FENOC
FirstEnergy Nuclear Operating Company

Beaver Valley Power Station
P.O. Box 4
Shippingport, PA 15077

Paul A. Harden
Site Vice President

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

October 21, 2010
L-10-292

10 CFR 50.73

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

SUBJECT:
Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
LER 2010-001-00

Enclosed is Licensee Event Report (LER) 2010-001-00, "Void in Emergency Core Cooling System Pump Suction Header Results in Entry into Technical Specification LCO 3.0.3." This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(v)(A), 10 CFR 50.73(a)(2)(v)(D) and 10 CFR 50.73(a)(2)(vii).

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 T. Tuite, Manager, Regulatory Compliance at 724-682-4284.

Sincerely,

Paul A. Harden

Attachment

c: Mr. W. M. Dean, NRC Region I Administrator
Mr. D. L. Werkheiser, NRC Senior Resident Inspector
Ms. N. S. Morgan, NRR Project Manager
INPO Records Center (via electronic image)
Mr. L. E. Ryan (BRP/DEP)

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Beaver Valley Power Station Unit Number 1	05000334	1 of 5

4. TITLE

Void in Emergency Core Cooling System Pump Suction Header Results in Entry into Technical Specification LCO 3.0.3

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
08	26	2010	2010	- 001 -	00	10	21	2010	None	
									FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100 %

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

☐ 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)
☐ 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)
☐ 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

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Brian T. Tuite, Manager, Regulatory Compliance	(724) 682-4284

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 EXPECTED SUBMISSION DATE).* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
-	-	-

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

The "A" High-Head Safety Injection (HHSI) Pump was being returned to service on 08/26/2010 following scheduled maintenance with Beaver Valley Power Station (BVPS) Unit No. 1 at 100 percent power. [One HHSI pump is also used for normal charging during power operation.] Ultrasonic tests (UT) were performed on the in-service Unit 1 charging pump common suction piping headers following a fill of the drained HHSI (charging) pump/piping. The UT identified an air void existed within the 8 inch suction header that was determined to exceed the void size acceptance criteria. Both trains of HHSI were declared inoperable, and Technical Specification LCO 3.0.3 was entered. Following additional venting and a subsequent verification that both suction piping were full of water, both trains of HHSI were declared operable, and Technical Specification LCO 3.0.3 was exited.

The cause of this event is the charging pump suction piping layout at BVPS Unit 1 is conducive to allowing a void to migrate to the charging pump common suction header during a fill and vent procedure. Currently the only available high point vent is not sufficient because the vent is on a common header to all three charging pumps outside the clearance boundary. The charging pump fill and vent procedure introduced the void by allowing air to enter the operating charging pump suction header by opening the clearance isolation valve without removing the air on the cleared side of the valve. This event is considered to have very low risk significance based upon an Engineering best-estimate evaluation which showed that both HHSI trains could have performed their safety function during a postulated design basis accident.

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 (EIIS) codes are identified in the text using the format [XX].

DESCRIPTION OF EVENT

With Beaver Valley Power Station (BVPS) Unit No. 1 at 100 percent power on 08/26/2010, the "A" High-Head Safety Injection (HHSI) Pump [BQ] was being returned to service following scheduled maintenance. {Note: One High-Head Safety Injection pump is also used at BVPS Unit 1 for routine continuous Reactor Coolant System charging [CB] during power operation, and this pump is commonly referred to as a Charging Pump.} At this time, the "B" HHSI pump was operating with the "C" HHSI pump in standby pursuant to meeting BVPS Unit 1 Technical Specification 3.5.2 which requires two HHSI pumps to be operable.

Following filling of the drained "A" HHSI (charging) pump/piping, ultrasonic tests (UT) were performed on the in-service Unit 1 HHSI pump common suction pipe headers (6 inch and 8 inch). Preliminary indications at 1345 hours showed the 6 inch header was full of water, but an air void existed within the 8 inch suction header. After initial void identification, the 8 inch line was vented multiple times and Engineering was notified to assess the size of the void.

The UT process of locating potential voids only identifies one dimension (i.e., depth of bubble). HHSI void acceptance criteria is defined in cubic feet and is unique to each specific piping location (in this case, over 30 specific locations for the HHSI piping, with individual void size limits for each pipe grouping). Thus, the UT process can not directly assess the acceptability of an identified void.

Engineering evaluation of the void data concluded that the measured void exceeded the allowable charging suction piping void size acceptance criteria as defined in the void-measuring test procedure. The control room was notified of this conclusion at 1649 hours and both trains of HHSI were immediately declared inoperable, and Technical Specification (TS) LCO 3.0.3 was entered pursuant to Technical Specification 3.5.2 Condition C for less than one full train of Emergency Core Cooling System (ECCS). Additional venting was initiated and it was subsequently verified that both suction piping headers were full of water. Technical Specification 3.5.2 and LCO 3.0.3 were exited at 1718 hours.

An investigation determined that the procedure being used to return the "A" HHSI pump to service introduced the void by allowing air to enter the operating charging pump suction header by opening the clearance isolation valve without removing the air on the cleared side of the valve. The drained HHSI pump was filled with pressurized water from the operating charging suction header by opening the clearance valve, which forced any air in

the cleared pump/pipes to migrate upwards into the operating charging suction header. This pump recovery procedure was used multiple times in past years without recognizing any adverse conditions because the existing high point vent was used to vent off the air prior to taking UT measurements. A recent procedure change resulted in the order of venting and UT testing being altered during a HHSI pump recovery, and this was the first time that the UT was performed before venting of the common suction header, which allowed the void to be discovered this time.

