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November 23, 1990
ND3MNO:3063

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
LER 90-016-00

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

Gentlemen:

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

LER 90-016-00, 10 CFR 50.73.a.2.iv, "ESF Actuation - Low Head Safety Injection Recirculation Valve Closed During Testing".

Very truly yours,

T. P. Noonan
General Manager
Nuclear Operations

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Attachment

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November 23, 1990

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Beaver Valley Power Station Unit 1		DOCKET NUMBER (2) 0 5 0 0 0 3 3 4	PAGE (3) 1 OF 0 4
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TITLE (4)
ESF Actuation - Low Head Safety Injection Recirculation Valve Closed During Testing

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																																																															
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LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
T.P. Noonan, General Manager Nuclear Operations	4 1 2 6 4 3 - 1 2 5 8

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	J G	6 8	W 1 2 0	N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

On 10/24/90, operators were performing the Safeguards Protection System Train B Test (OST 1.1.12). During the performance of this test, an unanticipated closure of Train B Low Head Safety Injection Pump minimum flow line isolation valve MOV-SI-885B occurred. Operators terminated OST 1.1.12 and manually opened MOV-SI-885B from the control board. Instrumentation and Control technicians investigated this event and determined that the 3-4 contact pair of Solid State Protection System relay K641B had failed, allowing current to pass while the contacts were supposed to be open. This relay failure caused valve MOV-SI-885B to close. Technicians replaced the 3-4 contact pair in relay K641B. The event was apparently caused by the contact pair not properly opening after testing during the last performance of OST 1.1.12 on 9/21/90. There were no safety implications due to this event. This failure only affected the Train B Low Head Safety Injection Pump recirculation capability. The pump would have been fully capable of performing its design function in the event of a large break LOCA where recirculation flow is not required. The Train A System was operable throughout the event. The failure of one train of safety injection is bounded by analysis in Beaver Valley's UFSAR Section 6.3.1.2, "ECCS Single Failure Criterion Compliance".

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20565, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Beaver Valley Power Station Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 3 4 9 0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 0	0 1 6	0 0	0 2	OF 0 4

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

Description of Event

On 10/24/90, operators were performing the Safeguards Protection System Train B Test (OST 1.1.12). This test verifies the operability of Train B Solid State Protection System (SSPS) actuation circuitry by inputting test signals into SSPS and observing relay actuations. Actual safeguard component actuations are inhibited during the test by the use of designed blocking features.

At 2112 hours, operators initiated OST 1.1.12. Continuous communications between the control room and the operators performing the test was established. The first relay tested in the procedure was the Main Feedwater Isolation and Safety Injection Automatic Transfer Relay (K642B). At 2113 hours, Operators input a test signal to energize relay K642B. At this time, the Train B Low Head Safety Injection (LHSI) Pump minimum flow line isolation valve MOV-SI-885B closed. Operators immediately stopped the test to evaluate this unanticipated actuation. Aside from inputting this one test signal, no other manipulations had been performed on the SSPS circuitry.

MOV-SI-885B is normally open during operation and is designed to remain open during the early stages of an accident to provide minimum flow protection for the B LHSI pump. In the later stages, the valve will automatically close. The automatic closure signal is generated from a safety injection signal coincident with a low Refueling Water Storage Tank level. The Refueling Water Storage Tank serves as the initial supply for safety injection water.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-630) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555 AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Review of station prints showed that safety injection relay K642B initiated a close signal to MOV-SI-885B. This signal was blocked by contacts 3-4 of Refueling Water Storage Tank (RWST) Low Level relay K641B (Westinghouse Model AR440AR). During power operation, this relay is de-energized due to normal level being maintained in the RWST. Before the test had been started, operators had verified as part of its required initial conditions section that there was no low level signal from the RWST. This verified that relay K641B should have been de-energized, so its 3-4 contact pair should have been open, blocking the 120 VAC which closes MOV-SI-885B. I&C technicians attempted to verify the contact condition by measuring the voltage across the 3-4 contact pair of relay K641B. However, instead of the full 120 VAC that should have been across the relay's contacts, the technicians found there was only 57 VAC potential across them. The voltage between the other contacts of relay K641B was measured. All other contact pairs had a full 120 VAC across them, verifying that they were open and that relay K641B was de-energized.

At 2216 hours, operators reset relay K642B and terminated OST 1.1.12. Operators then manually opened MOV-SI-885B. The valve was declared inoperable due to the failed 3-4 contacts of relay K641B. The components that receive actuation signals from the other contacts of relay K641B were not declared inoperable, based on the satisfactory voltage test results of those contacts.

Cause of Event

This event was caused by the failed 3-4 contact pair of relay K641B. Even though the relay was verified to be de-energized, its normally open 3-4 contacts were not fully open and allowed current to pass.

As stated above, relay K641B is normally de-energized during power operations. The only time this relay is energized is for testing during the last steps of OST 1.1.12. When that part of the procedure is being performed, relay K641B is energized via a test signal and the voltages across the contacts of relay K642B are measured to verify proper operation of relay K641B. The test signal is then removed and operators verify that relay K641B de-energizes.

The 3-4 contacts of relay K641B had apparently failed to fully open after being closed for testing during the last previous performance of OST 1.1.12. This previous test was performed on 9/21/90.

LICENSEE EVENT REPORT (LER)
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TEXT (If more space is required, use additional NRC Form 386A's) (17)

Previous Similar Events

Review of station records showed no previous similar Licensee Event Reports. One similar failure of this relay had occurred on 10/28/85, when the 3-4 contacts of relay K641B apparently failed to fully open after testing. During this previous event, 54 volts were measured across the contact pair instead of the full 120 VAC. When technicians began to investigate this problem, the condition cleared and could not be reproduced. No further corrective actions were taken at that time.

The NPRDS database was reviewed for failures of AR440AR relays. No failures similar to the one described in this event were identified.

Corrective Actions

- 1) I&C removed and inspected the 3-4 contact set. No cause for the failure was evident. No evidence of arcing (contact burning or pitting) was noted. The contacts appeared to be free-moving and did not bind or hang up during testing. In order to assure contact reliability, the contact set was replaced with a qualified spare set. The relay was then retested and MOV-SI-885B was returned to service at 2016 hours on 10/25/90.
- 2) An engineering evaluation of relay K641B and its "as-installed" application has been initiated. If no specific cause for this failure can be verified, the relay will be replaced during an upcoming outage.

Safety Evaluation

There were no safety implications due to this event. The failure of the K641B relay caused MOV-SI-885B to be inoperable. This caused the Train B Low Head Safety Injection (LHSI) Pump to be inoperable, although it would still have been capable of performing its design function for any event where minimum recirculation flow was not a concern (eg. large break LOCA). The LHSI system is comprised of two redundant trains, either of which is fully capable of supplying all required safety injection flow during an accident. Failure of one train of the LHSI system is bounded by Beaver Valley Unit 1 safety analysis (Reference: UFSAR Section 6.3.1.2, "ECCS Single Failure Criterion Compliance").