

**Eric A. Larson**  
Site Vice President

724-682-5234  
Fax: 724-643-8069

August 23, 2013  
L-13-272

10 CFR 50.73

ATTN: Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

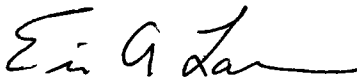
SUBJECT:  
Beaver Valley Power Station, Unit No. 2  
Docket No. 50-412, License No. NPF-73  
LER 2013-001-00

Enclosed is Licensee Event Report (LER) 2013-001-00, "Void in Emergency Core Cooling System Pump Suction Header Results in a Condition Prohibited by Technical Specifications." This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B).

There are no regulatory commitments contained in this submittal. Any actions discussed in this document that represent intended or planned actions are described for the NRC's information, and are not regulatory commitments.

If there are any questions or if additional information is required, please contact Mr. Brian F. Sepelak, Supervisor, Regulatory Compliance at 724-682-4282.

Sincerely,



Eric A. Larson

Enclosure – LER 2013-001-00

cc: Mr. W. M. Dean, NRC Region I Administrator  
Mr. D. I. Spindler, NRC Senior Resident Inspector  
Mr. P. J. Bamford, NRR Project Manager  
INPO Records Center (via INPO Consolidated Event System)  
Mr. L. E. Ryan (BRP/DEP)

LE22  
HRR

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory information 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 Section (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.

<b>1. FACILITY NAME</b> Beaver Valley Power Station Unit Number 2	<b>2. DOCKET NUMBER</b> 05000412	<b>3. PAGE</b> 1 OF 5
--	-------------------------------------	--------------------------

**4. TITLE**  
Gas Void in Emergency Core Cooling System Pump Suction Header Results in a Condition Prohibited by Technical Specifications

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
06	24	2013	2013	001	00	08	23	2013	None	
									FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)									
	<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)						
<b>10. POWER LEVEL</b> 100	<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							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Brian F. Sepelak Supervisor, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) 724-682-4282
---	--

**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

**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 6/24/2013, Beaver Valley Power Station (BVPS) Unit No. 2 was at 100 percent power. At 0836 hours, the Control Room was notified of a void in the suction piping of the "A" train High Head Safety Injection (HHSI) pump. During a routine performance of a void monitoring procedure, a void of approximately 0.62 cubic feet was discovered at the suction of the "C" HHSI pump which was aligned to the "A" train. The pump was declared inoperable and Technical Specification (TS) LCO 3.5.2, ECCS Operating, was entered. The "B" HHSI pump, aligned to the "B" train, was operable and in service. The "A" HHSI pump was inoperable, due to planned maintenance. Following venting and verification that the suction piping of the "C" HHSI pump was sufficiently full of water, the "A" train of HHSI was declared operable and TS LCO 3.5.2 was exited at 1623 hours on 6/24/2013. It was subsequently determined that the gas void had existed prior to the "C" pump being credited as the stand-by HHSI pump on the "A" train eight days previously. The "C" HHSI pump was inoperable during the eight day time frame. TS LCO 3.5.2, ECCS Operating, requires two trains of ECCS to be operable. As this condition existed for greater than the allowed restoration and shut down completion times of this LCO, a condition prohibited by technical specifications had existed. At no time during this event were both trains of ECCS inoperable simultaneously.

The void source was determined to be from an inadequate fill and vent of the reactor coolant pumps seal return line. The root cause of this event is the minimum flow required to move entrained air through the seal water return piping was not present. The procedure used to fill and vent the seal return lines did not ensure a minimum flow was obtained that would move the entrained air to the vent location. The plant risk associated with this event was evaluated to be very low.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Beaver Valley Power Station Unit Number 2	05000412	YEAR	SEQUENTIAL NUMBER	REV NO.	2 OF 5
		2013	- 001	- 00	

**NARRATIVE**

There were no structures, components, or systems that were inoperable at the start of the event that contributed to the event. Energy Industry Identification System (EIS) codes are identified in the text using the format [XX].

**DESCRIPTION OF EVENT**

On 6/24/2013, Beaver Valley Power Station (BVPS) Unit No. 2 was at 100 percent power. The "A" High Head Safety Injection (HHSI) pump [BQ] was inoperable and on clearance, as scheduled maintenance was in progress. The "B" HHSI pump was operable, aligned to the "B" Emergency Core Cooling System (ECCS) header, and in service. The "C" HHSI pump was aligned to the "A" ECCS header as the stand-by pump. This satisfied Technical Specification (TS) LCO 3.5.2, ECCS Operating, which requires two trains of ECCS to be Operable.

