

Lew W. Myers
Senior Vice President724-682-5234
Fax: 724-643-8069February 16, 2001
L-01-014

***Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 2000-006-01***

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 supplement is submitted:

LER 2000-006-01, 10 CFR 50.73(a)(2)(iv), "Reactor Trip/Turbine Trip Due to Turbine EH Loss of Control Power."


Lew W. Myers

Attachment

IE22

cc: Mr. H. J. Miller, Regional Administrator
United States Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406

Mr. L. J. Burkhart
BVPS Project Manager
United States Nuclear Regulatory Commission
Washington, DC 20555

Mr. David M. Kern
BVPS Senior Resident Inspector
United States Nuclear Regulatory Commission

Mr. J. A. Hultz
Ohio Edison Company
76 S. Main Street
Akron, OH 44308

INPO Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Mr. L. E. Ryan
Bureau of Radiation Protection
Department of Environmental Protection
RCSOB-13th Floor
P.O. Box 8469
Harrisburg, PA 17105-8469

Manager, Nuclear Licensing and
Operations Support
Virginia Electric & Power Company
5000 Dominion Blvd.
Innsbrook Tech. Center
Glen Allen, VA 23060

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: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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.

FACILITY NAME (1)

Beaver Valley Power Station Unit 1

DOCKET NUMBER (2)

05000334

PAGE (3)

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TITLE (4)

Reactor Trip / Turbine Trip Due to Turbine EH Loss of Control Power

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	05	2000	2000	-- 006	-- 01	02	16	2001	None	
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)										
OPERATING MODE (9)		1	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)		100 %	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
			20.2203(a)(2)(ii)		20.2203(a)(4)		X 50.73(a)(2)(iv)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)			
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

T. S. Cosgrove, Manager Licensing

TELEPHONE NUMBER (Include Area Code)

(724) 682-5203

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	TG	JX	W120	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO
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EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At 1305 on July 5, 2000, Beaver Valley Power Station (BVPS) Unit 1 experienced a reactor trip from 100% power due to the four (4) Main Turbine throttle valves going closed. There were no turbine related activities ongoing at the time. The Sequence of Events recorder indicated a momentary loss of DC control power (18 milliseconds) to the Analog Electrohydraulic (AEH) control system associated with the Main Turbine. One second later, a computer point indicated that a Throttle Valve/Governor Valve transfer had occurred. All four Main Turbine throttle valves closed between 10 and 13 seconds after the momentary loss of DC power. Following initiation of the automatic reactor trip signal, all control rods fully inserted and the Unit was stabilized in Mode 3 with decay heat being removed via the normal post-reactor trip method of using the steam bypass system into the Main Condenser. There were no radiological releases.

The throttle valve mixing amp 3 card was the only failed component found in the AEH control cabinet. Though initially thought to be the cause, subsequent evaluation showed this failure was not responsible for the turbine trip. A new mixing amp 3 card was installed and tested satisfactorily with the original DC power supplies. It is known that the reactor trip was caused by a failure in the AEH control cabinet, though no specific cause has been identified.

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Beaver Valley Power Station Unit 1	05000334	2000	- 006	- 01	2 OF 4

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

PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor System
Westinghouse Main Turbine (TA)
Main Turbine Control Fluid System (TG)

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1 at 100 % power

There were no systems, structures, or components that were inoperable that contributed to the event.

DESCRIPTION OF EVENT

At 1305 on July 5, 2000, Beaver Valley Power Station (BVPS) Unit 1 experienced a reactor trip from 100% power due to the four (4) Main Turbine throttle valves going closed. There were no turbine related activities ongoing at the time. The Sequence of Events recorder indicated a momentary loss of DC control power (18 milliseconds) to the Analog Electrohydraulic (AEH) control system associated with the Main Turbine. One second later, a computer point indicated that a Throttle Valve/Governor Valve transfer had occurred. The momentary power loss caused the AEH to reset in the condition of Throttle Valve Control. The AEH is not designed to be in Throttle Valve Control when the Main Generator breaker is closed. With the AEH in Throttle Valve Control, the desired position for the Throttle Valves was zero (0) percent. All four Main Turbine throttle valves closed between 10 and 13 seconds after the momentary loss of DC power. The four throttle valves closing initiated an automatic reactor trip.

