U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-277/88-04
50-278/88-04

Docket No. 50-277
50-278

License No. DPR-44
DPR-56 Category C

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

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

Inspection At: Delta and Philadelphia, Pennsylvania

Inspection Conducted: February 1-11, 1988

Inspectors: Jack Strosnider 4/28/88
for S. K. Chaudhary, Senior Reactor Engineer date
MPS; EB; DRS

H. Kaplan 4/28/88
H. Kaplan, Senior Reactor Engineer, MPS; date
EB; DRS

Approved by: Jack Strosnider 4/28/88
J. R. Strosnider, Chief date
Material and Processes Section, EB, DRS

Inspection Summary: Inspection on February 1-11, 1988 (Combined Inspection Reports Nos. 50-277/88-04, and 50-278/88-04)

Areas Inspected: A special announced inspection by two region-based inspectors was conducted at the Philadelphia Electric Company's engineering offices in Philadelphia, Pennsylvania and at Peach Bottom Atomic Station, Delta, Pennsylvania. The inspection covered review of licensee action in response to Unresolved Safety Issue (USI A-7), Mark I Containment Program. The inspection included review and examination of design analyses and calculations; design and construction/erection drawings and schedule; modification to the torus, torus-attached-piping; temperature monitoring system instrumentation; and Plant Unique Analysis Report. A visual examination of installed items verified the "as-built" condition of modifications.

Results: The licensee's actions in response to Mark I Containment Program met the requirements of NUREG-0661 and licensee commitments in PUAR. No violations or durations were identified.

DETAILS

1.0 Persons Contacted

Philadelphia Electric Company

*W. T. Baxter, Supervisor, Nuclear Quality Assurance
*W. C. Birely, Senior Licensing Engineer
*C. B. Boyce, Licensing Engineer
*A. R. Diederich, Manager, PECO-Nuclear
John Franz, Station Manager
*D. M. O'Rourke, Branch Head, Civil/Structural Engineering
*H. W. Vollmer, Manager, Civil-Architecture

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T. Johnson, Senior Resident Inspector
R. Urban, Resident Inspector
L. Meyers, Resident Inspector

In addition, the inspectors contacted other engineers, technicians, health physicist and chemists, and quality assurance personnel as their work interfaced with the scope of this inspection. Personnel marked with (*) attended the exit meeting at the conclusion of the inspection.

2.0 Inspection Purpose and Scope

The purpose of the inspection was to determine if the licensee had modified the Peach Bottom Atomic Power Plant, Unit 2 & 3 containments consistent with commitments to NRC concerning Unresolved Safety Issue (USI) A-7, and that these modifications had been performed using appropriate procedures and with an acceptable level of quality. The scope of this inspection was defined by the instructions contained in the NRC Temporary Instruction (TI) 2515/85.

Technical issues in USI A-7 involved suppression pool hydrodynamic loads on the Mark I containment. These hydrodynamic loads were not considered in the original design of these containments. The newly identified loads affected the torus shell, torus support structures, internal structures, and piping attached to torus (torus attached piping, TAP). The issue was addressed through a two-phased approach consisting of short term and long term programs. Licensees with plants having Mark I containments were required to submit a plant-unique analysis report (PUAR) to provide a basis for the plant specific modifications. For Peach Bottom the NRC staff reviewed the PUAR against acceptance criteria contained in NUREG-0661. The staff issued safety evaluation reports (SERs) for the Peach Bottom plants in March 1984.

As part of the STP, the licensee performed two (2) modifications in each unit:

1. Installation of torus support saddles at 16 support locations in each unit, and,

2. Installation of supports on the four (4) longest safety relief valve (SRV) discharge lines in each unit.

- As part of the LTP, the licensee scheduled the following modifications in each unit. The schedule covered the period from September 1979 to December 1981. Modifications were:

1. Vacuum breakers and new supports on SRV Lines in the drywells: (Mod. 536)
2. Rerouted, resupported SRV piping in the torus, and installed quenchers; (Mod. 537)
3. Installed Downcomer Ties; (Mod. 539)
4. Installed Vent Header Deflectors; (Mod. 538)
5. Torus temperature monitoring systems; (Mod. 603)
6. Installed elbows on RHR lines; (Mod. 605)
7. Performed MSRV discharge test in Unit-2 only; (Mod. 611)
8. Modified torus internal structures; (Mod. 649)
9. Installed torus nozzle stiffners; (Mod. 650)
10. Installed torus tiedowns; (Mod. 651)
11. Installed torus shell stiffners; (Mod. 653)

The modifications were implemented on the following schedule:

	Modifications	
Outage	Unit 2	Unit 1
1980	536	*
	537	*
	538	*
	539	*
	603	*
	605	*
	611	*
1981	*	536 & 605
	*	537 & 649
	*	538 & 650
	*	539 & 651
	*	603 & 653
1982	649	*
	650	*
	651	*
	653	*

3.0 Review Criteria

Temporary Instruction (TI) 2515/85 was primarily used to define inspection requirements. The NRC staff SERs, licensee's PUAR, and applicable sections of the Code of Federal Regulations also were used to define additional inspection requirements and licensee commitment.

