FINAL DRAFT EQUIPMENT ENVIRONMENTAL QUALIFICATION

COMMONWEALTH EDISON COMPANY QUAD CITIES NUCLEAR POWER STATION UNIT 1

NRC DOCKET NO. 50-254

NRC TAC NO. 42478

EG&G IDAHO, INC. SUBCONTRACT NO. K-7015

Prepared by

Franklin Research Center The Parkway at Twentieth Street Philadelphia, PA 19103 FRC PROJECT C5417 FRC TASK 12

FRC Group Leader: C. J. Crane

Prepared for

EG&G Idaho, Inc. Idaho Falls, Idaho 83401

January 31, 1981

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Because of schedule limitations, this report draft has not gone through the complete review cycle of FRC. While the overall conclusion is expected to remain the same, the reader is cautioned that some details of the report may change as the review is completed.





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1. INTRODUCTION

1.1 PURPOSE OF THE REVIEW

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The NRC Office of Inspection and Enforcement (IE) issued Bulletin 79-01B, "Environmental Qualification of Class LE Equipment" in January 1980. This Bulletin required the Licensee to perform a detailed evaluation of the environmental qualification of Class LE electrical equipment required to function under postulated accident conditions and to submit a report on this action.

The objectives of the NRC Equipment Environmental Qualification Review program are to evaluate nuclear power plant safety-related electrical equipment in accordance with criteria established by the NRC and to identify (1) equipment whose qualification documentation is adequate, i.e., substantiates that equipment is capable of performing its specified design basis safety function when it is exposed to a harsh environment and (2) equipment whose qualification documentation is deficient, i.e., does not give reasonable assurance that the equipment is capable of performing it specified safety function.

To meet the overall program goals, the objective of this Technical Evaluation Report is to review the Licensee's submittals to determine if the Licensee reviewed its safety-related electrical equipment for environmental qualification in accordance with the DOR Guidelines and NUREG-0588 as required by IE Bulletin 79-01B. The NRC will perform an audit of the qualification documentation references as part of its safety evaluation program. If discrepancies are found, the audit will be extended.

1.2 GENERIC ISSUE BACKGROUND

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Safety-related electrical equipment must be capable of performing design safety functions under all normal, abr mal, and accident conditions. Of particular concern is the assurance that equipment will remain operable during

and following exposure to the harsh environmental conditions (i.e., temperature, pressure, humidity (steam), chemical sprays, radiation, and submergence) imposed as a result of a design basis accident. These harsh environments are generally defined by the limiting conditions resulting from the complete spectrum of postulated break sizes, break locations, and single failures consequent to a loss-of-coolant accident (LOCA), main steam line break (MSLB) inside the reactor containment, or a high energy line break (HELB) outside reactor containment (such as a main steam or feedwater line break). The purpose of equipment qualification is to provide tangible evidence that equipment will operate on demand and to verify design performance, thereby establishing assurance that the potential for common-mode failure is minimized.

Qualification criteria applied during the licensing of the older nuclear plants have been modified over the years, and industry standards concerning qualification have been revised as the design of reactor systems has changed and as regulatory and operating experience has accumulated. Examples of such standards are IETE Standards 279-71, 323-74, 383-74, 317-76, 334-74, 382-72, and 381-77. NRC NUREG documents 0413 and 0588 have been developed to address this topic. In particular, NUREG-0588 (published for comment in December 1979) formally presented the NRC staff positions regarding selected areas of environmental qualification of safety-related electrical equipment in the resolution of General Technical Activity A-24, "Qualification of Class IE Safety Related Equipment." The positions documented therein are applicable to plants that are or will be in the construction permit or operating license review process.

Although qualification standards and regulatory requirements have undergone considerable development, all of the currently operating nuclear power plants are required to comply with 10CFR50, Appendix A, General Design Criteria for Nuclear Power Plants, Section I, Criteria 4. This criterion states in part that "structures, systems and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents."

In addition, gualification requirements are also embodied in 10CFR50 Appendix A, General Design Criteria 1, 2, and 23 and Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criteria III and XI. These requirements are applicable to safety-related equipment located inside as well as outside of containment.

The NRC staff has evaluated the Licensee's equipment qualification program by reviewing the qualification documentation of selected safety-related equipment as part of the operating license review for each plant. The NRC staff has also used a variety of methods to assure that these general requirements are met for electrical safety-related equipment. In the oldest plants, qualification was based on the fact that electrical components were of high industrial quality. After 1971, qualification was judged on the basis of IEEE 323-71; however, no regulatory guide /as issued adopting the IEEE 323-71 standard. For plants whose Safety Evaluation Reports were issued after July 1, 1974, the Commission issued Regulatory Guide 1.39 which in most respects adopted the most recent standard, IEEE 323-74.

In 1977, the NRC staff instituted the Systematic Evaluation Program (SEP) to determine the degree to which the older operating nuclear plants deviated from current licensing criteria. The subject of electrical equipment environmental qualification (SEP Topic III-12) was selected for accelerated evaluation as part of this program. Seismic qualification of equipment was to be addressed as a separate SEP topic. In December 1977, the NRC issued a generic letter to all SEP plant Licensees requesting that they initiate reviews to determine the adequacy of existing equipment qualification documentation.

