

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-277/80-04
50-278/80-04
Docket No. 50-277
50-278
DPR-44
License No. DPR-56 Priority _____ Category C
C

Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania 19101

Facility Name: Peach Bottom Atomic Power Station Units 2 and 3

Inspection at: Delta, Pennsylvania

Inspection conducted: February 22-23 and 25-29, 1980

Inspectors: Edward N. Thumm
E. G. Greenman, Resident Reactor Inspector

March 24, 1980
date signed

C. J. Cowgill III
C. J. Cowgill, Resident Reactor Inspector

March 24, 1980
date signed

Edward N. Thumm / for
A. R. Blough, Resident Reactor Inspector

March 24, 1980
date signed

Approved by: E. C. McCabe, Jr.
E. C. McCabe, Jr., Chief, Reactor Projects
Section No. 2, RO&NS Branch

March 27, 1980
date signed

Inspection Summary:

Inspection on February 22-23 and 25-29, 1980 (Combined Inspection Report Nos. 50-277/80-04 and 50-278/80-04)

Areas Inspected: Special, onsite regular and offshift inspections by the resident inspectors (26 hours Unit 2; 37.5 hours Unit 3). Areas inspected included circumstances surrounding the valving-out of a seismically qualified air supply to five Unit 3 containment ventilation valves, a blocking error during modification work on two valves, which resulted in valving-out the air supply to the valve disc seals for these valves, including the modification, and followup on prior associated LERs.

Results: Noncompliances - Three in three areas (Infraction - failure to have adequate approved procedures to assure a seismically qualified supply system for five containment isolation valves, Detail 5. Infraction - failure to take adequate and timely corrective action to assure that containment ventilation valves would not be opened beyond the point whereby closure against post-LOCA conditions could be assured, Detail 5. Infraction - failure to follow procedures (four examples) related to modifications and the blocking and permit system, Detail 4).

DETAILS

1. Persons Contacted

- J. Armstrong, Test Engineer
- * R. S. Fleischmann, Assistant Station Superintendent
- W. MacFarland, Construction Engineer
- S. Mannix, Modification Coordinator
- S. Roberts, Results Engineer
- * W. T. Ullrich, Station Superintendent
- A. Wasong, Test Engineer

Other licensee employees were contacted during the inspection. These included engineering personnel, reactor operators, and shift supervision.

- * denotes those present at exit interviews on site and for summation of preliminary inspection findings.

2. Previous Inspection Item Update

(Open) Unresolved Item (79-20-03 and 79-22-04) - Modification of containment isolation valves to provide mechanical stops restricting valve opening. Stops had not been installed as of the date of this inspection - (reference Detail 5).

3. Logs and Records

The following logs and records for the periods indicated were reviewed pursuant to the licensee's administrative requirements and procedures. Comments regarding specific areas are contained within this report.

- a. Unit 3 18-inch Containment Ventilation Valves Seismic Fix Status Round Sheets, December 22, 1979 - March 3, 1980
- b. LLRT test results for AO 3511 and AO 3512
- c. Shift Supervision Log - selected entries
- d. Local Permit No. 3-7C9-81 dated February 19, 1980
- e. Modification 510 dated March 13, 1979
- f. MRF No. 3-7C9-81 dated May 2, 1979

4. Containment Ventilation Valve Operator and Air Supply System Modifications

a. Modification Review

The inspector reviewed documentation associated with Modification No. 510 (79-29), "Containment Atmosphere Isolation Valve's Closure Seal". This modification details provisions for a seismically qualified local air supply to each of 18 containment isolation valves, installation of pressure switches to monitor the valve seal air, and the eventual installation of mechanical stops to limit valve motion to 37 degrees. The installation of the seismically qualified air supplies was completed in March, 1979.

