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October 12, 2004  
L-04-131

***Beaver Valley Power Station, Unit No. 1***  
***Docket No. 50-334 License No. DPR-66***  
***LER 2004-001-00***

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 2004-001-00, 10 CFR 50.73(a)(2)(i)(B), "Control Rod Shutdown Bank Anomaly Causes Entry Into Technical Specification 3.0.3."

  
L. William Pearce

Attachment

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

JEZZ

# LICENSEE EVENT REPORT (LER)

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

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.

<b>1. FACILITY NAME</b> Beaver Valley Power Station Unit Number 1	<b>2. DOCKET NUMBER</b> 05000334	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Control Rod Shutdown Bank Anomaly Causes Entry into Technical Specification 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	14	2004	2004	- 001	- 00	10	12	2004	None	
									FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> <i>(Check all that apply)</i>									
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"/> 50.73(a)(2)(vii)						
	<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)						
<b>10. POWER LEVEL</b>	<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)						
100	<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	Specify in Abstract below or in NRC Form 366A					
	<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)							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME L. R. Freeland, Manager Regulatory Compliance	TELEPHONE NUMBER <i>(Include Area Code)</i> (724) 682-4284
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**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
X	AA	EC	W120	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
<input type="checkbox"/> YES <i>(If yes, complete EXPECTED SUBMISSION DATE).</i> <input checked="" type="checkbox"/> NO				

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

On 8/14/2004 at 0740 hours during performance of the normally scheduled Control Rod Assembly Partial Movement Surveillance Test at Beaver Valley Power Station (BVPS) Unit 1, the operator performing the test observed an unexpected condition during the insertion of control rod Shutdown Bank "A" which showed Group II rods at 223 steps withdrawn, two steps higher than expected. When the expected response to the rod motion was not received, the surveillance test was stopped. The BVPS Unit 1 Technical Specification (TS) 3.1.3.5 requires shutdown bank control rods to be withdrawn at least 225 steps except during surveillance testing. There are no applicable action requirements for a whole bank not being withdrawn. At 0810 hours, TS 3.1.3.5 and 3.0.3 were entered. At 11:07 hours, the Shutdown Bank "A" rods were withdrawn to 226 steps on the Group II demand counter using the normal rod withdrawal process, exiting TS 3.0.3 and TS 3.1.3.5.

The initiation of preparation for shutdown was completed within one hour of entering TS 3.0.3. Thus, BV1 initiated actions to shutdown the Unit, even though actual power level was not decreased. Therefore, this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by plant Technical Specifications as per NUREG-1022, Rev. 2, page 36. The cause of the Group II Shutdown Bank "A" control rods to fail to move as demanded was a degraded Slave Cyclor Logic card inside the Rod Control Logic cabinet. The safety significance of this event was low. All control rods, including the Shutdown Banks, remained trippable throughout the event.

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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}  
Control Rod Drive System {AA}

**CONDITIONS PRIOR TO OCCURRENCE**

Unit 1: 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 8/14/2004, at 0740 hours, during performance of the normally scheduled Control Rod Assembly Partial Movement Surveillance Test at Beaver Valley Power Station (BVPS) Unit 1, the operator performing the test observed an unexpected condition during the insertion of control rod Shutdown Bank "A". This test is performed to satisfy BVPS Unit 1 Technical Specification (TS) Surveillance Requirement (SR) 4.1.3.1.1, which requires that each shutdown and control rod not fully inserted in the core to be determined to be OPERABLE by movement of at least 10 steps in any one direction at least once per 31 days. The surveillance first tests Shutdown Bank "A" by inserting the bank 10 steps. Rod positions at the start of the test were at the all-rods-out position for the current cycle, 226 steps withdrawn. Each of the two control rod Groups within Shutdown Bank "A" normally alternates stepping in(out) one step during normal continuous rod motion. The first insertion of the Shutdown Bank "A" rods was 3 1/2 steps, with the group demand counters for Shutdown Bank "A" showing Group I at 222 steps withdrawn and Group II at 223, as expected. In the next rod move, Group I moved in a step instead of the expected Group II, now showing Group I at 221 and Group II at 223 steps withdrawn. This resulted in having a two step difference between the two control rod Groups which was not expected, and, therefore, rod motion was immediately stopped. No rod control alarms were received. When the expected response to the rod motion was not received, the test was stopped. Therefore, the TS surveillance exception was no longer applicable. Further rod motion was not attempted due to conservative decision considerations concerning potential adverse control rod consequences, awaiting evaluation by station Instrument and Control technicians.

BVPS Unit 1 TS 3.1.3.5 requires that all shutdown rods meet the insertion limits specified in the Core Operating Limits Report (COLR) in Modes 1 and 2. [The COLR insertion limit is shutdown rods withdrawn at least 225 steps.] TS 3.1.3.5 also requires that with a maximum of one shutdown rod inserted beyond the insertion limit, except for surveillance testing pursuant to SR 4.1.3.1.1, the rod shall be restored to within the limit within one hour or

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declare the rod inoperable and apply TS 3.1.3.1. The Action requirements of TS 3.1.3.5 allows for only one rod to be inoperable. There are no applicable action requirements for a whole bank not being appropriately withdrawn. Thus, at 0810 hours, TS 3.1.3.5 and 3.0.3 were entered, which requires restoration within one hour or place the unit in at least Hot Standby within the next 6 hours.

