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L-01-147

Beaver Valley Power Station, Unit No. 2
Docket No. 50-412 License No. NPF-73
LER 2001-002-00

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

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 2001-002-00, 10 CFR 50.73(a)(2)(iv)(A), "Trip of One Service Water Pump Caused Automatic Actuation of Emergency Service Water System."


Lew W. Myers

Attachment

IE22

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Central File

NRC FORM 366 (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 <small>Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to: bjs1@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 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.</small>		EXPIRES 7-31-2004						
LICENSEE EVENT REPORT (LER) <small>(See reverse for required number of digits/characters for each block)</small>												
1. FACILITY NAME Beaver Valley Power Station Unit No. 2				2. DOCKET NUMBER 05000412		3. PAGE 1 OF 4						
4. TITLE Trip of One Service Water Pump Caused Automatic Actuation of Emergency Service Water System												
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED			
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER		
10	05	2001	2001 - 002 - 00			12	04	2001	None			
									FACILITY NAME	DOCKET NUMBER		
									FACILITY NAME	DOCKET NUMBER		
9. OPERATING MODE		1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
10. POWER LEVEL 100		20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)			50.73(a)(2)(ix)(A)	
		20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)			50.73(a)(2)(x)	
		20.2203(a)(1)			50.36(c)(1)(i)(A)			X	50.73(a)(2)(iv)(A)			73.71(a)(4)
		20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)			73.71(a)(5)	
		20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)			OTHER Specify in Abstract below or in NRC Form 366A	
		20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)				
		20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)				
		20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)				
		20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)				
20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)						
12. LICENSEE CONTACT FOR THIS LER												
NAME T. S. Cosgrove, Manager Regulatory Affairs								TELEPHONE NUMBER (Include Area Code) (724) 682-5203				
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			
B	BI	MO	S188	Y								
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR		
YES (If yes, complete EXPECTED SUBMISSION DATE)						X NO						
16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)												
<p>On October 5, 2001 at 0026 hours, Beaver Valley Power Station (BVPS) Unit No. 2 experienced a trip of the "C" Service Water Pump (2SWS-P21C) which was operating on the "A" Service Water System (SWS) header. The "A" Service Water Pump (2SWS-P21A) was unavailable due to cleaning of the pump's intake bay. The "A" and "B" Standby Service Water System (SSWS) Pumps (2SWE-P21A and 2SWE-P21B) automatically started on low Service Water header pressure on each of their respective trains. The "B" Service Water Pump (2SWS-P21B) continued to operate normally during this event.</p> <p>An investigation revealed the motor circuit breaker for 2SWS-P21C opened on ground over current as a result of a winding failure in the motor for 2SWS-P21C, which was caused by an insulation breakdown. This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as a condition that resulted in the automatic actuation of an Emergency Service Water system that does not normally run and that serves as ultimate heat sink. The SSWS operated as designed in response to the loss of a running SWS pump. This event is considered to be of Low Safety Significance.</p>												

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PLANT AND SYSTEM IDENTIFICATION

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

CONDITIONS PRIOR TO OCCURRENCE

Unit 2: Mode 1 at 100 % power

The "A" Service Water Pump, 2SWS-P21A, was unavailable due to cleaning of the pump's intake bay. There were no other system, structures or components that were inoperable that contributed to the event.

DESCRIPTION OF EVENT

On October 5, 2001 at 0026 hours, Beaver Valley Power Station (BVPS) Unit No. 2 experienced a trip of the "C" Service Water Pump (2SWS-P21C) which was operating on the "A" Service Water System (SWS) header. The "A" Service Water Pump (2SWS-P21A) was unavailable due to cleaning of the pump's intake bay. The motor tripped on ground over current. The "A" and "B" Standby Service Water System Pumps (2SWE-P21A and 2SWE-P21B) automatically started on low Service Water header pressure on their respective trains. The "B" Service Water Pump (2SWS-P21B) continued to operate normally during this event. 2SWE-P21B was secured eleven minutes later and 2SWE-P21A was secured after recovery of the "A" Service Water Pump (2SWS-P21A). The non-safety related Chiller units tripped due to the SWS low-pressure conditions, and were recovered shortly thereafter. No additional failures or equipment challenges occurred as a result of this event.

The Standby Service Water System (SSWS) is designed to provide a heat sink if the Main Intake Structure (which contains the SWS pumps) becomes disabled by a postulated beyond-design-basis event of a barge impact explosion. The SSWS pumps are located within the Alternate Intake Structure. The SSWS is designed to accommodate unit shutdown from 100 percent reactor power and subsequent cooldown of the Reactor Coolant System to less than 200F. The SSWS pumps are provided with an automatic start capability. Each SSWS pump will automatically start and align to its associated SWS piping train header when a low pressure is sensed in its associated SWS header. Although this automatic start feature is not required to meet the postulated beyond-design-basis loss of the Main Intake Structure event, it 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 SSWS improves the reliability of the unit's heat sink capability. The downstream side of each SWS header is cross-connected via non-safety related cooling loads. Thus, during the unexpected loss of one running SWS pump, a low pressure was ultimately experienced in both SWS headers, causing both SSWS pumps to start.

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REPORTABILITY

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as a condition that resulted in the automatic actuation of an emergency service water system that does not normally run and that serves as ultimate heat sink. This automatic actuation is expected as part of the SWS design for a single failure of an operable SWS pump.

CAUSE OF EVENT

The cause of the trip of 2SWS-P21C was the opening of the pump's motor circuit breaker due to a ground over current signal. The ground appears to have been caused by a premature insulation failure in the pump motor stator. Insulation material voids or defects during original manufacturer of the motor caused a sudden breakdown in the stator winding insulation. This conclusion is based on the random time of failure, the quick fault relay operation, and the visual inspection of the motor stator.

The motor was disassembled and inspected at the vendor. It was not revealed where the grounded conductor was located. Normally at the point of contact, the energy dissipated from the inductive discharge of the winding, causes a visually identifiable burned area in the insulation and or welding of the core iron at the point of ground. The lack of this type of visual evidence leads to the conclusion that the ground path propagated very quickly, not heating up the insulation materials to a combustible temperature.

SAFETY IMPLICATIONS

The over-current trip of 2SWS-P21C, resulted in only one train of normal Service Water being available. When the pressure in each of the SWS headers reached the low-pressure set point, the respective SSWS pump started as designed. Since 2SWS-P21A pump was out of service due to intake bay cleaning and 2SWS-P21C tripped, both of these components were unavailable per probabilistic safety analysis. Both SSWS pumps started and their associated check valves and Motor Operated Valves (MOV's) opened as designed. The SWS and SSWS systems performed as designed and 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. The SSWS system is capable of providing its design function during site-related historic events. Operation of the SSWS system does not adversely impact the operation of the SWS system. Thus, this event is considered to be of Low Safety Significance.

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CORRECTIVE ACTIONS

1. The "B" train of SSWS was secured and the "B" SWS header was restored to its normal arrangement in eleven minutes.
2. The intake bay for 2SWS-P21A was returned to service and the "A" SWS header was restored to its normal arrangement in five hours and 45 minutes.
3. The motor for 2SWS-P21C was refurbished and the pump was tested satisfactory.
4. An engineering evaluation will be performed on the 2SWS-P21B motor material condition, as it is the remaining SWS pump that has not been recently refurbished.

Corrective Action completion is being tracked through the Corrective Action Program.

PREVIOUS SIMILAR EVENTS

A review of past Beaver Valley Power Station Licensee Event Reports for the last three years found no similar events at BVPS Unit 1 or Unit 2.