



**Commonwealth Edison**

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March 30, 1984

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: Quad Cities Station Units 1 and 2  
Final Resolution of Safety Evaluation  
Report for Environmental Qualification  
of Safety-Related Electric Equipment  
NRC Docket Nos. 50-254 and 50-265

- References (a): B. Rybak letter to H. R. Denton  
dated April 4, 1983.
- (b): B. Rybak letter to H. R. Denton  
dated May 19, 1983.
- (c): B. Rybak letter to H. R. Denton,  
dated February 29, 1984.

Dear Mr. Denton:

A meeting was held with members of your staff on January 25 and 26, 1984 to discuss Commonwealth Edison Company's (CECO's) resolution for all deficiencies noted in the SERs and TERs for the Zion, Dresden and Quad Cities Stations. Quad Cities specific deficiencies and resolutions were discussed on January 26. Commonwealth Edison also discussed the general methodology for compliance with 10 CFR 50.49, "Equipment Qualification of Electric Equipment Important to Safety for Nuclear Power Plants", which became effective February 22, 1983. Reference (c) transmitted, in draft form, CECO's understanding of the final resolution of all SER open items and the deficiencies noted in the associated with TER as discussed with your staff. As requested by the NRC staff in the meeting, compliance with 10 CFR 50.49 and confirmation that all design basis events at Quad Cities Units 1 and 2, including flooding outside drywell, was addressed in Section I of the enclosure of that letter. The staff has reviewed Reference (c) and requested a final submittal. This letter and its enclosure is considered the final resolution of the environmental qualification issue at Quad Cities Station.

As discussed with your staff, equipment installed as a result of TMI Lessons Learned implementation (NUREG-0737), have been removed from the environmental qualification program pending completion of the control room design review, Regulatory Guide 1.97, Rev. 2 implementation, and final NUREG-0737 implementation. Inclusion of the following equipment will be reevaluated in accordance with their respective schedules:

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PDR

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March 30, 1984

Acoustic monitors  
Containment water level indication  
Containment pressure indication  
Suppression pool radiation monitors  
Suppression pool temperature monitors  
Containment hydrogen analyzers

No items in NRC Categories I.B, II.A, or II.B for which justification for continued operation had not been previously submitted have been identified. References (a) and (b) provided revised and upgraded justifications for continued operation (JCO) for all items which qualification documentation had not been established at the time References (a) and (b) were submitted.

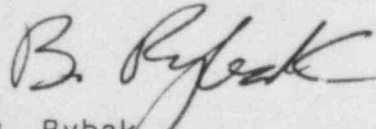
We believe the environmental qualification documentation maintained in the CECO Equipment Qualification files, which is summarized in Section IV of the enclosure, complies with the requirements of 10 CFR 50.49. These files are available for NRC audit. We also believe that Quad Cities Units 1 and 2 can continue to operate without undue risk to the public health and safety based on the present status of the qualification program and justification for continued operation as provided in References (a) and (b).

It is therefore requested that a final Safety Evaluation Report be issued to indicate that Commonwealth Edison's Quad Cities Environmental Qualification Program, as described in this letter and enclosure, meets the requirements of 10 CFR 50.49 and that the deficiencies noted in the SER dated January 18, 1983 are considered resolved.

If there are any questions you may have regarding this matter, please address them to this office.

One signed original and forty (40) copies of this letter is provided for your use. We have enclosed ten (10) copies of the enclosure to this letter.

Very truly yours,



B. Rybak  
Nuclear Licensing Administrator

lm

cc: NRC Resident Inspector - Quad Cities  
R. Bevan - NRR

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COMMONWEALTH EDISON RESOLUTION OF ENVIRONMENTAL QUALIFICATION  
SER AND TER OPEN ITEM DEFICIENCIES FOR QUAD CITIES 1 AND 2

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- A. Compliance with 10CFR50.49(b)
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- A. Cable
- B. Differential Pressure Indicating Switch
- C. Differential Pressure Transmitter
- D. Distribution Panel, 125 V dc
- E. Electric Air Heater
- F. Electrical Penetrations
- G. Flow Switches
- H. Flow Transmitters
- I. Hydrogen Sensors
- J. Level Indicating Transmitter Switches
- K. Level Switches
- L. Level Transmitters
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- N. Local Panels
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- P. Motor Control Centers, 480 V
- Q. Motor Driven Pumps
- R. Motor Exhaust Fans
- S. Motor Operators
- T. Position Switches
- U. Pressure Switches
- V. Pressure Transmitters
- W. Radiation Detectors
- X. Room Coolers (Fan Motors)
- Y. Solenoid Valves
- Z. Switchgear, 4.16 kV
- AA. Temperature Elements
- BB. Temperature Switches
- CC. Terminal Blocks
- DD. Oils and Greases

## I. GENERIC ENVIRONMENTAL QUALIFICATION ISSUES

### A. Compliance With 10CFR50.49(b)

Paragraph (a) of 10CFR50.49(b) requires that each licensee establish a program to environmentally qualify electrical equipment. 10CFR50.49(b) groups this equipment into the following three categories:

- 1) Safety related electrical equipment as defined in IEEE Std. 323-1974 and 10CFR50.49(b)
- 2) Nonsafety-related electrical equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions of the safety-related equipment
- 3) Certain post-accident monitoring equipment

The following discussions present the methodology used to identify all electrical equipment falling within the above three categories:

#### 10CFR50.49(b)(1) Safety-Related Electrical Equipment

- ° All design basis events such as loss of coolant accident and main steam line breaks inside containment and high energy line breaks outside containment were reviewed.
- ° A list of systems required to mitigate the consequences of loss of coolant accidents, main steam line break and a high energy line breaks analyses, technical specifications, and emergency operating procedures, considering the functions that must be performed for a potentially harsh environment. The six functions considered were: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment heat removal, (5) core residual heat removal, and (6) prevention of a significant release of radioactive material to the surrounding environment.
- ° Not all equipment in a particular safety-related system requires environmental qualification and post-accident active or passive functional capability in order to accomplish accident mitigation. Depending on system design, certain motor-operated valves, solenoid-operated pneumatic valves, temperature switches, limit switches and instrumentation may not be required to perform a safety function or mitigate the consequences of an accident in order for the system to accomplish its design basis safety function. Several other systems only require that the containment isolation portion of the system remain functional.
- ° A system analysis was performed to identify the set of electrical equipment which the system requires in order to perform its design basis safety function. Addition or deletion of equipment from the master list of electrical equipment was performed as necessary. Plant emergency operating procedures were used as a guide to identify devices and display instruments required to be used by the operator. This equipment was also added to the master list of electrical equipment.



- ° The equipment which must remain functional in these systems was identified by review of system descriptions and appropriate drawings (piping and instrumentation drawings, schematics, electrical one line diagrams and control logic diagrams). Application of system/component failure analyses was performed to identify the electrical equipment which requires environmental qualification.
- ° Plant areas with environmental parameters (pressure, temperature, humidity, radiation level, submergence level, etc.) which increase significantly above normal ambient conditions as a result of a design basis event, were defined to be harsh post-accident areas. Containment spray and radiation dose from recirculating radioactive fluids were included in these considerations.
- ° A review of the location of the equipment was performed. Equipment items which were required to function but are not located within a harsh environment, were deleted from the list. In addition, certain equipment items are not exposed to a harsh environment at the same time that they are required to perform a safety-related function. These items were deleted from the list.
- ° Station operators who were also part of the team of personnel conducting these activities were consulted to review the completeness of the master equipment list and the list of safety related systems.
- ° In addition to electrical schematics, wiring diagrams were reviewed as necessary to identify connection types, terminal blocks, etc., which support electrical component function.
- ° Based on the results of the above tasks, a final safety-related systems list and a final master equipment list (including display instruments) of electrical equipment which requires environmental qualification were developed. This list has been revised and updated on a continuing basis to reflect plant design changes and new information. System Component Work Sheets (SCEWS), in accordance with NRC I.E. Bulletin 79-01B format, were also completed.
- ° The methodology used by the licensee to identify electrical equipment which requires environmental qualification is in full compliance with the requirements of NRC I E Bulletin 70-01B supplements 1 and 2 and 10CFR50.49. Therefore, the master list of electrical equipment is judged by the licensee to address all electrical equipment within the scope of 10CFR50.49(b)(1).

#### 10CFR50.49(b)(2) Nonsafety-Related Equipment

10CFR50.49 includes in its scope nonsafety-related electrical equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions of the safety-related equipment. The possibility of failure of nonsafety-related equipment in a manner detrimental to safety equipment has been evaluated by a combination of methods which are summarized below:

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A master list of electrical equipment requiring environmental qualification was developed in accordance with 10CFR50.49(b)(1) and the requirements of NRC I.E. Bulletin 79-01B. This equipment is required to provide safe shutdown and to mitigate the consequences of design basis accidents such as a loss of coolant accident or main steam line break inside containment and high energy line break outside containment. The licensee's generic position (described previously) with respect to compliance with 10CFR50.49(b)(1) describes the methodology used to identify the equipment.

Not all the equipment in a particular safety-related system requires qualification and post-accident active or passive functional capability in order to accomplish accident mitigation and safe shutdown. A system failure analysis was performed on each safety-related system to identify the set of equipment requiring environmental qualification. The system failure analysis included a review of the safety system operation, systems interaction and included a review of the safety system operation, system interaction and operation of equipment with each safety system. This failure analysis identified all auxiliary systems and equipment which were necessary for the required operation of the safety-related system or equipment. This effort included review of the plant safety analyses, technical specification, emergency operating procedures, piping and instrumentation diagrams, schematics, wiring diagrams, electrical one line diagrams and control logic diagrams. The entire instrument loop associated with each identified instrument was reviewed to identify any other components whose function could adversely affect operation of the equipment required to remain functional. A small number of equipment items were identified as potentially affecting the performance of the equipment required to remain functional. These items were added to the equipment qualification master list and were subsequently qualified under the equipment qualification program, therefore eliminating the potential for affecting or degrading system performance.