Preliminary NRC review of Licensee responses led to the preparation of NUREG-0458, an interim NRC assessment of the environmental qualification of electrical equipment. This document concluded that "no significant safety deficiencies requiring immediate remedial actions were identified." However, it was recommended that additional effort should be devoted to examining the installation and environmental qualification documentation of specific electrical equipment in all operating reactors.

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On May 31, 1978, the NRC Office of Inspection and Enforcement issued IE Circular 78-08, "Environmental Qualification of Safety-Related Electrical Equipment at Nuclear Power Plants," which required all Licensees of operating plants (except those included in the SEP program) to examine their installed safety-related electrical equipment and ensure appropriate qualification documentation for equipment function under postulated accident conditions. Subsequently, on February 8, 1979, the NRC Office of Inspection and Enforcement issued IE Bulletin 79-01, which was intended to raise the status of IE Circular 78-08 to the level of Bulletin, i.e., action requiring a Licensee response. This Bulletin required a complete re-review of the environmental qualification of safety-related electrical equipment as described in IE Circular 78-08.

The review of the Licensee responses indicated certain deficiencies within the scope of equipment addressed, definition of harsh environments, and adequacy of support documentation. It became apparent that generic criteria were needed to evaluate the electrical equipment environmental qualification for both SEP and non-SEP operating plants. Therefore, during the second half of 1979, the Division of Operating Reactors (DOR) of the NRC issued internally a document entitled "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors." (The document is hereafter referred to as the "DOR Guidelines.") The document was prepared as a screening standard for reviewing all operating plants, including SEP plants. Originally it was intended that the Licensees would evaluate their qualification documentation in accordance with the DOR Guidelines. However, initial NRC review of this documentation, which was compiled to support Licensee submittals, revealed the need for obtaining independent evaluations and for accelerating the qualification review program.

In October 1979, the NRC awarded Franklin Research Center (FRC) a contract to provide assistance in the "Review and Evaluation of Licensing Actions for Operating Reactors," which included an assignment for review of equipment environmental gualification under SEP Topic III-12. FRC was given the assignment to review equipment environmental gualification documentation

and to present the results in the form of a Technical Evaluation Report for each plant included in this program.

On January 14, 1980, the NRC Office of Inspection and Enforcement issued the XCR Guidelines and IE Bulletin 79-01B, which expanded the scope of IE Bulletin 79-01 and requested additional information on environmental qualification of safety-related electrical equipment at operating facilities, excluding the 11 facilities undergoing the SEP review. This Bulletin stated that the criteria to be used in evaluating the adequacy of the safety-related electrical equipment qualification are the DOR Guidelines. The scope of the review was expanded to include high energy line breaks (inside and outside containment) in addition to equipment aging and submergence. The NRC advised the Licensees that the criteria contained in the DOR Guidelines would be used in its review of Licensee submittals; problems arising from this review would be resolved using NUREG-0588 as a guide.

In early February 1980, the NRC decided that Indian Point Units 2 and 3 a.d Zion Units 1 and 2 should be included within SEP Topic III-12 for the purpose of equipment environmental qualification review.

On February 21, 1980, the NRC and representatives of the SEP Plant Owners Group held an open meeting at NRC headquarters to discuss an accelerated review program in accordance with the DOR scheening guidelines. Representatives of the Indian Point Units and Zion Station also attended this meeting. The NRC formally issued to all Licensees represented at the meeting the DOR Guidelines document [29]* which included a second document, "Guidelines for Identification of That Safety Equipment of SEP Operating Reactors for Which Environmental Qualification Is To Be Addressed," [29] together with the request that the Licensees review their plant systems and provide additional equipment environmental qualification information to the NRC on an accelerated schedule.

For non-SEP plants, the NRC Office of Inspection and Enforcement formed a task force including a principal reviewer in each region and a task leader from headquarters. The regional members are responsible for the technical

*For References, see Section 6.

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review of the Licensees' responses to IE Bulletin 79-01B, and the task leader is responsible for the overall coordination of the review effort with NRC to assure overall consistency. The regional reviewers held meetings with the Licensees in their respective regions which resulted in staff positions being issued in a supplement to IE Bulletin 79-01B dated February 29, 1980.

In April 1980, the NRC organizational structure was modified and the Equipment Qualification Branch was formed within the new Division of Engineering. Responsibility for reviewing the status of equipment qualification for all plants was assigned to this branch.

On May 27, 1980, the NRC issued Memorandum and Order CLI-80-21, [32] specifying that Licensees and applicants must meet the requirements set forth in the DOR Guidelines and NUREG-0588 regarding environmental qualification of safety-related electrical equipment in order to ratisfy 10CFR50, Appendix A, General Design Criteria, Section I, Criterion 4. This Order also established that the Safety Evaluation Reports on this subject, to be prepared by the NRC staff, must be issued on February 1, 1981 and that all subsequent actions to be taken by Licensees to achieve full compliance with the DOR Cuidelines or NUREG-0588 must be completed no later than June 30, 1982.

In October 1980, EG&G awarded Franklin Research Center (FRC) a contract to provide assistance in the equipment environmental qualification review for 13 of the plants whose Licensees responded to IE Bulletin 79-01B. FRC was given the assignment to evaluate the Licensee's equipment environmental qualification submittal and to present the results in the form of a Technical Evaluation Report for each plant.

