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July 21, 2006

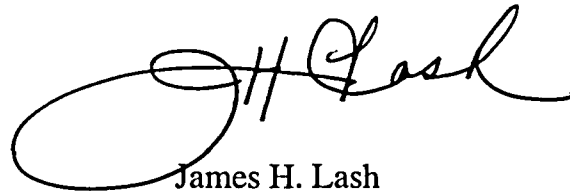
L-06-118

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 2006-002-00

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

The following Licensee Event Report is submitted:

LER 2006-002-00, 10 CFR 50.73(a)(2)(i)(A), "Unit Shutdown Completed as Required by Plant Technical Specification for Failed Solid State Protection System Memory Card."



James H. Lash

Attachment

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

JE22

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.

| | | |
|--|-------------------------------------|--------------------------|
| 1. FACILITY NAME Beaver Valley Power Station Unit Number 1 | 2. DOCKET NUMBER 05000334 | 3. PAGE 1 of 5 |
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4. TITLE
Unit Shutdown Completed as Required by Plant Technical Specification for Failed Solid State Protection System Memory Card

| 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 |
| 05 | 26 | 2006 | 2006 | 002 | 00 | 07 | 21 | 2006 | None | |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER |

| | | | | | | | | | | | | |
|--|--|---|---|--|--|--|--|--|--|--|--|--|
| 9. OPERATING MODE 1 | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) | | | | | | | | | | | |
| | <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) | | | | | | | | |
| 10. POWER LEVEL 100 | <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)(vii)(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)(vii)(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) | | | | | | | | |
| | <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) | | | | | | | | |
| | <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 checked="" type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER | | | | | | | | | |
| <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) | Specify in Abstract below or in NRC Form 366A | | | | | | | | | |

12. LICENSEE CONTACT FOR THIS LER

| | |
|---|--|
| FACILITY NAME L. R. Freeland, Director Performance Improvement | TELEPHONE NUMBER (Include Area Code) (724) 682-5206 |
|---|--|

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| X | JG | SSPS Card | W120 | Y | | | | | |

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

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

At 1046 hours on May 26, 2006, Beaver Valley Power Station (BVPS) Unit No. 1 removed Train B of Solid State Protection System (SSPS) from service to perform a routine bi-monthly channel functional surveillance test in accordance with Technical Specifications. The Unit is required to enter multiple BVPS Unit No. 1 Technical Specification Action statements for the SSPS being out of service. At 1145 hours, the Memory test portion resulted in failed indication from four memory test positions. At 1415 hours, BVPS Unit No. 1 commenced power reduction to comply with the most limiting Technical Specification Action since the memory tests were still failed and Train B remained inoperable. At 1831 hours, the reactor was shut down per the normal shutdown procedure and Mode 3 (Hot Standby) was entered. This event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(A) for completing a plant shutdown required by the plant's Technical Specifications.

The root cause was indeterminate despite rigorous investigation. The most probable cause of the event was a poor or intermittent electrical connection in the testing circuit of Solid State Protection System. The suspect connection was narrowed down to one of three locations: Pin 4 of Universal Card A412 or the rack connector or termi-point clip for this pin. This failure would not have prevented the proper operation of the SSPS since Pin 4 is used only during testing and not during normal operation of the SSPS train. The failure of the SSPS Train B test circuit was very low risk significance.

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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}
Solid State Protection System {JG}

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

At 1046 hours on May 26, 2006, Beaver Valley Power Station (BVPS) Unit No. 1 removed Train B of Solid State Protection System (SSPS) from service to perform a routine bi-monthly channel functional surveillance test (1MSP-1.05) in accordance with Technical Specifications. This surveillance requires that one train of the SSPS be bypassed (i.e., taken out of service) with a part of this surveillance verifying the correct logic for the permissive blocks within the memory card in SSPS. The Unit is required to enter multiple BVPS Unit No. 1 Technical Specification Action statements for one train of the SSPS being out of service, with the most limiting Technical Specification Action allowing one train of SSPS to be bypassed for up to two hours during the surveillance testing. Technical Specification (TS) 3.3.1.1 for Reactor Trip Instrumentation, Table 3.3-1, Functional Unit (FU) 21 for Reactor Trip Breakers, Action 40.b states "With one reactor trip breaker inoperable as a result of something other than an inoperable diverse trip feature, be in at least Hot Standby within 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.1, provided the other channel is Operable."

At 1145 hours, the Memory test portion resulted in failed indication from four memory test positions. These specific failures led to a preliminary initial conclusion that all reactor trip signals associated with P-10 (e.g., intermediate range trip, source range trip, power range low setpoint trip) would not have been generated in SSPS Train B below the P-10 setpoint. SSPS Train A was fully operable at the time of the event.

At 1235, Instrumentation & Control (I&C) reported that the Universal Logic Card A412 was replaced and re-testing is commencing.

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DESCRIPTION OF EVENT (Continued)

At 1246 hours, the allowable two hour time for bypassing one channel for testing had elapsed and BVPS Unit No. 1 entered TS 3.3.1.1, Table 3.3-1, FU 21, Action 40.b action to shut down the unit within the next 6 hours.