The remainder of this modification is still in progress on a valve-by-valve basis. Some containment isolation valves in the partially-modified condition require special procedures (i.e., manual inflation and deflation of the boot seal) during opening and closing evolutions. The Plant Modification Control Sheet (PMCS) for this modification was reviewed. Findings were as follows:

1. No documentation of the need for procedural changes was identified as part of Plant Modification Control. This documentation is required by procedure A-14, "Plant Modification", revision 6, dated August 8, 1978 and subsequent revisions. This failure to follow procedures when examined collectively with other examples constitutes an infraction level item of noncompliance (277/80-04-01 and 278/80-04-01).
2. The PMCS indicated that:
 - a. Parts II, "Mod Description", and III, "Purpose", describe only a portion of the modification - addition of a seismically qualified air supply to the boot seals. The scope of Modification 510 (79-29) includes the addition of pressure switches to detect low seal pressure and the eventual installation of mechanical stops to limit valve motion.
 - b. Part V, "Design/Design Review", contains no signature for performance of design review, which was apparently conducted by a member of the Engineering and Research Department. Failure to complete the PMCS as required is contrary to procedure A-14, which specifies documentation of the design review by signing the PMCS. This failure to follow procedure when examined collectively with other examples constitutes an infraction level item of noncompliance (277/80-04-02 and 278/80-04-02).

Additionally, the inspector also noted these inadequacies were not identified by the responsible engineer - SLO, who had on March 16, 1979, signed the PMCS to document his approval of sections I thru V, for forwarding to PORC.

b. Blocking and Permits

The inspector reviewed Maintenance Request Form (MRF) 3-7C9-81, issued to accomplish one part of Modification 510 to an 18-inch butterfly valve number AO-3512 (Unit 3). Associated documentation and procedures, including the "Local Permit" (Form 196-21057), procedure A-26, "Procedure for Corrective Maintenance", revision 21, dated February 14, 1980, and permit and blocking procedures were also reviewed. Instructions for completing the MRF are contained in procedure A-26. The inspector confirmed that MRF 3-7C9-81 had been completed in accordance with this procedure.

The MRF stipulated that the equipment was Technical Specification related and required a Local Permit. Procedure A-26 states in part: "The Control Operator shall ... prepare, if necessary, the permit (Form 196-21057 Philadelphia Electric Company Station Operating Handbook, Permits and Blocking). If the Technical Specification 'yes' block has been checked, on the Permit line marked 'apparatus', write the words 'Tech Spec'." The Local Permit associated with MRF 3-7C9-81 did not have the required "Tech Spec" notation on the apparatus line. This failure to follow procedures when examined collectively with other examples constitutes an infraction level item of noncompliance (278/80-04-03). The "Details of Blocking" section of the Local Permit lists four specific valves to be closed and tagged. "Philadelphia Electric Company Station Operating Handbook, Permits and Blocking", Section 140a, "Application of Blocking", requires the individual doing the blocking to perform each item of blocking in sequence and tagging and recording of each item as it is completed. The stated purpose of this procedural step is to avoid errors in applying the blocking and to obtain a record. Contrary to the blocking procedure, on February 20, 1980, a worker closed and tagged a wrong valve, the boot seal supply to AO-3511, when the closure and tagging of the air supply to AO-3512 activator was listed on the Permit. This event was also reported by the licensee as part of Licensee Event Report No. 3-80-7/1P, dated February 22, 1980 (see Detail 5). This failure to follow the blocking procedure when examined collectively with other examples constitutes an infraction level item of noncompliance (278/80-04-04).

The inspector also examined the licensee's controls to assure transmittal of information regarding modifications to management, to the operating staff, and training of personnel. The inspector was not able to determine that adequate training had been provided to personnel. This area is considered unresolved pending further NRC review (80-04-03 and 80-04-05).

5. Non-Routine Event Review

The inspector reviewed the following non-routine events on site and in the NRC office for safety significance, circumstances, and relationship to Technical Specification limits. The licensee's PORC reviews, evaluation, and corrective action were also verified.

<u>LER Number</u>	<u>Title</u>
3-80-7/1P	Seismic Air Supply to Five Containment Valves Found Valved Out of Service

While performing a routine inspection of plant equipment, the backup, seismically qualified bottled nitrogen supply to five valves referenced below, was found valved out of service. The five valves involved were:

AO-3506	DW exhaust to SBT
AO-3507	DW exhaust to SBT
AO-3519	DW torus nitrogen supply
AO-3521A	Torus purge fan supply
AO-3521B	Torus purge/N ₂ supply

Discussion with licensee representatives indicated that the bottle supply and backup air supply for each of the five (5) valves had been valved out of service on December 23, 1979. Round sheets were also used by the inspector to confirm this date. Isolation of this supply resulted in a condition where, in the event of a design basis earthquake, the unqualified instrument air supply could have failed and the seismic backup system would not have been immediately available. Inspection determined that the normal air supply system (instrument air) to these valves had been maintained in-service, and that valve boot seal pressure was maintained, thus containment integrity was not compromised with the valves closed and the seals inflated. The licensee immediately restored the backup supply for these valves to service and inspected remaining valves at both Unit 2 and Unit 3. No additional valving errors of this type were identified.