1.3 SPECIFIC ISSUE BACKGROUND

The staff beld regional meetings with the Licensees and interested parties during the week of July 13, 1980 in various locations. The staff issued a second supplement to IE Bulletin 79-013, a response to significant questions raised during the public meetings, and two Orders. The Order dated May 30, 1980 required the Licensees to comply with the previously issued Commission Memorandum and Order of May 27, 1980 (CLI-80-21). The above Orders

required the Licensees to complete the tasks identified in IE Bulletin 79-01B no later than November 1, 1980 to allow the staff to comply with the February 1, 1981 date imposed by the Commission Order. The responses to the questions were issued on February 29, 1980; and the second and third supplements to IE Bulletin 79-01B, highlighting the staff positions affecting the Licensees' responses, were issued September 29 and October 24, 1980, respectively.

1.4 SCOPE OF THE REVIEW

Environmental qualification of safety-related electrical equipment was selected by the NRC for accelerated review. Therefore, the scope of this report is limited to equipment that must function to mitigate the consequences of a loss-of-coolant accident (LOCA) or high energy line break (HELB) and whose environment is adversely affected by that event. In addition, IE Bulletin 79-01B requires environmental qualification for all safety-related electrical equipment exposed to a harsh environment in accordance with the DOR Guidelines or NUREG-0588. Harsh environments include the limiting conditions resulting from (i) the entire spectrum of postulated line breaks resulting from a loss-of-coolant accident (LOCA) or a high energy line break (HELB) inside and outside of containment and (ii) radiation from fluids which are recirculated from inside containment to accomplish long-term cooling subsequent to an accident. Qualification aspects not included within the scope of this evaluation are:

seismic qualification

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- equipment protection against natural phenomena
- equipment operational service conditions (e.g., vibration, voltage, and frequency deviations)

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- equipment located where it is subject to outdoor environments
- equit ent protection against fire hazards
- equipment protection against missiles.

2. NRC CRITERIA FOR ENVIRONMENTAL QUALIFICATION

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2. NRC CRITERIA FOR ENVIRONMENTAL QUALIFICATION

2.1 CRITERIA PROVIDED BY THE NRC

The DOR screening guidelines used by FRC to evaluate the electrical equipment environmental gualification program were:

- "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" [29]
- "Guidelines for Identification of That Safety Equipment of SEP Operating Reactors for Which Environmental Qualification Is To Be Addressed" [29]
- NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment." [34]

These guidelines were issued by the NRC in February 1980 for implementation by all Licensees.

2.2 STAFF POSITIONS AND SUPPLEMENTAL CRITERIA

The NRC identified the following staff positions and supplemental criteria to be used in conjunction with the referenced DOR screening guidelines.

2.2.1 SERVICE CONDITIONS INSIDE CONTAINMENT FOR A LOSS-OF-COOLANT ACCIDENT (DOR GUIDELINES SECTION 4.1)

For Pressurized Water Reactors (PWRs), the DOR Guidelines state that the containment temperature and pressure conditions as a function of time should be based on the most recent NRC-approved service conditions specified in the Final Safety Analysis Report (FSAR) or other Licensee documentation. In the specific case of pressure-suppression type containments, the following minimum high temperature conditions may be used: (1) Boiling Water Reactor (BWR) Drywells -- 340°F for 6 hours and (2) PWR Ice Condenser Lower Compartments -- 340°F for 3 hours. As stated in Supplement 2 to IE Bulletin 79-01B, [30] "these values are a screening device, per the Guidelines, and can be used in

lieu of a plant-specific profile, provided that expected pressure and humidity conditions as a function of time are accounted for."

Service conditions should bound those expected for coolant and steam line breaks inside containment with due consideration given to analytical uncertainties. The steam line break condition should include superheated conditions, with peak temperatu and subsequent temperature/pressure profile as a function of time. If containment spray is to be used, the impact of the spray on required equipment should be accounted for.

The adequacy of a plant-specific profile is dependent on the assumptions and design considerations at the time the profiles were developed. The DOR Guidelines and NUREG-0588 provide guidance and considerations required to determine if the calculated plant-specific temperature/pressure profiles encompass the LOCA and HELB accidents inside containment.

2.2.2 SUBMERGENCE

(DOR GUIDELINES SECTION 4.1, SUBITEM 3; and SECTION 4.3.2, SUBITEM 3)

Equipment submergence (inside or outside containment) should be addressed where the possibility exists that submergence of equipment may result from HELBs or other postulated occurrences. Supplement 2 to IZ Bulletin 79-01B [30] provides the following additional criterion: If the equipment satisfies the guidance and other requirements of the DOR Guidelines or NUREG-0588 for the LOCA and HELB accidents, and the Licensee demonstrates that its failure will not adversely affect any safety-related function or mislead the operator after submergence, the equipment can be considered exempt from the submergence portion of the qualification requirements.

2.2.3 EQUIPMENT LOCATED IN AREAS NORMALLY MAINTAINED AT ROOM CONDITIONS (DOR GUIDELINES SECTION 4.3.3)

Supplement 2 of IE Bulletin 79-01B [30] permits deferment of the review of environmental qualification for all safety-related equipment items located in plant areas where the equipment is not exposed to the direct effects of a HELB or to nuclear radiation emanating from circulation of fluids containing radioactive substances. At the Licensee's option, the review may be deferred until after February 1, 1981.

