

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-353/90-26

Docket No. 50-353

License No. NPF-85

Licensee: Philadelphia Electric Company  
Nuclear Group Headquarters  
Correspondence Control Desk  
P. O. Box 195  
Wayne, Pennsylvania 19087-0195

Facility Name: Limerick Generating Station

Inspection At: Wayne, Pennsylvania

Inspection Conducted: November 26-30, 1990

Inspector:	<u>Leonard Cheung</u>	<u>1/25/91</u>
	Leonard Cheung, Senior Reactor Engineer	date
	<u>Leonard Cheung for</u>	<u>1/25/91</u>
	Ralph Paolino, Senior Reactor Engineer	date
	<u>Leonard Cheung for</u>	<u>1/25/91</u>
	G. Rangarao, Reactor Engineer	date
	<u>Leonard Cheung for</u>	<u>1/25/91</u>
	G. Garten, Electrical Engineer	date
Approved by:	<u>C. J. Anderson</u>	<u>1/25/91</u>
	C. J. Anderson, Chief, Plant System Section, EB/DRS	date

Inspection Summary: Inspection of November 26-30, 1990, (Inspection  
Report No. 50-353/90-26)

Areas Inspected: Special, announced inspection to review the licensee's implementation of a program for establishing and maintaining the qualification of electrical equipment within the scope of 10 CFR 50.49.

Results: Based on a review of the results of this inspection, the inspectors determined that the licensee has implemented a program to meet the requirements of CFR 50.49. No violations were identified.

## DETAILS

### 1.0 Persons Contacted

See Attachment 1

### 2.0 Purpose

The purpose of this inspection was: (1) to review the licensee's implementation of a program to meet the requirements of 10 CFR 50.49 for the Limerick Generating Station (LGS) Unit 2; (2) to evaluate the licensee's actions on the Limitorque valve operator jumper wires resulting from Information Notice 86-03 "Potential Deficiencies in Environmental Qualification of Limitorque Motor Valve Operator Wiring"; and, (3) to review the licensee's actions on the installation of Raychem cable splices resulting from IE Information Notice 86-53 "Improper Installation of Heat Shrinkable Tubing."

### 3.0 Background

NUREG-0588 was issued in December 1979 to promote a more orderly and systematic implementation of equipment qualification programs by industry and to provide guidance to the NRC staff for its use in ongoing licensing reviews. The positions contained in that report provide guidance on: (1) how to establish environmental service conditions; (2) how to select methods that are considered appropriate for qualifying equipment in different areas of the plant; and, (3) other areas such as margin, aging, and documentation. In February 1980, the NRC asked certain near-term OL applicants to review and evaluate the environmental qualification documentation for each item of safety-related electrical equipment and to identify the degree to which their qualification programs were in compliance with the staff positions discussed in NUREG-0588.

IE Bulletin 79-01B, "Environmental Qualification of Class IE Equipment," issued by the NRC Office of Inspection and Enforcement (IE) on January 14, 1980, and its supplements, dated February 29, September 30, and October 24, 1980, established environmental qualification requirements for operating reactors. This bulletin and its supplements were provided to operating license (OL) applicants for consideration in their reviews.

A final rule on the environmental qualification (EQ) of electrical equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, Section 50.49 of 10 CFR 50, specifies the requirements to be met for demonstrating the environmental qualification of electrical equipment important to safety located in a harsh environment. In conformance with 10 CFR 50.49, electrical equipment for Limerick Generating Station (LGS) may be qualified according to the criteria specified in Category II of NUREG-0588.

To document the degree to which the environmental qualification program complies with the NRC environmental qualification requirements and criteria, the licensee provided equipment qualification information by letters dated October 7, 1983, January 16, 1984, February 16, 1984, April 6, 1984, August 31, 1984, and September 7 and 10, 1984 to supplement the information in FSAR Section 3.11.

The NRC staff reviewed the above information for the adequacy of the LGS environmental qualification program for electrical equipment important to safety as defined in 10 CFR 50.49. In addition, the NRC staff conducted an audit of the licensee's qualification documentation and the installed electrical equipment on March 14-16, 1984. A safety evaluation report (SER) on environmental qualification of electrical equipment important to safety was issued in August 1983. Supplements 1 and 2 to this SER were issued in December 1983 and October 1984, respectively. The SER and its supplements described in detail the NRC staff review and audit of the licensee's EQ documentation, and concluded that the licensee had demonstrated conformance with the requirements for environmental qualification as detailed in 10 CFR 50.49.

