

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-277/84-22
Docket No. 50-277
License No. DPR-44
Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania

Facility Name: Peach Bottom Atomic Power Station, Unit 2

Inspection At: Delta and Philadelphia, Pennsylvania

Inspection Conducted: July 16 - July 27, 1984

Inspectors:

<i>for</i>	<u><i>S. D. Elmer</i></u> A. T. Gody, Chief, Management Programs Section, DETP	<u>8/11/84</u> date
	<u><i>G. Napuda</i></u> G. Napuda, Lead Reactor Engineer	<u>10/11/84</u> date
	<u><i>Wm Kessel</i></u> P. K. Eapen, Ph.D., Lead Reactor Engineer	<u>10/11/84</u> date
<i>for</i>	<u><i>G. Napuda</i></u> A. R. Blough, Senior Resident Inspector	<u>10/11/84</u> date
	<u><i>W. J. Bicehouse</i></u> W. J. Bicehouse, Radiation Specialist	<u>10/11/84</u> date
	<u><i>W. J. Bicehouse</i></u> R. Hogan, Radiation Specialist	<u>10/11/84</u> date
	<u><i>E. T. Shaub</i></u> E. T. Shaub, Reactor Engineer	<u>10/12/84</u> date
	<u><i>Wm Kessel</i></u> H. F. Van Kessel, Reactor Engineer	<u>10/11/84</u> date

Accompanying Personnel: P. Swartzel, Management Analyst, General Accounting Office

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S. D. Ebnetter, Chief, Engineering Programs
Branch, DETP

10/11/84
date

Inspection Summary: Inspection on July 16-20 and 23-27, 1984 (Report Number 50-277/84-22): Special outage assessment team inspection of Philadelphia Electric recirculation piping replacement project including engineering and design; 50.59 reviews; contractor control and interfaces; procurement; radiological controls; administrative controls; and, quality assurance and control. The inspection involved 558 hours onsite and 35 hours at the corporate offices by six region based inspectors, one senior resident and two supervisors.

Results: One violation was identified (Failure to maintain certification requirements for quality control inspectors, paragraph 6.2).

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Attachment 1 - Documents Reviewed

1. Persons ContactedPhiladelphia Electric Company (PECO) Electric Production Division (EPD)

- * R. Brown, Licensing Engineer
- * A. Donell, Quality Control (QC) - Site Supervisor
- * N. Gazda, Applied Health Physics - Supervising
T. Hearn, QC Inspector
- * A. Hilsmeir, Senior Health Physicist
J. Hufnagel, Engineer, Outage Planning
D. Kemper, Maintenance Supervisor
B. Maquire, Technical Assistant, Quality Assurance (QA)
- * C. Mengers, General Supervisor, QA
R. Moore, Superintendent QA Division
G. McCarty, Technical Assistant, ALARA Engineer
- * C. Nelson, Support Health Physics
F. Pfender, Shift Superintendent
- * F. Polaski, Outage Manager
D. Smith, Assistant Station Superintendent
W. Texter, General Supervisor, QC
A. Trapuzzano, QA Auditor
A. Traub, Training Supervisor
- * T. Wilson, Supervisor, QA

PECO Engineering and Research Department (E&RD)

- * J. Austin, Supervising Engineer, Construction Division
A. Bazzani, Lead Engineer, Pipe Replacement Group, Mechanical Engineering
B. Clark, Engineer, Mechanical Engineering
E. Edwards, QC Inspector, Construction Division
J. Evans, QA Engineer
J. Gloecker, Engineer, Mechanical Engineering
- * F. Hoelzle, Project Engineer, Construction Division
- * R. Jones, Supervisor QC, Construction Division
W. Knapp, Corporate Health Physics
M. Miller, Responsible Engineer - Decontamination, Mechanical Engineering
J. Moskowitz, Engineer-in-Charge, Power Plant Design
J. Muldoon, Electrical Supervisor, Construction Division
- * J. O'Rourke, Branch Head, Mechanical Engineering
F. Pavlides, Quality Assurance Manager
- * J. Pizzola, QA Engineer
W. Smith, QA Engineer
J. Weisheit, General Superintendent, Construction Division

Chicago Bridge and Iron Company (CB&I)

- A. Bouch, Materials Engineer
- * G. Czapnik, Welding and QA Supervisor
- G. Doan, Safety Supervisor
- P. Gundy, Area Engineer
- * C. Halfast, Project Manager
- D. Northington, Field Engineer
- M. Novak, ALARA Engineer
- K. Schoenleber, Site Manager
- T. Stafford, ALARA Engineer

Bechtel Power Corporation

- N. Cairns, Site Engineer
- E. Goldberg, Project Engineer
- * R. Kelley, Project Resident Engineer
- M. Osborne, Assistant Project Engineer
- G. Quarien, Supervisor, Plant Design

General Electric Company

- * G. Englesson, ALARA Coordinator
- G. Francis, Site Engineer
- J. Hoffman, Supervisor Site QC
- A. Labucay, Site Engineer
- * R. Lebre, Project Manager
- J. Zilinski, Responsible Engineer, Decontamination

Quadrex

D. Brown, Transportation Consultant

* Indicates those persons present at the exit interview on July 27, 1984.

2. Scope of the Inspection

This Operations Assessment Inspection was conducted to review the piping replacement activities for the Recirculation and Residual Heat Removal Systems. The review afforded an excellent means to assess the licensee's activities in the areas of design, installation, quality assurance, quality control, radiological control, contractor control, procurement, and material receipt and storage. In addition, the piping replacement activities provided a central theme to assess corporate functions, which interface with the Peach Bottom Station, such as, project engineering, design, the offsite committee and quality assurance. The inspection provided an overview of interface control, management support and ability of the total organization to support the piping replacement program in particular, and safe operation of the Peach Bottom Station in general.

The inspection was oriented toward a determination of the PECO organization by identifying strengths and weaknesses in each inspection area. However, if noncompliances with regulatory requirements were observed they were to be cited as violations.

The inspection identified strengths, weaknesses and one violation.

Paragraphs three through eight discuss the details of the inspection in the areas of Engineering and Design; Radiological Control; Contractor Control; Quality Assurance/Quality Control; Procurement, Receipt Inspection and Storage; and Administrative Controls.

3. Review of Engineering and Design

3.1 Program Description

The piping replacement program at Peach Bottom 2 is conducted as a major modification under the station design change program. NRC Generic Letter 84-07 permits the piping replacement to be conducted under the provisions of 10 CFR 50.59, without prior NRC approval.

The Engineering and Research Department (E&R) is responsible for the engineering and design of this major modification. E&R has designated mechanical engineering as the lead division. The lead project engineer and 4 other engineers from the Power Plant Design Section of Mechanical Engineering Division (MED) are dedicated to this modification. Additional personnel from all engineering disciplines are made available for the project on an as-needed basis.

The Construction Division of E&R has assigned 2 full time construction engineers and a part time Lead (Construction) Project Engineer to oversee the construction activities executed by the Chicago Bridge and Iron (CB&I) Company, PECO's construction contractor for the project.

Philadelphia Electric Company (PECO) has contracted with the General Electric (GE) Company, who designed the original recirculation system, to be the engineer for the replacement of recirculation system piping. GE also provides overall ALARA coordination and technical guidance for the piping replacement and installation. GE will also have overall responsibility for the decontamination of the replaced piping. GE contracted London Nuclear Limited (LNL) Company to perform the decontamination activities in accordance with GE prepared procedures. (For further information on decontamination activities refer to Paragraph 4). A project manager and staff of 13 are maintained by GE on site. This staff supports the project's day-to-day activities and serves as an interface between the project and offsite GE organizations. Detailed engineering and piping system analyses are conducted at the GE office in San Jose, California.

Bechtel Power Corporation (BPC) is contracted by PECO to provide the engineering for the Residual Heat Removal (RHR) system piping, Reactor Water Cleanup (RWCU) system piping and containment penetrations. Major engineering and design calculations are conducted at the San Francisco, California BPC office. BPC maintains a site supervisor and a staff of four to attend to routine project matters and review field changes on PECO's behalf.

