

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-277/88-30  
50-278/88-30

Docket Nos. 50-277  
50-278

License No. DPR-44  
DPR-56

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 Dates: August 15-19, 1988

Inspectors: S. K. Chaudhary 8/25/88  
S. K. Chaudhary, Lead Reactor Engineer, date  
MPS, EB, DRS, Region I

J. E. Carrasco 8/25/88  
J. E. Carrasco, Reactor Engineer, MPS, EB, date  
DRS, Region I

Approved by: Jacques P. Strosnider for 8/25/88  
J. Strosnider, Chief, Materials & Processes date  
Section, Engineering Branch, DRS, RI

Inspection Summary: Routine unannounced inspection on August 15-19, 1988  
(Report Nos. 50-277/88-30 and 50-278/88-30)

Areas Inspected: Adequacy of licensee actions in response to NRC IE  
Bulletin 80-11; adequacy of corrective actions in response to violation  
87-16-01; and to review additional information to resolve the unresolved  
item 87-16-02.

Results: One violation with several examples was identified. The violation  
consisted of inadequate inspections of modifications to masonry walls to  
assure quality.

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## DETAILS

### 1.0 Persons Contacted

#### Philadelphia Electric Company

- \* J. Franz, Plant Manager
- \* D. McGarrigan, Superintendent, Quality Control
- \* J. Pratt, Peach Bottom Atomic Power Station, Manager, Quality
- \* J. Netzer, Superintendent, PS&R for Projects
- \* D. Smith, Vice President, Peach Bottom Atomic Power Station
- \* T. Cribbe, Regulatory Engineer
- \* G. Hanson, Regulator Engineer
- \* A. Hegeohs, Site Project Engineer, Nuclear Energy Division
- \* D. Torone, Modification Installation Engineer
- \* P. Hinnbnuamp, Administrative Assistant, Modifications

#### Bechtel Power Corporation

- \* E. Patel, Project Engineer

#### United States Nuclear Regulatory Commission

- \* T. Johnson, Senior Resident Inspector
- \* Denotes those attending the exit meeting.

The inspectors also contacted other administrative and technical personnel during the inspection.

### 2.0 Inspection Purpose and Scope

The purpose of this inspection was to review the adequacy of: licensee actions in response to NRC Bulletin 80-11, Masonry wall design; adequacy of corrective actions in response to violation 87-16-01; and to review additional information for the unresolved item 87-16-02. Particular emphasis was placed on determining the technical adequacy of design and installation of modifications to the identified walls, and the status of licensee commitments made to the NRC during the last inspection in this area (IR 87-16). The documents reviewed during this inspection are listed in Attachment A.

### 3.0 Licensee's Actions on Previous NRC Concerns

(Closed) Violation (87-16-01): This violation pertained to a lack of written procedures describing the scope and qualitative/quantitative acceptance criteria for walkdown surveys of block walls performed in response to IE Bulletin 80-11.

The licensee has developed, approved, and implemented a procedure to document the scope and acceptance criteria for block wall surveys, and has resurveyed block walls according to the requirements of this procedure.

This item is closed. (50-277;50-278)

(Closed) Unresolved Item (87-16-02): This item pertained to the separation of masonry walls from reinforced concrete walls at the boundary interface. These separations (through cracks) were at the boundary where positive connections had been assumed in the analysis to evaluate the safety of the wall.

The licensee has implemented a program of chipping and drilling of block walls at interfaces to positively identify if connections between block walls and reinforced concrete walls do exist.

This item is closed. (50-277; 50-278)

#### 4.0 Installation of Modifications

##### Concrete Expansion Anchor Bolts

The inspector performed a walk through inspection of Units 2 and 3 to visually examine the status of masonry walls and blockouts. The inspection consisted of random verification of walls and blockouts to determine whether their configuration and location matched those shown on the design drawings and survey results. An independent verification of torque values for the concrete expansion anchors was also performed.

The inspector selected wall numbers 76.6 and 76.10 in the reactor building, and wall number 16.1 in the reactor core isolation cooling (RCIC) room in Unit 2. In Unit 3, wall number 413.1 in the reactor building was selected.