#### 4.0 Limerick EQ Program

The NRC inspectors examined the licensee's implementation of the 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: (1) Emergency reactor shutdown; (2) Containment isolation; (3) Reactor core cooling; (4) Containment heat removal; (5) Core residual heat removal; and, (6) Prevention of significant release of radioactive material to the environment.

The licensee management does not have a corporate directive identifying the requirements of the EQ program. The Limerick 2 EQ program was based on the Limerick 1 EQ program which was developed when Limerick 2 was still under construction. Two procedures, entitled "Environmental Qualification Report for Electrical Equipment for Limerick Unit 1," dated September 1988, and "Extension of Equipment Qualification programs to Limerick Unit 2," dated February 1989, are used for the Limerick EQ program. The following information specific to LGS is defined in these procedures:

- \* Environmental design criteria for electrical equipment. The licensee uses NUREG-0588 Category II as the basis for qualifying their equipment.

- Equipment requiring environmental qualification. This section describes how the EQ master list was developed.
- Environmental service conditions. This section defines the normal and accident conditions for the EQ program, including temperature, pressure, humidity, operating duration and radiation for areas both inside and outside of the drywell.
- Qualification testing and analysis of equipment.
- Methodology for evaluating environmental qualification to service conditions.
- Corrective action plan and Justification for interim operation.
- Maintenance/Surveillance programs and replacement parts program.

In addition to this LGS EQ Report, various procedures developed by both the corporate personnel and LGS site personnel are used to implement the LGS EQ program. These include procedures for controlling plant modifications, performing EQ maintenance, handling EQ replacement parts, and conducting QA/QC audits. These are described in paragraphs 10.0, 3.0, and 6.0 of this inspection report, respectively.

To supplement the above procedures, an individual equipment qualification review record (EQRR) package is provided to support the qualification of each equipment type within the scope of 10 CFR 50.49. Preparation of an EQRR package is controlled by procedure EE-6.2 entitled "Procedure for control of environmental qualification documentation for nuclear plant class IE equipment." Each EQRR package consists of 8 sections. Section 1 contains documentation that defines the qualification acceptance criteria. Section 2 contains a summary of the EQRR, including a list of all components qualified by the package, and the environmental conditions for the components included in the package, equivalent to SCEW sheets of other plants. Section 3 contains the primary qualification reports used as evidence of qualification. Section 4 contains all analyses and calculations performed and any supporting documents used to supplement the primary qualification reports. Section 5 contains any pertinent correspondence used to support the qualification. Section 6 contains any special maintenance required to support the qualification. Section 7 contains inspection data. Within the scope of this review, no deficiencies were identified.

#### 5.0 EQ Master List

10 CFR 50.49(d) requires that a licensee establish and maintain a current list with supporting documentation of electrical safety-related equipment which must 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) the integrity of the reactor coolant pressure boundary; (b) the capability to shutdown 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 Part 100. Also, identified as important to safety is non-safety-related equipment whose failure under postulated environmental conditions could prevent the satisfactory accomplishment of required safety functions by safety-related equipment. Components required for display information and to perform post-accident sampling and monitoring, and radiation monitoring (Regulatory Guide 1.97) and TMI upgrades (NUREG-0737) have also been included in Limerick's EQ program.

The EQ master list is part (Appendix B) of the LGS EQ report. The licensee entered this master list into their computer program, such that the list can be retrieved either by plant ID numbers or by functional systems. The inspectors reviewed the current EQ master list, dated November 12, 1990, by plant ID numbers on November 26, 1990. P&ID drawings were used to verify the accuracy of the EQ Master List. Systems checked include: The Residual Heat Removal System, the Core Spray System, Nuclear Boiler Vessel Instrumentation, and the Plant Leak Detection Systems.

