



**Entergy Operations, Inc.**

17265 River Road  
Killona, LA 70057-3093  
Tel 504 739 6685  
Fax 504 739 6698  
jjarrel@entergy.com

**John P. Jarrell III**  
Manager, Regulatory Assurance  
Waterford 3

10 CFR 50.73

W3F1-2015-0069

August 18, 2015

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

Subject: Licensee Event Report (LER) 2015-006-00, Void Discovered in Low Pressure  
Safety Injection System Piping  
Waterford Steam Electric Station, Unit 3 (Waterford 3)  
Docket No. 50-382  
License No. NPF-38

Dear Sir or Madam:

On June 20, 2015, Waterford Steam Electric Station, Unit 3 (Waterford 3) identified a void that exceeded the maximum volume allowed for OPERABILITY while performing high point venting of Low Pressure Safety Injection (LSPi) system 'B'.

LER 2015-006-00 provides details associated with a condition that resulted in inoperability of LPSI system 'B' for 11 days, exceeding the outage time allowed by Technical Specification 3.5.2 action a. It was determined that this condition is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B). A follow up to LER 2015-006-00 is due by February 29, 2016 to provide the safety significance determination that is not yet complete.

This report contains no new commitments. Please contact John P. Jarrell, Regulatory Assurance Manager, at (504) 739-6685 if you have questions regarding this information.

Sincerely,

A handwritten signature in blue ink, appearing to read "JPJ/MMZ", written over a circular blue ink stamp.

JPJ/MMZ

Attachment: 1. LER 2015-006-00

cc: Mr. Mark L. Dapas, Regional Administrator  
U.S. NRC, Region IV  
RidsRgn4MailCenter@nrc.gov

U.S. NRC Project Manager for Waterford 3  
Michael.Orenak@nrc.gov

U.S. NRC Senior Resident Inspector for Waterford 3  
Frances.Ramirez@nrc.gov  
Chris.Speer@nrc.gov

**Attachment 1**  
**to**  
**W3F1-2015-0069**

**Licensee Event Report 2015-006-00**

**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**

Waterford 3 Steam Electric Station

**2. DOCKET NUMBER**

05000382

**3. PAGE**

1 OF 5

**4. TITLE**

Void Discovered in Low Pressure Safety Injection System Piping

**5. EVENT DATE**

MONTH	DAY	YEAR
06	20	2015

**6. LER NUMBER**

YEAR	SEQUENTIAL NUMBER	REV NO.
2015	- 006	- 00

**7. REPORT DATE**

MONTH	DAY	YEAR
08	18	2015

**8. OTHER FACILITIES INVOLVED**

FACILITY NAME	DOCKET NUMBER
	05000
FACILITY NAME	DOCKET NUMBER
	05000

**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 type="checkbox"/> 50.73(a)(2)(vii)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input 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 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)
<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 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 type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

**10. POWER LEVEL**

100

**12. LICENSEE CONTACT FOR THIS LER**

## LICENSEE CONTACT

John Jarrell

## TELEPHONE NUMBER (Include Area Code)

5047396685

**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

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

MONTH	DAY	YEAR
02	29	2016

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

On June 20, 2015, at 1525, while performing high point venting of Low Pressure Safety Injection (LPSI) system 'B', a void that exceeded the maximum volume allowed for OPERABILITY was identified. Emergency Core Cooling System (ECCS) train 'B' was declared INOPERABLE and Technical Specification (TS) 3.5.2 action a. was entered. The void was subsequently removed from the piping and TS 3.5.2 action a. was exited at 1719.

Follow up investigation has determined that the void was likely introduced to the system piping due to an inadequately performed fill and vent procedure performed following a maintenance activity on June 9, 2015. The amount of time that the LPSI 'B' was INOPERABLE was 11 days. This time period exceeds the TS allowed outage time of 7 days. Corrective action is being performed to change the tagging desk guide to ensure consideration is given to vent outside of the tagout boundary and to perform additional venting after system restoration; additional actions are pending.

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

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](mailto: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	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Waterford 3 Steam Electric Station	05000382	2015	- 006	- 00	2 OF 5

**NARRATIVE****INITIAL CONDITIONS**

During the time of interest from June 9, 2015 to June 20, 2015, Waterford 3 was in Mode 1 at approximately 100% power. There were no other structures, components, or systems that were inoperable at the start of the event that contributed to the event.