Based on the above considerations, the licensee has not specifically classified any electrical equipment as nonsafety-related whose failure under postulated environmental conditions could prevent accomplishment of required safety functions by the safety-related equipment. Therefore, the current master list of electrical equipment and the review methodology is judged by the licensee to adequately address electrical equipment within the scope of 10CFR50.49(b)(2).

#### 10CFR50.49(b)(3) Certain Post-Accident Monitoring Equipment

Paragraph (b) (3) of 10CFR50.49 includes in its scope "certain post-accident monitoring equipment." Specific guidance parameters to be monitored is provided in Regulatory Guide 1.97 Revision 2. The licensee's generic position with respect to this issue and the methodology that was used to identify equipment that falls within this category is presented below.

Display instrumentation is currently included as an integral part of the qualification program in accordance with requirements established by NRC IE Bulletin 79-01B. The identified display instrumentation was evaluated in the NRC SER/TER review, and System Component Evaluation Work Sheets (SCEWS) for this equipment have been developed. The detailed systems review and development of the master list of electrical equipment requiring environmental qualification provided justification of equipment additions or deletions from the master list as necessary on a case by case basis.

The licensee's methodology used to identify display instrumentation has been previously described in Section 10CFR50.49(b) (1) (above). Equipment that currently falls within the category classified as certain post-accident monitoring equipment was selected based on the following:

- Sensors for display instrumentation channels which are exposed to a harsh environment following a design basis accident. These are identified in the plant Emergency Operating Procedures and are used by the operator to diagnose system failure to perform safety functions. This equipment is incorporated into the qualification program in accordance with the requirements of NRC IE Bulletin 79-01B and the DOR guidelines (enclosure 4).
- Instrumentation previously identified by the NRC based on plant walkdowns conducted under the Systematic Evaluation Program (SEP Topic III-12).

At this time, the following activities have not been completed by the licensee: The detailed Control Room Design Review; the revision to the Plant Emergency Operating Procedures based on the results of the control room design review and the Regulatory Guide 1.97 revision 2 review; the response to NRC concerning compliance with Revision 2 of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident"; and a determination of certain installed and operating electrical equipment located in harsh environments required for TMI Lessons Learned Implementation (NURGE-0737) in accordance with NRC IE Bulletin 79-01B supplement 3 item 2. As these activities are completed, equipment considered by the licensee to be classified as Regulatory Guide 1.97 revision 2 Category 1 or Category 2 items will be fully qualified in accordance with 10CFR50.49 criteria before operation in the plant.

Based on the above considerations, the licensee judges that all electrical equipment within the scope of 10CFR50.49(b)(3) has been adequately addressed and incorporated into the licensee's equipment environmental qualification program.



## B. One Hour Minimum Operating Time Margin

In order to account for various uncertainties inherent in equipment qualification test programs, the NRC criteria for qualification incorporated a one-hour minimum time margin requirement in addition to the required operability time of equipment. The "one-hour minimum margin plus required operating time" requirement was established by the DOR Guidelines section 5.3.1, IE Bulletin 79-01B Supplement 2 Question/Answer No. 12, and NUREG-0588 section 3.(4). Even though some equipment was required by design to perform its safety function within a short time period after the onset of an accident, the NRC criteria required that this equipment remain functional in the accident environment for a period of at least one hour in excess of the design operating time for the equipment. The NRC SER/TER used this criteria in the review of the licensee's equipment qualification documentation.

Subsequently, the NRC issued Generic Letter 82-09 which stated that equipment may be qualified using the required operating time plus an appropriate margin, however, subsequent failures must be shown not to be detrimental to plant safety. This criteria is applicable to equipment subject to the requirements of the DOR Guidelines or Category II of NUREG-0588. In addition, the one-hour time margin is not applicable to equipment whose safety function is performed prior to significant changes in the environment. Regulatory Guide 1.89 revision 1 position C-6 further discusses this issue. The outline presented in position C-6 of R.G. 1.89 states that equipment which is required by design to perform its safety function within the first 10 hours of the event should remain functional in the accident environment for a period of at least one hour in excess of the required equipment operating time unless a time margin of less than one hour can be justified. This justification must include: consideration of a spectrum of line breaks; potential need for use of the equipment later in the event; determination that failure of the equipment after the required operating time interval will not degrade safety function or mislead the operator; and determination that margin applied will account for uncertainties in the qualification program. 10CFR50.49(e) (8) also requires use of appropriate margins.

CECO's position with respect to the issue of one-hour minimum operating time margin is in accordance with the criteria presented in Generic Letter 82-09, 10CFR50.49(e) (8), and Regulatory Guide 1.89 revision 1 position C-6. Test data and analysis used to demonstrate qualification of equipment envelop the required design operating time plus one-hour margin or an appropriate margin properly justified in accordance with NRC criteria. This issue is therefore considered resolved.



### C. Containment Transient Margins

For Dresden and Quad Cities Stations, General Electric performed a drywell temperature analysis based on a main steam line break. The analysis considers main steam line break inside the drywell with break areas of 0.01 and 0.75 ft<sup>2</sup>. The peak temperature was calculated to be 334F for 600 seconds. This G.E. drywell temperature analysis profile is used in the qualification of all equipment being tested for use inside the drywell. The analysis performed for CECO (GE Report NSEO-52-0682) is based on a main steam line break with adequate margins. The margins include conservative decay heat values, heat transfer coefficients, valve closure times and flowrates. The analysis will, therefore, supercede Appendix A, Figure A-2V and A-3 of the TER. This report was transmitted to the NRC by letter, Mr. T. Rausch to Mr. H.R. Denton, dated January 25, 1983.

### D. Aging and Qualified Life

The NRC DOR guidelines, Section 5.4(4) and 7.0, require that the licensee conduct an assessment of electrical equipment to identify materials susceptible to significant age related degradation which could affect performance of design safety functions. A qualified (designated) life should be established for equipment susceptible to significant aging based on engineering evaluations and judgment. Maintenance, surveillance and equipment or component replacement intervals should be based on the established qualified life so that equipment qualification is maintained on a continuing basis. Specifically, the DOR guidelines require: identification of materials susceptible to significant degradation due to thermal and radiation aging, establishment of ongoing programs to review surveillance and maintenance activities to identify equipment exhibiting age related degradation. Arrhenius techniques are generally considered acceptable for assessment of thermal aging. These requirements are also implicitly established by 10CFR50.49 Section e(5), NUREG-0588, Rev. 1, Section 4 and Regulatory Guide 1.89, Rev. 1, Section 7; however, for new equipment (replacement equipment), these standards are more rigorous in that the criteria of IEEE-323 (1974) must be applied and the equipment must be preconditioned prior to testing. Methods for compliance with established criteria are presented below.

For installed equipment, the licensee has identified electrical equipment whose materials are susceptible to significant age related degradation. A qualified (designated) life has been established for each equipment type with requisite replacement or component refurbishment schedules. Various methods were employed in establishing the qualified life for equipment such as: use of available qualification test data on similar or actual components or equipment to support a conservative equivalent life extrapolation of the enveloping temperature test profile using Arrhenius techniques; contact with vendors to obtain bills of material, material information, and technical data to identify age sensitive materials; review and engineering evaluation of industry references and technical literature to determine material radiation threshold and thermal withstand capabilities; and engineering analyses to establish a reasonable qualified life and justified replacement schedule. Calculations, assumptions, technical data and references were incorporated into the respective equipment qualification documentation. The results of these evaluation and analyses are incorporated into the existing plant maintenance and surveillance program to ensure that equipment qualification is maintained. Based on these considerations, the licensee fully complies with the aging and qualified life criteria presented in the DOR guidelines.

When currently installed equipment (qualified to the DOR guidelines) is replaced, the new equipment will be qualified in accordance with the aging and qualified life criteria presented in 10CFR50.49, Section e(5), NUREG-0588, Revision 1, Section 4 and Regulatory Guide 1.89, Revision 1, Section 7, unless there are sound reasons to the contrary to preclude upgrading. For this equipment, the qualification test plans and test reports are evaluated to ensure that equipment is properly preconditioned (naturally or artificially) prior to testing and a reasonable qualified (designated) life and component replacement interval is established. The results of the equipment qualification program are incorporated into the existing plant maintenance and surveillance program to ensure that equipment qualification is maintained.

With respect to synergistic effects, the licensee recognizes the limitations in the state-of-the-art; therefore, synergisms were not addressed unless known synergisms were identified and were considered to have significant effect on equipment's safety function. Based on these considerations, the licensee fully complies with the synergistic effects criteria presented in 10CFR50.49 Section e(7), NUREG-0588, Revision 1, Section 4(3) and Regulatory Guide 1.89, Revision 1, Section 7.

Finally, the station maintenance history file will be used in conjunction with the established maintenance and surveillance program to identify significant age related degradation trends, characteristics and observations for equipment. Appropriate corrective actions will be taken on a case-by-case basis.

Based on these considerations, the license fully complies with the aging and qualified life criteria presented in 10CFR50.49, NUREG-0588, Category 1 and Regulatory Guide 1.89.

#### E. Maintenance and Surveillance

The DOR guidelines and 10CFR50.49 require that on-going programs be implemented to establish and perform maintenance, surveillance, and equipment (or component) replacement activities for safety-related electrical equipment to ensure that equipment qualification is maintained on a continuing basis. The program must incorporate the established values of designated life for equipment considered to be susceptible to significant aging. The licensee's methodology, with respect to compliance with NRC criteria, is summarized below.