By June 30, 1982, all safety-related electrical equipment potentially exposed to a harsh environment in nuclear generating stations licensed to operate on or before June 30, 1982 shall be qualified to either the DOR Guidelines or NUREG-0588 (as applicable). Safety-related electrical equipment is that required to bring the plant to a cold shutdown condition and to miggate the consequences of the accident. It is the responsibility of the Licensee to evaluate the qualification of safety-related electrical equipment to function in environmental extremes not associated with accident conditions and to document it in a form that will be available for the NRC to audit. Qualification to assure functioning in mild environments must be completed by June 30, 1982.

2.2.4 SIMULATED SERVICE CONDITIONS AND TEST DURATION (DOR GUIDELINES SECTION 5.2.1)

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The Guidelines require that the test chamber environment envelop the required service conditions for a time equivalent to the period from the initiation of the accident until the service conditions return to normal. Supplement 2 to IE Bulletin 79-01B (30) provides the following additional criterion: "Equipment designed to perform its safety-related function within a short time into an event must be qualified for a period of at least 1 hour in excess of the time assumed in the accident analysis. The staff has indicated that time is the most significant factor in terms of the margins required to provide an acceptable confidence level that a safety-related function will be completed. The 1-hour qualification requirement is based on the acceptance of a type test for a single unit and the spectrum of accidents (small and large breaks) bounded by the single test."

2.2.5 DEFERMENT OF QUALIFICATION REVIEW

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Supplement 3 to IE Bulletin 79-01B [31] permits the submittal of qualification documentation regarding the TMI Action Plan equipment and the equipment required to achieve and maintain a cold shutdown condition to be delayed as follows:

 Qualification information for installed TMI Action Plan equipment musc be submitted by February 1, 1981.

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- Qualification information for future TMI Action Plan equipment (reference NUREG-0737, when issued), which requires NRC pre-implementation review, must be submitted with the pre-implementation review data.
- Qualification information for TMI Action Plan equipment currently under NRC review should be submitted as soon as possible.
- Qualification information for TMI Action Plan equipment not yet installed that does not require pre-implementation review should be submitted to NRC for review by the implementation date.
- Qualification information for equipment required to achieve and maintain a cold shutdown condition should not be submitted later than February 1, 1981.

2.2.6 TEST SEQUENCE (DOR GUIDELINES SECTION 5.2.3)

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Supplement 2 to IE Bulletin 79-01B [30] provides the following additional criteria:

"Sequential testing requirements are specified in NUREG-0538 and the DOR Guidelines. Licensees must follow the test requirements of the applicable document.

- If the test has been completed without aging in sequence, justification for such a deviation must be submitted.
- If testing of a given component has been scheduled but not initiated, the test sequence/program should be modified to include aging.
- Test programs in progress should be evaluated regarding the ability to comply by incorporating aging in the proper sequence. These programs would then fall in the first or second category."

2.2.7 RADIATION

(DOR GUIDELINES SECTIONS 4.1.2, 4.2.2, and 4.3.2, SUBITEM 2)

Supplement 2 to IE Bulletin 79-01B [30] provides the following additional criteria:

"Both the DOR Guidelines and NUREG-0538 are similar in that they provide the methods for determining the radiation source term when considering LOCA events inside containment (100% noble gases/50% iodine/1% particulates). These methods consider the radiation source term resulting from an event which completely depressurizes the primary system and releases the source term inventory to the containment.

NUREG-0578 provides the radiation source term to be used for determining the qualification doses for equipment in close proximity to recirculating fluid systems inside and outside containment as a result of LOCA. This method considers a LOCA event in which the primary system may not depressurize and the source term inventory remains in the coolant.

NUREG-0588 also provides the radiation source term to be used for qualifying equipment following non-LOCA events both inside and outside containment (10% noble gases/10% iodine/0% particulates).

When developing radiation source terms for equipment qualification, the Licenze must ensure consideration is given to those events which provide the most bounding conditions. The following table summarizes these considerations (RCS = reactor coolant system):

		LOCA	Non-LOCA HELB				
Outside Containment		NUREG-0578 (100/50/1 in RCS)	NUREG-0588 (10/10/0 in RCS)				
Inside Containment		Larger of					
		NUREG-0588 (100/50/1 in Containment)	NUREG-0588 (10/10/0 in RCS)				
		or					

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NUREG-0578 (100/50/1 in RCS)

Gamma equivalents may be used when consideration of the contributions of beta exposure has been included in accordance with the guidance given in the DOR Guidelines and NUREG-0588. Cobalt-60 is one acceptable gamma radiation source for environmental gualification of safety-related equipment. Cesium-137 may also be used."



3. METHODOLOGY USED BY FRC

IE Bulletin 79-01B required the Licensee to:

- provide a master list which identifies the systems and electrical equipment required to function during and subsequent to an accident and to maintain the plant in a safe condition
- provide the environmental service conditions
- identify the submergence levels
- provide written evidence of the qualification of the equipment identified
- evaluate the qualification documentation using the DOR Guidelines and NUREG-0588
- submit a Licensee Event Report (LER) for electrical equipment determined not to be environmentally qualified.

The requirements of IE Bulletin 79-01B were requested under provisions of 10CFR50.54(f), "Conditions of Licenses," which requires the Licensee to submit written statements, signed under oach or affirmation, to enable the Commission to determine whether or not a license should be modified, suspended, or revoked.

