

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-277/87-18  
50-278/87-18

Docket Nos. 50-277/50-278

License Nos. DPR-44/DPR-56 Priority - Category C

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

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

Inspection At: Philadelphia, Pennsylvania

Inspection Conducted: June 15-19, 1987

Inspectors: *R. J. Paolino* 10-27-87  
R. J. Paolino, Lead Reactor Engineer date

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Plant Systems Section, EB/DRS

Inspection Summary: Inspection on June 15-19, 1987, Combined Inspection Report  
Nos. 50-277/87-18 and 50-278/87-18)

Areas Inspected: Special, announced inspection to review the licensee's implementation of an environmental qualification (EQ) program for establishing and maintaining the qualification of electrical equipment important to safety within the scope of 10 CFR 50.49.

Results: No violations were identified.

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<u>Unresolved Items</u>	<u>Paragraph</u>	50-277/50-278 <u>Item No.</u>
1. Recognition of desired EQ instrument indications for control room operators	5.0	87-18-01
2. Procurement controls for upgrading of replacement components not evident	6.0	87-18-02
3. Use of heat shrink tube splice over braided cable	12.0	87-18-03
4. Generic file deficiencies	14.0	87-18-04
5. Upgrade Rockbestos file to include new data	14.1.1	87-18-05
6. Gulf Atomic radiation monitor does not meet Regulatory Guide 1.97 accuracy requirements	14.1.4	87-18-06
7. Qualification of wire crimps in Limitorque valve actuators.	15.0	87-18-07
8. Management approval of EQ document files.	13.0	87-18-08

## DETAILS

### 1. Persons Contacted

#### 1.1 Philadelphia Electric Company (PECO)

W. M. Alden, Licensing Support  
J. Basilio, Senior Licensing Engineer  
W. C. Birely, Senior Licensing Engineer  
\* W. W. Bowers, Supervising Engineer  
\* W. J. Boyer, Supervising Engineer  
\* H. J. Clune, Engineer  
K. Cutler, I & C Engineer  
J. Davenport, Maintenance Supervisor  
\* G. F. Dawson, Senior Engineer - Maintenance  
\* A. B. Donell, QA Site Supervisor  
J. Evan, Project Branch Chief E & R QA  
J. J. Ferencsik, Engineer-In-Charge  
C. Fletcher, Senior Engineer  
\* R. J. Lees, Assistant Chief Electrical Engineer  
J. F. Leonard, QA Engineer  
J. Moore, Jr., Engineer  
J. McElwain, QC Supervisor  
\* P. K. Pavlides, Director - QA  
\* R. B. Rock, Electrical Engineer - Nuclear Service  
\* J. W. Rogenmuser, Station EQ Coordinator  
D. C. Smith, Superintendent - OPS  
R. J. Smith, Senior Engineer  
D. M. Spamer, Engineer - Nuclear Service  
\* D. J. Thompson, Jr., Nuclear Service Group Leader  
\* M. G. Wiwel, Electrical Engineer - Nuclear Service

#### 1.2 Bechtel Power Corporation

B. Dilodare, EQ Engineering Supervisor  
D. Klein, Mechanical Engineering Supervisor  
T. Veale, Engineer-Maintenance

#### 1.3 Consultants

R. D. Condello, DiBenedetto Associates, Inc.  
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#### 1.4 U. S. Nuclear Regulatory Commission

\* C. J. Anderson, Chief, Plant Systems Section, EB/DRS, RI  
\* L. Bettenhausen, Acting Deputy Director, DRS, RI  
\* U. Potapovs, Chief, Special Projects Section, HQ

\* Denotes personnel present at exit meeting of June 19, 1987 at the PECO corporate offices.



## 2. Purpose

The purpose of this inspection was to review the licensee's implementation of a program to meet the requirements of 10 CFR 50.49 for the Peach Bottom Atomic Power Station Units 2 and 3 and their implementation of corrective action commitments resulting from deficiencies identified in Franklin Research Center Technical Evaluation Report.

## 3. Background

Based on the Technical Evaluation Report (TER) issued by the Franklin Research Center (FRC) on August 3, 1982, a Safety Evaluation Report was issued by NRC to the Philadelphia Electric Company on December 20, 1982.