4.0 Documentation Reviewed

Prior to the inspection, the inspectors reviewed the docket files (50-277/50-278) for pertinent technical information and related licensing correspondence. The PUAR was reviewed to identify the licensee commitments. The inspectors also reviewed NRC staff SERs, previous inspection reports, NUREG-0408, and NUREG-0661. The above docket search identified information addressing the methodology, acceptance criteria, procedures, specifications, schedules and other programmatic details related to the licensee's response to this issue.

During the inspection at the licensee's engineering/corporate offices and at the plant site, the inspectors reviewed modification design calculations, design and installation/fabrication drawings, engineering specifications, installation/erection procedures, quality assurance and quality control records, and additional correspondence. The inspectors also reviewed the photographic record of the progress of modifications maintained by the licensee as a control record.

Based on the above review, the inspectors determined that design calculations were sufficiently detailed and contained references and technical assumptions/bases to permit review. Appropriate requirements from applicable codes and standards were incorporated. There was evidence of independent checks and design reviews, and design input controls. The design drawings were properly checked, reviewed, and approved for construction; and the drawing had adequate details for proper installation/erection.

The engineering specification adequately described the technical and quality assurance requirements for procurement of material and sources, construction/installation, and inspection/verification with acceptance/rejection criteria. The documents reviewed to determine the above findings are listed in attachment 1 to this report. No violation or deviation was identified.

5.0 Erection/Installation Procedures and Practices

The inspector reviewed portions of documents on microfilm that were generated by Chicago Bridge and Iron (CB&I), the subcontractor for the Unit 2 & 3 containment suppression chamber (Torus) modifications . The microfilm reels reviewed were identified as 1-83-0255 and 1-83-0258, for Unit 2 and 1-83-0209 and 1-83-0210 for Unit 3. The microfilm reels contained engineering specifications, welding procedures, NDE procedures, inspection records, certified material test reports and engineering calculations. The quality of the film was acceptable and retained records were comprehensive in scope and readily retrievable. The Unit 2 work was performed under CB&I contract 94410; the Unit 3 work under CB&I contract 99412. Installation of the new quencher assembly was performed in accordance with the applicable portions of the ASME Code, Section III and XI (1977 edition & Summer 1978 Addenda) as specified by Code Case N-236. Classification of assemblies included subsection NF-Class 3 component supports, subsection ND-class 3 piping, and subsection NE-Class MC. The CBI documents consisted of certified material test reports, visual, radiographic and magnetic particle test reports, welding procedure specifications, and welding procedure and welder qualification records. Also included were shop release reports, job site receiving and inspection check lists, material heat number (traceability) sheets, nonconformance reports, master check (traveller) lists covering operations inspections and examinations, welding and coating records and repair check lists. The principal materials employed in the modification were SA 516 Grade 70 steel plate, SA 36, structural steel plate and shapes, and SFA 5.1-E7018 weld filler metal.

The inspector verified that the material certifications for these materials conformed to the applicable SA and SFA material specifications including satisfactory impact test results obtained at temperatures between -15°F and -50°F. The minimum specified test temperatures were -10°F for component supports and 0°F for materials welded to the existing containment vessels. The principal welding procedure employed was WPS-W1-7018-1, using the manual metal arc process with E7018 filler metal. The inspector verified that WPS-W1-7018-1 was qualified in accordance with ASME IX and III requirements. Documentation included ample evidence of welder qualification and NDE personnel qualification records along with detailed visual and magnetic particle test reports of structural welds required for modification. Radiographic reports were also available for the safety relief valve piping butt welds. The inspector reviewed both shop and field weld history records that included part identifications, weld procedure specifications, weld fit up inspections, and welder identifications. The inspector noted the absence of preheat entries. Preheat was required for thicknesses greater than 1" since welding was performed without stress relief. The licensee immediately contacted CB&I who stated that preheat was employed when required and that the QA sign off indicated that it had been performed.

