



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

May 24, 2000

L-2000-121  
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: 2000-002-00  
Date of Event: April 24, 2000  
Valve V3523 Not Fully Closed  
Results in Operation of Facility Outside TS

The attached Licensee Event Report 2000-002 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

A handwritten signature in black ink that reads "Rajiv S. Kundalkar".

Rajiv S. Kundalkar  
Vice President  
St. Lucie Nuclear Plant

RSK/EJW/KWF  
Attachment

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

**LICENSEE EVENT REPORT (LER)**

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

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.

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**TITLE (4)**  
Valve V3523 Not Fully Closed Results in Operation of Facility Outside TS

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	24	2000	2000	- 002	- 00	05	24	2000	FACILITY NAME	DOCKET NUMBER

<b>OPERATING MODE (9)</b> 6	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</b>										
<b>POWER LEVEL (10)</b> 000	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)				

<b>LICENSEE CONTACT FOR THIS LER (12)</b>										
<b>NAME</b> Kenneth W. Frehafer, Licensing Engineer								<b>TELEPHONE NUMBER (Include Area Code)</b> (561) 467 - 7748		

<b>COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)</b>										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	
X	BQ	V	T020	YES	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	

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

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

On April 24, 2000, St. Lucie Unit 2 was shutdown in Mode 6 during the SL2-12 refueling outage. Valve V3523, a motor operated valve (MOV) for 2B hot leg injection, was being worked to investigate the reason why the valve would not fully close. FPL discovered that the cause of the inability of V3523 to close was the presence of foreign material inside the valve.

FPL concluded that past operation of St. Lucie Unit 2 between December 4, 1998, and December 16, 1998, when compensatory measures were implemented to maintain valve V3523 in its throttled position, was in a condition prohibited by Technical Specifications.

The valve was reworked and placed back in service.

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

**Description of the Event**

On April 24, 2000, St. Lucie Unit 2 was shutdown in Mode 6 during the SL2-12 refueling outage. Valve V3523 [EIIS:BQ:V], a motor operated valve (MOV) for 2B hot leg injection, was being worked to investigate the reason why the valve would not fully close. The valve was maintained in the throttled open position during the last operating cycle pending repairs. As part on the repair efforts, Engineering personnel determined that foreign material under the seat prevented valve V3523 from fully closing.

**Cause of the Event**

Investigation of the foreign material found in V3523 revealed that it was a piece of a failed charging pump internal spring. Review of the condition report (CR) data base revealed that CRs 96-1756 and 97-1553 concerned the failures of charging pump internal valve springs. In both cases, coils from the broken springs were found to be missing and were presumed to be lost into the chemical and volume control system (CVCS). Metallurgical examination determined that the recovered foreign material was 300 series, austenitic stainless steel. The lab report further states that the ring is moderately magnetic, indicating that it is in a severely cold worked condition. The charging pump springs are 302 series stainless steel and spring material would be expected to be in a cold worked condition.

System drawings were reviewed in order to determine if an opportunity existed for a broken charging pump spring coil to reach V3523. Drawings 2998-G-078, Sheet 122, "Flow Diagram Chemical & Volume Control System," and Sheet 130A, "Flow Diagram Safety Injection System," show that line I-2-SI-141 provides a cross connection between the charging pumps and the high pressure safety injection (HPSI) system. Lines I-2-SI-141 and I-2-SI-176 provide flow paths to the 2A HPSI header and the 2B hot leg injection header, respectively. V3523 is located just downstream of the 2B hot leg injection connection. Review of plant procedures determined that there is no current procedure which utilizes the CVCS to 2B hot leg injection flow path. However, such a procedure did exist during the last refueling. OP-2-0010125A, "Surveillance Data Sheets," Revision 25, Data Sheet 11, "Check Valves Cycled During Cooldown, Cold and Heatup Conditions," was performed on December 4, 1998. During that test, one charging pump was aligned to pass 40 gpm flow through V3523. Subsequent to that test, a work request for the V3523 dual position indication problem was originated.

**Analysis of the Event**

On December 4, 1998, while St. Lucie Unit 2 was in Mode 5 during the SL2-11 refueling outage, valve V3523 experienced intermittent dual indication. Operations personnel determined that the dual indication was caused by a malfunction of the valve limit switches, and the decision was made to continue with the plant startup. St. Lucie entered Mode 4 and was brought to full power operation. On December 16, 1998, troubleshooting efforts to repair valve V3523 indication were unsuccessful. Compensatory measures were implemented that allowed operation for the remainder of the cycle with valve V3523 throttled open. On April 24, 2000, FPL discovered the foreign material that prevented the valve from being fully closed.

