



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

August 14, 2006

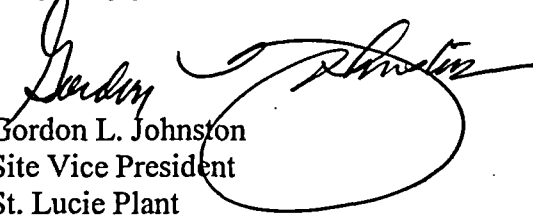
L-2006-198
10 CFR 50.73

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

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 2006-004-00
Date of Event: June 15, 2006
Unplanned Manual Reactor/Turbine Trip Due to DEH Leak

The attached Licensee Event Report 2006-004-00 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,


Gordon L. Johnston
Site Vice President
St. Lucie Plant

GLJ/dlc

Attachment

IE22

NRC FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104		EXPIRES: 06/30/2007																																									
LICENSEE EVENT REPORT (LER)										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.																																						
1. FACILITY NAME <div style="text-align: center;">St. Lucie Unit 2</div>					2. DOCKET NUMBER <div style="text-align: center;">05000389</div>			3. PAGE <div style="text-align: center;">1 OF 3</div>																																								
4. TITLE <div style="text-align: center;">Unplanned Manual Reactor/Turbine Trip Due to DEH Leak</div>																																																
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																																					
06	15	2006	2006	- 004 -	00	8	14	2006	FACILITY NAME		DOCKET NUMBER																																					
9. OPERATING MODE <div style="text-align: center;">3</div>			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply) <table style="width:100%; font-size: x-small;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td>Specify in Abstract below or in NRC Form 366A</td> </tr> </table>										<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)	<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)	<input type="checkbox"/> 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
													<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)																																													
<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)	<input type="checkbox"/> 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																																													
10. POWER LEVEL <div style="text-align: center;">45%</div>																																																
12. LICENSEE CONTACT FOR THIS LER																																																
NAME <div style="text-align: center;">Donald L. Cecchetti - Licensing Engineer</div>								TELEPHONE NUMBER (Include Area Code) <div style="text-align: center;">772-467-7155</div>																																								
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																																							
A	TD	FCV	S188	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) <p>On June 15, 2006, St. Lucie Unit 2, while returning to power from the SL2-16 outage, initiated an unplanned manual reactor/turbine trip due to a severe DEH leak on the number 1 throttle valve actuator [EIIS:FCV]. Operation procedures 2-EOP-01 "Standard Post Trip Actions," and 2-EOP-2, "Reactor Trip Recovery," were completed without contingencies and Unit 2 was stabilized in Mode 3. The DEH leak ceased upon turbine trip and all control rods fully inserted. No main steam safety valves [EIIS:SJ]lifted, Feedwater to the steam generator was supplied by the main feedwater pumps [EIIS:SJ] and all safe shutdown equipment operated as designed. The leak was a result of improper torquing by a contractor of the cap screws used to attach a blind flange to the actuator, which ultimately led to the failure of the interfacing o-ring under the high DEH pressure. The Root Cause determined the failed o-ring was the result of poor contractor workmanship and inadequate procedure guidance for torque verification following o-ring installation during rebuilding of the actuator at the vendor's facility.</p>																																																

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 2 of 3
		2006	- 004	- 00	

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

Description of the Event

While returning to power following the SL2-16 outage, the turbine number 1 throttle valve (FCV-08-643) actuator experienced a severe DEH leak and a manual trip of the reactor/turbine was initiated. Operation procedures 2-EOP-01 "Standard Post Trip Actions," and 2-EOP-2, "Reactor Trip Recovery," were completed without contingencies and Unit 2 was stabilized in Mode 3. The DEH leak ceased when the turbine tripped. All control rods fully inserted and no main steam safety valves (MSSV) lifted. Feedwater to the steam generator was supplied by the main feedwater pumps and all safe shutdown equipment operated as designed.

Cause of the Event

The cause of the event was a blank flange being improperly attached to an auxiliary servo actuator body by Allen-head cap screws. Proper tightening of the flange to the servo actuator results in a deformation of the o-ring creating a tight seal against the nominal 2000-psi DEH pressure boundary. However, the blank flange was not fully torqued during assembly at the vendor's facility during an overhaul of the servo actuator. Upon disassembly of the blank flange the o-ring was found cut in one location and split in several others. Investigation of retaining head cap screws revealed the required torque value of 90 ft-lbs was not met, resulting in the sealing o-ring failure when subjected to the high DEH pressure. The mating surface of the bolted joint surfaces of the servo actuator and blank flange were found to be contaminated with rust as a result of improper mating of the bolted joint. The Root Cause determined the failed o-ring was a result of poor contractor workmanship and inadequate procedure guidance for torque verification following o-ring installation.

Analysis of the Event

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as any event or condition that resulted in manual or automatic reactor trip. An extent-of-condition was performed which identified seven additional actuators had been recently rebuilt at the vendor's shop and installed in Unit 2 during SL2-16. This review determined the integrity of the bolted connections on these actuators could be verified by checking the gap between the actuator blocks and cover plates and by checking the applied torque of cover plate fasteners. These tasks were performed with satisfactory results and Unit 2 was returned to power. Although performed by highly experienced specialized workers, the cause of the failed o-ring was over reliance on post assembly leak testing and inadequate procedure guidance lacking critical step verification.

Analysis of Safety Significance

Given the turbine throttle valves are classified as Non-Nuclear Safety Related and based on the satisfactory inspection of all other valves in the extent of condition population and all plant systems actuated to perform their design safety function with no radiological events occurring, this event had no impact on the health and safety of the public.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 3 of 3
		2006	- 004	- 00	

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

Corrective Actions

The proposed corrective actions and supporting actions listed below are entered into the site corrective action program. Any changes to the proposed actions will be managed under the commitment management change program.

1. Reassembly of the blank flange on the turbine number 1 throttle valve was performed following cleanup of the pressure boundary and installation of a new o-ring. (Completed)

Visual inspections and torque checks of the additional bolted blank flanges assembled at the contractor's facility were performed to ensure the integrity of the pressure boundary. (Completed)

2. Assess the level of oversight needed for vendor shop work including attributes such as subject matter expert oversight/review of shop procedures, Quality Assurance procedure use and adherence, and follow guidance. (Due 11/1/06)

Similar Events

Review of industry operating experience for applicable industry events resulted in two relevant events involving improperly torqued fasteners:

1. A Salem Unit 2 event involved a power reduction and manual turbine trip due to a leak on a governor valve connection to its dump valve as a result of improper torquing of attachment bolts, which subsequently led to o-ring failure.
2. A power reduction and manual turbine trip also occurred at Catawba Unit 2 due to a significant EH fluid leak on a GE turbine combined intercept valve fast acting solenoid valve (FASV), as a result of under torqued fasteners and o-ring failure.

Several other similar events were also identified but were not relevant to St. Lucie:

1. A mis-machined actuator block at HB Robinson resulted in an EH leak. The leak was due to an o-ring installed in an area where an o-ring groove was not machined. The o-ring extruded because it was over-squeezed as a result of the lack of an o-ring groove.
2. North Anna had two failures involving a broken dump block check valve and a governor valve failure, and VC Summer had an EH leak due to a cut filter cover gasket. However, these events were not relevant to the PSL event.

Work orders and St. Lucie's corrective action program were also reviewed for issues involving DEH leaks at St. Lucie, from 2000 to present, and determined not to be relevant to this event.

Failed Components

Siemens TV Servo Actuator Throttle Valve #1FCV-08-643