

Report No.

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February 10, 1984

Docket No. 50-278

Dr. Thomas E. Murley
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

SUBJECT: LICENSEE EVENT REPORT NARATIVE DESCRIPTION

Dear Dr. Murley:

This is an up-date of a Licensee Event Report submitted on December 7, 1983. The information was reported to Mr. A. R. Blough, Region I, United States Nuclear Regulatory Commission.

Reference:	Docket No. 50-278
Report No.:	3-83-18/3X-1
Event Date:	November 17, 1983
Report Date:	February 10, 1984
Facility:	Peach Bottom Atomic Power Station RD 1, Box 208, Delta, PA 17314

Technical Specification Reference:

Technical Specification 3.3.C.3 requires that the scram time for 90% insertion of a control rod not exceed 7.00 seconds.

Description of the Event:

On November 17, 1983, during a shutdown of Unit 3, both control rods 34-35 and 34-27 exceeded the allowable scram insertion time of 7.00 seconds. However, review of timing chart records during the post scram investigation identified

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only control rod 34-35 as exceeding the allowable limit. Both scram solenoid valves on control rod 34-35 were replaced and Unit 3 was returned to service on November 20, 1983. On January 14, 1984, during a shutdown of Unit 3, control rod 34-27 again exceeded allowable scram insertion time. Due to this second control rod slow scram, an extensive investigation was undertaken by the licensee. During this investigation, a second review of the November 17, 1983, scram insertion time charts revealed that control rod 34-27 had also exceeded the scram insertion time limit on November 17, 1983.

Probable Consequences of the Occurrence:

The failure of the solenoid on the hydraulic control unit did not prevent scrambling of the two control rods, but did cause a delay in the scram of the two control rods until the backup scram valves in the pneumatic system operated. All other control rod scram times were determined to be satisfactory and provided adequate shutdown of the reactor.

Cause of the Occurrence:

The cause of the slow scram times was the failure of one of the two scram solenoid valves on each hydraulic control unit to exhaust the control air. A foreign material (yellow varnish-like substance) found on the solenoid valve plunger was determined to cause the plunger to stick in the closed position. Investigation has determined that Loctite No. 242 adhesive/sealant, which is applied, as recommended by General Electric (SIL No. 128, Revision 1, Supplement 1, issued on August of 1978) by procedure to the cap nut on the solenoid housing during maintenance, caused this occurrence.

The cause of the delay in determining that control rod 34-27 had a slow scram insertion time was inadequate guidance in procedure ST-10.9 that evaluates control rod performance following scram. Surveillance Requirement 4.3.C.2 of the Technical Specifications states that, "Whenever such scram time measurements are made (such as when a scram occurs and the scram insertion time recorders are operable), an evaluation shall be made to provide reasonable assurance that proper control rod drive performance is being maintained." There are two scram insertion time recorders, each monitoring 29 control rods selected on a rotating basis by the Site Reactor Engineers. Each recorder has 30 channels; 29 control rod channels and one timing channel. The timing channel is position one on the left hand margin of the chart. The 29 control rod channels trace, after a scram, a series of dashes

representative of the distance traveled during each timing interval. These 30 channels are uniformly spaced across a 3.75-inch wide chart.

If a rod fails to scram, a solid line is drawn during the timing. On November 17, 1983, control rod 34-27 was connected to channel 2 next to the timing channel on one of the recorders. When this control rod failed to scram, a solid line was drawn at the left hand margin of the chart appearing to be the ordinate of a graph. Control rod 34-35 was being monitored on channel 14 of the same recorder, and also resulted in a solid line.

During the initial review of the data, control rod 34-27 was mistakenly evaluated to have been at a position other than position 48. Since the intent of this procedure was to time control rods from position 48 to full in, this control rod was thought to require no further evaluation. Two additional reviews of this data by members of the technical staff failed to identify the solid line up the left margin as an indication of control rod 34-27 failing to scram properly. The failure of control rod 34-35 to properly scram was evaluated correctly and corrective measures were taken. On January 14, 1984, control rod 34-27 was connected to channel 29 as a result of the rotation of other control rods through the testing program. Upon review of the January 14, 1984 data, it was determined that control rod 34-27 did not scram promptly.