It should be noted that unlike the initial modification in 1978 all welding by CB&I was performed when the torus in both units was dry. In 1978, with the torus partially filled with water, CB&I utlizied specially devloped welding procedures featuring preheat and electrode control to minimize moisture. No rejectable magnetic particle indications were reported after welding.

The inspector reviewed non-conformance reports and found no significant deficiencies or problems The vast majority of the reports addressed dimensional problems and were satisfactorily dispositioned.

The inspector reviewed the licensee's audit reports OP-176, OP-133, OP-150 and OP-84 covering Bechtel and CB&I activities.

The audits were found to cover a wide spectrum of activities including purchasing, design control and QA and welding. The inspector verified through review of OP-84 that all fifteen findings from these audits were resolved satisfactorily.

In summary the inspector concluded that the modifications in the Unit 2 and 3 containment suppression chambers had been accomplished under an acceptable QA program.

6.0 Physical Verification and Visual Examination

The inspector visually examined a sample of modifications made in response to USI A-7. The physical inspection and examination were performed to verify that the "as-built" modifications matched those shown on plant design drawings and in design documents. Examples of the items visually examined included saddle support, column tie downs, torus attached piping nozzle reinforcements, and reinforcements to pump supports in core spray line. These items were inspected for general location and geometry, member dimensions, boundary conditions, and general quality of workmanship and corrosion protection. The items examined are listed in Table 1.0 in the attachment 1 to this report.

7.0 Review of Licensee Administrative Controls, Quality Assurance, and Quality Control

The inspectors reviewed documentation, and held discussions with cognizant licensee engineers and management personnel to evaluate the licensee's QA/QC efforts and administrative controls. The pertinent documents that were examined are listed in Paragraph 9.0 of this report. These documents are maintained by the licensee on microfilm in the plants record management/control system. Records reviewed in this effort provided a sample of the licensee's QA/QC effort. The licensee's efforts were directed toward assuring the effective implementation of designers and contractor's quality assurance program. These records provided evidence of licensee's efforts in surveillances and audit of contractor's program and workmanship. The audits were performed annually and were comprehensive in scope. The quality of the contractor's work was evident

by the lack of any technical and/or QA adverse finding. The audit team included at least one technical specialist/Engineer in the audited area. The inspector reviewed three audits covering the areas of Welding/NDE, QC inspection coverage, and procedural compliance of the contractor. There were some minor findings which were resolved ir timely manner with adequate dispositions. The audits reviewed are listed in attachment 1.

The engineering services were provided by the licensee's approved Architect/Engineer Bechtel Power Corporation, and erection/construction services were provided by Chicago Bridge & Iron Company (CBI). Both of these contractorswere on the licensee's approved vendor list for their services, and were audited by the licensee's QA department for their effective implementation of the QA/QC program. The inspectors verified that the procurement documents issued by the licensee and/or the A/E contained detailed requirements for QA/QC and applicable codes and standards for the purchased materials and services.

8.0 Suppression Pool Temperature Monitoring System Modification

The inspector reviewed the modifications to the suppression pool temperature monitoring system, including the technical specifications to confirm the following:

- The placement and number of temperature monitoring devices were in accordance with the PUAR commitments.
- Suppression pool temperatures were indicated in the control room.
- Instrumentation alarm set points had been established consistent with TS pool temperature limits.
- Control room instrumentation was adequate to assure that requirements could be met.

The inspector also reviewed drawing No. 6280-E-2394-3, Rev. 3, and engineering specifications to determine the technical basis of design, and adequacy of modification/installation.

Based on the above review and visual examination of completed work, the inspector determined the following:

- The controlled drawings indicated that two independent channels of temperature indicators have been placed at their ten locations in the suppression pool.
- The suppression pool temperature is indicated and recorded in control room by digital indicators and strip chart recorders.
- The low alarm set point was 95°F for the vital-bus powered instrumentation; the high alarm set point was 120°F.

- The above instrumentation and temperature set-points were consistent with PUAR commitments, and TS requirements.

The inspector determined that the design and installation of the temperature monitoring system in the suppression pool met the licensee commitments and the requirements of NUREG.0661.

No deviation or violation was identified.

9.0 Exit Interview

An exit meeting was conducted on February 11, 1988, at the corporate engineering officers by the inspector. Attendees at the meeting are listed in paragraph 1 of this report. The inspector summarized the purpose, scope and findings of the inspection. No written material was provided to the licensee during this inspection. The licensee representatives did not indicate that this inspection involved any proprietary information.