Isolation of this seismically qualified backup supply would have required a manual operator action to restore a seismically qualified supply system and assure seal capability in the event of a design basis earthquake. The licensee's preliminary evaluation indicated that, if a seismic event occurred (resulting in a loss of normal supply), the valves still would have remained sealed for approximately 15 hours. This time frame is based on review of the licensee's leak rate results to determine the leak rate that would have existed with the air supply to the boot seals of this type valve valved-out, a condition which had been identified as a result of modification to two additional valves, AO-3511 and AO-3512. Worst case leakage of 7,050 cc/min when added to the actual sum of all the penetrations satisfied Technical Specification requirements for all leakage. The inspector discussed additional local leak rate testing which was in progress for the valves found with the seismic supply isolated. These results will be reviewed during a subsequent inspection (278/80-04-06).

Causative Factors

This occurrence was caused by personnel error coupled with procedural inadequacies and inconsistencies. Discussion with cognizant licensee representatives indicated that, due to personnel error and a number of changes in progress, the valves for both the bottle supply and backup air supply for Unit 3 containment isolation valves 3506, 3507, 3519, 3521A, and 3521B had been valved out of service on December 23, 1979 in the belief that they were no longer required. This date was determined based upon personnel interview with the individual involved. The inspector reviewed the following licensee Round Sheets: "Unit 3, 18-inch Containment Ventilation Valves Seismic Fix" for the period December 22, 1979 - March 2, 1980. This review indicated that bottle pressures were indicating within normal ranges (75 pounds or greater) until December 25, 1979. Round checks for valves 3521A and 3521B

checks showed that the backup supply was out of service at that time. The backup supplies to valves 3506, 3507, and 3519 were logged out of service as of December 27, 1979. Bottle pressure for the backup supply to valve 3519 appeared to have been re-opened on January 19, 1980. However, discussion with the licensee representative who identified the supply misalignment stated that the air supply pressure to this valve was found closed on February 21, 1980, although the bottle pressure was reading normally. The inspector's review indicated that the Seismic Fix Status Round Sheet contained instructions to maintain 75 pounds pressure to the Containment Ventilation Valves. Review of procedures related to containment purging, ventilation, and inerting, indicated that numerous changes had been issued. These showed certain inconsistencies based on modification work on the valves which was in progress. The Round Sheet in use, had instructions been adhered to, would have precluded this event. Further, the Round Sheets had been prepared and issued without formal PORC review and approval. The review indicated that if the Round Sheets or check-offs had been incorporated into system procedures, the event would also have been precluded predicated upon procedural adherence. Failure to develop, approve, and issue adequate procedures is contrary to Technical Specification 6.8.1 and constitutes an infraction level item of noncompliance (277/80-04-04 and 278/80-04-07).

LER Number

Title

2-80-1/1P and 2-80-1/1T

Opening of Containment Ventilation Valves Beyond Acceptable Limits

Drywell 18-inch ventilation valves cannot be assured of closing under post-LOCA conditions if opened more than 37 degrees. This fact was identified and reported by the licensee in March, 1979 by LER 2-79-11/1P. While de-inerting the drywell in preparation for a planned shutdown of Unit 2 on December 31, 1979, the air supply pressure to two drywell ventilation isolation valves (AO-2521A and AO-2521B) was raised to a pressure which fully opened the valves. The valves remained fully open for about eight hours during conditions which require primary containment integrity. Since the two valves involved represented both containment isolation valves in one path to the environment, the ability to properly isolate the containment in the event of a LOCA could not be assured with the valves opened greater than 37 degrees. The event was caused by lack of procedural coverage of the restriction on valve opening (see discussion of LER 2-79-11/1P). The licensee's corrective action was to place a cautionary tag on each valve stating the correct operating pressure on the air supply regulation for each drywell ventilation isolation valve on Unit 2 and Unit 3. In addition, procedural changes were made to include:

- a. A requirement to maintain the output of the air supply regulating valve at zero psig during reactor operation except while inerting or de-inerting the drywell, and
- b. A strong caution that raising the air supply above the specified valve can cause the valve to open greater than 37 degrees, removing assurance of closure during a LOCA.

