



FirstEnergy Nuclear Operating Company

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L-05-158

Beaver Valley Power Station, Unit No. 2
Docket No. 50-412 License No. NPF-73
LER 2005-002-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

The following Licensee Event Report is submitted:

LER 2005-002-00, 10 CFR 50.73(a)(2)(iv)(A), "Automatic Actuation of Standby Service Water Pump Following Unexpected Service Water Pump Trip."


L. William Pearce

Attachment

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Sr. Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
INPO Records Center (via electronic image)
Mr. L. E. Ryan (BRP/DEP)

JE22

NRC FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104		EXPIRES 6/30/2007	
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)							
1. FACILITY NAME Beaver Valley Power Station Unit Number 2				2. DOCKET NUMBER 05000412		3. PAGE 1 OF 5	
4. TITLE Automatic Actuation of Standby Service Water Pump Following Unexpected Service Water Pump Trip							
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY
08	02	2005	2005	- 002	- 00	09	30
8. OTHER FACILITIES INVOLVED							
FACILITY NAME None						DOCKET NUMBER	
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 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"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(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"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	
		<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)	
100		<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"/> 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"/> 20.2203(a)(2)(vi)		<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(v)(D)	
						<input type="checkbox"/> 50.73(a)(2)(vii)	
						<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
						<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
						<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
						<input type="checkbox"/> 50.73(a)(2)(x)	
						<input type="checkbox"/> 73.71(a)(4)	
						<input type="checkbox"/> 73.71(a)(5)	
						<input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A	
12. LICENSEE CONTACT FOR THIS LER							
FACILITY NAME L. R. Freeland, Manager Regulatory Compliance						TELEPHONE NUMBER (Include Area Code) (724) 682-4284	
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT							
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT
B	BI	MO	S188	Y			
14. SUPPLEMENTAL REPORT EXPECTED							
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE). <input checked="" type="checkbox"/> NO							
15. EXPECTED SUBMISSION DATE						MONTH	DAY
16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)							
<p>On August 2, 2005 at 1448 hours, Beaver Valley Power Station (BVPS) Unit No. 2 unexpectedly experienced a trip of the "A" Service Water Pump (2SWS-P21A) which was operating on the "A" Service Water System (SWS) pipe header. The pump motor tripped on ground over current. The "B" Standby Service Water System pump (2SWE-P21B) automatically started on low Service Water header pressure on the "B" piping train header and recovered pressure in both the "A" and "B" SWS headers. The "C" Service Water Pump (2SWS-P21C) continued to operate normally during this event supplying "B" SWS header.</p> <p>This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) / (a)(2)(iv)(B)(9) as a condition that resulted in the actuation of an emergency service water system that does not normally run and that serves as ultimate heat sink since the actuation of 2SWE-P21B was valid. The unexpected trip of the BVPS Unit 2 Service Water Pump 21A was the direct cause for the automatic actuation of the BVPS Unit 2 Standby Service Water Pump 21B, due to a motor stator insulation breakdown that resulted in a turn-to-turn short. The safety significance associated with the over-current trip of the running service water pump 2SWS-P21A that occurred at BVPS Unit 2 on August 2, 2005 is considered to be very low.</p>							

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor {PWR}
Service Water System (SWS) {BI}
Standby Service Water System (SWE) {KG}

CONDITIONS PRIOR TO OCCURRENCE

Unit 2: Mode 1 at 100 percent power

There were no systems, structures, or components that were inoperable at the start of the event that contributed to the event other than as described below.

DESCRIPTION OF EVENT

On August 2, 2005 at 1448 hours, Beaver Valley Power Station (BVPS) Unit No. 2 unexpectedly experienced a trip of the "A" Service Water Pump (2SWS-P21A) which was operating on the "A" Service Water System (SWS) pipe header. The pump motor tripped on ground over current. The "B" Standby Service Water System pump (2SWE-P21B) automatically started on low Service Water header pressure on the "B" piping train header and recovered pressure in both the "A" and "B" SWS headers. The "C" Service Water Pump (2SWS-P21C) continued to operate normally during this event supplying the "B" SWS header. One of the three non-safety related Chiller units also tripped due to the SWS low-pressure conditions, and was recovered shortly thereafter. Voltage fluctuations were briefly observed on AE 4 kV bus just prior to and following the 2SWS-P21A motor trip. No additional failures or equipment challenges occurred as a result of this event.

Approximately 6 hours after the trip of 2SWS-P21A, 2SWS-P21C was re-aligned to the "A" SWS header (requiring a brief entrance into a Technical Specification 3.0.3 condition for approximately 7 minutes) and 2SWS-P21B was started on the "B" header. This allowed the plant to exit the Technical Specification action statement for an inoperable Service Water System subsystem and 2SWE-P21B to be placed back into standby.

