



FPL

July 29, 2013

L-2013-204
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: 2013-001-00
Date of Event: May 31, 2013

Unplanned Manual Reactor Trip Due to Algae

The attached Licensee Event Report 2013-001 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

Joseph N. Jensen
Site Vice President
St. Lucie Plant

JJ/rcs/mkm
Attachment

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NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (10-2010) LICENSEE EVENT REPORT (LER)					APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013 Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.						
1. FACILITY NAME St. Lucie Unit 2					2. DOCKET NUMBER 05000389		3. PAGE 1 OF 3				
4. TITLE Unplanned Manual Reactor Trip Due to Algae											
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	
5	31	2013	2013	001	00	07	29	2013	NA		
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)							DOCKET NUMBER	
1			<input type="checkbox"/> 20.2201(b)		<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> 50.73(a)(2)(vii)		
			<input type="checkbox"/> 20.2201(d)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
10. POWER LEVEL 40%			<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
			<input type="checkbox"/> 20.2203(a)(2)(i)		<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)		
			<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		OTHER		
			<input type="checkbox"/> 20.2203(a)(2)(vi)		<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(v)(D)		Specify in Abstract below or in NRC Form 366A		
12. LICENSEE CONTACT FOR THIS LER											
NAME Richard Sciscente - Principal Engineer, Licensing								TELEPHONE NUMBER (Include Area Code) 772-467-7156			
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	KE	V	N425	YES							
14. SUPPLEMENTAL REPORT EXPECTED							15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)											
<input checked="" type="checkbox"/> NO											
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) On May 31, 2013 at 0712 EDT, St. Lucie Unit 2 was in Mode 1 at 40% reactor power when it was manually scrammed prior to securing the 2A1 Circulating Water Pump (CWP) due to high differential pressure on the debris filter system (DFS) for the 2A1 Condenser Waterbox as a result of an algae intrusion. At the time of the trip, the 2A2 Circulating Water Pump had been removed from service for maintenance. This reactor trip event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as a manual actuation of reactor protection system (RPS). This event had no significant safety consequence. Given the response of the plant and the actions taken, the health and safety of the public was not affected by this event. The high differential pressure on the 2A1 DFS was the result of internal binding of a flush-water check valve that caused a false low DFS transmitter differential pressure and prevented the DFS strainer from initiating a backwash. To correct the problem, the flush-water check valves associated with the DFS differential pressure transmitter will be replaced with a more robust design.											

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NARRATIVE

Description of the Event

On May 31, 2013 at 0712 EDT, St. Lucie Unit 2 was in Mode 1 at 40% reactor power when it was manually scrammed prior to securing the 2A1 Circulating Water Pump (CWP) due to high differential pressure on the debris filter system (DFS) for the 2A1 Condenser Waterbox as a result of an algae intrusion. At the time of the trip, the 2A2 Circulating Water Pump had been removed from service for maintenance.

Cause

A root cause evaluation determined that the flush water check valve design was not optimal for application in the DFS system. Internal binding of the check valve caused a false low differential pressure and prevented the DFS strainer from initiating a backwash.

Analysis of the Event

The DFS is part of the Circulating Water System, which is designed to provide a heat sink for the main condenser under normal operating and shutdown conditions. The DFS removes debris from the circulating water coolant supplied to the main turbine condenser to prevent clogging of tubes at the condenser tubesheet.

The DFS has a Differential Pressure Monitoring System (DPMS) that monitors the build-up of debris on the filter elements. The DPMS has a flush system to ensure that debris does not clog the strainer. Each DPMS independently flushes when a high differential pressure is detected.

The DPMS flush water check valves of the 2A1 waterbox stuck in the open position resulting in a false low indication on the DFS differential pressure transmitter that prevented the DFS strainer from starting the automatic backwash cycle.

If DFS differential pressure increases excessively, the rotating nozzle "vacuum" design backwash function becomes ineffective and the DFS and Circulating Water Pump must be removed from service to backflow and unclog the filter.

There is a tight clearance between the poppet and the internal bore for the flush water check valve. This made the valve susceptible to binding as a result of debris, crud, and/or corrosion product build-up.

Safety Significance

A risk assessment associated with Unit 2 unplanned manual reactor trip event due to intake intrusion (algae influx) was developed. The Conditional Core Damage Probability (CCDP) and Conditional Large Early Release Probability (CLERP) values were evaluated for the stated event and were found to be significantly below the thresholds required by RG-1.174 for the risk to be "Very Small," where CCDP is below 1.0E-06 and CLERP is below 1.0E-07. Therefore, it is concluded that the risk impact of the stated event is Very Small.

This reactor trip event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as a manual actuation of reactor protection system (RPS). This event had no significant safety consequence. All safety related systems functioned as designed. There were no safety systems actuations as a result of the trip. Given the response of the plant and the actions taken, the health and safety of the public was not affected by this event.

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NARRATIVE

Corrective Actions

The corrective actions listed below are entered into the site corrective action program. Any changes to the actions will be managed under the corrective action program.

1. Replace the DPMS flush water check valves with a more robust design to be more reliable.
2. Revise the preventative maintenance for the DFS to establish a replacement frequency of once per operating cycle for DFS flush water check valves.

Similar Events

A similar event occurred at St. Lucie on April 1, 2009 involving ingress of algae. St. Lucie has experienced similar plant trips as a result of intake and jelly fish intrusion and/or related equipment failures. Prior troubleshooting did not identify this possible degradation mechanism for the DPMS and flush water check valves.

A review of nuclear industry events also identified several similar events associated with traveling water screens and intake system blockage/intrusion resulting from algae and intake debris.

Failed Component(s)

Flush Water Check Valve

Manufacturer

The DPMS design was part of the original Taprogge modification to install the DFS strainers.

The flush water check valves are Nupro stainless steel poppet check valves (Part number SS6C4-1).