The inspector reviewed procedures S.3.8.1.A, "Inerting Primary Containment", revision 9, and S.3.9.1.B, "De-inerting and Purging Primary Containment", revision 4, both dated February 21, 1980, to verify that procedural changes had been incorporated.

The inspector's review indicated that the procedures do contain the above noted provisions and currently allow the valves to be opened beyond 37° only if the reactor is subcritical or less than 105 psig. Containment ventilation and purging is the subject of ongoing correspondence between the licensee and the NRC. This matter is under continuing review by NRR and is considered unresolved pending completion of this review and subsequent issuance of a Technical Specification amendment (277/80-04-05 and 278/80-04-08).

The inspector noted inconsistencies in the licensee's report to the NRC, LER 2-80-1/1T, dated January 17, 1980. In his description of the event, the licensee stated:

"On 1/3/80 with Unit 2 at 92% power and the drywell being de-inerted in preparation for a planned outage, two drywell ventilation isolation valves (AO-2521A and AO-2521B) were found to be fully opened instead of being limited to 37 degrees open which is permitted during reactor operation. The valves were immediately readjusted to less than 37 degrees open. The valves had been in the full open position for approximately eight hours".

The Unit 2 drywell was being de-inerted on December 31, 1979 in preparation for a planned outage. The two drywell isolation valves were subjected to full opening that day. The concern over post-LOCA closure assurance was relevant for only about eight hours because the reactor was shutdown about eight hours subsequent to full opening of the valves. The occurrence was discovered on January 3, 1980 during inspector review of the Shift Supervision Log and resulted in a prompt report to the NRC on January 3, 1980. The licensee investigation was initiated after notification of licensee management by the NRC inspector that a problem with the administrative control of the valves existed.

The licensee is submitting a revised report, clarifying the sequence of events. This submittal will be reviewed during a subsequent inspection (277/80-04-06).

Enforcement action regarding inadequate corrective action to preclude the occurrence is discussed in the following.

<u>LER Number</u>	<u>Title</u>
3-79-11/1P and 3-79-11/1T	Failure to Repressurize Valve Disc Seals After Inerting

During an inspection of the drywell torus ventilation valves on March 23, 1979, the licensee found the inflatable disc seals were depressurized. These seals are required, with the valves closed, to maintain acceptable leakage values. The unit had been critical

for about 28 hours. Technical Specification 3.7.A.2 requires primary containment integrity at all times when the reactor is critical. Technical Specification 3.7.A.3 requires, in the event of a primary containment integrity breach, that integrity shall be re-established within 24 hours or the reactor placed in the cold shutdown condition within 24 hours. Therefore, Technical Specification 3.7.A.2 and 3.7.A.3 were exceeded for approximately four hours.

The licensee's immediate corrective action involved repressurizing the seals to restore primary containment integrity, which was accomplished within 40 minutes. The licensee event report dated April 6, 1979 stated that the containment isolation valve inflatable seals had been included on the startup check-off list. The inspector reviewed revisions made on March 28, 1979 to procedures GP-2A, "Reactor Startup and Heatup", GP-2, "Normal Plant Startup", and C.O.L. GP-2A, and verified that each procedure had been changed to incorporate a requirement to ensure drywell and torus 18" ventilation valves are closed per S.3.9.1.H before the reactor is critical or reactor water temperature exceeds 212⁰F. The inspector reviewed procedure 3.9.1.H, "Interim Operating Procedure for Containment Purge, Inert, and Exhaust Valves", revision 0, dated 3/16/79 and verified that the procedure, if properly performed, would leave the boot seal in a pressurized condition. Review of the applicability table for procedure S.3.9.1.H reveals, however, that only the nine applicable Unit 2 valves were initially incorporated -- the nine applicable Unit 3 valves were omitted from the table.