The final rule on environmental qualification of electric equipment important to safety for nuclear power plants become effective on February 22, 1983. This rule, Section 50.49 of 10 CFR 50, specifies the requirements of electrical equipment important to safety located in a harsh environment. In accordance with this rule, equipment at Peach Bottom Units 2 and 3 may be qualified to the criteria specified in either the DOR Guidelines or NUREG-0588, except for replacement equipment. Replacement equipment installed subsequent to February 22, 1983 must be qualified in accordance with the provisions of 10 CFR 50.49, using the guidance of Regulatory Guide 1.89 unless there are sound reasons to the contrary.

On December 5, 1983, a meeting was held to discuss the licensee's proposed method to resolve the EQ deficiencies identified in the December 20, 1982 SER and the August 3, 1982 TER. The majority of the deficiencies identified were documentation, similarity, aging, qualified life and replacement schedule. The minutes of this meeting and the proposed method of resolution for each of the EQ deficiencies were documented in the licensee's February 21 and June 13, 1984 submittal to the NRC. The June 13, 1984 submittal included the licensee's justification for continued operation, addressing each item for which environmental qualification was not yet completed.

Based on the review and evaluation of the above data, the NRC staff concluded, in a letter to the licensee dated October 18, 1984, that the licensee's EQ program complies with the requirements of 10 CFR 50.49 and that continued operation until completion of the licensee's EQ program will not present undue risk to the public health and safety.

## 4. EQ Program

The NRC inspectors examined the implementation and adequacy of the licensee's EQ program for establishing and maintaining the qualification of electrical equipment in compliance with the requirements of 10 CFR 50.49. The licensee's EQ program encompasses electrical equipment important to



safety which has the potential of being subjected to a harsh environment. Equipment important to safety as defined in 10 CFR 50.49 includes both safety-related and non-safety-related equipment plus certain post-accident monitoring equipment. Specifically included, are those systems required to achieve or support:

- Emergency reactor shutdown
- Containment isolation
- Reactor core cooling
- Containment heat removal
- Core residual heat removal
- Prevention of significant release of radioactive material to the environment.

The licensee's program for establishing and maintaining qualification of electrical equipment within the scope of 10 CFR 50.49 is defined in the following licensee documents:

- PBAPS Environmental Qualification Report
- PBAPS Quality Assurance Plan
- ERDP 3.1, Procedure for Handling Modifications
- ERDP 3.2, Procedure for Maintaining, Amending and Revising the Project Q-List
- ERDP 3.3, Procedure for Performance of Safety Evaluation
- ERDP 3.4, Procedure for Design Control
- ERDP 4.4, Procedure for Control of Safety - Related Equipment
- A-5, Administrative Procedure - Safety Evaluation
- A-10, Administrative Procedure - Equipment Location Code List, Station Policy
- A-14, Administrative Procedure - Plant Modifications
- A-25, Administrative Procedure - Preventive Maintenance program
- A-27, Administrative Procedure - Material Control
- A-41, Administrative Procedure - Control of Safety Related Equipment

These documents were reviewed to evaluate the procedural methods and their effectiveness for:

- Requiring all equipment that is located in a harsh environment and is within the scope of 10 CFR 50.49 be included on the Master List of electrical equipment requiring qualification.
- Controlling the generation, maintenance and distribution of the EQ Master List.
- Defining and differentiating between a mild and harsh environment.
- Determining harsh environmental conditions at the equipment location through engineering analysis and evaluation.
- Establishing and maintaining a file of plant conditions.
- Establishing, evaluating and maintaining EQ documentation.
- Training of personnel in the environmental qualification of equipment.

- Controlling plant modifications such as installations of new and replacement equipment and providing for updating replacement equipment in accordance with 10 CFR 50.49 criteria.

An Equipment Qualification Review Record (EQRR) is completed for such electrical components important-to-safety requiring EQ. The Electrical Equipment - Nuclear Support Group (EE-NSG) is responsible for reviews and revisions to the EQ documentation. In conjunction with the maintenance programs at the station, the EE-NSG is also responsible for:

- Reviewing maintenance procedures, significant component failures and maintenance concerns, including recommendations for corrective action with potential EQ impact as determined by the Engineer-Maintenance and/or Engineer-Technical.
- Providing recommendations to the Engineer-Maintenance and the Engineer-Technical when called upon in regards to EQ concerns.
- Reviewing procedures for surveillance test, modification acceptance tests and any special tests with potential EQ impact as determined by the preparer.