Procedure NED-6.1 "Control of the environmental qualification reports for PBAPS and LGS" and NED-6.2 "Control of Environmental Qualification Documentation for Nuclear Plant Class 1E Equipment" are used to control additions and deletions from the EQ Master List. These procedures constitute a formalized method used in the past to develop and control the EQ Master List.

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

#### 6.0 QA/QC Interface

The inspectors discussed with the licensee's cognizant corporate and site QA engineers, the QA/QC discipline involvement with the EQ programs and their training. The licensee has a Corporate Nuclear Quality Assurance (NQA) group and a Limerick site NQA General Manager, who reports directly to the president of the company.

The Corporate NQA group conducts audits in the EQ area once every two years. At the time of the inspection, Limerick 2 had been operating for about a year. The first QA audit on Limerick 2 started November 1990, and was still in progress during the time of this inspection. Therefore, no previous QA audit reports on Limerick 2 were available for the inspector's review.

The NQA group at the Limerick site reviews the materials procurement requests and repair orders, modification changes, surveillance evaluation inspection and perform area audits to verify the licensee's compliance with

10 CFR 50.49 requirements. The station QC personnel perform surveillance and monitoring activities, conduct material receipt inspections and audits and verify the implementation of EQ requirements on the basis of each engineering work change authorization and modification.

Discussion with the licensee QA personnel indicated that the individuals are knowledgeable of EQ requirements and possess adequate training and experience. No deficiencies were identified in this review.

#### 7.0 Information Notices and Bulletins:

Implementation of the licensee requirements in addressing the concerns of Information Notices (IN) and Bulletins is described in procedure (NGAP) NA-02A00, Revision 1. The special projects group of the licensing section is responsible for first screening the incoming bulletins and information notices. Those affecting the EQ program are transmitted from the licensing section to the nuclear service group managers to review. The nuclear service group manager and section heads then perform a thorough evaluation of the bulletins and INs against the appropriate EQ files to determine if modifications to the equipment file or more qualification documents are required for the EQ files. The disposition or response is transmitted back to the licensing section for tracking and processing. However, the nuclear service group keep the records of evaluations and dispositions.

The inspectors reviewed the records for processing the following Information Notices, Bulletins and Generic Letters pertaining to environmental qualification of electrical equipment important to safety for nuclear power plants.

- Generic Letters 84-24; Certification, dead line information,  
85-15; 86-15; 88-07. Modified enforcement policy and compliance  
with 10 CFR 50.49.
- Information Notices & Bulletins:
 

IN 86-02	Failure of Valve Operator Motor During EQ Testing.
IN 86-03	Potential Deficiencies in EQ of Limitorque Motor Valve Operator Wiring.
IN 88-04	Inadequate Qualification and Documentation of Fire Barrier Penetration Seals.
IN 89-03	EQ of Litton-Veam CIR Series Electrical Connectors.
IN 89-66	Qualification Life on Solenoid Valves.
IN 90-23	Improper Installation of Patel Conduit Seals.
Bulletin 86-02	Static "O" Ring Differential Pressure Switches.
Bulletin 88-01	Westinghouse Circuit Breaker Class 1E.
Bulletin 88-03	Inadequate Latch Engagement in GE/HFA Type Relays.
Bulletin 88-10	Molded Case Circuit Breakers.
Bulletin 90-01	Loss of Fill-Oil in Rosemount Transmitters.

During the construction stage when no response was required by the NRC, the licensee generated internal letters to incorporate the technical information from the INs and Bulletins with their design modifications and EQ files.

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

#### 8.0 EQ Maintenance Program

The team reviewed the Limerick, Unit 2 EQ maintenance program to determine PECCO's provisions for maintaining the status of the qualified equipment. Procedure A-25.2, Revision 2, "Environmental Qualification Program", Section 7.0, dated October 1990, describes the EQ maintenance program requirements.

The required EQ maintenance for qualified equipment is identified in the "Equipment-Specific, Equipment Qualification Review Record," (EQRR) sheet and in the EQ related maintenance/surveillance section of the equipment qualification package. Maintenance requirements are developed based on requirements resulting from the equipment qualification report, manufacturer's recommendations, material analyses, and plant and industry operational experience with the equipment. The EQ maintenance requirements are implemented through the Preventive Maintenance (PM) program, the Surveillance Testing (ST) program, and the Operations Lube Program delineated in the Operations Manual (OM) Chapter 10. It is the responsibility of a designated EQ coordinator to ensure that all of the EQ maintenance requirements are satisfied by the PM, ST or OM procedures.