The licensee corrected this problem by a subsequent revision to the procedure on July 11, 1979. No additional problems were identified with Unit 3 valve operation between the report date (April 6, 1979) and the revision of July 11, 1979. An additional check-off list, C.O.L. S.3.9.1.H, was established on April 18, 1979 with the purpose: "To verify that the following list of valves are closed and that the boot seals are inflated". This check-off list did include Unit 3 valves but was incorporated into the basic procedure (3.9.1.H) by reference only. There is no specific requirement to actually perform C.O.L. S.3.9.1.H as part of procedure S.3.9.1.H. The intent, status, and usage of C.O.L. S.3.9.1.H are considered unresolved (80-04-07 and 80-04-09).

<u>LER Number</u>	<u>Title</u>
2-79-11/1P	Design Deficiencies in Containment
2-79-11/1P (Supplemental)	Ventilation System Isolation Valves
2-79-11/1T	

An engineering review of the containment ventilation system isolation valves determined that the valves (butterfly valves) would not close from the fully open (90 degree) position when subjected to post-LOCA conditions. The engineering analysis indicates that the valves will close under post-LOCA conditions if restricted to a maximum of 37 degrees open. The valve manufacturer has confirmed that the valve

body, disc, and operator meet seismic requirements, but analysis and inspection revealed that some areas of the valve control system could not be certified as seismically qualified.

The licensee found, during inspection, three valves (one on Unit 2 and two on Unit 3) with their inflatable boot seals not inflated. In each case, redundant valves in these lines were in the closed position with their seals pressurized so that primary containment integrity had been maintained.

In order to limit the opening of the valves to a position of less than 37 degrees, the licensee adjusted the air supply pressure to the actuator and imposed administrative controls on opening the valves. In LER 79-11/1T, dated March 29, 1979, the licensee, in describing controls over valve operations, stated in part: "These operations are addressed in a System Procedure".

The inspector reviewed licensee procedures relating to operation of these valves and found no restriction on degree of valve opening in procedures in effect on March 29, 1979. Specifically, procedure S.3.9.1.B, "De-inerting and Purging Primary Containment", was not revised to restrict valve opening to 37 degrees until February 21, 1980, subsequent to another event.

Failure to take adequate corrective action pursuant to findings identified in LER 2-79-11/1T contributed to an occurrence on January 3, 1980 in which two drywell ventilation butterfly valves were fully opened instead of being limited to 37 degrees (see discussion of LER 2-80-1/1T). This failure to assure proper corrective action for Reportable Occurrence 2-79-11/1T is contrary to Criterion XVI of 10CFR50, Appendix B, and constitutes an infraction level item of noncompliance (277/80-04-08 and 278/80-04-10).

A seismically qualified valve seal air supply was installed on the containment ventilation isolation valves. This modification included installation of a nitrogen supply bottle and related piping and valves for each seal. Further modifications planned by May 31, 1979 included addition of a low seal pressure alarm feature and a positive mechanical stop. As of the date of this inspection, the low seal pressure alarm feature had been established for four of the 18 valves involved. The inspector will review the licensee's progress regarding this alarm feature during a subsequent inspection (277/80-04-09 and 278/80-04-11).

After initial installation of the seismically qualified air supply, the licensee also incorporated, in procedure S.3.9.1.H, "Interim Operating Procedure for Containment Purge, Inert, and Exhaust Valves", a requirement for Station Superintendent's (or his designate's) permission to operate the valves. This procedure was originally applicable to a total of 18 valves. As a particular valve is partially modified during its multiple-step modification process, to the point that manual inflation and deflation of the boot seal is no longer required, the interim procedure becomes unnecessary for that valve.

The revision of procedure S.3.9.1.H in effect at the time of the inspection listed only eight valves to which it applies. Changes in various procedures reflecting status of modification was confusing and appears to have contributed in part to events described in LERs 2-80-1 and 3-80-7. Continuation of the pattern will eventually result in deletion of the interim procedure and consequential disappearance of the procedural reminder of the Station Superintendent or designate's authorization requirement, despite the fact that the planned positive measure to prevent excessive opening, a mechanical stop, is not yet installed on any valve. The installation and review of this stop remains unresolved.

6. Unresolved Items

Unresolved items are items about which more information is required to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items are discussed in Details 4 and 5.

7. Presentation of Preliminary Findings

During the period of the inspection, licensee management was periodically notified of the preliminary findings by the resident inspector (see Detail 1). A summary was also provided at the conclusion of the inspection and prior to report issuance. The items of noncompliance were identified to the licensee on February 26, 1980. A summary was provided on February 28 and March 5, 1980.