Based on the above, the inspection team concluded that the licensee has implemented a program to meet the requirements of 10 CFR 50.49, although some deficiencies were identified which are discussed in paragraph 14.0 of this report.

#### 5. EQ Master List

The licensee is required to establish and maintain a current list of equipment which must be qualified under 10 CFR 50.49. The licensee has established a comprehensive, systematic program for identifying safety related electrical equipment required to be environmentally qualified. Safety-related equipment is defined as that equipment which is relied upon to remain functional during and following design basis events to ensure (a) integrity of the reactor coolant pressure boundary, (b) capability to shut down the reactor and maintain it in a safe shutdown condition, and (c) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines of 10 CFR 100. Also identified as important to safety is non-safety-related equipment located in a potentially harsh environment and whose failure under postulated environmental conditions could prevent the satisfactory accomplishment of the required safety functions by the safety-related equipment.

Equipment required for display information and to perform post-accident sampling and monitoring per Regulatory Guide 1.97 have been included to the extent required therein.



The inspection team reviewed the EQ Master List dated May 30, 1987, selecting the following documents and drawings from the High Pressure Coolant Injection System to verify completeness of the EQ Master List.

- Quality assurance Program No. M-865, Revision 13
- Quality Assurance Program No. M-866, Revision 11
- Piping and Instrumentation Diagram No. M-365, Revision 6
- Piping and Instrumentation Diagram No. M-366, Revision 22

The inspection team identified several components which were on the drawing but not on the EQ Master List. However, the licensee was able to provide an acceptable justification for the omissions.

During this review, the inspection team noted that the emergency procedures had been enhanced as symptom oriented procedures. The procedures did not specifically address the use of particular instruments for monitoring each plant parameter. The operator is required to identify the reliable instrumentation under the given accident conditions. However, the control room personnel were unable to identify the available instrumentation that can provide reliable indication during an accident environment.

The licensee committed to train the operators to recognize the desired indications from the environmentally qualified instruments and identify these instruments in the control room before power operation at Peach Bottom Units 2 and 3. This item is unresolved (50-277/87-18-01, 50-278/87-18-01).

6. EQ Procurement Control

All replacements/procurements dealing with components other than in kind replacements are processed through the EQ group as a modification. The in-kind replacement/procurement program is controlled through Procedure A-27, entitled "Procedure For Material Control System."

The inspector reviewed the implementation of this procedure by reviewing the following randomly selected purchase orders:

- BW-217662, Limitorque Parts
- BW-217743, Limitorque Parts
- BW-217348, Conduit Seals
- BW-219301, Anchor Darling Valve Parts

The original purchase requirements, including EQ requirements were invoiced in these purchase orders. No discrepancies were observed. However, the site procurement program does not address the upgrade requirements of 10 CFR 50.49, paragraph (k)(1). The Peach Bottom station has several EQ components qualified to DOR Guidelines/NUREG-0588, Category II. The information provided to the procurement department does not indicate if the EQ component is



Category I or II. Lack of such identification could cause procurements without a review for upgrade. The licensee is required to upgrade such Category II components to Category I during replacements unless there are sound reasons to the contrary. During a telephone conversation on September 22, 1987, the licensee has committed to review the past EQ replacements for the replacement requirements before restart. This is an unresolved item pending NRC review of licensee evaluation of the past replacements and their program to upgrade replacement equipment to Category I requirements (50-277/87-18-02; 50-278/87-18-02).

7. EQ Modification Program

Design Control Procedure 3.4 for the Engineering and Research Department provides the necessary controls and responsibilities for design and review of modifications. The responsible engineer prepares the design input and forwards to the interfacing groups including EQ group for input and independent verification. Any revisions to the design input affecting the EQ components are forwarded to the EQ group again for review. The inspection team reviewed the following design modifications to confirm compliance with established procedures:

- MOD-2084, RHR pump Minimum Flow Valve
- MOD-1600, Modification to RCIC Logic
- MOD-1583, Replacement of Relays
- MOD-1316, ASCO Valves
- MOD-1364, ITT Differential Pressure Switches
- MOD-893B, Rosemount 1153 Transmitters

The licensee's procedure A-14 on plant modifications provides the necessary controls and responsibilities for modifications. All modifications that impact environmentally qualified equipment are reviewed by the station EQ coordinator before issue.