To assure the continued qualification of installed equipment, CECO has initiated a Qualification Maintenance Program. This program takes specific environmental qualification related surveillance and maintenance requirements and integrates them into existing surveillance, maintenance and testing programs. It was decided to take this approach, rather than to establish an independent program to take full advantage of these existing programs and the people that make them work.

For each type of environmentally qualified equipment, a loose leaf binder is being prepared which contains all of the qualification documentation and specific EQ related surveillance and maintenance. Engineering and station personnel will review these binders and incorporate any qualification requirements into station surveillance and maintenance procedures or develop new procedures where this equipment had not previously been installed at that station. Any EQ related surveillance and maintenance requirements will then be programmed into our newly developed General Surveillance Program which is computer based and which initiates needed activities and automatically

establishes the date of the next surveillance and maintenance activity once the work is completed. The Work Request form presently used for all surveillance and maintenance work has been modified to alert station personnel that they are working on an EQ piece of equipment. When EQ related surveillance and maintenance work is completed, this information will be entered into our computerized Maintenance History File. This file will have a record of work done and the potential for trending age related degradation. The Qualification Maintenance Program is flexible and can readily accommodate future requirements mandated by I&E Circulars, Notices and Bulletins or by manufacturer's recommendation.

To support the basic Qualification Maintenance Program, CECO is presently developing a training program for periodic presentation to our engineering and station personnel to educate them in all aspects of qualification. The Station Storekeeper and our Purchasing personnel are also being involved in this program to assure an adequate supply of replacement parts.

Through the use of our recently modified Work Request form, we are establishing a mechanism to upgrade qualification whenever equipment replacements are required. The company is developing its Qualification Maintenance Program based on two policies. When replacement parts are required, like-for-like parts are used; when exact parts are not available, the recommended replacement is subjected to a review by station engineering, operating and maintenance personnel. When a component qualified to the DOR Guidelines or to CAT. II must be replaced it will be replaced with a component qualified to NUREG-0588 Revision 1 Category I except where sound reasons to the contrary preclude this upgrading.

An example of the present program for large motors which includes a periodic lubrication program based on manufacturer's recommendations and our operating experience; chemical analysis of the lubricants may be performed. Bearings are inspected at each motor overhaul. Also, during these overhauls the windings are inspected and cleaned and any suspect windings are meggered and hipotted. A vibration signature is taken of all large motors and vibration analysis performed periodically so as to detect early signs of age related degradation. On a daily basis all large motors are visually inspected by operating personnel. To these ongoing surveillance and maintenance activities, any EQ related requirements such as the use of radiation resistant lubricants will be integrated into the present program. Results of completed surveillance and maintenance work will be entered into the Maintenance History File which has trending capabilities.

Another example of the present surveillance and maintenance program for transmitters includes a periodic calibration check based on manufacturer's recommendations and our operating experience. At the time of each check as-found and as-left data is recorded and transmitters beyond prescribed limits are recalibrated. Transmitters requiring frequent recalibration beyond prescribed limits are replaced. During calibration checks each unit is subjected to a thorough visual inspection. To these ongoing surveillance and maintenance activities any EQ related requirements, such as O-ring replacement each time the cover is removed, will be factored into the present program. As-found data will be entered into the Maintenance History File which has trending capabilities.



In summary, the company has initiated a comprehensive Qualification Maintenance Program which is being integrated into our present maintenance, surveillance and testing program. To support this program we are taking steps to assure adequate supply of replacement parts and components. The computerized General Surveillance Program provides an audible link of work performed and the Maintenance History File provides the potential to detect age related degradation.

Based on the above considerations, the licensee concludes that the activities conducted thus far on environmental qualification, and the current development of a maintenance and surveillance program for electrical equipment requiring environmental qualification fully complies with the requirements of the DOR guidelines and 10CFR50.49 regarding maintenance and surveillance.

F. Installed TMI Action Plan Items

NUREG-0737 "Clarification of TMI Action Plan Requirements" established actions to be taken by licensees regarding TMI Lessons Learned Implementation. NRC IE Bulletin 79-01B, Supplement 3 Item 2, requires environmental qualification of installed electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. Those items that have control or accident mitigating functions are included in the present environmental qualification program. The licensee's position with respect to TMI lessons learned equipment falling within the category of "certain post accident monitoring equipment" has been previously presented in generic position A above.

Based on these considerations, the licensee judges that installed TMI action plan items have been properly incorporated into the qualification program in accordance with NRC IE Bulletin 79-01B, Supplement 3 and 10CFR50.49 qualification requirements.



G. Correspondence1. Correspondence to NRC

• D. Peoples to J. Keppler - D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub> Master Lists	03/04/80
• F. Janacek to J. Keppler - QC <sub>1</sub> , QC <sub>2</sub> initial response	04/22/80
• IE Bulletin 79-01B Response D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub>	06/10/80
• Revised IE Bulletin 79-01B response D <sub>2</sub>	08/22/80
• J. Abel to J. Keppler - D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub> revised response (11/1/80)	10/29/80
• J. Abel to D. Eisenhut - D <sub>2</sub> revised response (11/1/80)	10/30/80
• T. Rausch to H. Denton TER Response D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub>	09/04/81
• TER Response Supplement QC <sub>1</sub> , QC <sub>2</sub>	02/03/82
• TER Response Supplement D <sub>3</sub>	02/23/82
• TER Response Supplement D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub> - TMI Equipment	04/29/82
• E. Schwartz to D. Eisenhut - TMI Action Plan Equipment Qualification	08/02/82
• T. Rausch to H. Denton - GE Drywell Analysis	01/25/83
• T. Rausch to H. Denton - Reaffirmance of JCOs	02/01/83
• B. Ryback to H. Denton - Proprietary Material	02/14/83
• B. Ryback to H. Denton TER Response D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub>	04/04/83
• B. Ryback to H. Denton - 10CFR50.49 Response D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub>	05/19/83
• C. Reed to H. Denton - R.G. 1.97 and G.L. 82-33 Commitments	11/15/83

2. Correspondence from NRC

• IE Bulletin 79-01	02/08/79
• IE Bulletin 79-01A	06/06/79
• J. Keppler to C. Reed IE Bulletin 79-01B	01/16/80
• NRC Request to D <sub>2</sub>	02/15/80
• IE Bulletin 79-01B Supplement	02/29/80
• D. Ziemann to D. Peoples - Schedule and Clarifications	03/28/80
• CLI 80-21	05/23/80
• Staff Orders D <sub>2</sub> , D <sub>3</sub> , QC <sub>1</sub> , QC <sub>2</sub>	08/29/80
• IE Bulletin 79-01B Supplement No. 2	09/29/80
• IE Bulletin 79-01B Supplement No. 3	10/24/80
• Staff Order	10/24/80
• G. Lainas to J. Abel - Partial NRC Review Dresden 2	02/13/81
• T. Novak to J. Abel - Partial NRC Review Dresden 3	04/01/81
• T. Ippolito to J. Abel - NRC SER-QC <sub>1</sub> , QC <sub>2</sub>	06/03/81
• T. Ippolito to J. Abel - NRC SER-D <sub>3</sub>	06/03/81
• D. Crutchfield to J. Abel - NRC SER - D <sub>2</sub>	06/10/81
• GL-82-09	04/20/82
• Memorandum to D. Eisenhut from P.O'Connor - JCO Evaluation	10/19/82
• D. Crutchfield to L. DelGeorge NRC SER-D <sub>2</sub> , D <sub>3</sub>	12/29/82
• D. Vassallo to L. DelGeorge - NRC SER-QC <sub>1</sub> , QC <sub>2</sub>	01/18/83

## II. POSITIONS CONSIDERED CLOSED

- A. EQUIPMENT PLACED IN NRC CATEGORY IIIA BY THE TER - None
- B. EQUIPMENT PLACED IN NRE CATEGORY IIIB BY THE TER - (equipment not in the scope of review)

### Quad Cities 1:

FRC Item 12 - PS-1-1462A, B, C, D  
FRC Item 62 - FT-1/2-7541-6A, B

### Quad Cities 2:

FRC Item 12 - PS-2-1462A, B, C, D

## C. SUMMARY OF QUALIFICATION METHODS

The qualification methods discussed in paragraphs 4.3.5 and 4.3.6 of the Franklin Research Center's Technical Evaluation Report for Dresden Units 2 and 3, respectively, are revised as follows:

A number of components were included in the original IE Bulletin 79-01B response which could be subjected to maximum temperatures between 104 and 120F for reasons other than direct exposure to a loss-of-coolant accident (LOCA) or high-energy line break (HELB) environment. It was initially thought that this environment should be classified as more severe than nonharsh (benign) conditions and an additional category called a mild environment was created in the IE Bulletin 79-01B response for this equipment. A subsequent examination of plant operating experience, vendor information, industry standards, regulatory criteria, and potential failure mechanisms for equipment in this mild category has led Commonwealth Edison Company (CECo) to the conclusion that this additional category is not required. The justification for this revision is presented below.

CECo's position with respect to areas where the temperature does not exceed 120F is that these are mild temperature areas and as such do not expose equipment to immediate, prolonged, or significant high-stress conditions. The maximum temperature of equipment represents no significant change from the normal temperature for equipment located in these areas. For all equipment located in these areas, the mild temperature environment is the result of normal plant operation, the loss of the heating, ventilating, and air conditioning (HVAC) system, or operation of equipment required for post-accident plant recovery. It is not the result of direct exposure to LOCA or HELB environment. In all cases the increase in temperature from the normal temperature to the maximum of 120F will be gradual. The resulting applied stresses on the equipment are relatively low and well within the maximum stress level capability of the equipment which is conservatively designed, fabricated, and installed as supported by equipment design specifications and manufacturers' data. Operability of similar equipment in such mild temperature environments has been demonstrated by many years of experience in the utility industry. In addition, operating experience (e.g., Licensee Event Reports) does not indicate that a common-mode failure of safety-related equipment resulting from mild temperature environments is a problem. Therefore, no additional evaluations or documentation are necessary to ensure that this equipment will perform its safety function.