CB&I is contracted by PECO to remove and install piping systems, mechanical equipment and structural steel. A project manager and a staff of 5 are maintained by CB&I onsite for the support of the project. Additional technical support is available from the CB&I corporate office on an as needed basis. CB&I has subcontracted GAPCO for automatic cutting and welding operations.

Removal and installation of electrical equipment is managed internally by PECO Electrical Engineering, Design and Construction Division. In addition, PECO has retained J. A. Jones Applied Research Company for metallurgical evaluations and Stone and Webster Engineering Corporation for additional engineering support.

3.2 Program Implementation

The activities and documents identified in paragraph 3.3, were reviewed to assure:

- Design input requirements such as design bases, regulatory requirements, codes, and standards were identified, documented, and their selection reviewed and approved.
- Design activities were prescribed and accomplished in accordance with procedures.
- Applicable design inputs were correctly translated into specifications, drawings, procedures or instructions.
- Controls were established for responsibilities, lines of communications, documentation and internal and external interfaces.
- Design verification was established to assure that the design meets the design input requirements.
- Procedures were established to control the issuance of design documents and their changes.
- Procedures were established to control design changes.
- Design documentation and records were maintained.

- Audits were conducted to verify compliance with all aspects of QA programs for design and design changes.
- New or modified systems were installed in accordance with the approved design.
- Safety Evaluations were conducted in accordance with the requirements of 10 CFR 50.59 and the bases for the evaluations were provided.
- Engineering and technical inputs were provided to the operations, pre-operation test, and training groups for procedure development to reflect the new or modified system.
- Engineering organizations were adequately staffed with qualified and trained personnel.

3.3 Activities and Documents Reviewed

- (1) Removal of cross ties on recirculation discharge loops
- (2) Protection of the RPV safe ends
- (3) Recirculation pump nozzle load reconciliation for new pipe welds and system configuration control
- (4) Precautions taken in welding replacement piping to recirculation suction and discharge valves
- (5) Radiation streaming potential for shielding plugs of N1 and N2 nozzles
- (6) Additional shielding inside reactor vessel
- (7) Attachments for rigging on containment liner and other safety related structures
- (8) Protective measures for safety related equipment in work areas
- (9) As-built drawings for existing piping
- (10) Deletion and addition of snubbers
- (11) Venturi type flow elements
- (12) Recirculation pump exposure to decontamination agents

- (13) Temporary changes to systems and structures to avoid interference with the work
- (14) Safety Evaluation Reports
- (15) Piping Analysis Reports

3.4 Findings

- 3.4.1 A substantial improvement in the quality of PECO engineering reviews of contractor documentations was noted. The reviewers were knowledgeable in the technical details of contractor documents. The records of the reviews were detailed and retrievable. PECO's comments were technically oriented. The inspectors reviewed the final copies of the GE safety evaluation for the project and the CB&I procedure (CSGM-1N) for the control of site generated modifications and noted that these final revisions accurately reflected the comments generated by PECO.
- 3.4.2 The inspectors reviewed the CB&I program for piping system alignment and configuration control. The project manager presented the technical details of the mockups used for aligning the piping system. Using the established mockup program and techniques CB&I can align the pipes within 0.01 inches of the specification. The CB&I project manager was actively involved in the technical details of this and other activities reviewed. CB&I management's involvement and attention to the technical details of the project are considered to be a strength.
- 3.4.3 Several site generated modifications (CSGMs 22, 30, 34, 42 and 65) were reviewed. BPCs engineering review and approval of these CSGM's were based on engineering judgements. However, the reviewers did not adequately document the bases of these engineering judgements. The inspector discussed the bases for the engineering judgements with the reviewers and determined that these bases were adequate. Some of these bases were determined to need documented explanations. The reviewers documented the bases for these CSGMs prior to the exit meeting. Additionally, PECO's representatives agreed to maintain adequate documentation for future CSGM reviews. The quality and adequacy of future CSGM reviews will be reviewed during future NRC inspections (50-277/84-24-01).

Except as noted above, the inspectors found the piping replacement program to be consistent with or exceed the guidelines of Generic Letter 84-07 and PECO's letter dated March 6, 1984.

4. Review of Radiological Control

4.1 Organization and Program Review

Radiation protection and radioactive waste management for the Unit 2 piping replacement are the responsibility of the PECO Electric Production Department (EPD). Within the EPD, the Peach Bottom Station Health Physics and Chemistry Section provides radiological surveillance and control under existing station administrative and health physics operating procedures. Special procedures and instructions for radiation protection and radioactive waste management developed by the piping replacement contractors are reviewed by the Plant Operation and Review Committee (PORC) under the Station Technical Specifications. Shipments of processed and packaged radioactive waste from the piping replacement are the responsibility of the Radwaste Group in the EPD. Audits and monitoring of radiation protection and radioactive waste management activities are provided by the EPD Quality Control and Quality Assurance Section.

Several contractors administer portions of the radiation protection and radioactive waste management activities at Unit 2 as follows:

- The General Electric Company (GE) coordinates the ALARA program. GE provides recommendations for radiation exposure mitigating measures and serves as a clearing house for technical information from other boiling water reactor pipe replacements.
- Chicago Bridge and Iron Company (CB&I) maintains an ALARA program which tracks radiation exposures, recommends measures to reduce exposures and provides mockup training. CB&I Radiological Engineers have been delegated specific ALARA responsibility for pipe replacement under Station Procedure A-83. CB&I is also responsible for operation of a temporary radioactive waste facility to process removed piping for eventual removal to Quadrex (a sub-contractor) for final processing.
- London Nuclear Limited (LNL) provides in situ chemical decontamination of Unit 2 recirculation piping to reduce radiation levels for subsequent pipe removal. GE provides technical guidance for this function.
- Chem Nuclear Services, Inc. will provide radioactive waste solidification services for demineralizer resins used by LNL.
- Bartlett Nuclear Inc. provides personnel trained in radiological controls and a temporary decontamination facility for processing removed piping. Health Physics Technicians, qualified under ANSI N18.1-1971, provide operational radiation protection services for Unit 2 drywell work. Radiological Engineers administer the CB&I ALARA program for drywell work.

The Engineering and Research Department (E&RD) through its Mechanical Engineering and Construction Divisions coordinates the safety evaluations for radioactive wastes generated by the piping replacement under 10 CFR 50.59. The safety evaluations are performed by contractors (primarily GE), reviewed by the E&RD and submitted to the Plant Operations Review Committee (PORC) for acceptance. Radioactive waste processing by the contractor onsite is controlled by EPD.

Generic Letter 84-07, "Procedural Guidance for Pipe Replacement at BWRs", requested a description of the radiation protection program for pipe replacements at boiling water reactors. In a letter from S. L. Daltruff, PECO to J. F. Stolz, USNRC, dated June 15, 1984, the licensee provided a description of the Unit 2 radiation protection program. Specific radiation protection planning and implementation reviews are discussed in NRC Inspection Reports 50-277/84-12 and 50-277/84-18.

4.2 Program Implementation

The radiological control program provided by PECO for piping replacement activities at Unit 2 was assessed in the areas of the radiological control and surveillance of ongoing work activities, the "as low as reasonably achievable" (ALARA) program, the identification and resolution of deficiencies and the management of radioactive wastes. The effectiveness of the radiological control program in each area was assessed by selected reviews of Unit 2 piping replacement activities completed or in progress during the inspection.

Each area was reviewed to assure that the following applicable requirements were met:

- Regulatory requirements such as 10 CFR Part 20, applicable Station Technical Specifications and implementing station procedures were being implemented.
- Commitments made by PECO in programmatic descriptions, presentations to the Region I staff and those resulting from previous inspections were being implemented.
- Interface controls were established to identify, control and maintain responsibilities, lines of communications and documentation requirements for internal and external interfaces.
- Safety Evaluations (as applicable) were conducted in accordance with the requirements of 10 CFR 50.59 and Station Technical Specification requirements for review and acceptance by the PORC.