Based on the discovery of the foreign material and the timeline of when it was introduced into the system, FPL concluded that valve V3523 was most likely not fully closed from December 4, 1998, until December 16, 1998. Therefore, St. Lucie Unit 2 was most likely operated in a condition prohibited by Technical Specifications during

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this time period. As such, this event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B). Because V3523 was most likely not fully closed, the following V3523 safety related functions were not met prior to implementation of the compensatory measures:

1. V3523 shall remain closed to prevent the diversion of safety injection flow whenever the HPSI system is not aligned for simultaneous hot and cold leg injection.
2. V3523 shall passively maintain the integrity of the HPSI system pressure boundary.
3. V3523 is classified as a containment isolation valve in UFSAR Table 6.2-52.

V3523 did not achieve the above functions and Technical Specifications 3.5.2 (emergency core cooling system (ECCS)) and 3.5.3 (containment isolation) were not fully met. Additionally, plant startup from Mode 4 to Mode 1 while not in compliance with T.S. 3.5.2 and 3.5.3 resulted in non-compliance with T.S. 3.0.4 (entry into operational mode).

**Analysis of Safety Significance**

The St. Lucie Unit 2 Updated Final Safety Analysis Report section 6.3.2.2.3 states that for long term core cooling, the high pressure safety injection (HPSI) pumps are manually realigned for simultaneous hot and cold leg injection. This ensures flushing and ultimate subcooling of the core coolant independent of break location. However, V3523 is required to remain closed to prevent the diversion of safety injection flow whenever the HPSI system is not aligned for simultaneous hot and cold leg injection. Additionally, V3523 is credited as a containment isolation valve.

Even though V3523 may not have met its specific safety functions, the overall safety functions of the 2B HPSI train were not compromised. Single failure criteria design redundancy is provided for by V3551 which is in series with V3523. During the time that V3523 was not fully closed, V3551 was fully closed. Therefore, containment integrity and hot leg injection were not adversely affected. In addition, check valves V3526 and V3527 provided isolation capabilities with regard to containment integrity. CVCS has also been cross connected with the 2A HPSI train, and similar mitigating factors with respect to series redundant isolation valves/check valves would apply to postulated charging pump spring induced failures in that train.

CR 96-1756 and 97-1553 on missing charging pump spring fragments state that "Based on the size of the spring fragment, system flow characteristics, number of containment pockets and component operation, internal migration of charging pump spring fragments through the CVCS system would not impact system operation, components (valves) or enter the reactor coolant system (RCS)." However, V3523 is the last HPSI stop valve prior to the RCS. The observation that the spring coil was wedged into the seat of V3523 and appeared to have shear force induced damage at the edges also suggests that an MOV could cut a charging pump spring coil into small enough pieces to migrate into the RCS. Because several charging pump spring coils are still unaccounted for, FPL evaluated the potential that spring coils or coil fragments could migrate into the RCS. The evaluation concluded that this was not a concern.

Based on the above, past operation with V3523 not fully shut had no impact on the health and safety of the public.

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**Corrective Actions**

1. Maintenance personnel examined the piping upstream and downstream of V3523 for additional foreign material and none was observed.
2. The core support barrel was removed during the SL2-12 refueling for a scheduled ISI. The reactor vessel was carefully inspected and no charging pump spring coil pieces were observed.
3. Check valve V3527, located downstream of V3523 was opened and inspected this outage due to seat leakage. FPL examined the piping upstream and downstream of V3527 for foreign material and none was observed.
4. MOV V3652 which is located near where 2B hot leg injection enters the RCS was also opened and inspected this outage. FPL examined the piping upstream and downstream of V3652 for foreign material and none was observed.
5. Subsequent to the charging pump spring 1996 and 1997 failures, General Maintenance Procedure No. 2-M-0041, "Charging Pump Maintenance," was revised to require that "To ensure reliable operation, the (charging pump) valve discs and springs should be replaced after 4500 hours of operation."
6. FPL evaluated the potential for charging pump spring fragments to enter the RCS and concluded that this was not a concern.
7. Valve V3523 was reworked and placed back in service during the SL2-12 refueling outage.

**Additional Information**

Failed Components Identified

Component: V3523, 2B Hot Leg Injection Valve at P-70  
 Manufacturer: Target Rock Valves  
 Model Number: 75C-003

Similar Events

None