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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9503280025 DOC.DATE: 95/03/21 NOTARIZED: NO DOCKET #
 FACIL:50-389 St. Lucie Plant, Unit 2, Florida Power & Light Co. 05000389
 AUTH.NAME AUTHOR AFFILIATION
 SCISCENTE,R.C. Florida Power & Light Co.
 SAGER,D.A. Florida Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 95-001-00:on 950221,noted no increase in discharge pressure for pump & low running amps for motor during ASME code surveillence.Caused by air binding.All pumps & piping vented extensively.W/950321 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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March 21, 1995

L-95-094

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

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 95-001
Date of Event: February 21, 1995
Low Pressure Safety Injection Pump Found to Be Inoperable
During ASME Quarterly Code Run Due to Air Binding.

The attached Licensee Event Report is being submitted voluntarily to provide notification of the subject event.

Very truly yours,

A handwritten signature in cursive script that reads "D. A. Sager".

D. A. Sager
Vice President
St. Lucie Plant

DAS/EJB

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, St. Lucie Plant

280021

9503280025 950321
PDR ADOCK 05000389
S PDR

Handwritten initials "IFRR" above two vertical lines.

LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), 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.

FACILITY NAME (1) St. Lucie Unit 2	DOCKET NUMBER (2) 05000389	PAGE (3) 1 OF 4
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TITLE (4) **Low Pressure Safety Injection Pump Found to be Inoperable during ASME Quarterly Code Run due to Air Binding**

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
2	21	95	95	--001--	0	3	21	95	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	<input checked="" type="checkbox"/> OTHER						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)							
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)							

LICENSEE CONTACT FOR THIS LER (12)	
NAME Richard C. Sciscente, Shift Technical Advisor	TELEPHONE NUMBER (Include Area Code) (407) 465-3550 x3151

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	BP	P	I075	Y					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/>	NO					

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

On February 21, 1995, at 0211, Unit 2 Operators started the 2B LPSI pump for a scheduled ASME code surveillance. The licensed operators noted no increase in discharge pressure for the 2B LPSI pump and low running amps for the motor. The non-licensed operator confirmed that local discharge pressure was reading only Refueling Water Tank static head pressure.

The root cause of the event was air binding and can be attributed to two possible scenarios: 1) air was trapped in the 2B Emergency Core Cooling System (ECCS) header following maintenance during the refueling outage and migrated to the 2B LPSI pump or, 2) A source of air inleakage to the 2B ECCS header existed during normal operation. To distinguish between these scenarios, additional testing and analysis will be performed.

Corrective actions include: All Unit 1 and Unit 2 ECCS pumps and piping were vented extensively. Successful ASME code surveillance runs were performed. Engineering is evaluating the feasibility of making the ECCS pumps on both units self venting. The Plant staff is continuing to investigate the source of the air binding.

This Licensee Event Report is being submitted voluntarily.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
		95	--001--	0
2 OF 4				

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

DESCRIPTION OF THE EVENT

On February 21, 1995, at 0211, Unit 2 Operators started the 2B Low Pressure Safety Injection LPSI pump (EIIS:BP) for a scheduled ASME code surveillance. The licensed operators noted no increase in discharge pressure for the 2B LPSI pump and low running amps for the motor. The non-licensed operator confirmed that local discharge pressure was reading only Refueling Water Tank (RWT) (EIIS:BP) static head pressure. The Predictive Maintenance test specialist utilized a vibration monitor and a stethoscope at the motor bearings and pump casing to note a lack of hydraulic noise and low vibration levels. Operations stopped the pump and it exhibited an approximate 2 minute coastdown. Operations reverified the valve lineup for the pump flow path and checked "open" the isolation valves for the two discharge pressure gages.

Subsequent pump runs confirmed that the LPSI pump exhibited abnormally long coast down, a high pitched noise, no evidence of flow, only static discharge pressure and low running motor amps. The 2B LPSI motor/pump shaft was turned freely by hand. The system alignment was reverified and V3673, marked "Seal Drain," was opened. A steady stream of approximately one liter of water issued from the drain.

A comparison of as found pump data with previous successful ASME code runs was performed. The initial conclusion was that the pump's impeller had become separated from the shaft. The pump exhibited no hydraulic noise, and the motor rotated at near synchronous speed, indicating no load conditions. At 0420, a clearance was issued for maintenance troubleshooting to begin.

