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Subject: Events Surrounding the Pilot Operated Relief Valve  
Actuation on May 19, 1994

Gentlemen:

On May 19, 1994, at Davis Besse Nuclear Power Station (DBNPS), the Pilot Operated Relief Valve (PORV) opened for approximately 5 seconds. The PORV opened during functional testing of a replacement Reactor Trip Module (RTM) in the Reactor Protection System (RPS). Although the PORV is not part of the RPS, a pressure signal to the PORV actuation control circuit originates from an RPS pressure sensor. This event was reported in the Monthly Operating Report for May 1994. The purpose of this letter is to provide a status of investigation of this event and to provide additional information since this event was of regulatory interest.

On May 19, 1994, the surveillance test Channel Functional Test of Reactor Trip Breaker "B", RPS Channel 1 Reactor Trip Module Logic, and Anticipatory Reactor Trip System Channel 1 Output Logic (DB-MI-03011) was being performed to meet Technical Specification requirements. At approximately 1000 hours, RPS Channel 1 was manually tripped as required by the test procedure. Status lights on RPS channel 2 did not indicate the expected RPS Channel 1 trip. Investigation showed that a set of contacts in the RPS Channel 1 RTM had not opened when the associated relay coil was de-energized. Operations declared RPS channel 1 inoperable at 1008 hours and performed required actions in accordance with Technical Specification 3.3.1.1. A Maintenance Work Order (MWO) was implemented to replace the malfunctioning RPS channel 1 RTM with a spare RTM from warehouse stock.

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The spare RTM drawn from stock was originally purchased from Bailey Controls by the Sacramento Municipal Utility District (SMUD) for the Rancho Seco RPS system. Three RTMs along with a number of other Bailey module types were purchased from SMUD. SMUD originally bought and maintained the modules as safety related under their 10 CFR 50, Appendix B Quality Assurance program. However, the modules were purchased by Toledo Edison as commercial grade to simplify the procurement process. The dedication process at DBNPS for the RTMs purchased included verification of part number, visual inspection and work bench functional testing at the module level. This was completed acceptably and the RTMs were placed in warehouse stock on December 10, 1993.

The replacement RTM was installed and post maintenance functional testing was initiated in accordance with Channel Functional Test of RPS Channel 1 (DB-MI-03001). At approximately 1755 hours with reactor power at approximately 99 percent, during the course of testing, the Power Range Test Module Switch was placed in the Test Operate position and the RPS Direct Current (DC) Power Supply Breaker subsequently opened. During this time, RPS Channel 1 was selected to supply RCS pressure signal input to the Non-Nuclear Instrumentation (NNI). When power was lost, the pressure signal spiked high, then failed low and the PORV opened for approximately 5 seconds. This caused a slight (approximately 35 psi) pressure decrease in the RCS. Following the PORV closure, operators placed the pressurizer heaters in manual, entered the Pressurizer System Abnormal Operation procedure (DB-OP-02513) and verified the PORV closed. NNI pressure and flow inputs from the RPS were swapped to RPS Channel 2 and at 1845 hours DB-OP-02513 was exited.

After this occurrence, the original failed RTM was repaired by Toledo Edison personnel by replacing the Main Trip Relay Circuit Board (PC2). When the repaired RTM was reinstalled in RPS Channel 1 for testing, a malfunction was revealed in the channel bypass circuitry in this module. Status lights on the RTM indicated the channel was bypassed even though the channel bypass key switch was not in the bypass position. A replacement Channel Bypass Circuit Board (PC5) was not available in spare parts stock but was obtained from another spare RTM and installed in the original RTM. Post maintenance functional testing, followed by testing to satisfy Technical Specification Surveillance requirements was completed at approximately 1035 hours on May 20, 1994. RPS Channel 1 was declared operable at approximately 1120 hours.

The reason for actuation of the PORV was traced to the RTM that was obtained from stock that had been purchased from SMUD. Review of the maintenance history for this module revealed that it was a spare module at Rancho Seco and had never been installed in the plant. Detailed visual inspection of the PC2 board from this module revealed a difference in configuration when compared to a PC2 board from a Toledo Edison RTM. Review of the modification history of the PC2 board revealed that a change to the board in 1971, prior to Rancho Seco commencing operation, was not implemented on this spare module.

The other two RTMs purchased from SMUD had the modification implemented. The purpose of the module modification was to alleviate a cross-bridging condition in the relay by relocating a resistor so that it functioned in a current limiting mode should cross bridging occur. Cross bridging causes a momentary shorting of the -15 volt power supply to ground. Since the modification had not been made, actuation of the relay forced an excessive current draw from the DC power supply, causing the power supply breaker to open and the resultant opening of the PORV.

Investigations as a result of this event have been conducted on the modification history of the SMUD modules purchased by Toledo Edison and other Babcock and Wilcox Owners Group (BWOG) utilities. The BWOG Instrument and Control Committee representatives were notified of the circumstances of the DBNPS event. The BWOG Instrument and Control Committee reviewed all Preliminary Safety Concerns (PSC) from the original design of the RPS until the time of the purchase from SMUD. This cross-bridging was not considered a PSC when the modification was implemented in 1971 because de-energization of a power supply is fail-safe and therefore not a safety concern. Further investigation has been requested by the BWOG that will provide complete design change information from B&W to each affected BWOG utility for the RPS modules. This will provide detailed information from which the modules that were spare at SMUD can be reverified as the current design. Enhanced inspection of the SMUD modules based on this information should prevent further recurrence.

In this event, the RPS logic was not required to actuate and did not actuate. The PORV actuation control circuit receives a pressure signal from the RPS pressure sensor but is not part of the RPS. The event was determined to not be reportable under the criteria of 10 CFR 50.73. This event was also not considered to be reportable under the criteria of 10 CFR, Part 21. The failure mechanism that was corrected by the design change would not have created a substantial safety hazard because a deenergized RPS channel by design would go to a tripped state.

Should you have any questions or require additional information, please contact Mr. William T. O'Connor, Manager - Regulatory Affairs, at (419) 249-2366.

Very truly yours,



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Vice President - Nuclear  
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