At 0836 hours, the Control Room was notified of a void in the suction piping of the "A" train HHSI pump. During a routine performance of void check procedure 3BVT01.11.04, Void Monitoring, a void of approximately 0.62 cubic feet was measured at the inspection points on the suction piping associated with the "C" HHSI pump. The allowable void limit, per the procedure, for this section of piping is 0.066 cubic feet. The pump was declared inoperable and TS LCO 3.5.2, ECCS Operating, Condition A, was entered. At 1623 hours, the Control Room was notified that the voided area had been successfully vented and the piping was verified to be water solid via ultrasonic inspection. The "A" train of ECCS was then declared operable and TS LCO 3.5.2, Condition A, was exited at this time.

It was subsequently determined that the void had existed prior to the "C" pump being credited as the stand-by ECCS pump on the "A" train eight days previously. TS LCO 3.5.2, ECCS Operating, requires two trains of ECCS to be operable. The "C" HHSI pump would have been inoperable during this time. As this condition existed for greater than the allowed restoration and shut down completion times of this LCO, a condition prohibited by technical specifications had existed.

On 6/04/2013, BVPS Unit No. 2 was in Mode 5 for a forced outage (2FOAC9) due to elevated Main Unit Generator [TB] end turn vibrations. During this outage, the "B" RCS Pump [AB] seal package was replaced. This involved draining and refilling the "B" RCS [AB] loop. The RCS was depressurized in conjunction with filling the "B" RCS loop. Procedure 3BVT01.11.04, Void Monitoring, was performed to support startup from the outage. The inspection points on the suction piping associated with the "C" HHSI pump were confirmed to be sufficiently full of water.

On 6/05/2013, maintenance on 2CHS-MOV201, Excess Letdown Heat Exchanger Inlet Valve [CB], was completed and the excess letdown flow path was flushed. This process aligned excess letdown flow to the primary drains tank [CF]. Operators monitored the drains tank level increase to confirm water movement. Following the excess letdown flush, the reactor coolant pump seal return line [CB] was returned to service. The seal return line was vented by closing manual isolation valves at the seal return filter and opening the filter vent. Operators reported that no air was vented. A steady stream of water was maintained for approximately 5 to 7 minutes with the vent valve throttled to a flow rate which would not overflow the tell tale drain funnel which is a 0.75 inch line.

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

1. FACILITY NAME		2. DOCKET	6. LER NUMBER			3. PAGE
Beaver Valley Power Station Unit Number 2		05000412	YEAR	SEQUENTIAL NUMBER	REV NO.	3 OF 5
			2013	- 001	- 00	

**NARRATIVE**

On 6/16/2013, at 0448 hours, the "C" HHSI pump was aligned to the "A" train ECCS as the stand-by pump. On 6/17/2013 at 0016 hours, the "A" HHSI pump was put on clearance for scheduled maintenance. The "B" HHSI pump remained the in-service pump on the "B" train through out this time period.

Entrained air, from both the seal return lines and the excess letdown line, accumulated in the suction of the "C" HHSI pump when the fill and vent for the excess letdown/seal water return lines were performed. The entrained air from these systems was flushed to the three inch seal water return header. A fill and vent of the seal water header was performed per procedure, however, the flow rate was inadequate to move entrained air to the vent point. Upon completion of the fill and vent and witnessing water flow into the tell tale drain for 5 to 7 minutes, operations personnel concluded that the system was water solid. The low flow moved the entrained air, gradually over time, to the "C" HHSI pump suction where the air accumulated into the void. Based on piping configuration, the "C" HHSI pump is the most likely pump that entrained air would migrate to when the "B" HHSI pump is in service.

**CAUSE OF EVENT**

Inadequate flow through the seal return lines for Unit 2 resulted in the inability to move the entrained air through the piping.

The minimum flow required to move entrained air through the seal return piping was not recognized by the procedure. Operations personnel performing the fill and vent observed water solid conditions at the vent point as directed by the procedure but upstream entrained air was still in the system, unable to be moved by the inadequate flow.

The fill and vent procedure lacked the details to adequately fill and vent the seal return lines because the alignment specified does not ensure adequate flow to move entrained air to the vent point.

**ANALYSIS OF EVENT**

Per BVPS Unit 2 TS LCO 3.5.2, ECCS Operating, two trains of ECCS are required to be OPERABLE in Modes 1, 2, and 3. The Unit 2 Updated Final Safety Analysis Report (UFSAR) assumes that a minimum of one train of ECCS would be available to operate in the event of an accident. BVPS Unit 2 had only one train of ECCS OPERABLE for approximately eight days, while the Unit was in Mode 1. Due to both the restoration and shutdown completion times allowed by the TS LCO 3.5.2 being exceeded, this event/condition is reportable as an operation or condition prohibited by the plant's technical specifications {10 CFR 50.73.(a)(2)(i)(B)}.

