



January 30, 2015

L-2014-375
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: 2014-001-01
Date of Event: July 25, 2014
Unit Shutdown Due to Leak on Safety Injection Tank Vent Valve Piping

The attached Licensee Event Report 2014-001-01 supplement is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Respectfully,

A handwritten signature in black ink, appearing to read 'Joseph Jensen', with a long horizontal flourish extending to the right.

Joseph Jensen
Site Vice President
St. Lucie Plant

JJ/lrb

Attachment

JE22
NRK



LICENSEE EVENT REPORT (LER)
(See Page 2 for required number of digits/characters for each block)

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.

1. FACILITY NAME St. Lucie Unit 2	2. DOCKET NUMBER 05000389	3. PAGE 1 OF 4
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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
07	25	2014	2014	001	01	01	30	2015	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input checked="" type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input checked="" 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 checked="" 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)
100	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input 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 checked="" 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 checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT Lyle R. Berry, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (772) 467-7680
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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
B	BQ	PSF		Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE MONTH: DAY: YEAR:
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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, 3) 10 CFR 50.73(a)(2)(i)B, 4) 10 CFR 50.73(a)(2)(v)(D), 5) 10CFR50.73(a)(2)(ii)(B) and 6) 10 CFR 50.73(a)(2)(vii)(B).

This supplement revises the event description, analysis of event and safety significance and adds additional reporting criteria. This condition was determined not to be a significant impact on the health and safety of the public.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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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 from the safety injection system. 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. Reactor shutdown to Mode 3 was completed on July 26, 2014 at 0414 and was uncomplicated. Mode 4 was achieved at 1000. 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 leak determined that the repair and replacement of vent valve V3811 was not performed as prescribed in the work order 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 affected systems, the flawed pipe 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 leak. 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 A and B HPSI pumps combines upstream of the postulated breach before injection into the affected cold leg. This flowpath is also shared by B low pressure safety injection (LPSI) header.

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Safety Significance

The identified leakage was determined to be less than 1 gpm. This flowrate is insignificant as compared to either the SIT discharge flowrate or the safety injection flowrate 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.

A review of the failure analysis for the piping shows that through-wall cracking extended ~225° around the piping; partial through-wall cracking extended another ~67.5° and only ~67.5° remained completely intact. As a result, while the leakage was insignificant, the remaining intact portion of the pipe wall could not have been assured to maintain its overall structural integrity during events requiring safety injection, adversely affecting the 2B1 SIT. The leak existed in Class I piping common to the 2B1 SIT, trains A and B of HPSI and train B of LPSI resulting in technical inoperability of those systems.

For PRA analysis it was assumed that the V3811 pipe breaks leaving a one inch hole in the 2B1 injection line. As a bounding condition, in the event of a Safety Injection signal, the B1 injection path is assumed to be unavailable. This is a conservative assumption, since it is likely that some of the HPSI and low pressure safety injection flow would enter the RCS. Also, injection flow exiting the break would be available in the reactor containment building sump for once through cooling.

A review of the station risk assessment indicates that the calculated change in Core Damage Frequency (CDF) and the limited exposure time result in a low safety significance.

This condition is reportable in accordance with the following requirements: 1) 10 CFR 50.73(a)(2)(ii)(A), An event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; 2) 10 CFR 50.73(a)(2)(i)A, The completion of a nuclear plant shutdown required by the plant's Technical Specifications; 3) 10 CFR 50.73(a)(2)(i)B An operation or condition which was prohibited by the plant's Technical Specifications; 4) 10 CFR 50.73(a)(2)(v)(D) Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate an accident; 5) 10 CFR 50.73(a)(2)(ii)(B), An event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety; and 6) 10 CFR 50.73(a)(2)(vii)(B) Any event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to remove residual heat.

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.

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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 order documents utilized by plant maintenance.