To determine if EQ maintenance requirements were incorporated into the procedures of the programs started above, the inspector selected the following maintenance procedures and compared them to the applicable EQRRs.

- Procedure PMQ-600-026, "Environmental Qualification Maintenance for Safety Related Brown-Boveri/ITE Switchgear," Revision 3.
- Procedure PMQ-092-033, "Preventive Maintenance Procedure for Q-listed 4KV Air Circuit Breaker," Revision 5.
- Procedure ST-2-055-403-2, "CELLS Suppression Pool Water Level Division 2-HPCI Calibration and Functional," and proposed PM Baseline Maintenance Request Form (MRF) for the first refueling outage.

In the sample of procedures reviewed, the procedures covered the EQ requirements stated in the applicable EQRR packages (ATWS switchgear, Gould level transmitters).

In addition, the inspector reviewed the MRF process and governing administrative procedures in relation to EQ maintenance. The preparation of MRFs and the PM program are governed by procedures AG-45, Revision 3 entitled "Work Package Planning Guideline," A-26 Revision 18 entitled "Procedure for Plant Maintenance Using the Maintenance Request Form," and A-25 1, Revision 4 entitled "Preventive Maintenance Program". The procedures define the requirements for planning, reviewing, and implementing the various maintenance procedures and require that EQ equipment be identified in the MRF. The MRF also provides a comment section for any special EQ requirements. The individual procedures attached to the MRF, require that craft personnel review the MRF before performing the work so that the craft personnel are aware of the EQ status and other performance conditions. The inspector reviewed the following MRFs to determine if the EQ requirements were incorporated into the MRFs in accordance with the administrative procedures.

- MRF No. 8800865, Corrective maintenance performed on the refueling floor air supply isolation valve, dated August 1988.
- MRF No. 8984436, Preventive maintenance performed on the core spray cooling test (pump) loop B isolation valve, dated October 1990.
- MRF No. 8984433, Preventive maintenance performed on the 1D core spray pump suction valve operator, dated October 1990.

These MRFs followed the administrative procedure requirements for planning, review, and checkoffs. The correct EQ requirements were properly included in the MRF and the MRF was tracked by the Computerized History and Management Planning System (CHAMPS). The inspector conducted interviews with onsite maintenance personnel and noted that the personnel were knowledgeable of both the MRF process and the applicable EQ requirements.

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

## 9.0 EQ Training

Training requirements for Philadelphia Electric Company (PECo) personnel are described in the PECo Quality Assurance Manual, Volume IV, Section 2. There is no specific dedicated EQ training requirements prescribed in the manual for corporate or site personnel. Administrative Procedure A-25.2 "Environmental Qualification Program," dated August 25, 1987, prescribes site personnel EQ training.

The EQ program provides training for site personnel involved in EQ activities. The personnel included are the maintenance crafts, the Instrumentation and Control (I&C) technicians, the station engineering and technical support staff, testing and laboratory branch staff, the spare parts staff, and the licensed operators. The site EQ training staff is in the process of expanding the training to include non-licensed operators.



The 1987 Fall Continuing EQ training for the Limerick technical staff and management was completed on October 8, 1987. The training consisted of four (4) identical one-day sessions held on September 10, 17, 24 and October 1, 1987, with an afternoon session on October 8, 1987.

The EQ training staff receives training from the PECO Plant Equipment Configuration Branch EQ Coordinator or designated alternate. Presently there are two key personnel within the Plant Configuration Branch who provide the EQ training. These key personnel have completed a Wyle course entitled, "Qualification of Safety Related Equipment of Nuclear Stations," and a Drexel/IEEE course entitled, "Nuclear Environmental Qualification."

In addition, staff members participate in various utility groups on equipment qualification issues, ongoing research activities, latest applicable test results and exchanges of information and other pertinent issues. Members of the EQ Branch visit the operating facility one day per week to personally communicate and discuss current EQ issues.

The inspector reviewed the EQ program procedures and training records for PECO site personnel. Based on the review of these documents and discussions with licensee personnel the inspector concluded the licensee EQ training is adequate.