- Quality Assurance and Quality Control overview of radiological controls was conducted to verify compliance thereto.
- Personnel selection, qualification and training of outage personnel in radiation protection and ALARA procedures were being completed.

The effectiveness of the radiological controls program in meeting each of the above requirements were assessed by:

- Detailed review of radiation work permits and supporting surveys, 10 ALARA reviews and recommendations, discrepancy reports for piping replacement activities, training and qualification records, QC/QA monitoring/audit reports and instructions, selected personnel monitoring records, ALARA committee meeting minutes, ALARA Program Instructions and selected procedures for decontamination, processing and shipping radioactive waste and operation of temporary radioactive waste facilities.
- Direct observation and measurements made during several plant tours.
- Interviews and discussions with cognizant PECO and contractor personnel.

4.3 Findings

4.3.1 Deficiency Reporting Program

PECO investigates, documents, reports, tracks, closes and trends identified discrepancies using Station Procedure A-86, "Administrative Procedure for Corrective Action". The discrepancies include:

- Suspected or known violation of Nuclear Plant Rules.
- Personnel contamination requiring notification of the Health Physics and Chemistry Section and Shift Supervision.
- Potential excess radiation exposure.
- Contamination on an incoming vehicle.
- Personnel contamination identified at the Gatehouse and Plant Exit friskers.
- Bioassay program results exceeding station action levels.

- Accidental dropping of or damage to core components.
- Significant degradation of plant housekeeping practices.

CB&I Radiological Engineering established a program for reporting and correcting radiological discrepancies in CB&I Procedure API-2. Piping replacement personnel identifying a work practice which did not conform to established radiological controls practices could initiate a Radiological Deficiency Report if resolution was not obtained from discussions with health physics technicians and radiological engineers. Piping replacement personnel were instructed in the CB&I procedure for reporting radiological discrepancies.

In practice, two procedures with differing requirements were in place to report radiological discrepancies. The inspector interviewed several PECO employees and determined that they were unfamiliar with their responsibility to report events or problems within the scope of PECO Station Procedure A-86. Interviews with CB&I employees showed that they were familiar with the radiological discrepancy reporting system in API-2. Review of discrepancy reports from both procedures showed that similar discrepancies were reported under both programs.

When these findings were presented to PECO, their representative stated:

- API-2 will be revised to delete its reporting system and reference the Station's A-86 Procedure.
- Information on the A-86 Procedure will be added to the General Employee Training Program.
- Reporting forms used for A-86 reports will be made available to all employees.
- Additional training will be provided to current workers to inform them of the existence and use of the A-86 Procedure.

These actions will be reviewed during a subsequent inspection.
(50-277/84-22-02)

4.3.2 Temporary Radioactive Waste Processes and Facilities

Three contractors will provide onsite temporary radioactive waste disposal operations to support Unit 2 pipe replacement:

- CB&I will process removed piping in a temporary radioactive waste facility.
- Chem Nuclear Services (CNS), Inc. will solidify demineralizer resins used by London Nuclear Limited in the chemical decontamination.
- Bartlett Nuclear (BN) Inc. will decontaminate pipe in a temporary trailer which they provide.

Under 10 CFR 50.59 and Technical Specification 6.5, PECO is responsible for a written safety evaluation and a determination by the PORC regarding the safety of these operations.

The inspector determined that although both the CNS and BN operations were being set up during the inspection, actions to ensure safety evaluations and acceptance by the PORC were incomplete. Lack of completion of these actions prior to the arrival and initial setups of these operations by these two contractors is considered a weakness in the planning and control of interfaces between PECO's Engineering and Research Department and the Electric Production Department. (50-277/84-22-03)

At the exit interview, PECO management stated:

- Safety evaluations and PORC determinations would be completed prior to initial operation of the temporary radioactive waste facilities and processes.
- Controls (i.e. Administrative "holdpoints") had been instituted to ensure that no operations of these radioactive waste processes could occur prior to completion of the safety evaluations and their acceptance by the PORC.

4.3.3 Skin and Clothing Contamination

Several radiation workers stated that low levels of skin and clothing contamination were discovered on their persons prior to their entry into contaminated areas. The inspector noted that up to 5,000 cpm, (approximately 50,000 dpm) "fixed" contamination was acceptable on protective clothing under PECO's Procedure HPO/CO-100.

The inspector requested 5 pairs of coveralls be drawn from clean stacks for examination. The inspector checked each pair with an Eberline Model RM-14 used for personnel frisking. One pair of coveralls exceeded the 5,000 cpm acceptance criteria, (i.e. 6,200 cpm in areas in normal contact with the wearer's body). The inspector noted that these contamination levels were well below levels at which 10 CFR 20.101 limits would be exceeded in normal use. However, the reported transfer to radiation workers' bodies and personal clothing indicated that the contamination was not "fixed". Examination of licensee's records confirmed the radiation workers' statements relating to the skin contamination.

When these findings were presented to PECO representatives, they stated:

- The laundry contractor is required to survey 100% of the clothing to ensure that Station Procedure HPO/CO-100 limits are being met.
- PECO surveys 10% of the laundered anticontamination clothing as a quality control measure.
- Data from these PECO surveys showed less than 2.5% of the laundered clothing exceeded station limits for "fixed" contamination.
- PECO intends to investigate further and obtain satisfactory performance by the laundry contractor.

The actions taken by the licensee to ensure that laundered anticontamination clothing meets requirements established in Station Procedure HPO/CO-100 will be reviewed during a subsequent inspection. (50-277/84-22-04)

Except as noted above, the inspector found the licensee's Radiological Control program to be adequate.

5. Review of Contractor Control and Interface

5.1 Requirements

- PECO, Operations Quality Assurance Program, Volume III
- PECO, Design and Construction Phase Quality Assurance Plan, Volume I
- CB&I, Nuclear Quality Assurance Manual, Division IV, Construction
- Piping Replacement Program Project Interface Procedure Manual

5.2 Program Review

The Project Interface Procedure Manual was developed to delineate the responsibilities of PECO and their major contractors in performing engineering design, procurement, removal and installation, and support of the Unit 2 recirculation piping replacement. Special procedures and instructions have been generated by PECO and CB&I to provide the additional control and direction of work activities associated with cutting, capping, decontamination, removal and replacement of piping.

Applicable portions of the programs referenced in paragraph 5.1, administrative procedures, special procedures and special instructions referenced in Attachment B were reviewed to ensure adequate interfaces and work controls were established. Reports, logs and records applicable to work implementation are referenced in the report details.

5.3 Program Implementation

To assure adequate interfaces were established and that work activities were being implemented in accordance with approved procedures and instructions, the following areas were reviewed and discussed:

- Project document control and review.
- CB&I and GE organization and administration.
- PECO construction overview/control.
- Site generated field modifications.
- Temporary attachments and rigging.
- Special instructions and associated travelers.
- Special procedures for overall project coordination.
- Project meetings.
- Control of onsite pipe polishing.
- Drywell tours for fire protection, housekeeping and ongoing work activities.

- 5.3.1 The project interface procedure manual delineates the requirements for document review and approval. Several procedures and instructions were selectively sampled and the documentation reviewed to ensure appropriate reviews and approvals were completed prior to use of the documents.

- 5.3.2 The organizations and responsibilities of General Electric and CB&I were discussed with their management representatives to ensure that current organizations were as described and project responsibilities were understood.
- 5.3.3 The PECO Construction Division is responsible for the installation of the recirculation piping modification. The responsible engineer is involved in the daily outage meeting with the contractor and reviews all site generated modifications to control the activity and ensure engineering technical reviews are done when necessary. In addition, there is a Construction Division person assigned to each work shift as an inspector/coordinator. These inspectors provide the interface between plant staff and the contractor.
- 5.3.4 Plant installed equipment that interferes with the piping replacement is removed and controlled utilizing CB&I procedure CSGM-IN and the station Maintenance Request Form (MRF). Fifteen CSGMs and the associated MRF and engineering reviews were reviewed and discussed with PECO and contractor personnel to ensure that: detailed instructions were provided for removal, storage and eventual reinstallation of the interference item; engineering reviews were performed as required; and, PECO construction personnel reviewed the CSGM and initiated the Maintenance Request Form (MRF) and system blocking permits as necessary.
- 5.3.5 Rigging is a major evolution during the recirculation pipe modification. The rigging report, erection drawings, and temporary attachments reports were used to control and document all rigging. Temporary attachments reports were generated to control installation, removal and cleanup of temporary attachments within the containment. Whenever the rigging evolution required a change from the erection drawing, a Rigging Change Notice was generated to provide for engineering evaluation of the change. The temporary attachment log and eight temporary attachment reports were reviewed and discussed with contractor personnel. Also, nine Rigging Change Notices were reviewed to ensure that adequate engineering review and calculations were performed. Temporary attachments were visually inspected to ensure the attachments and associated welding conformed to the Temporary Attachment Report.