This justification was found satisfactory by Franklin in the January 1983 TER for Quad Cities Units 1 and 2, Section 4.3.3.2. A further discussion concerning the qualification of safety-related electrical equipment located in a mild environment which CECo also endorses can be found in Reference 1.

This equipment was reevaluated on a case-by-case basis and reassigned to either the harsh or mild (benign) category as shown in Table 1. As a further clarification, the terms "nonharsh" and "mild" are now used synonymously in the report reflecting the current usage of these terms in the nuclear industry.

In support of this position, we note that the latest revision of 10CFR50.49 excludes equipment in a mild environment from the present equipment qualification effort.

The licensee's position on the above qualification methodology is summarized below:

1. A harsh environment is defined as any one or a combination of any number of the following conditions.
  - a. Temperature above 120 F
  - b. Total radiation exposure above  $5 \times 10^4$  rads
  - c. Pressure transient resulting from a LOCA or HELB inside the drywell, the pressure suppression pool, and the main steam tunnel
2. Qualification of humidity will be required only when the humidity is in conjunction with harsh temperatures.
3. A mild (nonharsh) environment must meet all of the following criteria.
  - a. Temperature equal to or lower than 120F
  - b. Total radiation equal to or below  $5 \times 10^4$  rads
  - c. Pressure no higher than that of all plant locations other than the drywell, the pressure suppression pool, and the main steam tunnel; i.e., less than or equal to atmospheric pressure
4. CECo's approach to achieve environmental qualification of safety-related electrical equipment is summarized below in Table 1 and the notes which follow.

TABLE 1

SUMMARY OF QUALIFICATION METHODS

<u>Radiation</u>	<u>Temperature</u>	
	<u>Mild (&lt;120F)</u>	<u>Harsh (&gt;120F)</u>
Mild (<5E04R)	Note a	Note b
Harsh (>5E04R)	Note c	Note d

Notes:

- a. Equipment located in a mild environment is not included within the scope of the NRC SER in accordance with 10CFR50.49. No action by the licensee is required.
  - b. Qualification analysis or qualification testing or a combination of both will be performed to ensure that equipment in this category is fully qualified for the harsh temperature environment. If the component or part of the component is found not to be qualified, its replacement will be complete by the end of the second refueling outage after March 31, 1982, or by March 31, 1985, whichever is earlier.
  - c. The component will be qualified for the harsh radiation environment only by a combination of analysis and testing, qualification testing, analysis, or by replacement with a fully qualified component. The replacement schedule will be as stated in Note b above.
  - d. The component will be qualified by testing or be replaced with a qualified component. The replacement schedule will be as stated in Note b above.
5. Equipment qualification for submergence and/or containment spray, if required, will be handled by analysis or testing as appropriate.

REFERENCES

1. A Nuclear Industry Position Regarding Environmental Qualification of Safety-Related Electrical Equipment Subjected Only to Mild Environment, submitted to H.R. Denton of the NRC by S.H. Howell of the AIF in a letter dated July 2, 1980.



COMMONWEALTH EDISON RESOLUTION OF ENVIRONMENTAL QUALIFICATION SER AND TER OPEN ITEM DEFICIENCIES  
FOR QUAD CITIES UNITS 1 AND 2

III. GENERIC DEFICIENCIES

Deficiency	Reference	Proposed Resolution
A. In many instances, the licensee has committed to replace equipment during a refueling outage following receipt of the qualified components onsite. It is concluded that the licensee has not provided a definitive schedule for the completion of corrective actions in compliance with NRC SER requirements.	TER, Section 5 Page 5-1	A definitive schedule for the completion of corrective actions in compliance with NRC SER requirements has been established. The schedule for completion of corrective action was reflected in Section 1.3 of the individual component summary sheets in Attachment 1 to the Dresden and Quad Cities TER responses for components in NRC Categories 1.B, 11.A, and 11.B. The schedule was also reflected in the May 19, 1983, transmittal from B. Rybak to H. Denton as required by 10 CFR 50.49.
B. It appears that the licensee has not resolved the NRC concern regarding margins applied to the in-containment temperature profile	TER, Section 5 Page 5-1	The resolution for this item is provided in Section 1 of this enclosure.
C. Appendix D of the TER discussed concerns which require resolution with regard to temperature switches and solenoid valves.	TER, Section 5 Page 5-2	Appendix D concerns were addressed in the 30-day response letter, Mr. T. Rausch to Mr. H.R. Denton, dated February 1, 1983. In addition, the temperature switch component summary sheets were included in Attachment 1 to the Dresden and Quad Cities TER responses. Verbal approval of the February 1, 1983, submittal on justification for continued operation (JCO) was given to B. Rybak from R. Gilbert on February 1, 1984. It is Commonwealth Edison's understanding that formal acceptance of this JCO will be given in the safety evaluation report.

COMMONWEALTH EDISON RESOLUTION OF ENVIRONMENTAL QUALIFICATION SER AND TER OPEN ITEM DEFICIENCIES  
FOR QUAD CITIES UNITS 1 AND 2

LEGEND:

QC1 = Quad Cities Unit 1

QC2 = Quad Cities Unit 2

None = No deficiencies noted or SCEWs provided subsequent to NRC review by FRC

IV. SPECIFIC EQUIPMENT EQ DEFICIENCIES

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<b>A. ELECTRICAL CABLE</b>				
QC1: 49 QC2: None	General Electric cable Model SI-57275; Vulkene insulated switchboard wire	1.B	Documented evidence of qualification inadequate	Testing and analysis had not been performed on this cable at the time of the TER/SER review; therefore, qualification documentation was noted as being inadequate by FRC. Qualification deficiencies for qualification time, material aging, humidity, temperature, pressure, and radiation were originally to be resolved by type testing. However, prior to testing, EDS Nuclear evaluated Wyle Test Report 44114-2 and concluded that the qualification deficiencies for pressure, radiation, and relative humidity could be resolved by that test report, and the remaining deficiencies could be resolved by an analysis utilizing Arrhenius methodology to extrapolate the test results. All deficient parameters were satisfactorily qualified by Wyle Test Report 44114-2 and EDS Analysis, Environmental Qualification of General Electric SI-57275 Electrical Cable Report 04-0590-69, Rev 1, October 7, 1983. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.
QC1: 51,53,55, 56 QC2: None	General Electric and Simplex cable; butyl rubber-insulated with PVC jacket; power and control functions	1.B	Documented evidence of qualification inadequate	Testing and analysis had not been performed on this cable at the time of the TER/SER review; therefore, qualification documentation was noted as being inadequate by FRC. Qualification deficiencies for qualification time, material aging, humidity, temperature, pressure, and radiation are being resolved by type testing. Prior to testing, it was determined that the term "Anhydrex XX" (identified as the insulation material in QC1 Item 56) was the Simplex name for their butyl rubber insulation. Because SCEWs existed for Simplex butyl rubber-insulated cable, all references to cables with Anhydrex XX insulation have been deleted from the qualification program to eliminate unnecessary duplication. All deficient parameters have been qualified by Wyle Test Plan 45916-03, Final Qualification Plan for Various Power Control and Instrumentation Cables. The test report is to be issued in February 1984.  Subsequent to the January 26, 1984, meeting with the NRC staff, the final test report was issued. Final qualification of these cables has been established. All tested cables are qualified for their intended service. However, the GE butyl cable located in the steam tunnel is not qualified for the 40-year plant life. This cable will be replaced before the end of its designated life in accordance with the plant maintenance program. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<b>A. Electrical Cable (continued)</b>				
QC1: 54 QC2: None	General Electric cable; cross-linked polyethylene (Vulkene)-insulated with PVC jacket; control functions	1.B	Documented evidence of qualification inadequate	Testing and analysis had not been performed on this cable at the time of the TER/SER review; therefore, qualification documentation was noted as being inadequate by FRC. Qualification deficiencies for qualification time, material aging, humidity, temperature, pressure, and radiation were originally to be resolved by type testing, engineering analysis, or replacement. Commonwealth Edison has reviewed a comparison analysis conducted by EDS, Environmental Qualification of General Electric SI-58743 and SI-58281 Electrical Cables, Report 04-0590-50, Rev 0, November 18, 1982. Although the analysis states that the cables are qualified, Commonwealth Edison has determined that a more detailed analysis to establish similarity to previously tested General Electric specimens will be conducted to fully document qualification. If this analysis cannot demonstrate qualification in CECo's judgment, the cables will be type tested or replaced.
QC1: 50 QC2: None	Simplex cable; polynylon-insulated single/multipair instrumentation cable	1.B	Documented evidence of qualification inadequate	Testing and analysis had not been performed on this cable at the time of the TER/SER review; therefore, qualification documentation was noted as being inadequate by FRC. Qualification deficiencies for qualification time, material aging, humidity, temperature, pressure, and radiation are to be resolved by type testing. Prior to testing, it was determined that the polynylon-insulated cable and the single/multipair instrumentation cable are the same. Therefore, all references to the polynylon-insulated cable have been deleted from the qualification program to eliminate unnecessary duplication. All deficient parameters have been qualified by Wyle Test Plan 45916-03, Final Qualification Plan for Various Power, Control, and Instrumentation Cables. The test report is to be issued in February 1984.  Subsequent to the January 26, 1984, meeting with the NRC staff, the first test report was issued. Final qualification of these cables has been established, and they are qualified for their intended service for the remaining 30 years of plant life. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>A. Electrical Cable (Continued)</u>				
QC1: None QC2: None	Simplex cable; three- conductor twisted with overall shield; instru- mentation wire	NA	None	Qualification deficiencies for qualification time, material aging, humidity, temperature, pressure, and radiation are to be resolved by type testing. All deficient parameters have been qualified by Wyle Test Plan 45916-03, Final Qualification Plan for Various Power, Control, and Instrumentation Cables. The test report is to be issued in February 1984.
Subsequent to the January 26, 1984, meeting with the NRC staff, the first test report was issued. Final qualification of these cables has been established, and they are qualified for their intended service for the remaining 30 years of plant life. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.				
<u>B. DIFFERENTIAL PRESSURE AND INDICATING SWITCHES</u>				
QC1: 32 QC2: 32	Barton 289	1.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Rosemount Model 1153, Series B transmitters. Qualification is required for temperature, pressure, humidity, and radiation during post-accident conditions. Rosemount has tested its Model 1153, Series B transmitters and provided the qualification documentation in Test Report 108025, Rev B, dated February 1983. The report has been reviewed and evaluated and found to qualify the transmitters for the required conditions. The qualified life of the Model 1153, Series B transmitters has been determined by Rosemount to be 20 years; therefore, these components will require replacement after this period. These qualified replacement components should be in NRC Category 1.A, Equipment Qualified.
QC1: 35 QC2: 35	Barton 288	1.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Rosemount Model 1153, Series B transmitters. Qualification is required for temperature, pressure, humidity, and radiation during post-accident conditions. Rosemount has tested its Model 1153, Series B transmitters and provided the qualification documentation in Test Report 108025, Rev B, dated February 1983. The report has been reviewed and evaluated and found to qualify the transmitters for the required conditions. The qualified life of the Model 1153, Series B transmitters has been determined by Rosemount to be 20 years; therefore, these components will require replacement after this period. These qualified replacement components should be in NRC Category 1.A, Equipment Qualified.



IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
C. DIFFERENTIAL PRESSURE TRANSMITTERS				
None				
D. DISTRIBUTION PANELS				
QC1: 44 QC2: 44	Cutler-Hammer	1.B	Documented evidence of qualification inadequate	Qualification deficiency was identified as the radiation parameter and was originally to be resolved by analysis and/or testing. This deficiency was applicable because these panels had not been qualified to a harsh radiation environment. Subsequently, the approach adopted for qualification was a combination of analysis and testing. Bechtel performed an engineering analysis (Chron 7332) for nonmetallic components except those associated with the circuit breaker. This analysis indicated that all these nonmetallic components had radiation damage thresholds in excess of the required radiation environment. A radiation test was conducted by Wyle for the breakers, and Wyle Test Report 45917-3 was evaluated. The deficiency is resolved by this analysis and the test report. These items are fully qualified to all environmental parameters. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.
E. ELECTRIC AIR HEATERS				
QC1: 59	Chromalox 1-113462/2-113462	1.B	Documented evidence of qualification inadequate	These heaters are used as common equipment for both the Quad Cities Units 1 and 2. This equipment was originally scheduled for replacement with a qualified heater because the qualification was not established at the time of TER/SER review. Radiation was the only harsh environment requiring qualification; therefore, all the materials were reevaluated to determine whether qualification could be established by analysis. Subsequently, the unit was qualified by Engineering Analysis for Nonmetallic Components, Bechtel Power Corporation, July 8, 1983 (Reference 3 of Qualification Package 06.C332.01). Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
F. ELECTRICAL PENETRATIONS				
QC1: 52	General Electric GE-NEBS	11.A	Documented evidence of qualification inadequate	<p>The original documentation submitted during the TER/SER review was incomplete because of the ongoing data search for these penetrations. Qualification was required for all the accident and normal environment parameters inside the drywell. Subsequent to the submittal of the TER response, environmental information study, Report EWA-EAF98-94, was received from General Electric (GE) along with another report dated May 30, 1972, for the electrical penetration assemblies summary data. These reports, as well as GE Report F-01 (April 30, 1971), GE Report 994-75-011 (April 29, 1975), and a special report for an incident at Dresden Unit 2 in June 1970, have been reviewed and found to adequately qualify these penetrations for the normal and accident environment. These electrical penetration assemblies contain metallic as well as nonmetallic materials. Deterioration due to thermal aging is insignificant for nonorganic and metallic materials under the specified environmental conditions. Therefore, component aging is based on organic materials. GE Report 994-75-011 demonstrates a cycling and aging test to simulate a nuclear power station startup and shutdown cycle. This 100F temperature change and 120 cycle test is consistent with the requirement of IEEE Standard 317-1976 even though this standard was not in effect at the time of the qualification test. Because the penetration assemblies successfully withstood the cycling and aging test, which represents significant thermal stressing, the aging qualification is considered supportable by this test. In addition, the penetration assemblies can be considered to have a remaining qualified life of 30 years. This conclusion is based on the material analysis of the age-sensitive materials used in the FOI canister design electric penetrations (GE Report EWA-EAF98-94), their location within the assembly (which is not subject to extreme temperature and radiation degradation), and the fact that these assemblies continued to function during and subsequent to the June 5, 1970, depressurization incident. This 30-year qualified life requires that periodic maintenance and surveillance procedures be established and implemented. Surveillance procedures are being developed to detect common-mode failure mechanisms. If unidentified aging or degradation mechanisms become apparent, upgraded replacement or maintenance programs will be developed to address these concerns.</p> <p>Based on the above reports and the followup meetings with GE and the fact that they did perform satisfactorily during the June 5, 1970, incident, it is concluded that these penetrations are qualified. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.</p>
QC2: None		NA	None	

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<b>G. FLOW SWITCHES</b>				
QC1: 11 QC2: 11	Barton, 289	I.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Rosemount Model 1153, Series B transmitters. Qualification is required for post-accident radiation only. Rosemount Test Report 108025, Rev B, dated February 1983, has been evaluated and found to qualify the Rosemount Model 1153, Series B transmitters for the normal service conditions and the postulated post-accident radiation at the Quad Cities units. The installed operational life of the Model 1153, Series B has been determined by Rosemount to be 20 years; therefore, these components will require replacement at the end of this period. These qualified replacement components should be in NRC Category I.A, Equipment Qualified.
QC1: 63	Mercoid, DA5333	I.B	Documented evidence of qualification inadequate	These components were scheduled for shielding or replacement, and qualification was not available at the time of the TER/SER review. Therefore, the documented evidence of qualification was considered inadequate by FRC. Qualification was required for post-accident radiation only. The shielding design for these components has been completed, and the radiation environment is now mild. Therefore, these components should be in NRC Category III.B, Equipment Not in the Scope of the Review.
<b>H. FLOW TRANSMITTERS</b>				
QC1: 10,31 QC2: 10,31	General Electric GE/MAC 553	I.B	Documented evidence of qualification inadequate	At the time of TER/SER review, these components were scheduled for either testing or analysis. The decision was made to test the component for radiation because radiation caused by a design basis accident is the only harsh environment to which these components are ever subjected. Subsequently, the GE/MAC 553 transmitters were tested by Wyle Laboratories. Qualification was provided in Wyle Test Report 45917-1, July 30, 1982. Review and evaluation of the test report revealed that these components are qualified for the required conditions. Therefore, these qualified components should be in NRC Category I.A, Equipment Qualified.
QC1: 61	Leads And Northrup 000-0300-0300	I.B	Documented evidence of qualification inadequate	This component was originally scheduled for replacement; however, no qualified replacement was identified at the time of TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. Subsequently, it was determined that this component would perform no safety-related function. It provides only flow indication for the SGTS and does not provide any control function. The required control function for the system is provided by FSL 1/2-7541-BA,B and -33A,B. Therefore, this component should be in NRC Category III.A, Equipment Exempt from Qualification.



#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
I. HYDROGEN SENSORS				
None				
J. LEVEL-INDICATING TRANSMITTER SWITCHES				
QC1: 42 QC2: 42	Yarway 4418C and 4418CE	I.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Rosemount Model 1153, Series B transmitters. Qualification is required for post-accident radiation only. Rosemount Test Report 108025, Rev B, dated February 1983, has been evaluated and found to qualify the Rosemount Model 1153, Series B transmitters for the normal service conditions and the postulated post-accident radiation at Dresden and Quad Cities units. The qualified life of the Model 1153, Series B has been determined by Rosemount to be 20 years; therefore, these components will require replacement at the end of this period. The qualified replacement components should be in NRC Category I.A, Equipment Qualified.
K. LEVEL SWITCHES				
QC1: None QC2: None	Magnetrol 291	NA	None	These components were originally considered to be in a mild area; therefore, they were deleted from the qualification program. Later, it was found that these components would be subjected to a harsh temperature environment for a short period of time during a LOCA. These components were previously tested, and the test results are provided in Wyle Test Report 43235-1, May 2, 1977. This report has been reviewed and evaluated and found to encompass the required time and temperature environment for Quad Cities units. Therefore, these qualified components should be in NRC Category I.A, Equipment Qualified.
L. LEVEL TRANSMITTERS				
None				
M. LOCAL CONTROL PANELS				
QC1: 65	Harlo, DRAW-D/297	I.B	Documented evidence of qualification inadequate.	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. These panels are required to be qualified for radiation only. A review of possible replacement panels on the market revealed that none were qualified to meet the required radiation dose. Therefore, the panels will be physically shielded to reduce their radiation dose to that of a mild environment. The panel shielding will be completed by March 1985. Therefore, the shielded panels should be in NRC Category III.B, Equipment Not in the Scope of the Review.