To provide assurance that the Licensee implemented the requirements of IE Bulletin 79-013 and to provide a basis for the NRC Safety Evaluation Report (SER), FRC developed this Technical Evaluation Report (TER) by:

- assessing the Licensee's responses in relation to the general requirements of the DOR Guidelines as augmented by the supplements to the 79-01B Bulletin
- using NUREG-0588 to resolve open issues.

The results and conclusions contained in this report are valid assuming that the Licensee's analyses of test reports referenced in the Licensee submittal are correct. Review of test reports was not within the scope of FRC's assignment. However, the NRC staff will audit selected analyses and

test reports, incorporating the results of the reviews with the conclusions of the TERS, when developing the plant-specific SERs.

The Licensee, Commonwealth Edison Co., identified an extensive list of safety-related electrical equipment items in various locations of the Quad Cities Nuclear Power Station Unit 1 in its submittals to the NRC. FRC analyzed the Licensee's listing and grouped together all identical equipment items located within plant areas that are exposed to the same environmental service conditions. This analysis resulted in a reduced listing containing (148) different equipment items that formed the basis for the review. Appendix A contains the environmental service conditions for each location, Appendix B contains a tabulation of the equipment items and locations (the tabulation does not include equipment covered by the evaluation deferment described in Section 2.2.3 of this report), and Appendix C lists the plant systems identified by the Licensee and the NRC as being essential to safety.

Using the listing of safety-related electrical equipment items,* each equipment item was reviewed by FRC in relation to:

- NRC DOR Guidelines, as modified by NRC staff interpretations
- · Licensee definition of harsh service environments (Appendix A)
- analysis and/or justification of gualification
- Licensee-proposed remedies for gualification deficiencies.

Topics not within the scope of FRC evaluation are:

- · completeness of the Licensee's listing of safety-related equipment
- acceptability of Licensee-provided environmental service conditions
- acceptability of Licensee-stated position concerning safety system or component function
- review and acceptability of qualification test reports and other qualification documentation.

"In this report, the term "safety-related electrical equipment" refers to the equipment defined by the two NRC Guidelines referenced in Section 2.1.

Upon completion of the final review for each equipment item, FRC developed an overall evaluation of the component and a specific conclusion with respect to its qualification. Based on the FRC conclusion, each equipment item was assigned to one of the generic qualification categories provided by the NRC. NRC categories are described below.

All equipment item numbers discussed in Section 4 of this report are associated with Reference 33.

The NRC Office of Inspection and Enforcement conducted an on-site verification inspection of selected 1E equipment to verify proper 'nstallation of equipment, overall interface integrity, location with respect to flood level for equipment inside the containment, and manufacturer's nameplate data. The manufacturer and model number from the nameplate data were compared to information given in the System Component Evaluation Work Sheets (SCEWS) of the Licensee's report. The details of this site inpection are documented in an internal NRC memorandum [35] and will be addressed by the NRC.

NRC QUALIFICATION CATEGORIES AND DEFINITIONS

 NRC Category I.a EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES

This category includes equipment items which are fully acceptable on the basis that all applicable criteria defined in the DOR Guidelines are satisfied and that the equipment has been found to be gualified for the life of the plant.

 NRC Category I.b EQUIPMENT FOR WHICH DEVIATIONS FROM THE DOR GUIDELINES ARE JUDGED ACCEPTABLE

This category includes equipment items which do not satisfy one or more of the applicable criteria defined in the DOR Guidelines; however, sufficient information has been presented to determine that the specific deviations are acceptable.

• NRC Category II.. EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES AND HAS A SERVICE LIFE LESS TIAN PLANT LIFE

This category includes equipment items that are fully acceptable on the baris that all applicable criteria defined in the DOR Guidelines are satisfied and that the equipment is gualified for a specific time interval which is less than plant life.

NRC Category II.b
EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR
GUIDELINES PROVIDED THAT SPECIFIC MODIFICATIONS ARE MADE

This category includes equipment items which will be fully acceptable and will satisfy all applicable criteria defined in the DOR Guidelines provided that specific modifications are made on or before the designated date. When the modifications are complete, the equipment can be considered gualified.

 NRC Category II.c EQUIPMENT FOR WHICH DEVIATIONS FROM THE DOR GUIDELINES ARE JUDGED ACCEPTABLE

This category includes equipment items which do not satisfy one or more of the applicable criteria defined in the DOR Guidelines; however, either sufficient bases have been presented to allow a determination that the specific deviations are judged to be acceptable for less than plant life or the specific deviations are judged by PRC to be acceptable for less than plant life based on review of the applicable qualification documentation associated with the general equipment environmental qualification program.

 NRC Category III EQUIPMENT THAT IS EXEMPT FROM QUALIFICATION

This category includes equipment items which are exempt from qualification on the basis that (i) the equipment does not provide a safety function (i.e., should not have been included in the equipment list submitted by the Licensee), (ii) the specific safety-related function of the component can be accomplished by some other designated component which is fully qualified, or (iii) the equipment is not subject to a potentially adverse environment as a result of accidents for which proper operation of the equipment is required. In addition, any failure of the exempt component must not degrade the ability of a qualified component to perform its required safety-related function.