- 5.3.6 CB&I has generated special instructions to coordinate and control each phase of the pipe replacement. The special instructions provide detailed instructions for each phase of work and are accompanied by travellers. The travellers are generated by the QA group and include the sign-offs for implementation, inspection holdpoints, and QA review. The inspector reviewed several special instructions and their associated travellers to ensure the traveller paralleled the special instruction and sufficient inspection holdpoints were included to ensure quality.

Travellers are also generated to control work activities associated with interferences when cutting or welding is required and were reviewed in conjunction with CSGM's.

- 5.3.7 PECO in conjunction with GE has developed Special Procedures (SPs) to provide control and coordination of the recirculation pipe replacement. Procedures SP-706, "Refueling Floor/Recirculation Pipe Replacement Overall Coordination Procedure" and SP-694, "Chemical Decontamination of Recirculation, RHR and RWCU Systems", were reviewed and discussed with PECO and contractor personnel to ensure those individuals or groups responsible for implementation and sign-offs were knowledgeable and aware of their responsibilities. The GE Engineering staff is responsible for the implementation of the decontamination process and GE Quality Control is responsible for inspection holdpoints and implementation verification.

Plant shift supervision was interviewed to determine the shift's involvement and control for the various phases of the pipe replacement. For all phases of the replacement, the shift is briefed on job status and conditions prior to work commencing. Although the shift is responsible for plant conditions, most of their involvement in the pipe replacement is operating and blocking plant equipment to support each phase of work.

- 5.3.8 To provide project coordination, PECO holds daily outage and biweekly Project Review meetings. NRC inspectors attended the July 19, 1984, Project Review meeting to verify that effective communications were established. The major focus of the meeting addressed engineering support activities, material status and delivery schedules, and the overall site project schedule. Minutes from previous meetings were reviewed to verify that PECO and contractor actions were taken to correct previously noted problems in the above areas.

- 5.3.9 The recirculation system replacement piping was mechanically and electrically polished at the vendor's facilities prior to delivery onsite. PECO plans to have the RHR replacement piping mechanically and electrically polished onsite. The proposed controls for the polishing were discussed with both PECO and contractor personnel to ensure adequate controls were planned. GE will provide technical direction and QC coverage for the polishing operations.
- 5.3.10 The inspector accompanied contractor personnel on tours of the drywell to observe housekeeping, fire protection, health physics coverage and work activities associated with the pipe replacement. Additionally, the inspector selected several interferences both electrical and mechanical (CSGMs 20, 22 and 42 and the associated MRFs) and verified the interferences were removed and stored in accordance with the applicable instructions and administrative controls. For the electrical interferences, the associated blocking was reviewed and the caution tags verified.

5.4 Findings

No violations were identified.

The contractor control and interface activities were implemented in accordance with established program and procedures.

6. Quality Assurance/Quality Control (QA/QC)

6.1 Administration and Organization

The licensee has delegated the QA/QC overview functions to the Quality Assurance Division (QAD) of the Electric Production Department (EPD) and the Quality Assurance Section (QAS) of the Engineering and Research Department (E&RD). The quality overview of activities associated with the piping replacement project have been further delegated to Bechtel Power Corporation, General Electric Company (GE), and Chicago Bridge and Iron Corporation (CB&I) for work performed by them.

The E&RD QAS conducts audits and surveillances of these three major contractors and other selected vendors. Activities by station and other EPD personnel and E&RD QAS are audited by EPD QAD who also conduct QA surveillances and perform a QC monitoring function.

The E&RD QAS staff of nine engineers/technicians, two supervisors and one superintendent are based at the corporate offices. Two groups of the EPD QAD are based onsite with another based at the corporate offices. One onsite group (QA) is responsible for auditing and surveillances while the other group (QC) conducts inspections and

monitoring. These groups consist of eight members and a supervisor and twenty four members and a supervisor respectively. The corporate group of four members and a supervisor support the onsite groups as necessary.

The onsite CB&I QA group has eleven permanently assigned members including a group Superintendent. There are thirteen onsite individuals, qualified to perform various inspections, available to this group on an as needed basis. These latter individuals' normal duties do not include "production" type responsibilities.

6.2 Program Review

Documents and procedures were reviewed to determine whether administrative controls addressed and/or included the following as appropriate.

- Independence, qualification and training of QA/QC personnel.
- Corrective action documentation and review.
- Inspection requirements and acceptance criteria.
- Audit program scope definition.
- Audit followup and re-audits.
- Monitoring and/or surveillances by QA/QC.
- Planning and conducting the various overviews.
- Long range audit scheduling.
- Periodic review of the audit program.

The quality trending analyses efforts of E&RD QAS and EPD QAD were also reviewed to determine their adequacy.

The personnel folders of selected QA/QC personnel were reviewed to determine whether they were qualified to established requirements and had received required or supplementary training. The sample included four E&RD QAS, eleven EPD QAD QA and twelve EPD QAD QC staff members. The types of required and supplementary training provided for QA/QC staff were also reviewed and discussed with cognizant staff and management.

6.3 Program Implementation

The 1984 EPD QAD audit schedule indicates that piping replacement project activities such as material decontamination, housekeeping, ALARA program, post modification testing, and plant startup are to be audited during this outage. The E&RD QAS monthly Major Activities Schedule indicates that an audit of the piping replacement is to be conducted during the outage. QAS representatives stated that their audit is to be completed in phases so as to encompass the total time frame of ongoing activities. Audits of major contractor, vendor and E&RD engineering activities related to plant modifications are also scheduled to be conducted during this outage. A monitoring overview is being performed by EPD QAD QC. This is a regularly scheduled tour of various areas by QC inspection personnel and is conducted in accordance with specially developed Detail Monitoring Checklists (DMC). These checklists provide specific guidance and reference the acceptance criteria for given functional areas such as housekeeping, rigging and handling, radiation protection, fire protection-ignition source control, and preoperational testing. The inspector accompanied a QC individual making such a tour inside the drywell on the morning of July 23, 1984.

Several document packages of completed audits were reviewed to verify they were conducted in accordance with a written checklist covering the scoped audit area, by a qualified person independent of the audited area, and to the established schedule and procedures. The adequacy and timeliness of necessary corrective action was also reviewed. Additionally, the listings of outstanding corrective actions associated with audits were reviewed to determine that a backlog was not developing.

Various QA/QC personnel were observed and interviewed during their preparation and conduct of auditing, monitoring and surveillance activities to determine whether they displayed adequate knowledge of their assignments and responsibilities. Interviews with supervisors and managers explored their understanding of resource allocations, redirection of overview emphasis when necessary, and commitment to provide their personnel with required or supplemental training.

6.4 Findings

- 6.4.1 There was little ongoing work in the drywell during the tour of that area. Generally poor housekeeping conditions existed included small tools scattered about at unmanned work locations, metal machining chips not collected, removed mirror insulation left laying around, hoses strewn about, and the movement of a pipe (removed from a high radiation

system) from the drywell with many onlookers not involved in the work. These and other conditions (except the pipe movement) were previously identified by EPD QC. The above conditions increased the possibility for intrusion of small items into critical piping systems, contaminated injury to workers and other unwanted occurrences. When these conditions and concerns were brought to the direct attention of PECO and CB&I management, all work within the drywell was stopped and a general cleanup conducted the same day.