The inspection team reviewed modification packages 86-057, 85-14, 87-019 and 87-020 and did not observe any EQ discrepancies.

Within the scope of this inspection, no deficiencies were identified.

8. EQ Maintenance Program

The inspection team reviewed the EQ maintenance program to determine the licensee's provisions for maintaining the status of equipment qualified to 10 CFR 50.49. Section 7 of Peach Bottom procedure A-26A, revision 5 establishes the requirements for EQ maintenance.

The required maintenance for qualified equipment is identified in the System Component Evaluation Work (SCEW) sheet of the equipment. This is forwarded from the licensee's Electrical Engineering group to the maintenance coordinator at the site for processing. There are two groups at the site performing the maintenance activities, the maintenance group for

electrical EQ items (such as pump motors and valve motors) and Instrumentation and Control (I&C) group for instruments (such as transmitters and indicators). These two groups operate independently. The maintenance coordinator forwards the maintenance requirements to the appropriate maintenance group for implementation.

The licensee's EQ maintenance program is part of their regular maintenance program. The implementation of this program is prescribed in two procedures: A-25, Preventive Maintenance Program, Revision 4, dated May 27, 1987 for electrical equipment and A-25A, Instrument Preventive Maintenance Program, Revision 0, dated November 17, 1986, for instruments.

The maintenance activities are scheduled by the maintenance engineer of each group, and performed by the craftsmen under the directions of the foremen. There are approximately 45 I&C technicians (craftsmen) and about 300 maintenance craftsmen (for both electrical and mechanical maintenance). The maintenance activities are monitored by the CHAMPS (Computerized History and Management Planning System). For each maintenance activity, the following information is stored in the computer memory:

- Name of the equipment,
- Brief description of the activity,
- Whether a maintenance procedure is required to perform the activity,
- Status of the activity,
- Next due date and last done date of the activity, and
- The Maintenance Request Form (MRF) number for the activity performed which can be retrieved for audit purpose.

The inspector randomly selected the records of the following MRFs for review.

- MRF 8861091, "2D" core spray pump section valve from Torus, dated May 19, 1987.
- MRF 8661081, "2B" dated May 19, 1987.
- MRF 8661284, "2C" 02-part sample downstream isolation valve, dated March 15, 1987.
- MRF 8661567, "2E" core system pump room fan coil unit, dated May 2, 1987.
- MRF 8660134, Unit 2 standby Gas Fan "A" Exhaust isolation valve, dated May 12, 1987.

Within the scope of this review, no deficiencies were identified.

#### 9. EQ Training

The general training requirements for personnel are prescribed in Volume 3, Section 3 of Peach Bottom QA plan. No dedicated EQ training requirements are prescribed in their EQ program procedure. The following describes the EQ training received by their EQ personnel.

Two key personnel of the licensee's EQ engineering group completed a Wyle seminar, Qualification of Safety Related Equipment for Nuclear Station and a Drexel/IEEE seminar, Qualification of Safety Related Equipment for Nuclear Station.

Plant site personnel (including engineers, foremen, craftsmen and contracting personnel) received 2-hour in house EQ training. Eight training sessions were conducted on April 28 and 29, 1987. These training sessions were to familiarize the site personnel with the Peach Bottom EQ program. In addition, the plant site construction personnel performing the installation of Raychem cable splices and Patel conduit seals received the following additional training:

- Patel conduit seals, conducted on March 18, and May 18, 1987 (14 craftsmen and a QC inspector attended this training).
- Raychem cable splices, conducted on February 26, 1987 (23 craftsmen and a QC inspector attended this training).
- Replacement of SMB-000 torque switch, conducted on August 19, 1986 (29 craftsmen attended this training).

The inspector reviewed the training records and did not identify any deficiencies.