Although both the "A" and "B" Service Water pumps both have the same low pressure auto-start setpoint, the pressure in the "A" train did not sufficiently drop to automatically actuate the "A" Standby Service Water System pump (2SWE-P21A) prior to pressure being recovered by 2SWE-P21B. Subsequent testing verified that the "A" train instrumentation was functioning correctly.

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DESCRIPTION OF EVENT (continued)

The Service Water System (SWS), which draws water from the ultimate heat sink (Ohio River), provides normal plant cooling for safety related and non-safety related equipment during both plant operation and shutdown conditions. The Standby Service Water System (SWE) is designed to provide a heat sink if the Main Intake Structure (which contains the SWS pumps) becomes disabled by the postulated beyond-design-basis event of a river barge impact explosion. The SWE pumps are located within the Alternate Intake Structure, located upstream of the Main Intake Structure on the Ohio River. The SWE is designed to accommodate unit shutdown from 100 percent reactor power and subsequent cooldown of the Reactor Coolant System to less than 200F. The SWE pumps are provided with an automatic start capability. Each SWE pump will automatically start and align to its associated SWS piping train header when a low pressure is sensed in its associated SWS header. This automatic start feature is not required to meet the postulated beyond-design-basis loss of the Main Intake Structure event, but is provided to prevent inadvertent plant trip on loss of a running SWS pump since normal power operation can not continue without adequate SWS flow. The automatic initiation of the SWE improves the reliability of the unit's heat sink capability. The downstream side of each SWS header is connected to each other via non-safety related cooling loads. During the unexpected loss of the running "A" SWS header pump, a low pressure was ultimately experienced in the "B" SWS header, causing the "B" SWE header pump to start. The SWS headers are designed to automatically separate if a low pressure condition exists for greater than 45 seconds. The "B" SWE pump started within 45 seconds of experiencing the low pressure condition, re-pressurized the header and, therefore, the headers remained cross-connected.

REPORTABILITY

This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) / (a)(2)(iv)(B)(9) as a condition that resulted in the actuation of an emergency service water system that does not normally run and that serves as an ultimate heat sink since the actuation of 2SWE-P21B was valid. This actuation was not a pre-planned sequence even though this automatic actuation is expected as part of the SWS design for a single failure of an operating SWS pump. The BVPS SWE also meets the definition of an emergency service water system described in 10 CFR 50.73(a)(2)(iv)(B)(9) since the SWE is a standby service water system designed to operate following the postulated loss of the Main Intake Structure during power operation. [Statements of Consideration for NUREG-1022, Rev. 2, Event Reporting Guidelines, 65FR63769, dated 10/25/2000, excludes only those standby service water systems that run to remove heat from the residual heat removal heat exchangers.]

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CAUSE OF EVENT

The unexpected trip of the BVPS Unit 2 Service Water Pump 21A was the direct cause for the automatic actuation of the BVPS Unit 2 Standby Service Water Pump 21B. The unexpected trip of the BVPS Unit 2 Service Water Pump 21A was due to a motor stator insulation breakdown that resulted in a turn-to-turn short circuit. The most probable cause of this insulation breakdown was insulation voids that remained in the stator insulation after the Vacuum Pressure Impregnation (VPI) manufacturing process performed during a previous motor rewind.

SAFETY IMPLICATIONS

The over-current trip of 2SWS-P21A resulted in only one train of normal Service Water being available. When the pressure in the "B" SWS header reached the low-pressure set point, the "B" SWE pump automatically started as designed. The SWS and SWE systems performed as designed for a single SWS pump trip and as described in the UFSAR. Safety related components and systems were not adversely affected by this event, as there was no notable interruption of service water-cooling. Operation of the SWE system does not adversely impact the operation of the SWS system.

The safety significance associated with the over-current trip of the running service water pump 2SWS-P21A that occurred at BVPS Unit 2 on August 2, 2005 is considered to be very low. This is based on the incremental core damage probability for the event when considering the actual component unavailability that was present at the time of the pump trip and the duration of the event.

CORRECTIVE ACTIONS

1. The 2SWS-P21A motor was repaired and 2SWS-P21A was returned to service on August 30, 2005.
2. The motor rewind specification for Service Water pumps will be revised to include more definitive requirements, including the need for additional coil testing.

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

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PREVIOUS SIMILAR EVENTS

A review found no prior BVPS Unit 1 and one BVPS Unit 2 Licensee Event Report within the last five years involving an automatic actuation of an Auxiliary River Water System pump (BVPS Unit 1) or a Standby Service Water System pump (BVPS Unit 2).

BVPS Unit 2 LER 2001-002, "Trip of One Service Water Pump Caused Automatic Actuation of Emergency Service Water System."

BVPS Unit 2 LER 2001-002 is similar to this LER but involved a trip of the 2SWS-P21C motor.

COMMITMENTS

There are no new commitments made by FirstEnergy Nuclear Operating Company (FENOC) for BVPS Unit No. 2 in this document.