The plant risk associated with the BVPS Unit 2 HHSI Pump [2CHS-P21C] void event that was discovered on 6/24/2013 following performance of 3BVT01.11.04 "Void Monitoring" is considered to be very low. This is based on the delta core damage frequency and delta large early release frequency for the event during the limited period that the degraded condition existed.

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

1. FACILITY NAME		2. DOCKET	6. LER NUMBER			3. PAGE
Beaver Valley Power Station Unit Number 2		05000412	YEAR	SEQUENTIAL NUMBER	REV NO.	4 OF 5
			2013	- 001	- 00	

**NARRATIVE**

**CORRECTIVE ACTIONS**

- 1.) Develop and implement methodology to successfully fill and vent the Unit 1 and Unit 2 seal return piping addressing the existence of entrained air in the piping.
- 2.) Develop and implement methodology to successfully fill and vent the Unit 1 and Unit 2 excess letdown piping addressing the existence of entrained air in the piping.
- 3.) Revise the appropriate procedures to include an initial condition that specific ultrasonic inspections be performed upon startup from an outage after the seal injection and seal return lines are returned to service. The applicable procedures have been placed on hold to prevent use prior to revision.
- 4.) Revise the appropriate procedures to include ultrasonic inspection points, determined from corrective actions 1 and 2 shown above, upon returning seal water return and excess letdown piping. Add performance of initial and follow-up ultrasonic tests for voids. The applicable procedures have been placed on hold to prevent use prior to revision.
- 5.) Identify relevant high points in the Unit 1 and Unit 2 RCP seal return lines and identify available vent valves associated with those high points. If no vent valve is available, the high point will be identified as requiring a vent valve and the appropriate actions will be initiated.

**PREVIOUS SIMILAR EVENTS**

A review of the BVPS LERs from the last three years shows no previous events involving the Unit 2 HHSI header and one similar event at Unit 1.

- BVPS-1 LER-2010-001 "Void in Emergency Core Cooling System Pump Suction Header Results in Entry into Technical Specification LCO 3.0.3"

The cause was determined to be the specific HHSI pump suction piping configuration at BVPS Unit 1 was conducive to allowing a void to migrate to the charging pump common suction header during the fill and vent procedure. This same piping configuration does not exist at Unit 2.

A review of the BVPS Condition Reports reveals gas voids have been found several times in both BVPS Units' HHSI systems within the last five years, pursuant to void monitoring performed for normal post maintenance testing. However, no voids previously identified, except as noted above, were above the applicable gas void size limit such that the HHSI system(s) was declared inoperable.

Condition Reports written in 2004, 2005, and 2006 documented voids found in the same location described above. These voids were discovered through the regular performance of 3BVT01.11.04 "Void Monitoring". In 2004 the void was from leakage past the miniflow recirculation drain valves. In 2005 and 2006 the voids were discovered at the end of an outage while returning the system to service. The voids were eliminated by venting the system. During those events, the "C" HHSI pump was not required to be operable. Therefore, there was no Technical Specification violation.

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

1. FACILITY NAME		2. DOCKET	6. LER NUMBER			3. PAGE
Beaver Valley Power Station Unit Number 2		05000412	YEAR	SEQUENTIAL NUMBER	REV NO.	5 OF 5
			2013	- 001	- 00	

**NARRATIVE**

More recent experience of voids found in other systems:

- CR 2010-86428 "Gas Void Discovered During the Performance of 3BVT01.11.04"

An unacceptable gas void was detected in the BVPS Unit 1 "A" Low Head Safety Injection (LHSI) Pump Suction Piping. The void size exceeded the acceptance criteria of this procedure. The apparent cause of the void was attributed to procedure deficiencies that provided the option of gravity filling of this piping. Due to the configuration of the piping a vacuum assist rig should always be used to fill and vent LHSI piping. The void was removed within the allowable outage time. Therefore, this was not reportable.

- CR 2010-86567 "Voids Discovered During 3BVT01.11.04"

An unacceptable gas void was detected in the BVPS Unit 1 "A" Quench Spray System Piping during the performance of 3BVT01.11.04. The void size exceeded the acceptance criteria of this procedure and the "A" Train of the Quench Spray System was declared inoperable. The apparent cause of the void was attributed to an inadequate fill and vent of the system after maintenance recovery during Refueling Outage 1R20. The void was removed within the allowable outage time. Therefore, this was not reportable.

**CR 2013-09725**