FPL

January 13, 2014

L-2014-001
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: 2013-002-00
Date of Event: November 12, 2013

Unplanned Manual Reactor Trip Due to Digital-Electro-Hydraulic (DEH) System Leak

The attached Licensee Event Report 2013-002-00 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

Joseph Jensen
Site Vice President
St. Lucie Plant

JJ/lrb
Attachment

IE22
NRR

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(10-2010)

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
St. Lucie Unit 1	05000335	1 OF 3

4. TITLE
Unplanned Manual Reactor Trip Due to Digital-Electro-Hydraulic (DEH) System Leak

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
11	12	2013	2013	- 002 -	00	01	13	2014	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE
1

10. POWER LEVEL
90%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Lyle R. Berry - Principal Engineer, Licensing	772-467-7680

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURE	REPORTABLE TO EPIX
B	TG	TBG	S958	Y					

14. SUPPLEMENTAL REPORT EXPECTED

- ☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*
- ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On November 12, 2013 St. Lucie (PSL) Unit 1 was manually tripped due to a digital-electro-hydraulic (DEH) fluid leak from a tubing fitting in the turbine control system. Prior to the reactor trip, PSL Unit 1 was at 90% power ascending to 98% power following the SL1-25 refueling outage. Following the reactor trip, emergency operating procedures were successfully completed and the unit was stabilized in Mode 3. The reactor trip was uncomplicated. All systems functioned as designed. There were no automatic safety system actuations as a result of the trip.

A root cause evaluation was performed which identified the cause as failure of a DEH tubing fitting as the result of high cycle fatigue fracture and inadequate tubing support following a DEH pump replacement.

Corrective actions include: 1) update of the engineering procedure for post-modification testing and 2) update of the maintenance procedure for post-maintenance testing, to inspect for vibration and inadequate support of adjacent tubing/piping after a change to a vibration inducing component (pump, fan, etc.)

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.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
St. Lucie Unit 1	05000335	2013	- 002	- 00	Page 2 of 3

NARRATIVE

Description of the Event

On November 12, 2013 St. Lucie (PSL) Unit 1 was manually tripped due to a digital-electro-hydraulic (DEH) fluid leak from a cracked ¼" Swagelok port connector tubing fitting in the turbine control system. Prior to the reactor trip, PSL Unit 1 was at 90% power ascending to 98% power following the SL1-25 refueling outage. Following the reactor trip, emergency operating procedures for standard post-trip actions and reactor trip recovery were successfully completed and the unit was stabilized in Mode 3. The reactor trip was uncomplicated.

Cause

A root cause analysis performed for this event identified the following causes:

Root Cause RC1: A change to the forcing frequency on the DEH cabinet caused the tubing connected to the differential pressure switch for the electro-hydraulic pump discharge filter to resonate and fail at a port connector due to high cycle fatigue. The change in vibration occurred as a result of the replacement of the Unit 1 DEH pumps with a different forcing frequency.

Root Cause RC2: The tubing assembly was not adequately supported when CAJON® tee connections were installed adjacent to the port connectors to allow testing in support of turbine test blocks. The mass of the CAJON® tee connections installed adjacent to the port connectors resulted in the tubing being overstressed by the vibration created by the replaced DEH pumps.

Analysis of Safety Significance

The DEH System is Quality Group D, non-seismic. The DEH System does not perform a safety function, and is not required to mitigate the consequences of a design basis accident; therefore it is considered Non-Nuclear Safety. All safety related systems functioned as designed. There were no safety system actuations as a result of the trip.

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.

Immediate Corrective Actions

1. Removed the CAJON® tee connectors and port connectors and re-supported four similar tubing installations inside the DEH cabinet. COMPLETE

Corrective Actions

1. Update the engineering procedure for post-modification testing to inspect for vibration and inadequate support of adjacent tubing/piping after a change to a vibration inducing component (pump, fan, etc.) which changes its forcing frequency.
2. Update the maintenance procedure for post-maintenance testing to inspect for vibration and inadequate support of adjacent tubing/piping after a change to a vibration inducing component (pump, fan, etc.) which changes its forcing frequency.

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1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
St. Lucie Unit 1	05000335	2013	- 002	- 00	Page 3 of 3

NARRATIVE

Similar Events

A search and review of data in the St. Lucie Corrective Action Program Database addressing the past five years revealed no previous occurrences or similar events.

Failed Component(s)

Swagelok ¼" port connector (TBG)

August 1989 Swagelok Catalogue

Catalogue Number -401-PC

Manufacturer

Swagelok Company