#### 10. IE Information Notices and Bulletins

The licensee's administrative controls for satisfying the requirements of IE Information Notices (IN) and Bulletins are prescribed in Licensing Section Procedure LS-A-1, Administrative Procedure for Review, Disposition and Monitoring of Response to NRC IE Bulletin, IE Information Notices and Division of Licensing Generic Letters, Revision 1, dated May 20, 1986. Implementation of these requirements is described in Procedure LS-I-6, Implementing Procedure for Review, Disposition and Monitoring NRC IE Bulletin IE Information Notices and Division of Licensing Generic Letters, Revision 1, dated February 24, 1986.

The special project group of the Licensing Section is responsible for the first screening of the incoming Bulletins and Information Notices. Those affecting the EQ program are transmitted from the Licensing Section to the Nuclear Service Group through the Chief Electrical Engineer. The Nuclear Service Group Supervisor performs a thorough review and evaluation against the appropriate EQ file, to determine if modification to the equipment or more qualification documents are required for the EQ file. The disposition or response (if required) is transmitted back to the Licensing Section for processing. However, the Nuclear Service Group keeps the records of evaluation and disposition.



The inspector reviewed the records for processing the following IE Information Notices:

- IE IN 87-16, Degradation of Static-O-Ring Pressure Switches, dated April 13, 1987.
- IE IN 85-47, Potential Effect of line - induced vibration on certain Target Rock Solenoid operated valves, dated June 27, 1985.
- IE IN 85-93, Westinghouse Type DS circuit breakers, Potential failure of Electric Closing Feature because of Broken Spring release latch lever, dated April 30, 1986.

Within the scope of this review, no deficiencies were identified.

11. Information Notice 86-03

The licensee reviewed the applicability of IN 86-03 regarding potential deficiencies in environmental qualification of Limitorque motor valve operator (MOV) wiring. In accordance with the vendor (Limitorque) recommendations, the licensee initiated a limited inspection to identify the intermittent gear frame material, the color of the limit switches and torque switches, and the type of wire on the limit switch blocks. Based on the Limitorque correspondence and the inspection verification, the licensee concluded that the MOVs were fully qualified. However, on August 9, 1986, the licensee's Electric Production personnel inspected 4 additional MOVs and discovered that the jumper wires could not positively be identified in order to establish their environmental qualification. The licensee instituted Modification 2062 and accordingly, all jumper wiring between the torque switches and the limit switches was replaced as required with environmentally qualified wiring carrying positive identification. Eighty three (83) such MOVs per unit (i.e., PBAPS Units 2 and 3) were rewired per Modification 2062.

The licensee evaluated the environmental qualification status of the replaced MOVs jumper wiring and concluded that the original wiring could have performed its intended safety function for the postulated Design Basis Event (DBE) condition.

The inspector reviewed the Modification 2062 package, including related Maintenance Request Forms (MRFs), Engineering Work Letter (EWL), safety evaluation, and procurement documentation. The modification work was inspected and verified for adequacy by the field construction QC personnel in accordance with the inspection checklist CD 5-3-II. Upon satisfactory operation, verification and post-modification testing, the equipment was accepted by Operation prior to its return to service. The inspector also verified that the personnel performing the quality control activities associated with the Modification 2062 were properly trained and indoctrinated. The quality assurance records and documentation were readily

traceable through the licensee's Nuclear Record Management System (NRMS) for review and verification of the modification activities.

A physical inspection of the Limitorque jumper wiring was also conducted to verify the licensee's compliance to IN 86-03. The actuator enclosures of MOV MO-2-10-018 (inside drywell) and MOVs MO-8-14-005D and MO-2-14-007B (outside containment) were removed and an examination performed to determine if the Brand Rex SIS new jumper wiring was positively identifiable, and met the environmental qualification requirements.

No violations were identified.

12. Information Notice 86-53

In response to IN 86-53, the licensee reviewed the Peach Bottom Atomic Power Station Units 2 and 3 Raychem heat shrink tubing application. The licensee had established installation procedure E-1317, which provided for the installation of the Raychem heat shrink tubing by the field construction. Accordingly, each Q-listed Raychem splice was QC inspected before and after the heat shrink was applied. The licensee's EQ File-38 had analyzed and established the environmental qualification of the splices based on a Franklin Research Center qualification test report. A training and information session for the licensee's QC and field personnel was conducted by a Raychem representative to emphasize familiarity and methodology for preparation and inspection of Raychem heat shrink splices.