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
N. LOCAL PANELS				
None				
O. MONITORS, ACOUSTIC				
QC1: None QC2: 104	NDT Instruments Model 400A preamplifiers	I.B	None, pending modifications	This equipment item has been removed from the environmental qualification program pending completion of the following items: a. Detailed control room design review b. Response to NRC concerning compliance with Regulatory Guide 1.97, Rev 2 c. Determination of electrical equipment located in harsh environments required for TMI lessons-learned implementation (NUREG 0737) in accordance with IE Bulletin 79-0:B, Supplement 3, Item 2 Further details are included in Section I of this enclosure.
P. MOTOR CONTROL CENTERS				
QC1: 43 QC2: 43	General Electric 7700 Series	I.B	Documented evidence of qualification inadequate	Qualification deficiency was identified as the radiation parameter and was originally to be resolved by analysis and/or testing. This deficiency was applicable because these MCCs had not been qualified to a harsh radiation environment. Later, the qualification was selected to be by the method of testing. A detailed walkdown of the MCCs was completed to identify the specific components of each MCC. An investigative study was undertaken to properly select the components to be included in the test program. These components, which were obtained from the stations with consideration for the vintage, were assembled into a test model designed to be representative of all MCCs. A radiation test was conducted for this model. Wyle Test Report 45917-30 was evaluated. The deficiency is resolved by this test report, and this item is fully qualified to all environmental parameters. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.
Q. MOTOR-DRIVEN PUMPS				
QC1: 2 QC2: 2	General Electric 5K6338XC23A	I.B	Documented evidence of qualification inadequate	The qualification of these components was not established at the time of TER/SER review, and the components were slated to be qualified for radiation during a post-DBA operation only. General Electric has provided qualification documentation in its Report NEDC-30067/83NED025 (February 1983) for the motors at Quad Cities. Based on the evaluation of the data in these reports, these motors are qualified for the normal and the postulated post-DBA environmental conditions. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.

IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>Q. Motor-Driven Pumps (Continued)</u>				
QC1: 3 QC2: 3	General Electric 5K6336XC193	1.B	Documented evidence of qualification inadequate	The qualification of these components was not established at the time of TER/SER review, and the components were slated to be qualified for radiation during a post-DBA operation only. General Electric has provided qualification documentation in its Report NEDC-30067/83NED025 (February 1983) for the motors at Quad Cities. Based on the evaluation of the data in these reports, these motors are qualified for the normal and the postulated post-DBA environmental conditions. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.
<u>R. MOTOR EXHAUST FANS</u>				
QC1: 60	General Electric 5K256BK2038	1.B	Documented evidence of qualification is inadequate	The qualification of these components was determined to be inadequate at the time of the TER/SER review because qualified replacements were not identified. Therefore, they will be replaced by qualified Westinghouse motors. Qualification is required for radiation only. Radiation qualification is documented in Westinghouse Test Report MM9112, dated January 1982. Review of the test report revealed that these fan motors are qualified for the required radiation dose rate. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.

# IV. Specific Equipment EQ Deficiencies (continued)

## S. MOTOR OPERATORS

Note: Resolution of identified deficiencies for motors operators is complex because of the large number of different models involved and the variety of environments encountered for which qualification is required. The cross-reference table below provides the plant identification numbers of the operators included in each FRC item and references the specific deficiency and resolution for each operator. The numeric and letter entries of the cross-reference table correspond to deficiency and resolution descriptions that follow in continuation of the resolution table.

Unit 1				Unit 1				Unit 2			
FRC	Valve Number	Deficiency Number	Resolutions	FRC	Valve Number	Deficiency Number	Resolutions	FRC	Valve Number	Deficiency Number	Resolutions
4	MO-1-1402-3A,B	3 4	D D	25	MO-1-1001-16A,B; MO-1-1001-185A,B; MO-1-1001-19A,B; MO-1-1001-4A,B	3 4	B.1, G I, J	4	MO-2-1402-3A,B	3 4	D D
5	MO-1-1402-4A,B	3 4	B.1, G I, J	26	MO-1-1001-23A,B	3 4	B.4, G H, I, J	5	MO-2-1402-4A,B	3 4	B.1, G I, J
6	MO-1-1001-26A,B	3 4	B.4, G H, I, J	27	MO-1-1001-28A,B; MO-1-1001-34A,B	1 2 3 4	B.1 E G I, J	6	MO-2-101-26A,B	3 4	B.4, G H, I, J
7	MO-1-1402-25A,B; MO-1-1402-24A,B	3 4	B.4, G H, I, J	28	MO-1-1001-63	1	A.2	7	MO-1-1402-25A,B; MO-1-1402-24A,B	3 4	B.4, G H, I, J
8	MO-1-1402-38A,B	1 2 3 4	B.3 E G H, I, J	29	MO-1-1001-50	1	A.1	8	MO-2-1402-38A,B	1 2 3 4	B.4 E G H, I, J
13	MO-1-2301-4	1 2	A.2 A.2	34	MO-1-1001-60	1	B.2	13	MO-2-2301-4	1 2	A.2 E
14	MO-1-2301-5	1	B.2	39	MO-1-1201-2 MO-1-1301-16 MO-1-1201-2 MO-1-1301-16	1 1 2 2	A.1 A.2 E A.2	14	MO-2-2301-5	1	B.2
19	MO-1-220-1	1 2	A.2 A.2	40	MO-1-1201-5	1	B.1	19	MO-2-220-1	1 2	A.2 E
22	MO-1-1001-7A,B,C,D	3 4	D D	41	MO-1-3706 MO-1-3703 MO-1-3706 MO-1-3703	1 1 2 2	A.2 B.1 A.2 E	22	MO-2-1001-7A,B,C,D	3 4	B.1, G I, J
23	MO-1-1001-5A,B	3 4	B.4, G H, I, J	45	MO-1-3702	3 4	B.1, G I, J	23	MO-2-1001-5A,B	3 4	B.4, G H, I, J
24	MO-1-1001-18A,B MO-1-1001-29A,B MO-1-1001-36A,B MO-1-1001-37A,B MO-1-1001-18A,B MO-1-1001-29A,B MO-1-1001-36A,B MO-1-1001-37A,B	3 3 3 3 4 4 4 4	B.1, G B.4, G B.1 B.1 I, J H, I, J I, J I, J	46	MO-1-202-5A,B MO-1-202-9A,B MO-1-202-6A,B	1 1 1	A.3 C C	24	MO-2-1001-18A,B MO-2-1001-29A,B MO-2-1001-36A,B; MO-2-1001-37A,B	3 4 3 4 3 4	B.1, G I, J B.4, G H, I, J B.1, G I, J B.1, G I, J
				68	MO-1-202-4A,B	1	C				



IV. Specific Equipment EQ Deficiencies (continued)

Unit 2			
FRC	Valve Number	Deficiency Number	Resolutions
25	MO-2-1001-16A,B;	3	B.1, G
	MO-2-1001-185A,B;	4	I, J
	MO-2-1001-19A,B;		
	MO-2-1001-4A,B		
26	MO-2-1001-23A,B	3	B.4, G
		4	H, I, J
27	MO-2-1001-28A,B; MO-2-1001-34A,B	1	B.1, B.4 (34B only)
		2	E
		3	G
		4	H, I, J
28	MO-2-1001-63	1	A.2
29	MO-2-1001-50	1	A.1
34	MO-2-1001-60	1	B.2
39	MO-2-1201-2	1	A.1
		2	E
40	MO-2-1301-16	1	A.2
	MO-2-1201-5	1	B.1
41	MO-2-3706	1	A.2
	MO-2-3703	1	B.1
45	MO-2-3702	2	B.1, E
46	MO-2-202-5A,B	1	A.3
		2	E
	MO-2-202-9A,B	1	C
		2	C
	MO-2-202-6A,B	1	C
		2	C

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>S. Motor Operators (continued)</u>				
QC1: 8,13,14, 19,27,28,29, 34,39,40,41, 46,68	Limiterque Type SMB ac motors: Peerless, Reliance, Limitorque, dc motor: Peerless, Reliance	I.B, II.A,	1. Documented evidence of qualification inadequate	A. Limitorques Inside the Drywell 1) Operators inside the drywell with Type B motor insulation, no motor brakes, and operating times less than 2 minutes are being qualified utilizing Test Report WCAP-7410L, supplemented by Bechtel Thermal Analysis NUC-31, which demonstrates that the operators complete their function before exceeding the WCAP-7410L test temperature. Test Report WCAP-7410L has been evaluated and found acceptable to qualify these components to the required environment at Quad Cities. Therefore, these components qualified by the above test report and the analysis should be in NRC Category I.A, Equipment Qualified. 2) All SMB-000 size operators inside the drywell and all operators with operating time greater than 2 minutes are being replaced with operators qualified to Limitorque Test Report 600376. This test report has been evaluated and found acceptable to qualify these components to the required environment at Quad Cities. Therefore, these replacement components should be in NRC Category I.A, Equipment Qualified. 3) Operators inside the drywell with short operating times and motor brakes will have replacement motors that do not require brakes. These replacement motors are qualified to Test Report 600376. Test Report 600376 has been evaluated and found acceptable to qualify these new motors to the required environment at Quad Cities. Therefore, these operators with qualified replacement motors should be in NRC Category I.A, Equipment Qualified. 4) This operator, located inside the drywell, with an Electric Apparatus motor is being qualified utilizing the WCAP-7410L test report supplemented by a statement from Limitorque that, for purposes of environmental qualification, the Electric Apparatus motor is equivalent to a Reliance motor as used in the WCAP test. With the above qualification, this operator should be in NRC Category I.A, Equipment Qualified.
QC2: 8,13,14, 19,27,28,29, 34,39,40,41	Limiterque Type SMB ac motors: Peerless, Reliance, Electric Apparatus, Limitorque dc motors: Peerless, Reliance	I.B, II.A		B. Limitorques Outside the Drywell 1) Limitorque has stated by letter that, for the purpose of equipment qualification, the Class B insulation system of Dresden and Quad Cities dc motors is similar to the ac motors qualified in Test Report B0003. Test Report 600461-B0003 has been evaluated and found applicable to qualify these operators to their environmental service conditions at Quad Cities. Therefore, these operators should be in NRC Category I.A, Equipment Qualified.

IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>S. Motor Operators (continued)</u>				
				<p>2) Operators in the steam tunnel and torus with short operating times are qualified by Test Report B0003, supplemented by Bechtel Thermal Analysis NUC-29. The analysis shows that the thermally sensitive materials will not exceed the qualification test temperature in Test Report B0003. Therefore, these operators should be in NRC Category I.A, Equipment Qualified.</p> <p>3) Operators with unqualified motors will have replacement motors qualified to the service conditions and Limitorque Test Report 600461-B0003. Therefore, these qualified replacements should be in NRC Category I.A, Equipment Qualified.</p> <p>4) The motors with brakes will be replaced with new motors that do not require brakes. The new motors will be qualified to Report B0003, or the operators will be completely replaced with new operators qualified to either Test Report 600376 or B0003 depending on the service conditions. These qualified replacements should be in NRC Category I.A, Equipment Qualified.</p> <p>C. Non-Class IE Items, providing no safety-related functions, have been deleted from the program. Therefore, these operators should be in NRC Category III.A, Equipment Exempt from Qualification.</p> <p>D. Operators located in mild environment have been deleted from the program. Therefore, these operators should be in NRC Category III.B, Equipment Not in the Scope of the Review.</p> <p>E. Letters (referenced on SCEW sheets) from Limitorque state the applicability of the B0003 and WCAP-7410L test reports for each shop order and provide evidence of similarity to the test specimens.</p> <p>F. Mobil 28 grease has been installed on all torque and limit switches for operators located inside the drywell and steam tunnel to replace Beacon 325, which hardened due to elevated temperatures.</p> <p>G. A motor analysis is being prepared by Bechtel utilizing Test Reports B0058, B0003, and WCAP-7410L. This analysis will demonstrate that Class B motors can withstand a design basis accident following 40 years of installed life.</p>
QC1: 8,13,19, 27,39,41,46	Limitorque Type SMB ac motors: Reliance, Limitorque, Peerless dc motors: NA	I.B, II.A	2. Demonstrate adequate similarity between the equipment and the test specimen	
QC2: 8,13,19, 27,39,41	Limitorque Type SMB ac motor: Reliance, Limitorque dc motors: NA	I.B, II.A		
QC1: 4,5,6,7,8, 22,23,24,25, 26,27,45	Limitorque Type SMB ac motors: Peerless, Reliance, Limitorque dc motors: NA	I.C II.C	3. Evaluate age-related degradation for these operators	
QC2: 4,5,6,7,8, 22,23,24,25, 26,27,45	Limitorque Type SMB ac motors: Peerless, Reliance, Limitorque dc motors: NA	I.B, II.C		

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>S. Motor Operators (continued)</u>				
QC1: 4,5,6,7,8, 22,23,24,25, 26,27,45	Limiterque Type SMB ac motors: Peerless, Reliance, Limitorque dc motors: NA	I.B, II.C	4. Qualified life or replacement schedule not established	H. Specific outage dates have been provided for all replacement items.
QC2: 4,5,6,7,8, 22,23,24,25, 26,27,45	Limiterque Type SMB ac motors: Peerless, Reliance, Limitorque dc motors: NA	I.B, II.C		I. No other weak-link materials (besides the grease in resolution F above) have been identified by Limitorque or Bechtel that require ongoing maintenance or replacement.  J. Limitorque tests have preconditioned the motors to their end-of-life condition in accordance with 10 CFR 50.49 (Test Reports B0058, 600461-B0003, 600376, and WCAP-7410L).
<u>T. POSITION SWITCHES</u>				
QC1: 5B QC2: None	NAMCo, EA08011100	I.B	Documented evidence of qualification inadequate	At the time of TER/SER review, adequate evidence of qualification was not established for these position switches because qualified replacement switches were not identified. Qualification is required for all the accident environmental parameters, and aging is required because these components are subjected to harsh levels of radiation and temperature during normal operation. At Quad Cities Unit 1, the original switch has already been replaced with a NAMCo snap-lock Model EA180-11302 during November and December of 1982. At Quad Cities Unit 2, the existing switch will be replaced with the above NAMCo model during the next station outage. Qualification data for these NAMCo replacement switches is provided in NAMCo Test Report QTR 105, Rev 3, August 20, 1981. This report has been reviewed and found to qualify these new switches for the required accident environment. To establish a designated life, an analysis is being performed based on the data provided in the NAMCo test report. These qualified replacement components should be placed in NRC Category I.A, Equipment Qualified.
<u>U. PRESSURE SWITCHES</u>				
QC1: 21 QC2: 21	Static-O-Ring 12NN-KK215VX	I.B	Documented evidence of qualification is inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Rosemount Model 1153, Series B transmitters. The harsh environment parameters this equipment will encounter are temperature, pressure, and humidity during post-DBA operation. Radiation is considered mild at <1.0E04 rads. Rosemount Test Report 108025, Rev B, dated February 1983, which provides the qualification data for these transmitters, indicates that the transmitters are qualified for the required environmental conditions. The qualified life of the Model 1153, Series B transmitters has been determined by Rosemount to be 20 years; therefore, these components will require replacement at the end of this period. These qualified replacement components should be in NRC Category I.A, Equipment Qualified.



#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
U. Pressure Switches (continued)				
QC1: 33 QC2: 33	Static-O-Ring GWL-3	11.A	Documented evidence of qualification is inadequate	Not applicable because these components are not subjected to harsh environmental conditions; therefore, they are deleted from the qualification program. These components should be in NRC Category 111.B, Equipment Not in the Scope of the Review.
QC1: 36 QC2: 36	Static-O-Ring 12N-AA5-PP	11.A	Documented evidence of qualification is inadequate	Not applicable because these components are not subjected to harsh environmental conditions; therefore, they are deleted from the qualification program. These components should be in NRC Category 111.B, Equipment Not in the Scope of the Review.
QC1: None QC2: None	Barksdale B2T-A12SS	NA	None	These components were located in mild environments at the time of the TER/SER review; therefore, no deficiency was identified. Subsequently, deficiencies were identified for pressure, temperature, and humidity only. Therefore, these Barksdale B2T-A12SS pressure switches will be replaced with qualified Rosemount Model 1153, Series B transmitters. Rosemount has tested its Model 1153, Series B transmitters and provided the qualified documentation in Test Report 108025, Rev B, dated February 1983. The report has been reviewed and evaluated and found to qualify the transmitters for the required conditions. The qualified life of the Model 1153, Series B transmitters has been determined by Rosemount to be 20 years; therefore, these components will require replacement after this period. These qualified replacement components should be placed in NRC Category 1.A, Equipment Qualified.

#### V. PRESSURE TRANSMITTERS

QC1: None QC2: None	Bailey, B&W KG556220BAA1WFE	NA	None	At the time of the TER/SER review, no deficiency was identified for these Bailey pressure transmitters. However, these transmitters are required to be qualified for post-accident radiation only. Wyle has conducted testing on these transmitters and provided qualification documentation in Test Report 45917-60, September 1983. The report has been reviewed and evaluated, and it has been determined that these transmitters are qualified for the required accident radiation dose. Therefore, these qualified components should be placed in NRC Category 1.A, Equipment Qualified.
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#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
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#### V. Pressure Transmitters (continued)

QC1: 9,30 QC2: 9,30	GE/MAC 551	I.B	Documented evidence of qualification inadequate	At the time of TER/SER review, these components were scheduled for either testing or analysis. The decision was made to test the component for radiation because radiation caused by a design basis accident is the only harsh environment to which these components are ever subjected. Subsequently, the GE/MAC Model 551 and 553 transmitters were tested by Wyle Laboratories. Qualification was provided in Wyle Test Report 45917-1, July 30, 1982. Review and evaluation of the test report revealed that these components are qualified for the required conditions. Therefore, these qualified components should be in NRC Category I.A, Equipment Qualified.
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#### W. RADIATION DETECTOR