The conditions observed, QA/QC documentation of similar conditions and nonprompt cleanup efforts, and discussions with various personnel confirm that the area of housekeeping is a weakness. (50-277/84-22-05)

- 6.4.2 The QA Manual that CB&I proposed to use for the piping replacement project had been approved by ASME. However, the licensee decided to apply a more conservative quality approach and required the contractor to include safety related nonpressure retaining parts into the program. Also, remote welding machine operators must be qualified to the acceptance criteria of ASME Section IX and NDE results must be evaluated by an SNT-TC-1A Level II or III. These steps by the licensee to implement a quality program that exceeds their commitments and minimum requirements are considered strengths.
- 6.4.3 It is a practice of E&RD QAS to audit certain vendors of major contractors even though these vendors have been approved and are audited and/or under surveillance by the contractor. An evaluation of the contractor's quality overview is within the scope of these audits. The selection of such vendors is based in part on the importance of the supplied component or service. This method of verifying that the contractor's QA program is being implemented effectively and the additional assurance that important components/services are of the highest quality is considered a strength.
- 6.4.4 A positive method of verifying welder identification has been included into E&RD QASs audit program. A duplicate photograph of the security identification badge along with the signature of every welder is kept in the station files. During audits of welder qualification and welding activities at work locations, the auditor utilizes selected photographs and signatures as a means to positively verify that the designated welder is taking his or her own qualification test and the assigned welder is doing the work at the work location. This method to preclude the abuse of qualification testing and the use of unauthorized welders is considered a strength.

- 6.4.5 The EPD QAD QC group conducts continuous monitoring tours except when required to perform a pre-established inspection. Structured checklists have been developed for the various functional activity areas and are in use. A QA surveillance of ongoing activities is also being performed by both E&RD QAS and EPD QAD QA. In many cases, the activities to be observed had been preselected and the surveillance is conducted when the work is ongoing. At times, the surveillance is on an "opportunity" basis, such as when an important unscheduled activity occurs. The emphasis on observation (random at times) of ongoing activities is considered a strength.
- 6.4.6 In addition to records of education, experience and formal training, the personnel folders of EPD QAD QA staff now contain information on the specific on-the-job training received by the individual. Those staff members with engineering degrees are provided BWR Systems training at PECO's simulator center. However, those individuals with non-engineering degrees or experience equivalency do not receive this training. The EPD QAD Superintendent acknowledged the statement that the lack of some sort of BWR Systems training for all QA staff detracted from an otherwise excellent QA staff training program.
- 6.4.7 The quality trending program by E&RD QAS has not yet been fully implemented. Information has been accumulated since January, 1983 and a trial analysis has been done. However, work is still ongoing on the first official analysis. EPD QAD has initiated work on their quality trend analysis as a result of a previous NRC inspection (reference IE Inspection Report 50-352/84-21). PECO representatives acknowledged the statement that expeditious implementation of quality trending analyses would enhance the QA Program.

Except as noted above, the inspector found the licensee's QA/QC activities to meet or exceed minimum requirements.

7. Review of Procurement, Receipt Inspection and Storage Activities

7.1 Procurement

The inspectors interviewed PECO engineers and reviewed a sampling of procurement documents to verify the following:

- Procurement documents had been properly prepared, reviewed, and approved.
- Specific identification was provided for services and materials to be purchased.

- Requisite technical requirements were included.
- Requirements for test and inspection and special instructions for packaging, shipping and storage were included.
- Documents specified that materials and services were nuclear safety related, that a QA program consistent with 10 CFR 50, Appendix B must apply, that 10 CFR 21 applied, and that access for audit of the supplier's plant and records must be permitted.
- Documentation of material certification was specified.
- Changes to procurement documents received appropriate reviews and approvals.

Within the scope of this review, no violations were identified. The inspector found that PECO's Mechanical Engineering Division was, as of the inspection, thoroughly involved in the technical details of material specifications developed by the primary contractors (GE and BPC). In many cases, based on their own technical reviews of pipe cracking issues, PECO had established criteria that exceeded applicable codes and standards. Examples included (1) certain ASME code exceptions for small bore (less than 2.5 inch) piping will not be used; (2) special limits on material chemistry and on analyses for trace elements were established; (3) a 10-hour accelerated corrosion test was specified in lieu of the normal one-hour test; (4) wall thicknesses were greater than the code allowable minimum; and (5) weld buildup was not to be used for restoration of wall thickness in event of fabrication damage at weld prep locations. These PECO requirements were documented as comments on contractor proposed specifications and were implemented as changes or additions to the specifications. PECO's technical involvement and use of extra conservatism in material specifications is considered a strength.

However, the inspector identified two problems with PECO administrative and management controls over vendor documents.

- (1) PECO did not establish the requirement for approval of contractor procurement specifications until after some GE and BPC specifications had been issued to subcontractors for material fabrication. This problem was corrected by issuance of the Project Interface Procedures Manual (PIPM), a document that is approved by all major parties (PECO, GE, BPC, CB&I), and specifies the review and approval requirements for project documents. However, as a result of the late PECO review of GE specifications, some pipe pieces received weld buildups prior to PECO's prohibition of buildup. As of the end of the inspection, PECO was attempting to determine the precise details of each weld buildup for evaluation and for information to the inservice inspection (ISI) group, since the presence of weld buildups complicates UT inspection and evaluation of the piping.

- (2) PECO did not have a fully effective way of knowing what GE and BPC documents and revisions were currently issued for the project. Consequently, PECO could not be certain that contractors were fully complying with PIPM document approval requirements. Among a sampling of documents checked, the inspector found that the following GE specifications had not received PECO approval: 23A1625 Revision 2, and 23A1625AB Revision 1. The impact of PECO's approvals was small, since most changes in those specifications from previous procurement documents involved GE implementation of licensee comments and special requirements. Prior to the conclusion of this inspection, PECO had begun corrective action (i.e., obtaining vendor document indexes and verifying licensee review and approval).

The above listed two items are examples of a weakness in administrative and management controls to assure timely receipt and review of vendor documents (50-277/84-22-06).

7.2 Receipt Inspection

The inspector interviewed cognizant engineers and QC inspectors; reviewed the qualifications and certifications of QC inspectors; observed portions of a receipt inspection; and reviewed procedures, the Engineering Work Letter, and a documentation package applicable to receipt inspection of recirculation piping.

As of this inspection, several pieces of BPC supplied pipe had been received and physically inspected, but all were on "QC Hold", pending Mechanical Engineering Division (MED) review for completeness of vendor-supplied documentation. Also, NCR's were outstanding on two pipe spools. Several pieces of GE supplied pipe had been received and inspected for shipping damage, but the remainder of receipt inspection was on QC hold pending additional receipt inspection guidance from MED. The inspector verified on July 16, 17 and 27 that material on QC hold was appropriately marked and segregated. Also, the inspector observed the receipt and inspection for shipping damage of piping received July 17.

In reviewing receipt inspection procedures, the inspector noted that the QC inspector developed a checklist for each inspection based on his review of procurement documents. For the recirculation piping, guidance regarding the minimum receipt inspection was provided in the engineering work letter (EWL). The inspector noted that the actual receipt inspections have gone significantly beyond that described in the EWL regarding dimensional and wall thickness checks. The use of a detailed, shipment-specific checklist and the practice of exceeding minimum inspection requirements established by engineering is considered a strength.

In reviewing Construction Division QC inspector qualifications, the inspector noted that the inspectors are all very experienced craftsmen, technicians, or engineers. Stability of the group with respect to persons assigned has improved in the last two years. A qualified NDE Level II contractor was added to the group in August, 1983 for the purpose of QC review of vendor-supplied radiographs. This individual's qualifications were reviewed with no discrepancies noted.

