FPL

September 22, 2014

L-2014-280
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: 2014-001
Date of Event: July 25, 2014
Unit Shutdown Due to Leak on Safety Injection Tank Vent Valve Piping

The attached Licensee Event Report 2014-001 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Respectfully,

(ACTING)
Joseph Jensen
Site Vice President
St. Lucie Plant

JJ/lrb

Attachment

IE22
NRR

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

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 and Information Collections Branch (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.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
St. Lucie Unit 2	05000389	1 OF 3

4. TITLE

Unit Shutdown Due to Leak on Safety Injection Tank Vent Valve Piping

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
7	25	2014	2014	- 001	- 00	9	22	2014	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☒ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☒ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	*Specify in Abstract below or in NRC Form 366A*

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Lyle R. Berry, Licensing Engineer	(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-FACTURER	REPORTABLE TO EPIX
B	BQ	PSF		Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

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

On July 25, 2014 with St. Lucie Unit 2 in Mode 1 at 100% power, a leak was confirmed on a one inch pipe between a safety injection tank (SIT) and a discharge header vent valve. In accordance with Technical Specifications (TS) and plant procedures, operators subsequently shut down the unit to repair the leak. The shutdown was uncomplicated and all plant safety systems functioned as designed. The leaking vent line and valve assembly were replaced and returned to service on July 28, 2014.

Engineering evaluation identified the direct cause of the pipe leak as through-wall cracking from high cycle, low stress fatigue. This condition is reportable in accordance with the following requirements: 1) 10 CFR 50.73(a)(2)(ii)(A), 2) 10 CFR 50.73(a)(2)(i)A, and 3) 10 CFR 50.73(a)(2)(i)B.

The safety significance of this event was minimal. The identified leakage flow rate was determined to be less than 1 gallon per minute (gpm). The SIT discharge and the high pressure safety injection flow rates remained capable of satisfying their design requirements during loss of coolant accident (LOCA) events.

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St. Lucie Unit 2	05000389	2014	- 001	- 00	2 OF 3

NARRATIVE

Description of the Event

Background

On March 17, 2014 Unit 2 2B1 safety injection tank (SIT) (EIIS:TK) discharge piping vent valve V3811 (EIIS:VTV) was replaced during the SL2-21 refueling outage. On June 22, 2014, the control room entered the Process Radiation Monitor Abnormal Operating Procedure, due to a rising trend on two containment particulate radiation monitors. Concurrently, plant data showed that 2B1 SIT was being filled daily beginning June 22, 2014. The frequent SIT replenishment requirement and radiation monitor trend was indicative of a leak. Containment entries were made on June 24 and 25, 2014 and on July 23 and 25, 2014 to investigate the suspected leak from the 2B1 SIT piping.

On July 25, 2014 at 1129 EDT, detailed video imaging confirmed the leak was on a one inch pipe (EIIS: PSF) between the safety injection system (EIIS:BQ) SIT and vent valve V3811. The valve is within the Quality Group A (ASME Class 1 equivalent), Seismic Class I portion of the safety injection line. The applicable Technical Specification Limiting Condition of Operation (LCO) required the SIT to be restored to operable status within 24 hours or shut down to Mode 3 within the next 6 hours with continuation to Mode 4 within the following 6 hours. The unit was subsequently shut down to repair the leak. The shutdown was uncomplicated and all plant safety systems functioned as designed. The cracked vent line and valve assembly were replaced and returned to service on July 28, 2014.

Cause of the Event

A root cause evaluation team for the SI pipe break determined that the repair and replacement of vent valve V3811 was not performed as prescribed in the work control documents utilized by plant maintenance. This resulted in a number of adverse factors which ultimately resulted in the failure of the pipe nipple upstream of the vent valve due to outside diameter initiated, high cycle, low stress fatigue.

A contributing cause was that neither Maintenance nor the non-destructive examination (NDE) Inspector verified the dimensions of the field-cut inlet pipe nipple before the vent valve was welded in as required by procedures.

Analysis of the Event

For the purposes of evaluating impact on the effected systems, the flaw was conservatively considered to have fully failed, resulting in a nominal one (1) inch diameter breach in the safety injection header at the location of the flaw. A one (1) inch breach, at this location, would result in a depressurization of the 2B1 SIT and loss of inventory from the tank. As a result, the affected SIT was declared Inoperable. The affected safety injection header is one (1) of the four (4) cold leg injection points for the high pressure safety injection (HPSI) system. Flow from the two HPSI Pumps combines upstream of the postulated breach and flows into the affected cold leg. Given that the postulated breach was relatively small when compared to the twelve (12) inch diameter safety injection header and the capacity of HPSI system, the HPSI system would have been able to deliver sufficient flow to the reactor core, under accident conditions, to meet its safety-related functions.

NARRATIVE

Safety Significance

The identified leakage was determined to be less than 1 gpm. This flow rate is insignificant as compared to either the SIT discharge flowrate or the safety injection flow rate during LOCA events. Also, the SIT tank volume lost during a four hour station blackout (SBO) event is insignificant compared to the total volume of the four SIT's. As a result, the safety significance of the minor leakage from this location was minimal. In addition, the branch line for the vent valve contained a tie-back support which would act to restrain the valve and piping in place in the event the through-wall flaw continued to propagate. Finally, the impact of the leakage on surrounding equipment did not reduce their ability to perform their design functions.

This condition is reportable in accordance with the following requirements: 1) 10 CFR 50.73(a)(2)(ii)(A), 2) 10 CFR 50.73(a)(2)(i)A, and 3) 10 CFR 50.73(a)(2)(i)B.

Corrective Actions

1. The "Weld Coordinator" software program will be modified to include hold points in weld travelers for dimension verification. For Class 1, 2 and 3 piping and Pipe Category 4 and 5 (NNS, high pressure), the non-destructive examination inspector will verify piping dimensions.

2. Welding work control procedures will be revised to ensure that the applicable weld travelers incorporate the requirement to use NDE procedure 4.10 "Component, Support & Inspection ASME Section III and ANSI B31.1 Butt and Fillet Welds Visual Examination" and that the procedure is clearly designated as a corrective action to prevent recurrence (CAPR).

3. Maintenance continuing training will be revised to emphasize the findings of the root cause evaluation, the impact to the plant of this event, the importance of using human performance tools when complying with work documents, and the importance of ensuring that condition reports are addressed by the appropriate work document.

Similar Events

The failure of a Unit 2 main steam antenna type vent line MS-11-1 occurred at approximately 2355 on 5/15/11. The one inch steam line vent MS-11-1 appeared to have broken off, creating a steam leak that was non-isolable without closing the main steam isolation valves (MSIVs). An inspection of the failed vent revealed it did not meet the design dimensions on the installation work order. During subsequent Unit 2 main steam walkdowns another vent line, MS-8-4, was found to have been installed without meeting design dimensions. Two high energy vent lines were not installed in accordance with the approved plant design; one of these lines subsequently failed resulting in a plant shutdown. The root cause was that the installation of the vent line was not performed as prescribed in the work control documents utilized by plant maintenance.