None

#### X. ELECTRIC MOTORS (ROOM COOL'R FAN MOTORS)

QC1: 37 QC2: 37	General Electric Model 5K215AK2476	I.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Westinghouse motors. The components are required to be qualified for post-accident radiation only. Westinghouse has provided the radiation qualified for the replacement motors in Test Report MM9112, dated January 1982. Based on review and evaluation of this report, it has been determined that the Westinghouse motors are qualified for the postulated accident radiation dose. Therefore, these qualified replacement components should be in NRC Category I.A, Equipment Qualified.
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#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>X. Electric Motors (Room Cooler Fan Motors) (continued)</u>				
QC1: 38 QC2: 38	General Electric Model K1B4AL2151	I.B	Documented evidence of qualification inadequate	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by qualified Westinghouse motors. The components are required to be qualified for post-accident radiation only. Westinghouse has provided the radiation qualified for the replacement motors in Test Report MM9112, dated January 1982. Based on review and evaluation of this report, it has been determined that the Westinghouse motors are qualified for the postulated accident radiation dose. Therefore, these qualified replacements should be in NRC Category I.A, Equipment Qualified.
<u>Y. SOLENOID VALVES</u>				
QC1: 16 QC2: 16	AVCo C5512 Gould, 320X39/320X30	I.B	Documented evidence of qualification inadequate	The November 1980 submittal identified these components as requiring qualification by testing or replacement. No information on replacement qualification was available at that time; therefore, FRC determined that documented evidence of qualification was inadequate. Subsequently, CECo joined a generic test program for these valves sponsored by TVA. The TVA test program was initiated at Wyle Laboratories to envelop all harsh environmental conditions at Quad Cities. The ongoing test program has currently established a 5-year qualification for these solenoid valves. In addition, an analysis will be performed to take credit for the tests being conducted to environmental conditions beyond those required and to establish a reasonable estimate of the qualified life and appropriate maintenance and replacement requirements.
QC1: 17 QC2: 17	AVCo/Target Rock C5450-5	II.C	Aging degradation not identified, qualified life and replacement schedule not established	At the time of the TER/SER review, these components were identified as Dresser Industries valve Model C5450-5. FRC noted that only age degradation was not identified and qualified life and replacement schedule were not established. Subsequently, these components were identified as Automatic Valve Corporation (AVCo) Model C5450-5 operators on Target Rock relief valves. As a result, these operators are required to be qualified to harsh environmental conditions due to temperature, humidity, pressure, radiation, and demineralized water spray. Thermal aging is also required to be addressed. General Electric Plant Design Engineering Memorandum 126-62, dated January 15, 1975, establishes qualification for these AVCo/Target Rock solenoid valves to the Quad Cities harsh environmental conditions. In addition, this report has been supplemented by a Bechtel analysis performed to establish a reasonable estimate of the designated life. Therefore, these qualified components should be in NRC Category I.A, Equipment Qualified.

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>Y. Solenoid Valves (continued)</u>				
QC1: 18 QC2: 18	Dresser 1525VX	11.C	Aging degradation not identified, qualified life and replacement schedule not established	During the TER/SER review, FRC indicated that aging degradation for these Dresser solenoid valves was evaluated inadequately and that qualified life and replacement schedule were not established. Later, it was also determined that these components would be exposed to higher levels of radiation and temperature than the original values stated in the November 1980 report. Therefore, these components are required to be qualified for temperature, radiation, and aging. Northeast Utilities Millstone 1 Project Engineering Program 42963, Section I, demonstrates partial qualification for these valves. This report is being supplemented by a Westec analysis to establish complete environmental qualification and proper maintenance and replacement requirements. Westec has identified all subcomponent materials and confirmed that a high-temperature insulation system was employed in these valves. This insulation system was also satisfactorily submergence-tested. The analysis is scheduled for completion in March 1984.
QC1: 47 QC2: 47	Versa VPS2502/VGS4522/ VGS4422	1.B	Documented evidence of qualification inadequate	At the time of TER/SER review, evidence of qualification was not adequately established for these Versa solenoid valves because qualified replacements were not identified. The Versa valves will be replaced by ASCo solenoid valve Model NP8344A73V at Quad Cities. Based on the evaluation of ASCo Test Report AQR-67368, Rev 0, these ASCo valves are qualified to the required environmental conditions at Quad Cities. Therefore, these qualified replacement components should be in NRC Category 1.A, Equipment Qualified.
QC1: 66	Versa VWS2302	1.B	Documented evidence of qualification inadequate	TER/SER review identified that the qualification documentation was inadequate because a qualified replacement was not identified for this Versa solenoid valve. After reevaluating the qualification requirements, it was determined that the SGTs butterfly valve is of the fail-open type and is normally open during system operation. It is not required to change position following an accident. Failure of this valve will not affect system safety functions; therefore, this component should be in NRC Category 111.A, Equipment Exempt from Qualification.
QC1: None QC2: 49	ASCo NP-1 706380-3RVF	11.C	Aging degradation not identified, qualified life and replacement schedule not established	An aging analysis had not been performed on this component at the time of the TER/SER review; therefore, aging degradation was not identified as a qualification parameter. The qualified life and replacement schedule were not established. Aging and qualified life were addressed generically in Attachment 5 to the TER/SER response. Bechtel has performed an analysis (Bechtel Calculation NUC-32, Rev 0, dated July 20, 1983) to determine the qualified life of the solenoid valve subcomponents on the basis of ASCo Test Report AQR-67368, Rev 0. Subcomponent replacement schedules have been established and are being incorporated in the plant maintenance and surveillance program. The qualified life for the subcomponents is as follows: Viton A static seal, 37 years and solenoid coil, 30 years. Therefore, these qualified components should be in NRC Category 1.A, Equipment Qualified.



IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
Z. SWITCHGEAR				
None				
AA. TEMPERATURE ELEMENTS				
QC1: 1 QC2: 1	Minco (for Panalarm) S51-1-103	I.B	Documented evidence of qualification inadequate	The identified deficiency was temperature and was originally to be resolved by material analysis. A literature search revealed that all teflon components of the Minco temperature element were inadequate for the required environment. Therefore, the existing resistance temperature detectors TE-1291-60A through -60H will be replaced with environmentally qualified temperature detectors manufactured by Conax Corporation. These Conax temperature detectors will provide an environmentally qualified system, which will have redundant sensing trains to detect steam leaks. Conax Test Report IPS-875 was evaluated, and the replacement components are fully qualified for the required environment. These qualified replacement components should be in NRC Category I.A, Equipment Qualified.
BB. TEMPERATURE SWITCHES				
QC1: 15 QC2: 15	UEC Type F7, Model 88B	II.A	Documented evidence of qualification inadequate	The TER/SER evaluations concluded that the qualification documentation was inadequate for these components because CECO's periodic calibration did not provide evidence of qualification in accordance with the DOR guidelines. These temperature switches are required to be qualified to harsh environmental conditions of temperature, humidity, pressure, and radiation. Thermal and radiation aging effects must also be established. Therefore, it was determined that the qualification would be established by either analysis or replacement. Subsequently, it was decided to replace the microswitch to establish material traceability and to qualify the components by analysis. An analysis is being performed using MCC Powers Test Report 734-79-002, Rev 1; Farr Company Test Report L-71063, Rev A; and the manufacturers' technical literature.

IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
<u>BB. Temperature Switches (continued)</u>				
QC1: 20,48 QC2: 20,48	Fenwal Model 17002-40	II.A	Documented evidence of qualification inadequate	The TER/SER evaluation concluded that the qualification documentation was inadequate for these components because CECO's periodic calibration did not provide evidence of qualification in accordance with the DOR guidelines. These temperature switches are required to be qualified to harsh environmental conditions of temperature, humidity, pressure, and radiation. Thermal and radiation aging effects must also be established. These switches have a very short operating time, and the accident radiation dose is correspondingly small. They are very simple devices with the most sensitive material (terion) located only on the lead wires. Therefore, qualification is being established by material analysis based on the manufacturer's technical literature; GE Report NED024217; GE Report DVI45C3004; Wyle Report 43854-1 of TVA; and Bechtel Chron 7089, dated March 11, 1983.
QC1: 64	Chromalox bimetal thermoswitch; manufac- turer unknown	I.B	Documented evidence of qualification inadequate	The TER/SER stated that qualification documentation was inadequate for the thermoswitch because qualified replacements were not identified. In the TER response, it was stated that qualification was required for harsh temperature, humidity, pressure, and radiation for the components and that qualified replacements would be installed during or before critical outages at the stations. Subsequently, the stations removed these switches from the circuitry because they were not required for system operation. Therefore, the components should be deleted from the IE Bulletin 79-01B scope and placed in NRC Category III.A, Equipment Exempt from Qualification.
QC1: 67	Pall Trinity micro- switch 14-T-2H	I.B	Documented evidence of qualification inadequate	<p>The SER/TER stated that qualification documentation was inadequate for the thermocouple because qualified replacements were not identified. Qualification is not required for these components because an environmentally qualified suppression pool temperature monitoring (SPTM) system will be installed to monitor water temperature, thereby providing the same function as the subject thermocouples.</p> <p>The SPTM system has been removed from the environmental qualification program pending completion of the following items:</p> <ol style="list-style-type: none"> <li>Detailed control room design review</li> <li>Response to NRC concerning compliance with Regulatory Guide 1.97, Rev 2</li> <li>Determination of electrical equipment located in harsh environments required for TMI lessons-learned implementation (NUREG 0737) in accordance with IE Bulletin 79-01B, Supplement 3, Item 2</li> </ol> <p>Further details are included in Section I of this enclosure.</p>

#### IV. Specific Equipment EQ Deficiencies (continued)

FRC Item Number	Description (Manufacturer, Model, Etc)	NRC Category	Deficiencies	Proposed Resolution
CC. TERMINAL BLOCKS				
QC1: 57	Allen-Bradley	1.B	Documented evidence of qualification	These components were scheduled for replacement; however, no qualified replacement was identified at the time of the TER/SER review. Therefore, documented evidence of qualification was indicated as inadequate. They will be replaced by Marathon Series 1500 terminal blocks. The equipment is required to be qualified for harsh environment due to temperature, pressure, humidity, radiation, and demineralized water spray during post-DBA operation. In addition, thermal aging at 150F is required for the remaining 30 years. The Marathon Series 1500 terminal blocks were tested by Wyle Laboratories and qualified by Wyle Test Report TIE-45603-1, February 18, 1982. Based on review and evaluation of this report, it has been determined that the equipment has a qualified life of 40 years and is qualified for the postulated accident environment. These qualified replacement components should be in NRC Category 1.A, Equipment Qualified.
QC2: None	Allen-Bradley		inadequate	
DD. OILS AND GREASES				
None	Mobil 28	None	None	Qualified by Mobil Technical Bulletin, May 1974; used in Limitorques.
None	Mobil DTE medium heavy	None	None	Qualified by Mobil Technical Bulletin, May 1974; used in General Electric LPCI, core spray, RHR, and shutdown cooling pump motors.