On July 17, the inspector identified administrative deficiencies with respect to yearly verification of QC inspectors' qualifications. PECO procedure CD10.1, Revision 3, February 4, 1984, "Procedure for Certification of QC Inspectors", requires yearly supervisory evaluation and medical examinations of each QC inspector to support his continued certification. In two cases, inspectors were listed as "Personnel Certified as Construction Division QC Inspectors" (Exhibit CD10.1-II) but evaluations and medical examinations had not been completed within the last year. PECO believes that the evaluations had been initiated but were either delayed or lost due to delays in documenting medical examinations. Of the inspectors involved, one was currently active as a QC inspector (but had not been a receipt inspector for the pipe replacement project), and one had been inactive for over a year.

10 CFR 50, Appendix B, Criterion II, Quality Assurance Program, requires that the program provide for indoctrination and training of personnel as necessary to assure that suitable proficiency is achieved and maintained. Section 2.2 of the licensee's Quality Assurance Plan, Volume I, Revision 7, December 21, 1983, states that inspectors shall be qualified in accordance with FSAR Appendix D (17.2B). FSAR Appendix D (17.2B) states that the Engineering and Research Department follows ANSI 45.2.6-1978. ANSI-45.2.6-1978, Qualifications of Inspection, Examination and Testing Personnel for Nuclear Power Plants, states that (1) special physical characteristics needed by each inspector shall be verified by examination at least yearly, and (2) any inspector who has not performed inspections within the past year shall be re-evaluated for ongoing qualification. PECO E&RD Procedure CD10.1, Revision 3, February 4, 1983, requires annual recertifications, including supervisory evaluations and medical examinations, for all QC inspectors. Failure to complete annual recertifications for two inspectors is a Violation (277/84-22-07).

7.3 Storage

The inspector reviewed PECO and contractor procedures for storage of both new and reusable material associated with the pipe replacement. The inspector toured the Construction Division piping storage area on July 16, 17 and 27. On July 19, substantial improvement was noted since NRC Inspection 277/84-14 and 278/84-12 with respect to both access control and protection of material. The inspector toured CB&I storage areas for reusable material, including an in-plant area for snubbers and a temporary building for storage of small bore piping,

instrument tubes, ventilation ducts and miscellaneous materials. Material was generally well-marked and well-wrapped for protection. In one case, however, pipe clamps were being stored on top of a package of small bore piping. Since the piping was relatively thick-walled and heavily wrapped, no safety concern existed for this particular instance, but such practices could result in damage to components in other situations. The contractor (CB&I) corrected the problem, alerted personnel to the concern, and inspected and upgraded all storage areas. CB&I supervisors stated that each reusable component is visually inspected during re-installation. The inspector verified this program feature through review of the CB&I visual inspection procedure and by a sampling of work travelers associated with interference removal and reinstallation. Each traveler called for visual inspection (with a sign-off) of components to be reused.

Regarding handling and storage of reusable snubbers, the inspector reviewed CB&I training records and interviewed personnel to verify that responsible CB&I personnel had been trained in the special handling requirements for snubbers. Two sessions, one by CB&I supervision and one by senior PECO Maintenance Division craftsman, had been provided.

No violations or weaknesses were identified. However, the inspector identified a potential storage space problem as more new material is received and additional in-plant interferences are removed. PECO representatives stated that the situation is being studied and that CB&I is planning to build a temporary structure for polishing and storage of new piping.

Except as noted above, the inspector found the licensee's Procurement, Receipt and Storage program to be adequate.

8. Review of Administrative Controls

The inspector reviewed PECO's programs for equipment control (tagging), equipment protection, work permits, fire protection and housekeeping. Other administrative controls were checked within individual inspection areas detailed elsewhere in this report.

8.1 Equipment Control

PECO is using the normal station blocking and permits system for pipe replacement. The inspector interviewed responsible PECO and contractor personnel to verify that they were familiar with the system. The inspector reviewed a sample of open permits (tagouts) for completeness, proper reviews and approvals and appropriateness of specified lineups.

For the following permits, the inspector also checked the lineup of selected valves, breakers, and switches:

<u>Permit</u>	<u>Subject</u>
2-84-136	Reactor Vessel Master Permit
2-02-C8402848	Cut and Cap Recirc Pipe (Sub-permit of 2-84-136)
2-10-C8402853	Head Spray Pipe Replacement
2-84-134	Acetylene Use in Drywell

No improperly aligned equipment was noted. Permit 2-84-136 included information tags on control switches of valves to be operated during decontamination, to discourage tagging of the valves for other work. Nonetheless, two of the valves had been deactivated and this was pointed out to PECO personnel. The inspector reviewed the decontamination procedure and verified that the deactivated valves were not a safety concern, since they would be identified during filling of the system with water. Thus, only a schedule delay, and not a perturbation of the actual chemical decontamination, could result.

No violations or weaknesses were identified.

8.2 Work Permits

PECO is using the normal station Maintenance Request Form (MRF) system for administrative approval and control of pipe replacement project work. The inspector interviewed responsible PECO and contractor personnel to verify that they were familiar with the system. The inspector reviewed open MRFs for the project for completeness, proper reviews and approvals, and appropriateness of special instructions and plant restraints. No inadequacies were noted.

8.3 Fire Protection and Housekeeping

The inspector reviewed procedures and interviewed personnel regarding fire protection and housekeeping controls. These areas are governed by PECO's normal station administrative procedures during this outage.

Fire watches are supplied and trained by CB&I. The inspector reviewed fire watch training lesson plans, attendance records and quizzes. The inspector interviewed a sampling of fire watches and found them to be knowledgeable. The inspector reviewed fire extinguishers monthly inspection records and a sampling of fire watch sign-in logs.

The inspector reviewed measures to prevent recurrence of a June 8, 1984 event involving accumulation of acetylene in the drywell (PECO Event Report 2-84-11). Acetylene work is also controlled under a separate Ignition Source Control Checklist (Procedure A-12, Appendix A) from other hot work. This checklist specifies the required ventilation

lineup, which is controlled by a blocking permit. The inspector verified the proper ventilation lineup on July 25. Later that day, during plant testing requiring ventilation system changes, the inspector verified that acetylene work had been halted prior to disturbance of ventilation. Other measures to prevent acetylene buildup included (1) moving all bottles outside the Reactor Building, (2) disconnecting bottles and venting hoses at the end of each day, (3) leak checking hoses each day prior to use. The inspector had no further questions on this issue.

The inspector interviewed PECO and contractor personnel and toured the Unit 2 Drywell on July 26 to evaluate the housekeeping program. All CB&I and other contractor personnel were given a briefing, which includes fire protection and housekeeping requirements, by CB&I Safety Department during site indoctrination. Also, housekeeping is discussed during weekly safety meetings which are led by either a foreman or a safety supervisor. During a drywell tour on July 26, the inspector found that housekeeping was generally acceptable with exception of some loose metal chips near one recirculation riser. Further cleanup had been planned by the contractors for that evening based on previous EPD QC and NRC findings (significant housekeeping problems were found during the NRC tour on July 23, see paragraph 6.4.1). PECO and contractor representatives indicated that recent housekeeping fluctuations were caused, in part, by heavy demands for fire watch support from the contractor laborer group and that additional contractor laborers were hired. As of the end of the inspection, these personnel were in site orientation training. A weakness related to plant housekeeping is discussed in paragraph 6.4.1.

8.4 Equipment Protection

The inspector reviewed PECO and contractor measures to minimize damage to equipment not involved in the pipe replacement project; and to identify, evaluate and correct any incidental damages that does occur. Equipment identified as interferences is controlled under CB&I Procedure, CSGM-IN, "Control of Site-Generated Modifications", and these controls are discussed elsewhere in this report. Other equipment susceptible to damage, such as safety-relief valves and snubbers, is to be removed and stored. This was completed for safety-relief valves and is in progress for snubbers. Regarding other equipment remaining in the drywell, CB&I Special Instructions for the pipe replacement work, SI-3, SI-5, SI-7 SI-6 (Draft), and SI-16 each contain instructions to provide adequate protection to surrounding equipment. These provisions are incorporated by references into detailed, job specific work instructions (i.e. travellers) with verification signatures required. The inspector reviewed a sampling of such travellers. Any incidental damage is to be reported, per the CB&I QA Manual, as a nonconformance, and followed up on the Nonconformance Control List. The inspector reviewed this list and to date, no instances of incidental damage had been reported. For some major equipment, such as recirculation pump motors, protective structures were included in the project design and incorporated into the CB&I erection drawings.