TS 3.1.3.2 was also entered since the operation of the control rod group demand counters in the control rod position indication system were believed to be potentially inoperable. TS 3.1.3.2 requires control rod group demand counter rod position indication be operable. With one group demand position indicator inoperable, TS 3.1.3.2 Action b.1 requires all rod position indicators for the affected bank be verified operable and that the rods are within 12 steps of each other at least once per 8 hours.

At 0910 hours, Shutdown Bank "A" had not been restored to meet the COLR requirements. Action was initiated to commence plant shutdown per TS 3.0.3 with the requirement that the plant must be in Hot Standby by 15:10 hours. Power reduction was scheduled to commence at 11:10 hours.

Since no anomaly was identified within the control rod power cabinet and logic cabinet, at 11:07 hours, the Shutdown Bank "A" rods were withdrawn to 225 steps on the Group I demand counter and to 226 steps on the Group II demand counter using the normal rod withdrawal process. With all Control Rods being returned to acceptable Rod Insertion Limit positions, TS 3.0.3 and TS 3.1.3.5 were exited. TS 3.1.3.2 remained in effect as the group demand counter was the initial suspected cause of the event.

On 8/16/2004, the group demand counter was determined to be functioning properly, but the Unit conservatively remained in TS 3.1.3.2 Action b.1.

On 8/17/2004, additional testing indicated a continued rod movement problem, which was determined to be due to a lack of demand signal being continuously generated somewhere within the rod control system. Although subsequently shown not to be required, BVPS Unit 1 conservatively entered TS 3.1.3.1 Action d at 1408 hours due to declaring more than one control rod trippable but inoperable due to the inability to complete the surveillance at that time. TS 3.1.3.1 Action d states: With more than one rod trippable but inoperable, power operation may continue provided that the remainder of the rods in the bank(s) are aligned to within 12 steps while maintaining the rod sequence and insertion limits provided within the COLR and the inoperable rods are restored within 72 hours.

On 8/19/04, following replacement of the Slave Cyclor logic card, rod control pulse voltage returned to the expected value. At 0425 hours, following successful completion of the surveillance test pursuant to SR 4.1.3.1.1, TS 3.1.3.1 and 3.1.3.2 were exited.

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**REPORTABILITY**

Pursuant to NUREG-1022, Rev. 2, page 36: "Entry into STS 3.0.3 is not necessarily reportable under 10 CFR 50.73(a)(2)(i)(B). However, it should be considered reportable under this criterion if the condition is not corrected within an hour, such that it is necessary to initiate actions to shutdown, cooldown, etc." Based upon this NUREG-1022 criteria, any event where Tech Spec 3.0.3 is applied longer than one hour would be reportable under 10 CFR 50.73.

As noted in the description above, BVPS Unit 1 entered TS 3.0.3 and remained in TS 3.0.3 for more than one hour. Therefore, this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by plant Technical Specifications because TS 3.0.3 had been entered for longer than one hour, even though actual power level was not decreased from 100 percent.

**CAUSE OF EVENT**

The cause of the Group II Shutdown Bank "A" control rods to not move as demanded was the result of a degraded Slave Cyclor Logic card inside the Rod Control Logic cabinet.

**ANALYSIS OF EVENT**

The Slave Cyclor Logic card was determined to be degraded. The as found pulse voltage to the Slave Cyclor Logic card for the associated AC power cabinet was 9 volts or less (6.5 volts to 8.5 volts is a voltage transition region which may deter rod stepping). The correct voltage should be 14 volts. This degraded condition affected the ability of the Group II Shutdown Bank "A" control rods to move under manual or automatic control since movement demand was intermittent due to the degraded voltage. The ability to trip these control rods was not affected.

**SAFETY IMPLICATIONS**

The control rods associated with Group II Shutdown Bank "A" remained trippable. The degradation caused intermittent Group II movement due to the intermittent logic gate voltage. Manual or automatic rod insertion by stepping is not credited in the BVPS Unit 1 safety analyses in the BVPS Unit 1 Updated Final Safety Analysis Report (UFSAR). The UFSAR only credits the ability of the control rods to trip in the Design Basis Accident safety analyses. Therefore, the results of the Design Basis Accidents analyzed in the BVPS Unit 1 UFSAR had remained valid.

The plant risk associated with the BVPS Unit 1 Shutdown Bank "A" Group 2 position

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anomaly that occurred on August 14, 2004 is considered to be low. This is based on the incremental core damage probability for the event when considering manual rod insertion to be unavailable during the time period.

Based on the above, the safety significance of the Shutdown Bank "A" Group 2 position anomaly on August 14, 2004 was low.

**CORRECTIVE ACTIONS**

1. An initial investigation determined that Shutdown Bank "A" Group I and II control rods had remained trippable.
2. A subsequent investigation identified that a failure in a Slave Cyclor Logic card caused intermittent failure to move upon demand of Shutdown Bank "A", Group II. Following replacement of the failed Slave Cyclor Logic card and the Master Cyclor Selector Card, the surveillance test for SR 4.1.3.1.1 was performed successfully.
3. The Rod Control Preventive Maintenance frequency for both BVPS Units is being evaluated for optimal reliability.
4. Additional actions are being evaluated to address replacing obsolete Rod Control System cards with upgraded cards (as they become available) to help prevent age related card failures.

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

**PREVIOUS SIMILAR EVENTS**

A review found no Beaver Valley Power Station Licensee Event Reports within the last three years involving control rod manual movement or control rod position indication.

**COMMITMENTS**

There are no new commitment made by FirstEnergy Nuclear Operating Company (FENOC) for BVPS Unit No. 1 in this document.