Applicable ECCS pump recovery procedure has beenplaced on administrative hold pending completion of corrective actions.

CAUSE OF EVENT

The cause of this event is the charging pump suction piping layout at BVPS Unit 1 is conducive to allowing a void to migrate to the charging pump common suction header during a fill and vent procedure. There is no proper high point vent within the suction side clearance boundary for each of the three HHSI/charging pumps which does not allow fill and vent without void migration to the suction header. Currently the only available high point vent is not sufficient in this case because the vent is on a common header to all three HHSI pumps outside the clearance boundary. {One charging pump operates continuously when at power.} A pre-conditioned mindset existed for the individuals that performed the previous operations procedure reviews of Emergency Core Cooling System procedures for potential gas voiding issues that this procedure was acceptable based on successful past performances with no anomalies noted.

A similar design/configuration anomaly does not exist for the BVPS Unit 2 HHSI/charging system suction header.

ANALYSIS OF EVENT

Both trains of HHSI required to be operable pursuant to BVPS Unit 1 Technical Specification 3.5.2 were not fully capable of performing to design basis bounding requirements. With both trains of HHSI being declared inoperable due to a gas void in the common suction header leading to both HHSI pumps, this event/condition is reportable as an event that could have prevented the fulfillment of a safety function which adversely affects the ability to safely shutdown the plant { 10CFR50.73(a)(2)(v)(A) }, the ability to mitigate the consequences of an accident { 10CFR50.73(a)(2)(v)(D) }, and reportable as a single condition that caused two independent trains to be inoperable { 10CFR50.73(a)(2)(vii) }.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Beaver Valley Power Station Unit Number 1	05000334	2010	-- 001 --	00	4 OF 5

NARRATIVE

Notwithstanding the above, an Engineering evaluation was performed which showed that both HHSI trains could have performed their safety function during a postulated design basis accident, using a best-estimate assessment of plant parameters for a void of the size measured in this event located in the common charging header. In addition, since this same fill and vent process has been used in the past, a best-estimate evaluation of a postulated void from a bounding scenario where the entire void volume from a cleared and drained HHSI pump/piping migrates into the common charging suction header also showed acceptable HHSI train capability. Therefore, this event is not reportable pursuant to 10CFR50.73(a)(2)(ii)(B) as an unanalyzed condition that significantly degraded plant safety.

This event was previously reported as an event that could have prevented the fulfillment of a safety function pursuant to 10 CFR 50.72(b)(3)(v)(A)/(b)(3)(v)(D) at 2222 hours on 08/26/2010 (Event Notification No. 46208). However, the initial reportability of this event in EN No. 46208 for 10 CFR 50.72(b)(3)(ii)(B) is retracted, with the same basis as provided above for 10 CFR 50.73(a)(2)(ii)(B).

This event is also reportable pursuant to 10 CFR 50.73(a)(2)(i)(B) as an event/condition prohibited by plant Technical Specifications. BVPS Unit 1 Technical Specification 3.5.2, "ECCS-Operating", Required Action C.1 requires the entry into LCO 3.0.3 immediately when less than 100 percent of ECCS flow equivalent to a single operable ECCS train is available. TS LCO 3.0.3 requires action to be initiated within one hour to place the plant in a Mode or other condition in which the condition of operation is not applicable. The HHSI System was made inoperable longer than one hour when the HHSI fill and vent procedure introduced an unacceptable air void into the common HHSI suction pipe header during this event and likely during past performances. Therefore, BVPS Unit No. 1 was in a condition prohibited by plant Technical Specifications whenever the plant was in this unacceptable HHSI condition for longer than one hour.

The plant risk associated with the BVPS Unit 1 HHSI pump suction header void event that occurred on 08/26/2010 and with prior drained HHSI pump recovery events is considered to be very low. This is based upon an Engineering technical assessment, which concluded that the HHSI pump capability would not have been significantly challenged by the measured void using best-estimate considerations. Therefore, the conditional probability of the HHSI pumps failing due to the void is negligible, and the increase in risk is insignificant. Therefore, the safety significance of the HHSI pump suction header void event was very low.

CORRECTIVE ACTIONS

1. A solution will be developed to allow filling/venting in order to return a charging pump to service while at power in a manner that does not challenge the operability of the system. This may involve a design change to add a new vent valve between the suction isolation valve in the piping for each of the three charging pumps. Upon implementation of the solution, the fill and vent operations procedure will be revised to incorporate this solution.

2. Operations procedures at both BVPS Unit 1 and Unit 2 that fill and vent the ECCS systems will be reviewed, with a focus on prevention of air void migration into operating parts of systems. These procedure reviews will look at elevation differences, the order of UT and venting sequence, and the manipulation of valves outside of the clearance boundary.

3. A plant operating experience report has issued on this event (OE 32074).

4. The site procedure on procedure cross-discipline review guidance will be revised to ensure fill and vent procedures on ECCS systems include a review of applicable isometric drawings (or physical plant walk down) to ensure the proposed procedure modification will not adversely migrate or introduce a gas void.

Completion of the above and other corrective actions are being tracked through the BVPS corrective action program.

PREVIOUS SIMILAR EVENTS

Gas voids have been found several times in both BVPS Units' HHSI systems within the last five years, pursuant to surveillances performed for normal post-maintenance testing and to address both industry and regulatory initiatives on gas voids. However, no voids previously identified were above the applicable gas void size limit such that the HHSI system(s) needed to be declared inoperable.

CR 10-81835/10-81969