The inspector requested the licensee to randomly verify the installed torque in the concrete expansion anchor bolts installed in the foregoing listed structural concrete walls. The licensee provided a Quality Control inspector and a crew with a calibrated torque wrench (number 54-6028) to perform the requested verifications. Based on the above examination and independent torque verification the inspector determined the following:

- In wall 76.6 at elevation 165'-0" in the reactor building, 11 bolts of a sample of 26 failed to indicated the minimum specified torque of 85 foot pounds.
- Wall 76.10 at elevation 165'-0" in the reactor building, two out of three bolts failed to indicate the minimum specified torque value.

- In wall 16.1 at elevation 88'-0" in the RCIC room, nine bolts out of 18 failed to indicate the minimum specified torque.
- In Unit 3 wall number 413.1 in the reactor building elevation 165'-0", modifications had not been completed. The inspector did not verify the torquing.

Based on the above observations the inspector determined that the licensee's inspection procedure for verifying the acceptable installation and torquing of concrete expansion anchors was inadequate to assure proper installation. 10 CFR 50, Appendix B, Criterion X, requires an adequate inspection program to verify conformance with the documented instructions, procedures and drawings for accomplishing the activity. This is a violation of this requirement (50-277/88-30-01).

Furthermore, the inspector observed that the quality control verification of proper torquing of concrete expansion anchors was based on sampling. The licensee's procedure CD 5.12, Installation of Concrete Expansion Bolts, requires 1 in 5 installed anchors (20%) to be verified by Quality Control for proper torquing. The procedure was developed for IE Bulletin 79-02 which allowed sampling, but the sampling was based on a rigid statistical analysis of a large population of bolts encountered in the verification required by the Bulletin. The sampling plan of Bulletin 79-02 required a 95% confidence limit. The same sampling method/criteria used in the modification work without sufficient justification for determining the 95% confidence limit required by the Bulletin is improper when the sample size is changed. Especially, in view of the large number of bolt failures to meet the specified torque, raises a serious question as to the adequacy of this inspection criteria.

#### Installation of Structural Steel

The inspector reviewed the Quality Control documentation (Structural Steel Installation Form, CD 5.6-111) and visually examined the installed modification to the interfaces of block and structural concrete walls to verify the adequacy of inspection criteria and acceptability of the workmanship. These examinations were conducted in conjunction with the independent verification of anchor bolt torquing in the reactor building.

The inspector noted that the licensee's procedure, CD 5.6 Revision 5, Installation of Pipe Supports and Structural Steel, references the American Institute of Steel Construction (AISC) Code for design, fabrication, and installation of structural steel. The licensee's procedure requires inspection and verification of bolt holes for size and acceptability of fabrication of pipe supports but does not require a similar inspection for structural steel. The procedure also does not include an attribute for verification of acceptable fabrication and alignment of bolt holes to the previously installed concrete expansion anchors.

The AISC Code for design, fabrication, and installation of structural steel recommends verification of bolt hole locations and alignment of connections. The spacing of anchors is primarily controlled by the reinforcement bars in the structural concrete encountered during the drilling for anchors. Therefore, structural members must be fabricated so that the bolt holes are properly aligned with the installed anchor bolts. The inspector observed that during installation of the shop fabricated structural members the acceptability of bolt holes had not been verified by Quality Control. The structural steel inspection, as implemented for the modification (modification 2235), was inadequate in that the installation and inspection procedures do not require inspection/verification of bolt holes for acceptability; such as, size of hole, shape of hole, process by which hole was made (drilling, punching, burning), and the location of holes to match the installed anchors. This also is a violation of 10CFR 50, Appendix B, Criterion X, which requires examinations, measurements, or tests of material or products processed for each work operation where necessary to assure quality. Further, 10 CFR 50, Appendix A provides that structures be designed and fabricated in accordance with quality standards commensurate with their relative importance to safety (50-277/88-30-02).