A Physical inspection of the Raychem heat shrink splices was conducted to verify the adequacy of the licensee's compliance to IN 86-53. The inspection team determined that the cable splice sealing lengths, sizes and configuration for the inspected penetration 2N105A, Cable No. ZA 2B36445; Motor operated valves MO-2-020-29B, Cable No. ZA 2B3644S; MO-2-12-015, Cable No. ZA2B3673B; MO-2-10-018, Cable No. ZA2B3613T met the environmental qualification requirements. However, during the physical inspection of the Standby Gas Treatment System 480V fan motor power cable, the inspectors discovered that the Raychem heat shrink tubing was installed over the braided cable ZB2b6043A. Inspection form MOD 832 and motor leads splice application procedure drawing No. E-1317, Revision 33, do not address removal of unacceptable braid on the cable. The licensee's response to IN 86-53 did not include verifying quality attributes such as splices on braided cables.

During the inspection, the licensee confirmed that the subject motor leads had impregnated braid which was acceptable for the application. In order to preclude the potential of other splices on unimpregnated braids, the licensee has committed to inspect a suitable sample of splices involving braided cables and complete the required corrective actions. This item is unresolved pending NRC review of licensee evaluation and corrective actions. (50-277/87-18-03; 50-278/87-18-03)

13. QA/QC Interfaces

The licensee's E&R QA conducted an audit, OP-304, during January 2 through 8, 1985 and evaluated the electrical and mechanical engineering compliance with the requirements of the PBAPS QA plan and implementing procedures for performing equipment qualification activities. The audit identified two minor nonconformances: (1) the Component Evaluation Work Sheet (CEWS) for RHR pump data did not agree with the field verification sheet, and (2) Procedure EE-SES-1 required documented reasons for not completing field verification sheets for all equipment in the qualification package. The cognizant audited organization implemented the corrective action in a timely manner to resolve these deficiencies.

Another E&R QA audit, D-088, conducted during July 14 through 21, 1986, reviewed and evaluated the adequacy of the PBAPS environmental qualification records and documentation. The audit included the review of the licensee's environmental qualification program to demonstrate compliance with the applicable regulatory requirements established in 10 CFR 50.49 and the facility FSAR Section 7.19. The audit also verified the adequacy and effectiveness of the EQ group review of the PBAPS EQ-related equipment modification and installation. No EQ-related deficiencies were identified.

Nuclear Operation QA also conducted an audit, AC85-52PR, during November 25 through December 20, 1985, to assess the licensee's compliance to EQ-related regulatory requirements. Through the review of the EQ packages, including reports and records, the implementing program, and EQ-related equipment modification and maintenance, the audit verified the licensee's compliance to 10 CFR 50.49 requirements. The NRC concerns discussed in the associated IE Bulletins and Information Notices were adequately addressed.

The inspectors discussed with the licensee representatives the adequacy of the audit plan, audit schedule, training and qualification of the auditors, and the scope of the audits. These audits did not review the training aspect of the individuals performing quality control activities of EQ file preparation, procurement and maintenance of the environmentally qualified equipment. Nor did they address the EQ-related procurement, and the procedural requirements to establish approval authority for the EQ packages. In reviewing the EQ packages (files) there was no evidence to indicate licensee authorized personnel reviewed and approved the EQ package. The only signatures evident were that of the preparer and the reviewer with both individuals alternating signatures as preparer and reviewer. The licensee representatives stated that although the scope did not address these attributes specifically for EQ program, they were covered in the generalized QA audit plan. The inspection team did not identify any hardware problems resulting from the licensee's failure to establish and implement an authorized approval signature for the EQ packages.

This item is unresolved pending NRC review of licensee corrective action (50-277/87-18-08; 50-288/87-18-08).