The inspector concluded that reasonable in-process measures to minimize incidental damage have been established. The inspector expressed concern however that, considering the job scope, there is still significant potential for some such damage, especially to cables and other environmentally-qualified equipment. For example, some problems have already occurred with metal chips falling into cable trays during pipe cutting. Damage which could jeopardize equipment operational environmental qualification would not necessarily be obvious at normal ambient conditions. Currently, PECO does not have a comprehensive verification program at the end of the work, to ensure that no unin- volved equipment was damaged or had its environmental qualification compromised. The lack of such a program is a weakness (277/84-22-08).

No violations were identified.

Except as noted above, the inspector found the licensee's administrative controls to be adequate.

9. Exit Meeting

The inspection team met with the licensee's representatives, denoted in paragraph 1, on July 27, 1984 to discuss the findings of this inspection. The licensee's representatives acknowledged the inspection findings.

At no time during the inspection was written material provided to the licensee.

ATTACHMENT 1

Documents Reviewed

Program Documents

- Engineering and Research Department (E&RD) Quality Assurance Plan, Volume I
- Peach Bottom Final Safety Analysis Report (FSAR), Appendix D
- FSAR Section 172B
- Peach Bottom Operational Quality Assurance Plan, Volume III
- CB&I QA Contract Handbook
- Project Interface Procedure Manual, Revision 2

Electric Production Procedures

- Administrative Procedure (A)-14, Plant Modifications, Revision 9
- A-26, Procedure for Corrective Maintenance, Revision 23
- Special Procedures (SP)-694, Chemical Decontamination of Recirculation, RHR and RWCU Systems, Revision 1
- SP-698, Hydraulic and Mechanical Snubber Removal and Installation, Revision 0
- SP-706, Refueling Floor/Pipe Replacement Overall Coordination Procedure, Revision 0
- QADP-5, Procedures for Performance of QA Division Audits, Revision 11
- Quality Control Instruction (QCI)-002, Inspection of Radwaste Packaging, Revision 0
- QCI-003, Inspection of Radwaste Shipping, Revision 1
- QCI-014, Monitoring of Activities Associated with the Recirculation System Piping Replacement, Revision 0

Engineering and Research Department Procedures (ERDP)

- ERDP-4.1, Procurement in Accordance with Existing Controls, Revision 5
- ERDP-4.4, Procurement with Specifications, Revision 4
- ERDP-7.1, Receipt Inspection and Storage, Revision 8

- ERDP-3.1, Procedure for Handling Q-Listed Modifications, Revision 4
- Construction Division (CD) 10.1, Certification of Quality Control Inspectors, Revision 3
- CD 10.1, Exhibit I, Certification of Qualification (Sampled for Current QC Inspectors)
- CD 10.1, Exhibit III, Evaluation of Construction Division QC Inspectors (Sampled for Current QC Inspectors)

Chicago Bridge and Iron

- SH-IN, Site Receiving and Storage for Nuclear Procured Item Supplied by Others, Revision 1
- CSGM-IN, Control of Site Generated Modifications for Resolution of Interferences, Revision 0
- SH-9X, Packaging, Shipping, Site Storage of Nuclear Product Items, Revision 2
- Special Instruction (SI)-1, General Rigging and Handling Instructions, Revision 3
- SI-2, Installation Dimensional Control, Revision 0
- SI-3, Field Removal of Loop A Recirculation Piping, RHR Suction and Return Piping, Revision 5
- SI-7, Field Removal and Installation of Loop-A RHR Head Spray Piping, Revision 3
- SI-8, Mock-up Demonstration Instructions, Revision 3
- SI-9, Approved Process Materials, Revision 3
- SI-14, Welder's Performance Qualification Test Instructions, Revision 1
- SI-16, Protection of Existing Containment Vessel and Related Components During Welding, Revision 1
- SI-17, Contract Material Control, Revision 1
- SI-18, Pipe Joint Fit-up Instructions, Revision 1
- SI-19, Control and Use of Tools and Equipment on Stainless Steel Materials, Revision 0

- ST-22, Jobsite Control of Erection (ER) Drawings and Contract Drawings, Revision 0
- ALARA Program Instructions (API)-4, Specific Instructions for Control and Use of CB&I Solid Rad Waste Facility, Revision 1

General Electric

- Procedure for Evaluating and Documenting Potential ALARA Mitigating Actions for Peach Bottom Atomic Power Station Unit 2 Recirculation and RHR Piping Replacement Program

Interferences - CSGM's

- CSGM*-1, Remove Replace Snubber SS-C-4 @ EL 155' Az 310°, MRF 2-84-04109
- CSGM-13, RHR Head Spray Snubbers @ Az 270° EL 181', MRF 2-84-04107
- CSGM-20, Electrical Instrumentation for SRV Valves SRV 71H, J & G, MRF 84-02785, 84-02786, 84-02774
- CSGM-22, Remove and Replace 1"φ N₂ Instrument Line @ Az 260° from Elevation 143'-0 to EL 136'-6, MRF 2-8403581, Traveller 103, ERR 1903
- CSGM-30, Pipe Support at Az 78° and El 138° for 1½"φ pipe System 23, MRF 2-8403724, Traveller 101, ERR 1912
- CSGM-34, Blockout Channels at El 161 Az 30°, 90° and 300°, MRF 2-8402832, ERR 1911
- CSGM-42, Pipe Support PS-117 and Pipe Guide PG-13 @ Az 264 and El 135'-0, MRF 2-8402851
- CSGM-48, Electrical Conduit @ Az 90 and El 154'-0, MRF 2-8403907, 08, 09, 10 and 11
- CSGM-53, Permanently Remove Pipe Guide @ Az 100° Elv. 155'-5, MRF 2-8402849
- CSGM-65, Pipe Guide for 1"φ Drain Line @ Az 110°, Elev 142'-0, MRF 2-8404321, ERR 1967
- Rigging Change Notices 1 through 9, and associated ERR's
- Temporary Attachment Reports 4, 8, 10, 12, 14, 16, 17 and 32

Specifications, Engineering Documents and Correspondence Associated W/ Mod 1278

- PECO Purchase Order (PO) ME 339045-N General Electric for Recirculation Pipe Replacement including Change Orders 1 through 4
- GE Proposal N.416-6546-HE2 Recirculation, Pipe Replacement With Changes
- GE Pipe Purchase Specification 23A1625, Revisions 1 and 2
- GE Purchase Order 205-83L204, Johnson Controls Inc., Revision 0
- GE Purchase Order 205-83L200, Taylor Forge, Revisions 0 and 1
- Bechtel Material Requisition and Specification, 1187-068-P313Q, Revision 1
- Bechtel Material Requisition, 11187-068-P377B, Revision 1
- GE Specification 23A4078, Thermal Insulation Purchase Specification, Revision 0
- PECO Purchase Order EC 359335-N, CB&I Pipe Replacement Services, Revision 1
- PECO Letter to NRC, Qualification of Inspection, Examination, Testing and Auditing Personnel, dated July 28, 1981
- PECO Letters, J. DeLong (PECO) to J. O'Rourke (PECO), Chemical Composition of Recirculation Piping, dated April 19 and May 17, 1984
- PECO Letter, Approval and Comments of GE Piping Specification
- PECO Letter, Authorization for Bechtel Pipe Replacement Services, dated July 15, 1983
- PECO Letter, Comments on Bechtel Piping Specification 1137P-313Q, dated August 23, 1983
- PECO Letters to Bechtel, Approval of Various Specifications, dated February 25, May 17 and June 25, 1984
- GE Safety Evaluation Report (SER), Peach Bottom Nuclear Power Station Temporary Waste Handling Building Radiological Specification/Evaluation, April 1984
- Peach Bottom Modification 1278 Engineering Work Letter, Revision 4, dated July 19, 1984