• NRC Category IV.a EQUIPMENT WHICH HAS QUALIFICATION TESTING SCHEDULED BUT NOT COMPLETED

The qualification of equipment items in this category has been judged deficient or inadequace based upon review of the documentation provided by the Licensee. However, the Licensee has stated that the equipment item is

scheduled to be tested by a designated date. The results of the testing will dictate the specific qualification category of the equipment item. Specific justification for interim plant operation prior to testing should be provided for each item.

 NRC Category IV.b
EQUIPMENT FOR WHICH QUALIFICATION DOCUMENTATION IN ACCORDANCE WITH THE GUIDELINES HAS NOT BEEN ESTABLISHED

The qualification of equipment items in this category is deficient or inconclusive based upon review of the documentation provided by the Licensee. This equipment is judged to have a high likelihood of operability for the specified environmental service conditions; however, complete and auditable records reflecting comprehensive qualification documentation have not been made available for review. Specific justification for interim plant operation should be provided for each item.

NRC Category V EQUIPMENT WHICH IS UNQUALIFIED

The DOR Guidelines require that complete and auditable records reflecting a comprehensive qualification methodology and program be referenced and made available for review of all Class 1E equipment.

The qualification of equipment items in this category has been judged to be deficient or inadequate, based upon review of the documentation provided by the Licensee. The extent to which the equipment items fail to satisfy the crite i of the DOR Guidelines can be categorized as follows: (i) documentatio. .eflecting qualification as specified in the DOR Guidelines has not been made available for review, (i) qualification documentation made available for review is inadequate, or (iii) the documentation indicates that the equipment item has not passed the required tests.

 NRC Category VI EQUIPMENT FOR WHICH QUALIFICATION IS DEFERRED

This category includes equipment items which have been addressed by the Licensee in the equipment environmental qualification submittals; however, the qualification review of this equipment has been deferred by the NRC in accordance with criteria presented in Sections 2.2.3 and 2.2.5 of this report.



4. TECHNICAL EVALUATION

4.1 METHODOLOGY USED BY THE LICENSEE

The final response to IE Bulletin 79-01B from the Licensee dated November 1, 1980 contained a general introductory section which described the Licensee's basic approach to qualification and evaluation methodology. A review by FRC has generated the following observations and concerns.

4.1.1 ENVIRONMENTAL CONDITIONS

 The Licensee states in Section 4.1 of its response the following approach to applying DBE conditions to equipment:

Where components, because of their location, could be subject to differing environments for the various accidents, the most severe environmental conditions were utilized for qualification. Components located within compartments with postulated HELBs would be subjected to pressure, temperature, and humidity conditions resulting from that HELB, but would not be subjected to radiation doses in excess of 5 x 10⁴ rads simultaneously. These same components could be subjected to radiation doses in excess of 5 x 104 rads following a LOCA, but these doses would not be simultaneous with pressure, temperature and humidity. To simplify this analysis, qualification data was initially sought which demonstrated operability of these components for the combination of all environmental conditions. where qualification could not be demonstrated for the entire spectrum of conditions simultaneously, components were evaluated for the conditions associated with each individual accident. Environmental conditions are based on the specific accidents for which the components must function. Components which are exposed to harsh environments during accidents for which they are not required to function do not require gualification for these environments. Where qualification testing is to be performed, testing will be performed for each postulated environment separately.

FRC's position is that all components which have potential common-mode failures due to environmental stress must be qualified if any such failure would adversely affect connected circuits. Therefore, equipment which has no active function during a DBE cannot be exempted from qualification for this reason only. Also, FRC is concerned that qualification for a short operating

period may not be sufficient if failures in equipment at some point after a required operating period would adversely affect connected circuits. FRC notes that short operating periods are given for some of the equipment listed in the Licensee's submittal. It was not obvious that the environments specified would remain as given if the additional 1 hour of operating time required by the NRC is added to the stated operating time.

 The Licensee has used the following assumptions in evaluation of harsh and non-harsh areas:

> a. Integrated doses have been calculated for areas outside the drywell. Doses were established for 1 day, 30 days, and 1 year exposure. Integrated doses of less than 5 x 10⁴ rads during a component's service life are evaluated as nonharsh environmental conditions. Integrated doses of 5 x 10⁴ rads and greater are evaluated as harsh environmental conditions.

For certain electronic equipment, such as process parameter transmitters, susceptibility to performance degradation may occur at threshold levels lower than 5 x 10^4 rads. For other types of electrical equipment which do not contain electronic components, FRC does not expect noticeable degradation to occur below 5 x 10^4 rads.

b. Environments were considered nonharsh when the temperature was controlled to 104°F or less and the maximum integrated radiation dose was less than 5 x 10⁴ rads. Areas where infrequent temperature extremes up to 120°F could occur, and additionally, where temperature variations are not a result of the postulated accidents are considered as mild environments. Equipment in these areas functions normally in the same environment as postulated for post-accident conditions. For nonharsh and mild environments, qualification data is not required.

FRC believes that the Licensee's approach is less conservative than is permitted by the Guidelines. It is FRC's understanding that power plant equipment is usually designed for an environment of 50-104°F, 30-70% RH, and negligible radiation dose. This is not intended to imply that the equipment should be expected to fail if the temperature rises to 105°F, but certainly questions could be raised if it rises above 115°F and is exposed simultaneously to high humidity and moderate radiation dose rates.