#### 10.0 Control of EQ Related Plant Modification

Administrative Procedure A-14 entitled, "Procedure for Control of Plant Modification," Revision 6, establishes the management controls required to accomplish modifications to the facility and to ensure that all safety concerns related to plant modifications that have an impact on environmentally qualified equipment are properly addressed. The procedures apply to modifications to safety related and non-safety related components and systems.

There are a number of Engineering and Research Department Procedures (ERDP) that provide specific instructions in a standard format to implement requirements and responsibilities for plant modifications. Major ERDPs used for plant modifications include:

- ERDP 3.1 - Procedure for Handling Modifications
- ERDP 3.3 - Procedure for Performance of Safety Evaluations and Applications for Amendments to Facility Operating Licenses and Changes to the LGS FSAR
- ERDP 3.4 Procedure for Design Control
- ERDP 3.6 Procedure for Preparation and Review of Engineering Drawings for Plant Modification.

The responsible engineer prepares the design input and forwards the design package to the interfacing groups including the EQ group for input and independent verification. Any revision to the design input affecting the EQ components is forwarded to the EQ group again for review.

Since Limerick, Unit 2, Generating Station has only been in operation for a short period (commercial operation January 8, 1990) there were no modification packages available for review. Based on the above review, the inspector concluded that the licensee has a program for controlling EQ related modifications.

#### 11.0 EQ Procurement Program

The general procurement requirements of EQ spare and replacement parts was governed by procedure A-25.2, Revision 2, dated October 8, 1990, entitled, "Environmental Qualification Program." The details of the procurement process and subsequent evaluations were delineated in procedures A-129 and A-129.2, entitled, "Procurement and Control of Items and Services," and "Classification and Engineering Evaluation of Items and Off-Site Services," respectively. Procedure A-129.2 also provides requirements and guidelines for determining safety classification, procurement level, EQ evaluation requirements and procurement requirements. Procedure A-129 described the process for the procurement and accountability of items and services. The Procurement Engineering Group performs replacement part evaluations, and commercial grade spare parts dedications, determines safety classifications and the procurement level for EQ equipment subcomponents. The Nuclear Engineering Group performs replacement part evaluations for major components. The procurement documents were also reviewed by the Nuclear Quality Assurance, Limerick Quality Division, Quality Support Section for completeness and procedural compliance.

Details of the control and usage of spare parts in relation to work packages were specified in procedure AG-45, entitled, "Work Planning Package Guideline." The Station Spare Parts Group was responsible for the overall management and control of spare parts and materials. The coordination of the task was accomplished using the Material Management Action Request that served as a mechanism for requesting service from the spare parts group to stock coded parts, to revise stock levels or to purchase parts and materials through the work planning process. The work planner was required to verify that spare parts were coded for their intended use to ensure shelf life had not expired and to incorporate any specific installation of test requirements into the work packages.

The inspectors randomly selected 2 recent EQ related, procurement packages. One procurement package was for Rockbestos cable, reference No. 114-93634 and the second procurement package was for Limitorque valve motors, reference No. 114-25411. The procurement packages reviewed were found to be in accordance with the applicable procurement procedures. Within the scope of this inspection, no deficiencies were identified.

## 12.0 Detailed Review of EQ Files

The licensee's EQ files were examined to verify the qualification status of equipment within the scope of 10 CFR 50.49. In addition to comparing plant service conditions with qualification test conditions and verifying the basis for these conditions, the inspectors selectively reviewed areas such as required post-accident 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 (insulation class, component materials, test 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 decrease in insulation resistance on equipment performance; adequacy of demonstrated equipment accuracy; evaluation of test anomalies; and applicability of EQ problems reported in Bulletins and Information Notices and their resolutions.

The inspectors reviewed twelve EQ files. The type of equipment covered by these files included electrical cables, resistance temperature detectors, Limitorque valve operators, switches, solenoid operated valves, pressure transmitters, terminal blocks, cable splices, and radiation detectors. An equipment type is defined as a specific type of electrical equipment, designated by manufacturer and model, which is representative of all identical equipment in the plant area exposed to the same or less severe environmental service conditions.

