoming incapable of supporting normal power operation. An evaluation of the system under design basis accident conditions determined that the CCW system was in an unanalyzed condition and could have prevented the fulfillment of a safety function. In accordance with 10 CFR 50.73(a)(2)(ii) and 10 CFR 50.73(a)(2)(v) this event requires notification of the NRC via a License Event Report (LER).

Corrective actions included procedure revisions to isolate air intrusion paths into CCW from the Unit 1 containment instrument air compressors, revisions to Licensed Operator and Non-Licensed Operator Lesson Plans and Engineering procedures to reflect lessons learned from this event.

NARRATIVE

Description of the Event

On October 16, 2008, while Unit 1 was in Mode 1, the CCW system [EIIS:CCL] experienced air intrusion from a containment instrument air compressor [EIIS:CMP]. At the time, Operators detected and eliminated the source of the problem and concluded actions taken arrested the degradation of the system operating parameters prior to the issue becoming an operability concern. This conclusion was based upon the perceived large amount of margin in CCW flow and the small effect on system parameters. Engineering was subsequently requested to review this historical event to determine if both trains of CCW were operable. Engineering concluded that the amount of air intrusion into the CCW system was an unanalyzed condition and a review of operating alignments indicated that had a design basis accident such as a loss of coolant accident (LOCA) occurred, the operability of the available essential CCW header(s) was indeterminate.

Cause of the Event

A root cause evaluation (RCE) determined the event resulted from a latent design issue that did not recognize the potential for gas intrusion in the CCW system and the failure to recognize or understand the potential impact during the initial condition report(CR) screening process.

The original CCW design was vulnerable to gas intrusion that could result in a common mode system failure. Gas intrusion was not typically considered with respect to CCW design at the time the St. Lucie Plants were designed as evident from its absence from licensing bases documents. Consequently, St. Lucie operating procedures did not exist to detect and mitigate gas intrusion occurrences. The vulnerability to gas intrusion from the Unit 1 containment instrument air compressors was not recognized since the leakage path required multiple failures of different components.

Analysis of the Event

The Engineering evaluation of the CCW system indicated that Operators detected and eliminated the source of the air ingress well in advance of the system becoming incapable of supporting normal power operation. Although the conclusion indicates that during this air intrusion event, the CCW system was capable of supporting normal operation, the degree of air ingress resulted in an unanalyzed condition. If a design basis accident LOCA occurred, CCW system realignment would occur automatically. On receipt of the safety injection actuation signal (SIAS) the non-essential header would be isolated from the two separate and redundant essential headers. This would temporarily stop any further air ingress until Operators realigned the non-essential header to the one available CCW essential header to supply cooling to the reactor coolant pump (RCP) seals. The realignment is (assuming a single failure of one essential header) performed early in the emergency operating procedures and would re-initiate air ingress into the CCW system. Assuming Operators did not isolate the air ingress source, this continuous air ingress into the CCW system would at some point result in the operability of this train of the CCW system being indeterminate and in an unanalyzed condition.

CCW main header indicated flow became erratic with both high and low flow instrument swings around a small (~5%) base shift in flow and low flow alarms for the radiation monitors located immediately downstream of the CCW heat exchangers. While there are

numerous points within the CCW system for which low flow alarms might have been received, no other flow alarms were logged from any other CCW system location. Evaluation of the CCW system indicated that Operators detected and eliminated the source of the air ingress well in advance of the system becoming incapable of supporting normal power operation.

However, air intrusion of the amount in this event is an unanalyzed condition and review of operating alignments indicate that had a design basis accident (LOCA) occurred, assuming Operators did not isolate the air ingress source, continuous air ingress into the CCW system would result in the operability of the one available essential CCW header being indeterminate resulting in an unanalyzed condition which could have prevented the fulfillment of a safety function. Consequently 10 CFR 50.73 (a)(2)(ii) and 10 CFR 50.73(a)(2)(v) require notification of the NRC via a License Event Report (LER).

Analysis of Safety Significance

Air intrusion of the amount which occurred during the October 2008 event into the CCW system is an unanalyzed condition. An Engineering evaluation concluded the Operators detected and eliminated the source of the air ingress well in advance of the CCW system becoming incapable of supporting normal power operation. Assuming Operators do not isolate the air ingress source, this continuous air ingress into the CCW system under design basis accident conditions would have resulted in the operability of the CCW system being indeterminate. The probability of a design basis accident such as a LOCA concurrent with an air intrusion event is smaller than that of a loss of CCW due to the short fault exposure times.

Corrective Actions

The corrective and supporting actions are entered into the Site Correction Action Program (CAP). Any changes to the proposed actions will be managed under CAP.

1. Lesson plans for Licensed Operator and Non-Licensed Operators have been revised to include the RCE completed for this event as well as discussions on the recognition and mitigation of gas intrusion into plant cooling water systems resulting from operating experience within the Industry.
2. Implement positive isolation between the containment IA compressor fill lines and CCW utilizing additional isolation capability.
3. Revise Eng-QI 1.8 to include a design consideration to prevent creation of an interface between a gas subsystem and a fluid system whereby gas intrusion can occur either by component leakage or failure that could lead to a common mode failure of the fluid system in a future design.

NARRATIVE

Similar Events

This event is not considered a repeat event however, a similar event subsequently occurred on September 9, 2009, but appropriate actions were taken to address operability. Numerous opportunities to learn from internal and external operating experience (OE) were missed so that the 2008 CCW air intrusion event was not prevented. Missed opportunities resulting from Industry operating experience have been added to lesson plans for Licensed Operator and Non-Licensed Operator Initial and Continuing Training.

Failed Components

V18060, check valve, 1" Swagelok B-16C4-1

V1818A, check valve, 11/4" Crane Figure No. 1701

SE1814A, solenoid Valve, Asco/Auto Switch Co. 8211C13