For individual equipment items that have 120°F as the specified temperature, FRC has accepted that this is non-harsh provided that the elevated temperature is not a result of a design basis event (DBE).

4.1.2. AGING

In Section 4.3.6 of the Licensee's response, the following statements about aging are made:

- a. The components which are located outside the drywell and steam tunnel are exposed to insignificant amounts of radiation during normal operating conditions. The effects of radiation aging are therefore not considered in the gualification evaluation of these components.
- b. Most areas outside the drywell are maintained in a suitable environmental condition by safety-related HVAC equipment. The normal maximum environmental design temperature is 103°F, which in this study is defined as a nonharsh environment (Section 4.3.4). Thermal aging for these components is not required since the normal and post-accident environments are nonharsh. In addition, temperature extremes (up to 120°F) may occur in some plant areas. However, these conditions would result only during periods of extreme outdoor temperatures. Equipment designed and installed per industry standards would be capable of satisfactory operation without exhibiting aging-related degradation due to these temperature extremes. Therefore, the effects of thermal aging are not considered for components located in areas where the maximum ambient temperature is maintained at 120°F or below.

FRC's previous statements concerning radiation and temperature apply to these assumptions. It is not obvious that 120°F is due in all cases to causes other than a DBE. The Licensee has not clarified this for individual equipment items listed in the Licensee's response.

4.1.3 IDENTIFICATION OF ELECTRICAL COMPONENTS

The Licensee states that the FSAR was the basis for determining the equipment for which qualification documentation is required.

The clearly stated NRC position is that equipment items needed for mitigation of an accident, including that identified in the Emergency Operation Procedures that the Licensee relies upon to mitigate design basis events, must be evaluated either to demonstrate qualification or to provide

justification that unqualified equipment will not be misleading to the operator. Whether or not equipment is listed in the FSAR is irrelevant. The Licensee should assure that all safety-related electrical equipment has been identified and addressed. For example, it appears that splices, wire terminations, and connecting lugs have not been included.

4.1.4 QUALIFIED LIFE

The Licensee has not adequately addressed the topic of qualified life for any of the safety-related equipment identified by the Licensee as essential for safe shutdown of the plant. The DOR Guidelines required that equipment with components that are susceptible to degradation caused by thermal, radiation, or wear conditions is to have an established qualified life.

The Licensee should maintain detailed maintenance records to demonstrate that those components which can be degraded are replaced on a scheduled basis in order to restore the equipment and minimize the likelihood of equipment failure to perform a safety-related function.

Qualified life is the maximum period of normal service under specified conditions for which it can be demonstrated that the functional capability of the equipment at the end of the period is still adequate for it to perform its specified safety function for an applicable accident and to remain functional as long as required after the accident. The qualified life may depend on carrying out a specified maintenance program. The qualified life of some elements of an equipment assembly may be less than the qualified life of the assembly provided a program for replacement of such elements at intervals not exceeding their qualified lifetimes is specified and fulfilled. The qualified life of a particular equipment item may be changed during its installed life when justified by new information that permits a reanalysis of the qualification program.

It is necessary to establish a qualified life for every item of safaty-related equipment that requires environmental qualification. A conservative choice of qualified life must be made to account for the assumptions and approximations made in the qualification program.

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4.2 EQUIPMENT QUALIFIED FOR PLANT LIFE

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This section includes equipment items which are fully acceptable on the basis that (i) all criteria defined in Section 2 of the report are satisfied or (ii) sufficient data exist to determine acceptability by judgment.

4.2.1 NRC Category I.a EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES

This section normally includes equipment items which are fully acceptable on the basis that all applicable criteria defined in the DOR Guidelines are satisfied and the equipment has been found to be qualified for the life of the plant.

4.2.1.1 Equipment Item No. 125 Temperature Switches Located in the NW Corner Room Fenwal Model 17002-40 (Licensee References 18, 19, and 27)

Licensee Reference 27 is a test report. The Licensee indicates that the qualification data is satisfactory.

4.2.2 NRC Category I.b EQUIPMENT FOR WHICH DEVIATIONS FROM THE DOR GUIDELINES ARE JUDGED ACCEPTABLE

This section normally includes equipment items which do not satisfy one or more of the applicable criteria defined in the DOR Guidelines; however, sufficient information has been presented to determine that the specific deviations are acceptable. For the Quad Cities Unit 1 plant, there are no equipment items falls in this category.

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4.3 EQUIPMENT QUALIFIED WITH RESTRICTIONS

This section includes equipment items fully acceptable on the basis that (i) all criteria defined in Section 2 of this report a e satisfied, (ii) the equipment is qualified for a time interval less than plant life, or (iii) the equipment requires specific modification which, when completed, will establish full qualification.

4.3.1 NRC Category II.a EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES AND HAS A SERVICE LIFE LESS THAN PLANT LIFE

Equipment items in this category are fully acceptable on the basis that all applicable criteria defined in the DOR Guidelines are satisfied and that the equipment is qualified for a specific time interval which is less than plant life. For the Quad Cities Unit 1 plant, there are no equipment items in this category.

4.3.2 NRC Category II.b EQUIPMENT THAT FULLY SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES PROVIDED THAT SPECIFIC MODIFICATIONS ARE MADE

Equipment items in this category will be fully acceptable and will satisfy all applicable criteria defined in the DOR Guidelines provided that specific modifications are made on or before the designated date. When the modifications are completed, the equipment can be considered qualified. For the Quad Cities Unit 1 plant, no equipment falls in this category.