Corrective Action

On November 17, 1983, upon the discovery that control rod 34-35 did not satisfy the required scram time, both of its ASCO scram solenoid valves were replaced and sent to General Electric Company for failure analysis. On January 14, 1984, upon the discovery that control rod 34-27 did not satisfy the required scram time, its ASCO scram solenoid valves were replaced and sent to General Electric. An investigation was initiated to determine the cause.

Previous scram time test data for both Peach Bottom Units 2 and 3 were reviewed. It was determined that control rod 34-27 also had a slow scram time during the November 17, 1983, shutdown. Several items that contributed to the cause of this occurrence have been identified. The procedure did not give detailed instructions for reviewing the charts to insure identification of degraded performance of control rods. The intent of this procedure had been to evaluate scram times. The procedure for scram time testing will be modified to include samples of timing traces of control rods that fail to

scram, control rods that scram from positions other than position 48, and control rods with acceptable scrams.

The initial response from the General Electric Company indicates that one of the four valves sent to them was sticking when tested. In addition, after dismantling all four valves, one of each pair of valves had a yellow varnish-like foreign substance on top of the core assembly within the valves. The valve that was found sticking was one of the two with the foreign substance. The licensee has requested G.E. to review other utility information on this subject for possible similar problems.

The maintenance procedure used for the rebuild of these valves was reviewed. All 370 control rod scram solenoid valves were rebuilt during the previous May to August 1983 refueling outage. The procedure calls for the use of two substances that were initially thought to be possible sources of this foreign material, silicone lubricant and Loctite No. 242 adhesive/sealant. However, after testing, General Electric Company had eliminated the silicone lubricant as a possible cause.

To determine if this foreign substance was in any other scram valves, 40 additional scram solenoid valves were dismantled. The 40 valves inspected were valves that had not been scram timed since the end of the 1983 refueling outage. All 40 were dismantled, inspected, and found to have no sticking problems. One of the 40 showed minute traces of what appeared to be a yellow substance. On January 23, 1983, General Electric and Philadelphia Electric Chemistry Labs began testing to identify this substance and its possible source.

On January 23, 1983, after review of this event, Philadelphia Electric Company's Nuclear Review Board (NRB) established a special task force to review all quality control aspects of scram pilot valve replacement parts and rebuild kits. The members of this task force, headed by a PECO senior mechanical engineer, include PECO personnel from the Quality Assurance, Electrical Engineering, and Electric Production Departments and the General Electric Company. On January 26, 1983, this task force began its review with ASCO personnel at the ASCO facilities. As of February 1, 1984, the Task Force had concluded that the problem with the Peach Bottom valves did not originate at ASCO or in the GE storage and reshipment of parts kits.

The NRB has recommended that weekly tests be instituted to verify proper operation of the scram solenoid valves. Acoustic monitors have been installed on both units at the

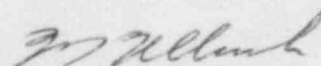
scram pilot valves to verify valve operation during weekly half-scrams. Unit 3 testing has started and Unit 2 testing is scheduled to begin during the week of February 13. This testing will continue until PECO has accumulated sufficient data to assure system reliability.

Further steps were taken to assure proper system operation before startup of Unit 3. The backup scram valves were satisfactorily tested. To assure proper operation of all scram valves, all rods were scrambled from the full in position with zero pressure in the reactor and proper control rod motion was verified. All rods were individually scrambled from position 48 with reactor power above 30%, and proper operation was verified.

On February 2, 1984, General Electric Company and Philadelphia Electric Company Chemistry Labs identified the yellow substance as Loctite 242. The manufacturer has indicated that Loctite 242 has a tendency to migrate. The manufacturer has recommended that "Cinch Bolt Guard" made by Loctite be used as a substitute. The Licensee is evaluating this recommendation. The use of Loctite will be eliminated in the interim.

To aid in the early detection of any future problems, the operators have been instructed to use a computer program to monitor all control rod positions following a controlled manual scram.

Very truly yours,



W. T. Ullrich
Superintendent
Nuclear Generation Division

MBR:lm

cc: A. R. Blough, Site Inspector
NRC Document Control Desk