At 1258 hours, subsequent testing showed unsatisfactory results and at 1415 hours, BVPS Unit No. 1 commenced a power reduction to comply with the Technical Specification Action 40.b requirement.

At 1446 hours, additional Technical Specification Action statements now required BVPS Unit No. 1 to perform a plant shutdown. These included: TS 3.3.1.1, FU 22, Action 1 [be in at least Hot Standby within 12 hours from 1046 hours], and TS 3.3.2.1, FU 1.b - 2.b - 3.a.2 - 3.b.2 - 4.b, Action 13 [be in at least Hot Standby within 12 hours from 1046 hours]. However, plant shutdown was already continuing, to comply with the more restrictive TS action of 3.3.1.1, Action 40.b.

At 1831 hours, the reactor was shut down per the normal shutdown procedure and Mode 3 (Hot Standby) was entered.

At 1915 hours, I&C concluded that the failure was in at least one of four associated universal logic cards that were replaced during repair efforts, and I&C completed additional testing showing that SSPS Train B was now fully returned to Operable status. BVPS Unit No. 1 exited the applicable Technical Specification Action statements requiring plant shutdown due to an inoperable SSPS train.

BVPS Unit No 1 reactor was taken critical at 1603 hours on May 27, 2006, and re-entered Mode 1 at 1728.

CAUSE OF EVENT

The root cause was indeterminate despite rigorous investigation. The most probable cause of the event was a poor or intermittent electrical connection in the testing circuit of Solid State Protection System. The suspect connection was narrowed down to one of three locations: Pin 4 of Universal Card A412 or the rack connector or termi-point clip for this pin. Pin 4 of the A412 card is only used in the test circuit. Card A412 was removed and installed several times during the troubleshooting performed on May 26 and was the last card that was installed prior to the satisfactory test of Train B. Multiple insertions may have resulted in a subsequent good connection at Pin 4. This failure would not have prevented the proper operation of the SSPS since Pin 4 is used only during testing and not during normal operation of the SSPS train.

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REPORTABILITY

At 1527 hours on May 26, 2006, BVPS Unit No. 1 notified the NRC in Event Notification No. 42606 of the initiation of a unit shutdown required by Technical Specifications pursuant to 10 CFR 50.72(b)(2)(i).

On May 26, 2006, BVPS Unit No.1 initiated and completed a plant shutdown as required by the most limiting applicable Technical Specification, which was Technical Specification 3.3.1.1, Table 3.3-1, Functional Unit 21, Action 40.b. Thus, this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(A) for completing a plant shutdown required by the plant's Technical Specifications.

SAFETY IMPLICATIONS

During performance of 1MSP-1.05-I "Solid State Protection System Train B Bi-Monthly Test" on May 26, 2006, the surveillance indicated unsatisfactory results while performing the memories function test for Positions 1 through 4 of the memories function selector switch. These switch positions are associated with the Power range, Intermediate range and Source range reactor trip blocks. At the time of the failure, the plant was operating at 100 percent power with all other Probabilistic Risk Assessment (PRA) modeled equipment available. The on-line risk was Yellow at the time of the failure due to the performance of the MSP, which renders the entire Train B of SSPS unavailable.

Since the most probable cause for this event only prevented SSPS Train B from functioning properly during the testing mode, and the opposite SSPS Train A signal remained available, there was no increase in the instantaneous risk above that which was previously analyzed in the on-line configuration risk monitoring program. However, since this event kept SSPS Train B out of service for approximately 8 hours, rather than the two hours originally estimated to perform for this surveillance test, there was a small increase in the weekly average risk to BVPS Unit 1. Overall, the impact on risk of this event is considered to be very low.

CORRECTIVE ACTIONS

1. During the next unit shutdown of sufficient duration, a visual inspection will be performed of the Unit 1 Train B Card A412 rack connector and the termi-point connector for signs of damage or deformation, paying particular attention to a possible bent Pin on pin 4 and any indications of a short between Pins 38 and 39.

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CORRECTIVE ACTIONS (Continued)

2. As an enhancement to the current procedure, a method of testing the P-10 permissive function will be added to the subject SSPS surveillances. This enhancement will ensure that applying the logic ground for Memory Test Switch Positions 1 thru 4 actually toggle the A412 gate high when performing these surveillances below the P-10 setpoint.
3. An Operating Experience report on this subject will be issued to the industry.

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

PREVIOUS SIMILAR EVENTS

A review found one prior BVPS Unit 1 and no prior BVPS Unit 2 Licensee Event Reports within the last five years for an event involving the Solid State Protection System.

- BVPS Unit 1 LER 2003-007, "Inadvertent Reactor Trip During Solid State Protection System testing." BVPS Unit 1 LER 2003-007 involved inadequate self checking and peer checking, which is not similar to BVPS Unit 1 LER 2006-002 since it involved an equipment malfunction.

COMMITMENTS

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