14. Equipment/Component Environmental Qualification File

The licensee's EQ files were examined to verify the qualified status of the safety related Class 1E equipment within the scope of 10 CFR 50.49. The review consisted of comparing plant service conditions with qualification test conditions and verification of the basis for these conditions. The inspectors selectively reviewed areas such as required operating time compared to the duration of time the equipment has been demonstrated to be qualified; similarity of tested equipment to that installed in the plant (e.g. insulation class, component materials, tested configuration versus installed configuration and documentation for both); evaluation of adequacy of test conditions; aging calculations for qualified life and replacement interval determination; effects of decreases in insulation resistance on equipment performance; adequacy of demonstrated equipment accuracy; evaluation of anomalies; and applicability of EQ problems reported in 1E Information Notices/Bulletins and their resolution.

The inspectors sampled 30 EQ files. The EQ files selected, covered such areas as electrical cables, Limitorque motor operated valves, pump motors, solenoid operated valves, cable splices, radiation detectors and pressure/level transmitters. These files contain documentation utilized by the licensee to provide the basis for demonstrating that the equipment type is qualified, the equipment type being a specific component or equipment, designated by the manufacturer and model number, which is representative of all identical equipment/components in a plant area exposed to the same or less severe environmental service conditions.

Based on a review of the EQ files, the inspectors determined that the licensee had not established adequate guidelines for controlling the file content. The files inspected contained similar deficiencies consisting of: 1) Inadequate and/or missing performance/acceptance criteria; 2) basis for qualification not stated (DOR Guidelines or NUREG-0588 Cat. II); 3) no positive statement that component/equipment was qualified; and, 4) references to qualification documents not clearly defined. However, the inadequate guidelines resulted in only a few deficient files.

Based on the EQ file audit findings this item was determined to be unresolved pending NRC review and evaluation of licensee corrective actions to upgrade the EQ files and provide adequate guidelines for EQ file content. (50-277/87-18-04; 50-278/87-18-04).

Specific deficiencies of the type noted above are discussed in Section 14.1 below.

#### 14.1 Specific File Deficiencies

##### 14.1.1 Rockbestos Coaxial Cables (EQ File No. 43)

The SCEW sheets identified the cables to be qualified as RSS-6-104 and RSS-6-110. However, the tested cables were identified in Rockbestos report QR-6802 as RSS-6-104/LE and RSS-6-110/LE respectively. RSS-6-104 and RSS-6-110 are Rockbestos' first generation cables and have not been qualified. The licensee stated that the cables installed at Peach Bottom are Rockbestos' second generation cables. RSS-6-104/LD and RSS-6-110/LD. RSS-6-104/LE and RSS-6-110/LE are Rockbestos third generation cable which were tested in the qualification test. The licensee later provided the inspectors with a Rockbestos document entitled "Analysis of Similarity Between Coaxial Insulation Types Polymer LD and Polymer LE," dated July 15, 1986. This document justifies the similarity between the installed cables and the tested cables. However, the EQ file did not contain this information. This item is unresolved pending NRC's review of licensee's corrective action on: 1) revising the SCEW sheet to show that the cables to be qualified match the cables installed; and, 2) similarity analysis between the cables installed and the cables tested is included in the EQ file (50-277/87-18-05, 50-278/87-18-05).

##### 14.1.2 Patel Conduit Seal (EQ File No. 47)

Qualification of the Patel Conduit Seal was based on the Wyle Laboratory Test Report PEI-TR-841203-02 and the licensee's analysis which qualified the conduit seal for 40 years service life plus 180 days post DBA condition in PBAPS Rooms 202 and 204. The inspector noted that the test report, page V, incorrectly referenced "Assembly Instructions in Appendix". These instructions are contained in Section 7 of the EQ file in Patel Drawing No. A-N-841206-08. Titled "Maintenance Records and Drawings". The licensee has agreed to correct the EQ file.

The licensee's site construction personnel conducted an installation demonstration for the conduit seal in accordance with the construction division procedure and inspection check list CD 5.3-1. The demonstration supplemented the physical inspection of the conduit seals for Rosemount transmitters LT-2-02-3-0720, Reactor Water Level, and DPT-2-02-116A, Steam Line Flow to Turbine. The site construction personnel had also conducted a training program for installation of the Patel conduit seal for the craft and site QC personnel. The documentation adequately supported the environmental qualification of the Patel conduit seal.