ATTACHMENT 1

TABLE 1.0

ITEMS FIELD VERIFIED

COMPONENT	LOCATION	COMMENTS
Torus Support Saddles (except # 8, 9 and 10)	Torus Room	Verified Dwgs. 300, and 350 Revisions 3 and
Ring Girders # 3, 6 and 14	Torus Room	Drawing 300. Rev. 3
Shell Stiffners (except #8, 9 and 10)	Torus Room	Drawing 300. Rev. 3
Torus Attached Pipes (Penetration Stiffners) # N 205A, E-B; N-209; N-210: N 211A; N-214 N 226C&D; N-228A&B;	Torus Room	Drawing 8 Rev. 3

DRAWINGS/DOCUMENTS REVIEWED

Design (Bechtel)
11187-015

S-816 - Vent Header Deflectors and Supports and Downcomer Ties; Plans and Sections, Rev. 4
S-817 - Vent Header Deflectors - Sections and Details, Rev. 3
S-818 - SRV Quencher Supports - Plans, Rev. 3
S-819 - SRV Quencher Supports - Plans, Sections, and Details, Rev. 6
S-820 - MSRV Discharge Line - Quencher and Ram's Head Details, Rev. 3
S-821 - RHR Discharge Elbow Modification and Support Details, Rev. 4
S-822 - Telescoping Struts for the SRV Discharge Line in the Torus, Rev. 3
S-823 - SRV Line Piping Modification in the Torus, Rev. 6
S-826 - Vent System Modification - Plans, Sections and Details, Rev. 3
S-827 - Monorail & Spray Header - Plans and Sections, Rev. 4
S-828 - Torus Stiffeners - Plan, Sections and Details, Rev. 2
S-829 - External Torus Nozzel Reinforcement (6" and above) Plan and Sections, Rev. 3
S-830 - External Torus Nozzel Reinforcement, Rev. 3

DRAWINGS

S-831 - Torus Internal Piping Supports - Plans Sections, and Details, Rev. 3.

S-832 - Torus Tiedowns - Plan and Typical details for Columns, Rev. 4.

S-833 - Torus Tiedowns - Sections and Miscellaneous Details, Rev. 4.

S-834 - HPCI and RCIC Turbine Exhaust Support Plans, Sections and Details, Rev. 4.

S-835 - Vent System Modification - Plans, Sections & Details, Rev. 3.

S-836 - Torus Tiedowns - Plans, Sections and Details, Rev. 4.

S-837 - External Torus Nozzel Reinforcement (6" and above) Plans and Sections, Rev. 3.

5-838 - External Torus Nozzel Reinforcement (6" and above Details), Rev. 2.

S-839 - Torus Tridowns - Plan and Typical Details for Columns, Rev. 6.

S-840 - Torus Tridowns - Sections and Miscellaneous Details, Rev. 4.

CALCULATIONS REVIEWED

PBM-007 - PBAPS - CSC Modification - Analysis & Design of Deflectors, Rev. 2

PBM-008-PBAPS - CSC Modification - Downcomer Ties, Rev.2

PBM-005 3-PBAPS-CSC Modifications - SRV Quecher Support, Rev. 2

PBM-010 - PBAPS - Containment. STRUTS for SRV Linesin Torus, Rev. 2

PBM-001 - PBAPS - SRV pipe supports, Rev. 1

PBM-026 - PBAPS - CSC - Modifications - External Torus Nozzels Reinforcements, Rev. 0

OTHER DOCUMENTS

NUREG-0408 - Mark I Containment Short Term Program Safety Evaluation Report.

NUREG-0661 - Safety Evaluation Report - Mark I Containment Long-Term Program.

NUREG-0474 - A Technical Update on Pressure suppression Type Containments in use in US, Light Water Reactor Nuclear Power Plant.

6280-E-120-2 Users; Manual, Suppression Pool Temp. Monitoring System (SPOTMOS)

Spec for Installation Containment Suppression Chamber CSC Modification for PB Atomic Power Station Specification Number 11187-P-3Q Rev. 7.

Spec for Purchase of Components for Containment Suppression Chamber Modification for Beach Bottom Atomic Power Station spec. 1187-P-1Q Rev. 7

Design Specific for Containment Suppression Chamber Modification for PB-2&3 Spec 1187-P-2Q Rev. 3.

General Project Requirement for Purchase Order for PB 2&3 attachment C to MR 11187-P-1Q Rev. A Spec. 11187-G1, Rev. A.

General Project Requirement for Supplier QA for P.B. - 2&3 attachment D to MR11187-P-1Q specific 1187-G-13 Rev. 0.