**EVENT DESCRIPTION**

On June 20, 2015, at 1525, during performance of procedure OP-903-026, "ECCS Train 'B' Valve Lineup Verification and Routine High Point Venting," to satisfy the monthly surveillance SR 4.5.2.b.2, a void was found at vent valve [VTV] SI-133B with a 20" arc indication. The exact volume of the arc was determined to be greater than the volume required to render the system INOPERABLE, which is 1.802 cubic feet. ECCS 'B' was declared INOPERABLE and TS 3.5.2 action a. was entered. ECCS train 'A' remained OPERABLE. Procedure OP-903-026 was completed to satisfactorily remove the void from the piping at vent valve SI-133B (venting for 32 seconds was required). TS 3.5.2 action a. was exited at 1719.

The previous performance of the surveillance (May 22, 2015) was satisfactory in that no gas accumulations were found in the system, therefore this timeframe was used for past operability determination. Investigation into potential causes for the void including leaking valves, system temperature changes, and performance of fill and vent was conducted. Review of system history since the last surveillance was performed revealed no indication of leaking valves nor has the system been placed in shutdown conditions.

It was determined that the most likely cause of the introduction of the void into the system occurred during a scheduled maintenance activity on June 9, 2015. The tagout for performing this work included draining the LPSI [BP] 'B' system. TS 3.5.2 action a. was entered at 0044 due to the LPSI 'B' being INOPERABLE for maintenance. Following completion of maintenance, procedure OP-903-026 was performed solely to support restoration of LPSI 'B' to service. When performing this procedure, operations cleared a portion of the tagout, opened the vent and drain lines, then filled the system. Once the system was full, the portions of procedure OP-903-026 that were within the tagout boundary were completed. The remaining portion of the tagout was removed and the LPSI 'B' was declared OPERABLE.

A review of the station logs indicates that LPSI 'A' was not inoperable during the time of interest beginning when TS 3.5.2 action a. was entered on June 9, 2015 at 0022 until removal of the void on June 20, 2015 at 1719.

The amount of time that the LPSI 'B' was INOPERABLE was 11 days. This time period exceeds the TS allowed outage time of 7 days. This condition is reportable under criterion 10 CFR 50.73(a)(2)(i)(B), Operation or Condition Prohibited by Technical Specifications.

**SYSTEM DESCRIPTION**

The ECCS or Safety Injection System (SIS) is designed to provide core cooling in the unlikely event of a loss of coolant accident (LOCA). In addition, the ECCS functions to inject borated water into the Reactor

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	3 OF 5
		2015	- 006	- 00	

## NARRATIVE

Coolant System (RCS) [AB] to add negative reactivity to the core in the unlikely event of a steam line rupture. Safety injection is also initiated in the event of a steam generator [SG] tube rupture or a control element assembly [ROD] ejection incident. To assure system availability, redundant components are provided. The major components of this system are three High Pressure Safety Injection (HPSI) pumps, two LPSI pumps, four safety injection tanks [TK], high pressure injection valves [INV], and low-pressure injection valves. The LPSI pumps serve two functions. One of these is to inject large quantities of boric acid water into the RCS in the event of a large pipe rupture. The other function of the LPSI pumps is to provide shutdown cooling flow through the reactor core and shutdown cooling heat exchanger [HX] for normal plant shutdown cooling operation or as required for long-term core cooling.

## REPORTABLE OCCURRENCE

TS 3.5.2 requires that two independent ECCS subsystems shall be OPERABLE in Modes 1, 2, and 3 (with pressurizer [PZR] pressure greater than or equal to 1750 psia and RCS average temperature greater than or equal to 500°F) with each subsystem comprised of: a. One OPERABLE high-pressure safety injection train, b. One OPERABLE low-pressure safety injection train, and c. An independent OPERABLE flow path capable of taking suction from the refueling water storage pool on a safety injection actuation signal [JE] and automatically transferring suction to the safety injection system sump [SUMP] on a recirculation actuation signal. Action a. requires that with one ECCS subsystem inoperable due to one low pressure safety injection train inoperable, restore the inoperable train to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1750 psia and RCS average temperature to less than 500°F within the following 6 hours.

Each ECCS subsystem is required by SR 4.5.2 to be demonstrated OPERABLE. To ensure that the ECCS subsystem can deliver the design flow to the RCS, SR 4.5.2.b.2. requires that the ECCS piping is verified full of water at least once per 31 days. Operability is demonstrated by satisfactory performance of the appropriate sections of procedure OP-903-026.

The reportability criterion is based on the conclusion that the LPSI 'B' train was inoperable during the time of interest beginning when TS 3.5.2 was entered on June 9, 2015 at 0022 until removal of the void on June 20, 2015 at 1719.