Following initiation of the automatic reactor trip signal, all control rods fully inserted and no Pressurizer or Steam Generator relief valves lifted or ECCS equipment actuated. The Unit was stabilized in Mode 3 with decay heat being removed via the normal post-reactor trip method of using the steam bypass system into the Main Condenser. The Auxiliary Feedwater System automatically started as designed and supplied make-up water to the Steam Generators. There were no radiological releases. Reactor Coolant System temperature and pressure and Steam Generator temperature, level and pressure exhibited normally expected post-trip responses.

The only failed component found during troubleshooting was the throttle valve mixing amp 3 card. A new mixing amp 3 card was installed and tested.

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REPORTABILITY

The automatic initiation of the Reactor Trip System constitutes an automatic actuation of an engineered safety feature as described in 10 CFR 50.73(a)(2)(iv). This requires NRC reporting within four hours of the occurrence, pursuant to the reporting criteria of 10 CFR 50.72(b)(2)(ii), and LER reporting within 30 days of the occurrence, pursuant to the reporting criteria of 10 CFR 50.73(a)(2)(iv). At 1417 hours on July 5, 2000, a 4-hour notification (Report # 37145) was made to the NRC in accordance with 10 CFR 50.72(b)(2)(ii).

CAUSE OF EVENT**Unexpected Failure:**

The throttle valve mixing amp 3 card was the only failed device found in the AEH control cabinet. It was initially believed that the mixing amp card 3 failed to ground and thus caused the +15 Vdc bus to go to ground, which affected both the primary and secondary power supply output. However a subsequent evaluation of the mixing amp 3 card by an offsite facility and BVPS System Engineering determined that this card's failure was not responsible for the AEH control cabinet failure and associated reactor trip. This is because the identified card failure was a crack in a solder trace (i.e., a fail open, not a failure to ground).

It is known that the reactor trip was caused by a fault in the AEH control cabinet. But the specific cause is unknown. Additional investigation is planned, but can only be performed when the station is shutdown. The station has operated continuously for over 200 days since the reactor trip indicating that the fault in the AEH controls has not re-occurred. The LER will be supplemented if additional investigation provides more defined conclusions.

SAFETY IMPLICATIONS

Following initiation of the automatic reactor trip signal, all control rods fully inserted, no Pressurizer or Steam Generator relief valves lifted, and no ECCS equipment actuated. The Unit was stabilized in Mode 3 with decay heat being removed via the normal post-reactor trip method of using the steam bypass system into the Main Condenser. The Auxiliary Feedwater System automatically started as designed and supplied make-up water to the Steam Generators. The unit was stabilized and station recovery was satisfactorily completed. There were no radiological releases and no RCS or steam generator tube leaks. Reactor Coolant System temperature and pressure and Steam Generator temperature, level and pressure exhibited normally expected post-trip responses.

At the time of the BVPS Unit 1 reactor trip, no components modeled in the Unit 1 Probabilistic Risk Analysis were unavailable. The calculated risk associated with this event is small.

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CORRECTIVE ACTIONS

1. The failed mixing amp 3 card which had apparently caused the +15 Vdc bus to go to ground was replaced and was sent to an offsite facility for testing. The failure analysis report identified that the failure was due to a crack in a solder trace on the circuit card. However, the identified failure did not support the apparent cause of the turbine trip. System Engineering performed an evaluation which determined that continued operation remained acceptable. Additional troubleshooting is planned during the next refueling outage. AEH capacitors will be replaced and tested to see if any could have failed by shorting to ground.
2. As a precautionary measure, the AEH control cabinet +15Vdc primary power supply was replaced. The removed power supply was sent to the vendor to perform as-found testing. Any follow-up corrective action will be based upon the as-found test results and additional investigation results.
3. Additional evaluation of vendor and industry information will be performed to determine if additional actions should be performed.

Corrective action completion is being tracked through the corrective action program.

PREVIOUS SIMILAR EVENTS

A review of the BVPS Corrective Action program documents and Licensee Event Reports found two similar events involving turbine trip or EHC Power supply within the last four years:

Condition Report 992408, Loss Of Turbine EH DC Power Supply. The primary power supply failed; however, the secondary power supply continued to provide power to the EH control system.

BVPS Unit 1 LER 96-008, "Reactor Trip During Solid State Protection System Turbine Testing."