CAUSE OF THE EVENT

In conjunction with the maintenance efforts, a root cause team was formed with members from Technical Staff, Electrical and Mechanical Maintenance, Operations, Engineering, and Predictive Maintenance to investigate the cause of the failed surveillance. After the maintenance teardown revealed that the pump's impeller was still properly attached to the motor shaft, the root cause team developed a Failure Modes and Effects Analysis to systematically eliminate potential causes of the observed conditions. All postulated failure modes were eliminated except suction blockage and air/gas binding. Most suction blockage failure modes were eliminated through boroscopic inspections, valve stroke and torque measurement testing, and check valve internal inspection. Reassembly of the pump and a successful post maintenance surveillance confirmed that the cause of the 2B LPSI to fail its surveillance run was most likely due to air binding. Subsequent plant testing revealed an air pocket in the B ECCS header.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

CAUSE OF THE EVENT (continued)

The most probable cause of the air binding is that air was trapped in the 2B Emergency Core Cooling System (ECCS) header (EIIS:BP) following return to service from maintenance during the refueling outage which ended in April 1994. The air subsequently migrated to the 2B LPSI pump suction piping. Another potential scenario is that a source of air inleakage to the 2B ECCS header existed during normal operation. To confirm the first scenario, additional testing and analysis is being performed.

A contributing factor to the initial misdiagnosis of the failure mode of the pump was a misleading identification tag on two of the three pump vent valves. This led to the erroneous initial conclusion that the pump was full of water.

ANALYSIS OF THE EVENT

This Licensee Event Report is being submitted on a voluntary basis for industry informational purposes.

The function of the ECCS subsystems is to provide sufficient emergency core cooling capability to the Reactor Coolant System (EIIS:AB) during design basis accidents. During the condition described in this report, both trains of Emergency Diesel Generators (EIIS:EK), charging (EIIS:CB) and High Pressure Safety Injection (EIIS:BQ) systems were available. The 2A LPSI pump was also in service. The RWT was available with the required number of flowpaths. If a postulated design basis accident had occurred during this condition, one complete ECCS subsystem would have been available to successfully mitigate the event.

The 2B LPSI pump was placed out of service at the time the abnormal response was discovered during the ASME quarterly code run. The time limit of the Unit 2 Technical Specification Limiting Condition for Operation (LCO) for an ECCS subsystem being inoperable was not exceeded.

Therefore, the health and safety of the public were not affected.

CORRECTIVE ACTIONS

- 1) The 2B LPSI pump was disassembled and visual inspection ensured that there was no damage to pump internals. As a precautionary measure, the pump's mechanical seal was replaced.
- 2) The 2B LPSI suction check valve was disassembled for visual inspection of the valve internals, and to facilitate boroscopic inspection of the suction piping. Satisfactory results were obtained.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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CORRECTIVE ACTIONS (continued)

- 3) Testing of the 2B LPSI suction motor operated isolation valve was performed to ensure that the stem and valve disk had not separated.
- 4) Systematic venting of the ECCS suction headers was performed. During this effort, air/gas was found upstream of the 2B ECCS Containment sump isolation valve. Chemical analysis confirmed that it was air.
- 5) Utilizing a newly written procedure to ensure complete system venting, a successful ASME code surveillance run on the 2B LPSI pump was performed and the pump was returned to service.
- 6) To address potential generic concerns, all Unit 1 and Unit 2 ECCS pumps were operated and successful ASME code surveillance runs were performed.
- 7) The 2B LPSI pump casing is being vented on a shiftly basis to ensure its continued operability. After a period of evaluation, this frequency may be relaxed.
- 8) Engineering is evaluating the feasibility of making the ECCS pumps on both units self venting.
- 9) The Unit 2 LPSI and Containment Spray pump vents and drains were tagged to indicate the proper casing vent points.
- 10) A step will be added to each ECCS pump surveillance test procedure that will require venting of the pump casing upon completion of the surveillance run.
- 11) Engineering will consult with the LPSI pump vendor for a validation of root causes for air binding.
- 12) The plant staff is continuing to investigate the source of air binding through increased surveillances, periodic ECCS system venting, gas analysis, and a review of industry operating experience.

ADDITIONAL INFORMATION

Component Failures

None

Previous Similar Events

There are no previous similar LERs at Plant St. Lucie.