The inspectors concluded after review of these twelve EQ files that, generally the EQ files contain adequate information to support the qualification of the equipment (except the EQ file for the containment high range radiation monitors, which is discussed in the following paragraphs). However, these EQ files were difficult to audit in that they contain extraneous documents unrelated to the EQ of the equipment.

During the review of the EQ file for the containment high range radiation monitor (CHRRM), the inspectors noticed a discrepancy in the qualification test of the CHRRM detectors as follows:

The radiation detectors are manufactured by General Atomic, with model No. RD-23. The test report used to support the qualification is General Atomic Report No. E-254-960, dated December 15, 1980, with 11 appendices. Appendix 1 is the test procedure which also contains the test data.

The test procedure divided the test profile (temperature and pressure vs. time) into three subprofiles. The test sample was to complete all three subprofiles. Each subprofile constitutes a separate test. The first subprofile is at 390°F for a very short duration. The second subprofile is at 355°F for a medium duration. The third subprofile is at 315°F for a long duration. The test results as recorded in the test data, indicated that the test sample (in this case the radiation detector) failed at the third test (for the third subprofile). The vendor made several attempts

to complete the third test without success. Finally, the test sample was replaced with a new one to complete the third test. The EQ file did not have data to show that either the first 2 subprofiles or the third subprofile alone can envelope the required Limerick 2 post accident temperature profile. This profile is 340°F for 6 hours followed by 2 hours at 250°F and then gradually decreasing to 112°F after 81 days.

During a December 11, 1990, telephone conversation, the licensee stated that they had obtained new documents from General Atomic that can establish that the same detector had been tested for all three subprofiles. The new documents indicate that two detectors (Y-501 and Y-1894) were used for the qualification tests. Detector Y-501 was used for the first and second subprofile test and detector Y-1894 was used for the third subprofile test. Detector Y-1894 failed the test and was subsequently replaced by a new detector (in this case detector Y-501). Because of this peculiar arrangement, detector Y-501 was tested for all three subprofiles, which is adequate to envelope the Limerick 2 post accident temperature and pressure profiles. The inspector agreed that qualification of the radiation detector is substantiated.

At the time of the inspection, the EQ file did not contain the above information. The licensee's EQ personnel spent more than one week and still could not determine the actual test results without the new information from the vendor. This indicates that the EQ file for the CHRRM was not auditable, this is contrary to 10 CFR 50.49 paragraph j which requires the record of qualification be maintained in an auditable form for the entire period during which the covered item is installed in the nuclear power plant. Because this is only one example out of the 12 files reviewed, and the detector was subsequently shown to be qualified, the inspectors considered this to be an isolated case, therefore, no citation was issued.

### 13.0 Plant Physical Inspection

The NRC inspector conducted a physical inspection on November 28 and November 30, 1990 of EQ components in Limerick Unit 2 Reactor Building at various elevations and in Limerick Unit 1 primary containment (Unit 1 was shutdown for refueling during that time). Items selected for examination included Limitorque valve operators, level switches, solenoid operated valves, pressure transmitters, cables and cable splices, and containment high range radiation monitor (CHRRM) detectors.

The inspectors examined characteristics such as mounting configuration, orientation, connection interfaces, model and instrument type, cleanliness and physical condition.

During discussions, the licensee stated that for Limerick Unit 2, a 100% walkdown had been conducted of the EQ items for equipment both inside and outside of the primary containment. A walkdown procedure was developed by the licensee for the walkdown; however, the results of this walkdown

were not reflected in the EQ files. In addition, it appeared that the licensee's EQ personnel were not familiar with the installed configuration of the EQ items. For example, before the physical inspection by the NRC inspector of the CHRRM detectors, the licensee stated that each detector was installed such that the detector cable and cable connectors (with Raychem splices) were in a sealed conduit. However, during the NRC walkdown inspection, it was noted that the cables were routed in a cage-type electric box, open to a harsh environment, and the cable was unprotected and bent 180 degrees for a length of about 8 inches before entering an unsealed conduit. Although the installed configuration was not clearly described in the qualification file, the inspector determined that the as-installed configuration was qualified for the service environment.

No other deficiencies were noted during the physical inspection.