This condition is reportable under 10 CFR 50.73(a)(2)(i)(B), Operation or Condition Prohibited by Technical Specifications, because the potential condition has existed for longer than the allowed outage time of TS 3.5.2 action a.

## CAUSAL FACTORS

A Condition Evaluation and Past Operability Evaluation were completed for this event; causal factors as determined by these evaluations are included below. An Apparent Cause Evaluation (ACE) is being performed; results of this evaluation including updates to the causes will be included in a planned update to this LER.

The cause of the condition of the LPSI 'B' gas accumulation at vent valve SI-133B was from an inadequately performed fill and vent procedure following maintenance on June 9, 2015. The fill and vent plan failed to identify that air/gas may not be removed from the piping between the pump discharge check valve [CKV] and the isolation boundary valve [ISV] (there is no vent in this area). The tagout did not

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	4 OF 5
		2015	- 006	- 00	

**NARRATIVE**

recognize that the gas remaining in the lines would migrate or be moved once the tagout boundary was restored. OP-903-026 was performed but only within the tagout boundary. Additional venting of the entire system should have been performed after the pump run to ensure all entrained gas was removed from the system. It was not recognized that once the tagout boundary was fully open, any remaining gas in the system would migrate to the next highest point or be swept to other high points in the system when the pump was run. Once the LPSI 'B' pump was started after the full tagout was removed, any gas remaining in the system from the fill/vent was transported, seeking the next highest point, with low flow, or no flow. In this case, because of the piping layout and flows during the LPSI 'B' pump run, gas accumulated at SI-133B where there is a low/no flow area in the piping.

**CORRECTIVE ACTIONS**

The ACE is in progress and has not been approved by site management. The corrective actions will be updated in revision to this LER upon approval of the ACE. Interim actions have been issued and are listed below.

Revise Tagging Desk Guide to include the following bullets in Attachment 6.1, Step 1.b.:

- When a line has been drained, the recovery plan and the fill and vent plan, as applicable, should evaluate venting of the next system high point(s) outside of the tagout boundary isolation, if all high points of the tagout boundary cannot be vented adequately. Additional venting outside the tagout boundary should be completed after tagout restoration. [CR-W3-2015-4076]
- When Safety Injection has been partially drained, the recovery plan and the fill and vent plan, as applicable, should evaluate additional venting after system restoration. After system restoration, the plans should evaluate a pump run of minimum 20 minutes to circulate the system and sweep any additional gas. Following the pump run, complete applicable sections of OP-903-026 for the system/train. [CR-W3-2015-4076]

**SAFETY SIGNIFICANCE**

Industrial Safety: There was no industrial safety significance associated with this issue.

Radiological Safety: There was no radiological safety significance associated with this issue.

Environmental Safety: There was no environmental safety significance associated with this issue.

Nuclear Safety: The apparent cause evaluation is still in progress and has not been approved by site management. The safety significance determination is not yet completed. Nuclear safety significance will be included as a planned update to this LER.

**PREVIOUS OCCURRENCES**

A search of condition reports was conducted to research history of voiding events in the LPSI system. No reports were identified that attributed cause of an identified void to improper restoration following maintenance. Additionally, system engineer records reveal that there have been no gas accumulations that can be attributed to an inadequate fill and vent since 2012.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	5 OF 5
		2015	- 006	- 00	

**NARRATIVE**

CR-WF3-2013-1957 documents that a void was discovered in the LPSI system that was attributed to the system depressurization where gas remained in solution following the refuel 18 shutdown and startup. Repeated stroking of the LPSI system flow control valve during depressurization resulted in the forming of the void due to the difference in elevation of the void location and the refueling water storage pool level.

Rollup Condition Report CR-WF3-2009-4155 was performed to document an adverse trend in gas accumulation in LPSI 'A' (40 condition reports). The cause was attributed to leakage past a flow control (FCV) and containment isolation valve with additional leakage past normally closed valves.

Significant Event Report 2-05 and General Letter 2008-01 were evaluated under CR-WF3-2008-0117. This evaluation addressed several of the previous gas intrusion, gas accumulation and voiding occurrences at Waterford 3 along with the various procedural changes, modifications, maintenance tasks, operational tasks, periodic inspections and training incorporated at Waterford 3. The evaluation credited the existing tagout restoration process to ensure that filling and venting of the system is performed per established operations procedures following maintenance activities.

**ADDITIONAL INFORMATION**

Energy industry identification system (EIS) codes and component function identifiers are identified in the text with brac