#### 5.0 Engineering and Design Control

The inspector reviewed documentation and held discussions with licensee personnel to determine the adequacy of identification of block walls, analysis and evaluation of their current function and design bases. This review was to assure that the analyses and evaluations were technically valid and properly documented to support the modifications designed for walls and blockouts. The review covered engineering calculations, design drawings and management controls exercised over the process. Based on the above review and discussions the inspector determined that:

- The licensee had engaged the services of Bechtel Power Corporation for analyses and evaluation of walls and design of modifications.
- The licensee identified 22 walls that required modification to meet the requirements of Bulletin 80-11.
- The analyses, evaluations and modifications were performed properly, were technically valid, and properly documented. The records were readily retrievable and Bechtel had applied adequate control measures to assure the validity of the design process.

However, the inspector determined that no formal mechanism or program existed to assure that the newly assigned wall and blockout designations were transferred to permanent design drawings for traceability of records and modifications. The licensee initiated an engineering request form (ERF) to amend the modification package to revise the drawings to include the wall and blockout designations. This ERF was approved by management before the inspector left the site.

### Configuration Control of Masonry Walls

During a previous NRC inspection (IR 87-16) the inspector was informed that the licensee was developing a procedure to establish a surveillance and/or inspection for masonry walls to assure that the walls/blockouts remained in the same condition and configuration as analyzed. The inspector determined that no such program or procedure has been developed and implemented as of the date of this inspection. The inspector requested the licensee to provide a schedule for developing and implementing such a program.

An second commitment for control of additional loads on masonry walls (PE letter of 12/2/87 Kemper to Johnston) has been fulfilled. The licensee has initiated procedure M-701, Revision 0, to control new loads.

### 6.0 Control of Nonconformances

During the review of Quality Assurance documentation the inspector identified one nonconformance report (NCR), CD-P-1469, which was written against the grouting operations of structural steel members in the masonry wall modifications. The NCR indicated no inspection or verification for acceptability of grout or the grouting operation had been performed by Quality Control. However, the NCR was dispositioned by the licensee's consultant (Bechtel) as "use-as-is". The rationale provided for this disposition was that the grouting operation was acceptable since the preparation of the concrete surface to be grouted, and mixing placing and curing of grout was performed in accordance with manufacturers instructions. The grout is applied to fill voids and gaps between the walls and structural steel to ensure load bearing areas are adequate. The inspector requested the licensee provide the basis of this rationale in the absence of any objective supporting evidence. The licensee was unable to produce any objective evidence to justify such a rationale by the dispositioning engineer. Visual inspection after installation cannot provide convincing evidence attesting to the adequacy of the grout. No independent, direct inspection, examination or test had been performed to establish the acceptability of the grout and the grouting operation. 10 CFR 50, Appendix B, Criterion X, requires examination, measurements or tests of material or products be performed for each work operation where necessary to assure quality. This is another example of inadequate implementation of the inspection program of the licensee. This is a violation (50-277/88-30-03).

### 7.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or violations. Unresolved items are discussed in paragraph 3.0.

## 8.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance interview on August 15, 1988. The findings of the inspection were discussed with licensee representatives during the course of the inspection and presented to licensee management at the August 19, 1988 exit interview (see paragraph 1 for attendees).

At no time during the inspection was written material provided to the licensee by the inspector. The licensee did not indicate that proprietary information was involved within the scope of this inspection.

ATTACHMENT A

DOCUMENTS REVIEWED

Engineering Calculations

Unit 2

87RE/ACI-25.1  
IE-8011/ACI-15.1  
87RE/ACI-15.1  
87RE/ACI-32.1  
87RE/ACI-16.1  
87RE/ACI-78.3  
87RE/ACI-406.6  
87RE/ACI-406.9

Unit 3

87RE/ACI-413.1

Cooling Tower

IE8011/ACI-532.1

Concrete Expansion Data Sheets for Block Walls

Wall Numbers 15.1, 15.2, 16.1 19.2, 25.1,  
25.2 76.6, 76.10, 128.1, and 128.2,

Modification Package 2235, Section 7, Quality Control Documentation