#### 14.0 Licensee's Actions in Response to Information Notice 86-03

The licensee reviewed the applicability of Information notice 86-03 regarding potential deficiencies in environmental qualification of Limitorque motor valve operator (MOV) wiring. The licensee elected to replace all jumper wires inside the Limitorque motor housings with qualified wiring and Raychem cable splices. A review of documented files, including licensee walkdown and maintenance records, indicates that all unidentified wiring was replaced with qualified wiring. No discrepancies in this area were noted in the NRC's plant physical inspection of selected Limitorque switch compartment intervals. All valves selected were outside the primary containment because of inaccessibility of the primary containment during operations.

<u>Valve No.</u>	<u>Location</u>	<u>Service</u>
HV-55-2F-004	Room 283, Rm 180 el. 177	High Pressure Coolant Injection
HV-55-2F-041	Room 283, Rm 180 el. 177	High Pressure Coolant Injection

The Limit switch compartments of these valves were opened for close inspection. The inspectors observed the installed condition and verified the jumper wires. No unqualified wiring was observed.

#### 15.0 Response to Information Notice 86-53

The licensee reviewed the applicability of NRC Information Notice 86-53 (IN 86-53) regarding improper installation of Raychem splices in electrical cables. The licensee concluded that there are no Raychem installation problems at Limerick Unit 2 based on the following reasons.

- a. The application and installation of Raychem heat shrinkable tubing is governed by a Bechtel procedure (wire and cable, notes and details drawings) E-1412.

- b. The Raychem Company frequently instructs Limerick Unit 2 electricians in the installation methods of Raychem splices to ensure a continuing quality in Raychem installations.
- c. Class 1E service splices and terminations at Limerick Unit 2 are witnessed by the QC organization to ensure that the Raychem is installed correctly.
- d. With the printed wire size range on the Raychem tubing, the use of the wrong diameter tubing has been minimized. The correct sizing of Raychem tubing was an IN 86-53 concern.

The team reviewed the E-1412 procedure and determined that the installation instruction addressed the concerns identified in IN 86-53. Furthermore, the licensee stated that the craft personnel refer to the E-1412 procedure when needed and the procedure is referenced in other procedures that require Raychem splices.

The team observed the installed condition of the Raychem splices associated with the following equipment:

- Splices associated with MOV HV-2F004 located in the HPCI room.
- A cable termination of a spare cable located in cable tray No. 2BCWA01 in the HPCI room.
- Splices associated with MOV HV-55-2F04 located in the HPCI room.
- Splices in the motor junction box for the core spray room cooler, 2GV11 in Room 186.

The Raychem splices observed were properly installed. In conclusion, within the scope of this inspection, PECD has addressed the concerns identified in IN 86-53.

#### 16.0 Exit Meeting

The inspectors met with licensee corporate personnel and plant site representatives (denoted in Attachment 1), at the conclusion of the inspection on November 30, 1990, and on December 12, 1990, following completion of the inspector's review of the qualification documents for the containment high range radiation monitors. The inspector summarized the scope of the inspection, the inspection findings and confirmed with the licensee that the documents reviewed by the team did not contain any proprietary information.

Attachment I

Persons Contacted:

Philadelphia Electric Company (PECo)

- V. Aggaswal, Branch Head, STR Branch
- \* L. Butchy, Engineer/Auditor, Nuclear Quality Assurance
- \* G. Chew, Senior Engineer, EQ Branch
  
- \*\* W. Clune, Engineer, EQ Branch
- \*\* W. Coyle, Manager, Program and Standard
- J. Evans, Superintendent, Quality Engineering
- # R. Krich, Branch Head, Limerick Licensing
- F. McCreesh, Engineer
- \*\* G. Stewart, Engineer, Licensing
- \*\* D. Thompson, Jr., Branch Head, EQ Branch

Limerick Generating Station

- S. Bobyock, Maintenance Program Engineer
- J. Evans, EQ Coordinator
- \*\* J. Philabaum, Licensing Engineer
- A. Skapik, Procurement Engineering

\* Denotes those present at the exit meeting on November 30, 1990.

# Denotes those present at the December 12, 1990 meeting at PECO Corporate Office to resolve the qualification issue of the containment high range radiation detector.