14.1.3 Namco Limit Switches (EQ File No. 23)

Qualification for the NAMCO Limit Switches was based on an ACME Cleveland vintage test report (1979) and the licensee's evaluation which qualifies these switches for 40 years plus 24 hours post-DBA condition. However, the Limit Switches at Peach Bottom Units 2 and 3 had undergone maintenance within the last two years requiring replacement of switch component parts for which the qualification status had not been addressed in the EQ file.

The licensee provided readily available documentation to support that the replacement parts used for maintenance were better than or equal to the original parts. The review of the EQ file and the limit switch maintenance documents assured that the equipment is qualified to perform its intended safety function for the postulated environmental conditions, including normal and accident conditions. The licensee agreed to include the data in the EQ file.

14.1.4 General Atomic High Range Radiation Monitor (EQ File No. 27)

The inspector reviewed the General Atomic High-Range Radiation Monitor EQ file for model RD-23. Qualification was based on the DOR Guidelines. In reviewing the EQ file the inspector noted that a licensee Part 21 report identified a potential deficiency in High-Range Radiation Monitor due to the degraded insulation resistance (IR) characteristics of the Rockbestos coaxial cable RSS-6-104. When the coaxial cable is exposed to high temperature in a LOCA environment, the cable dielectric insulation resistance decreases causing the monitor to not respond within the accuracy stated in Regulatory Guide 1.97. The analysis performed by the licensee during this inspection indicates the monitor does not meet the accuracy requirements of the Regulatory Guide 1.97. However, the monitor will function in a LOCA environment. This item is unresolved pending NRC review of licensee evaluation and corrective action. It was noted that this R.G. 1.97 item is not currently required to be in compliance with 10 CFR 50.49. (50-277/87-18-06; 50-278/87-18-06)

15.0 Plant Physical Inspection of Electrical Equipment

The plant physical inspection consisted of an examination of safety related electrical equipment selected from the EQ Master List. The equipment selected was located and installed inside and outside containment and consisted of limitorque motor operated valves, transmitters, solenoid valves, radiation detectors and electrical splices. The Inspectors examined characteristics such as mounting configuration, orientation, connection interfaces, model/type, bend radius, moisture seals, environment accessibility, cleanliness and physical condition.

During the course of physical inspection of Limitorque valve actuators in the Reactor Building, the inspectors observed 6 wire crimps inside two actuator housings (3 in MO-2-14-005D and 3 in MO-2-14-007B). The licensee later identified that these actuators are dual voltage motors and the crimps



are used to terminate the voltage leads not being used. The licensee claimed that these crimps were included in the Limitorque EQ test. They provided the inspectors with a vendor's document which stated that these crimps can be any one of the following:

- Thomas and Betts: RB873
- Burndy: YAE-14N53
- Hallingsworth: XSS-20826

The licensee could not identify which type was installed at Peach Bottom.

Following the inspection, the licensee transmitted to NRC additional justification for the qualification of these crimps, stating that the locations where the crimps were installed are relatively mild (maximum temperature of 118°F) and the required operating time is very short (32 seconds maximum post LOCA). The licensee also included in their transmittal portions of a document prepared by Nuclear Utility Group on Environmental Qualification, entitled "Clarification of Information Related to the Environmental Qualification of Limitorque Motorized Valve Operators" dated April 1986. Page 29 of this document contains a statement that "Limitorque has included the 3 terminal - lug types in its B0119 testing". Although the test configurations of the wire crimps were not known (i.e. whether they were touching the metals ground during the test), based on the fact that these crimps are all located in relatively mild environments (except radiation), the inspectors considered this response acceptable. The licensee agreed to incorporate this evaluation into the EQ file (including locations of all dual voltage motor). This item is unresolved pending NRC verification of the inclusion of the evaluation in the EQ file (50-277/87-18-07, 50-278/87-18-07).

#### 16.0 Unresolved Items

Unresolved items are matters which require more information in order to ascertain whether they are acceptable items or violations. Unresolved items are discussed in Details, paragraph 5.0, 6.0, 12.0, 14.0, 14.1.1, 14.1.4 and 15.0

#### 17.0 Exit Meeting

The inspectors met with licensee corporate and site personnel (denoted in Details, Paragraph 1) at the conclusion of the inspection on June 18, 1987 and June 19, 1987 at the plant site and the corporate office, respectively. The inspectors summarized the scope of the inspection and the inspection findings at that time.

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