- NEDC-30500, DRF-B31-00093, Class II, April 1984, Piping Replacement to Improve Resistance to Intergranular Stress Corrosion Cracking (IGSCC), Safety Evaluation for Peach Bottom Unit 2
- ENC-48, February 13, 1984, GE Specification 23A4044, Revision 0, Letter C. L. Malfast (CB&I) to Ray Lebre (GE-NSO) with Comments (4)
- "Quality Control Measurements" for Cross/Tee Discharge Loop B, by GE-BWR PD-QC, July 21, 1981 (check on wall-thickness measurements)
- Appendix C Structural Analysis Results/ANS-17 Computer Program Output, Pages 11, 33, 403, 405, 162, GE Specification No. 23A4086, Revision 0
- Isometric Joint Diagram Loop A, Figure I1, Page 442 of GE Specification No. 23A4086, dated January 20, 1984 (3)
- GE Specification 23A4044, Revision 1, Recirculation and RHR System Piping Replacement
- Dimensional Verification Report #1-RHR Return Piping, Loop A (Existing Locations), by CB&I's QA Engineers, June 8, 1984, provides as-built dimensions for subject piping
- Safety Evaluation for Modification No. 1278 and 1367, Revision 2, PBAPS 2, by PECO (Med), June 7, 1984
- Design Input for Modification 1278 and 1367, by PECO E&R Department, Revision 0
- GE Drawing No. 112D3315, Revision 1, Reducing Cross Spool - Reactor Recirculation System
- CB&I Drawing ER-102, Revision 5, June 27, 1984, "General Rigging Arrangements for Loops A and B Recirculation and RHR Pipe Removal and Replacement"
- CB&I Drawing ER-121, Revision 1, July 18, 1984, "Lug Location Details for Removal Pieces"
- CB&I Drawing ER-303, Revision 6, July 14, 1984, "Decontamination Configuration for N2 Nozzles"
- CB&I Drawing ER-300, Revision 2, April 13, 1984, "Existing Recirculation Piping Isometric - Field Removal Cut Locations and Piece Marks"
- CB&I Drawing ER-20A, Revision 4, June 28, 1984, "Assembly Weights for Recirculation Piping"

- GE Drawing 796E929, Revision 2, 3 Sheets, "Installation Kit Recirculation Loop Piping Replacement", Sheet #1 shows dimensions for new piping
- PLG-84-0101, Letter P. A. Tutton (PECO) to R. L. Lebre (GE), June 7, 1984, GE Installation Specification 23A4044, Revision 1, RHR/Recirculation Piping Replacement, Modification No. 1278, transmits comments on specification by referencing other documents
- PLG-84-4, Letter A. R. Diederich (PECO) to R. L. Lebre (GE), January 27, 1984, Recirculation and RHR System Piping Replacement, Modification No. 1278, Installation Specification GE #23A4044, transmits comments on specification
- PLG-1457, PECO Audit of General Electric Company, San Jose, California, Audit No. 297, Letter R. A. Mulford to J. W. Millard (GE-San Jose), June 15, 1984
- Flow Diagram, Control of Modifications, by PECO, Draft March 1, 1984
- PLC-84-0003, RHR and Recirculation Pipe Replacement Modification No. 1278, Letter P. A. Tutton (PECO) to C. L. Halfast (CB&I), February 14, 1984
- Engineering Work Letter, Revision 3, Recirculation and RHR Systems Piping Replacement, Modification No. 1278, Letter T. P. Gotzis (PECO) to P. A. Tutton (PECO), May 21, 1984
- Construction Job Memorandum, Modification 1278, Recirculation and RHR Replacement, by PECO's E&R Department, Construction Division, May 5, 1984
- Maintenance Request Form (MRF), as printed out by PECO's new CHAMPS computer program, as an example of program implementation

Record Documents

- ALARA Reviews under API-2 Procedure from CB&I
 - AI-470, Remove NI Cap and Plug JTI
 - CA-120, Install Insulation
 - CB-080, General Design (Pre Decon)
 - CB-110, HP Support I/S DW Replacement
 - CB-140, Rigging and Lugs
 - CB-210, Support MO 43 and 53
 - CB-272, General Scaffolding
 - RW-002, Work In Rad Waste Building
 - CB-340, Cut and Cap RHR Line at N-13 A Penetrations "B" Loop RHR Return
 - CB-320, Cut and Cap N-1 Suction Nozzles

-- Audit Packages

- OP-268, Taylor Forge Engineering
- OP-265, General Electric Company
- OP-266, Bechtel Power Corporation
- AP-84-52, MEM-Diesel Maintenance
- CB&I-1984-1, CQA Nuclear Program - Peach Bottom BWR Recirculation Piping Replacement

-- QC Inspection Reports (QCIR)

- THG-84-0039, Housekeeping and Ignition Source Control
- THG-84-0040, Housekeeping and Ignition Source Control
- THG-84-0041, Housekeeping and Ignition Source Control
- THG-84-0042, Housekeeping and Ignition Source Control

-- QA/QC Personnel Qualification Records

- CB&I QA Superintendent
- Twelve EPD QA Auditors/Engineers
- Five E&R QA Engineers
- Eleven EPD QC Inspectors
- Three GE QC Inspectors

-- Radiation Work Permits

- 2-94-0587, Cut and Cap N-2 Nozzles and Associated Work
- 2-94-0552, Install Shielding on N-1 Nozzles and Elbows - External Shielding Only
- 2-01-0543, Master Survey RWP for Drywell Unit 2 - All Elevations
- 2-07-0529A, Install Shield Doors at N-2 Penetrations
- 2-94-0554, Put Insulation Back on N-2 Penetrations at 240°, 300° and 330° Az, 157 foot Elevation
- 2-94-0615A, Set Up Rigging, Rig Out of Drywell all N-2 Elbows and N-1 Spool Pieces and Associated Work
- 2-02-0485, Perform GE In-Vessel Mitigation Measures and Related Work includes MRFs #84-02833, 02863, 02861, 02847 and 03057

-- Detailed Monitoring Checklists (DMC)

- DMC-4.1, Rad Waste Shipping (3/84)
- DMC-4.2, Rad Waste Packaging and Storage (3/84)
- DMC-4.3, Rad Waste Solidification (4/3/84)
- DMC-4.4, RWP/ALARA (6/22/84)
- DMC-8.2, Radiation Protection (7/17/84)
- DMC-8.3a, Cutting Procedure Plasma Arc (7/17/84)
- DMC-8.3b, Cutting Procedure for Machine Cutting (7/17/84)
- DMC-8.3c, Abrasing Cutting Procedure (7/18/84)

- DMC-8.5, Field Removal of Existing Loop A Recirculation Piping and RHR Suction and Return Piping (7/12/84)
 - DMC-8.13, Recirculating System Decontamination (7/17/84)
 - DMC-8.14, Install Recirculation and RHR System Piping
 - DMC-5.2, Plant Fire Protection
 - DMC-5.1, Ignition Source Control
 - DMC-3.1, Housekeeping
 - DMC-8.12, Field Removal of Existing and Installation of New Loop A RHR Head Spray Piping
- Draft Charter for ALARA Committee of the Nuclear Review Board (5/21/84) (Corporate ALARA Committee for PECO)
- ALARA Program Status Reports and ALARA Weekly Reports since April 29, 1984 (through report dated July 17, 1984)
- Training and Qualification Records for 3 CB&I ALARA Engineers and 8 Health Physics Technicians
- Radiation/Contamination Surveys for each RWP listed above
- Skin and Clothing Contamination Records from April 1, 1984 through July 26, 1984
- Deficiency Reports (A-86) Relating to Drywell Work from May to July 25, 1984
- Deficiency Reports Associated with CB&I Procedure API-2
- Maintenance Request Forms, Associated with Modification 1275
- Blocking Permits
- 2-84-136, Unit 2 Reactor Vessel
 - 2-02C8402848, Pipe Cutting and Capping
 - 2-10-C8402853, Head Spray Piping
 - 2-84-134, Dry Well Acetylene Usage
- Licensee Event Report 2-84-11, July 9, 1984, Acetylene Leak in Drywell on June 8, 1984
- QA 1984/1985 Audit Schedules