4.3.3 NRC Category II.c EQUIPMENT FOR WHICH DEVIATIONS FROM THE DOR GUIDELINES ARE JUDGED ACCEPTABLE

This section includes equipment items which do not satisfy one or more of the applicable criteria defined in the DOR Guidelines; however, either sufficient bases have been presented to allow a determination that the specific deviations are judged to be acceptable for less than plant life, or the specific deviations are judged by FRC to be acceptable for less than plant life based on review of other applicable qualification documentation associated with the general equipment environmental qualification program. For the Quad Cities Unit 1 plant, there are no equipment items in this category.

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4.4 NRC Category III EQUIPMENT THAT IS EXEMPT FROM QUALIFICATION

Equipment items in this category are exempt from qualification on the basis that: (i) the equipment does not provide a safety function (i.e., should not have been included in the equipment list submitted by the Licensee), (ii) the specific safety-related function of the component can be accomplished by some other designated component which is fully qualified, or (iii) the equipment is not subjected to a potentially adverse environment as a result of accidents for which proper operation of the equipment is required. In addition, any failure of the exempt component must not degrade the ability of a qualified component to perform its required safety-related function. For the Quad Cities Unit 1 Plant, there are no equipment items in this category.

4.5 EQUIPMENT FOR WHICH DOCUMENTATION CONTAINS DEVIATIONS FROM THE GUIDELINES THAT ARE JUDGED UNRESOLVED

This section includes equipment items which are deficient on the basis that all criteria defined in the DOR Guidelines are not satisfied. However, the equipment item is either scheduled to be tested or is judged to have a high likelihood of operability.

4.5.1 NRC Category IV.a EQUIPMENT WHICH HAS QUALIFICATION TESTING SCHEDULED BUT NOT COMPLETED

The qualification of the following equipment items has been judged deficient or inadequate based upon our review of the documentation provided by the Licensee. However, the Licensee has stated that the equipment item is scheduled to be tested by a designated date. The results of the testing will dictate the specific qualification category of the equipment item. Specific justification for interim plant operation prior to testing should be provided for each item.

4.5.1.1 Equipment Item No. 7 Pressure Transmitter Located in the NW and SW Corner Rooms General Electric Model 4532K11001 (Licensee References 19 and 21)

Licensee Reference 21 is a qualification report which will be reviewed later. This item has been placed in its most likely category pending review. The Licensee makes the following statements and commitments:

A contract will be issued for service to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also acutal doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to

radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long-term cooling.

4.5.1.2 Equipment Item No. 8 Flow Transmitter Located in the NW and SW Corner Rooms General Electric Model 4532K43001

(Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

A contract will be issued for service to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this ' time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long-term cooling.

4.5.1.3 Equipment Item No. 9 Flow Switch Located in the NW and SW Corner Rooms Barton Model 289 (Licensee References 18, 19, and 22)

Licensee Reference 22 is a qualification test report that we have not previously reviewed. The Licensee indicates that radiation was not addressed in this report and makes the following statements and commitments:

A contract will be issued for service to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation expos. 2, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long-term cooling.

4.5.1.4 Equipment Item No. 54 Flow Transmitter Located in the NE and SE Corner Rooms General Electric Model GE/MAC 553 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long term cooling.
4.5.1.5 Equipment Item No. 57 Pressure Switch Located in the NE and SE Corner Rooms Mercoid Model GN-L-3 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statement and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less thin those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long term cooling.

1 5.1.6 Equipment Item No. 131 Cable, Location Not Stated General Electric, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

a. Of the plant areas which could experience harsh pressure, temperature, and humidity, only the steam tunnel, isolation GC denser pipe chase, torus compartment (near postulated HPCI break only), and RWCU rooms contain equipment which must function in 1 mir * . less. Once equipment functions are completed, there woul . no further active function required. In all cases except the torus compartment, the only cables entering the potential harsh environment area would

terminate in that area. In the case of the torus compartment, other cabling could be in the vicinity of the HPCI line break; however, the torus compartment is so large that the harsh environment would dissipate almost instantly with valve closure. Radiation is not concurrent with other harsh conditions.

- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would be less than those calculated using such conservative assumptions. In addition, harsh radiation is not concurrent with pressure, temperature, and humidity; therefore, although some material degradation may occur due to radiation, stress factors are not present to accelerate damage. Finally, most of the materials utilized for this cable are currently utilized and have demonstrated the ability to withstand the radiation levels for which they must be qualified.
- 4.5.1.7 Equipment Item No. 132 Cable Located in the Outside Drywell Simplex, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Of the plant areas which could experience harsh pressure, temperature, and humidity, only the steam tunnel, isolation condenser pipe chase, torus compartment (near postulated HPCI break only), and RWCU rooms contain equipment which must function in 1 minute or less. Once equipment functions are completed, there would be no further active function required. In all cases except the torus compartment, the only cables entering the potential harsh environment area would terminate in that area. In the case of the torus compartment, other cabling could be in the vicinity of the HPCI line break; however, the torus compartment is so large that the harsh environment would dissipate almost instantly with valve closure. Radiation is not concurrent with other harsh conditions.
- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would be less than those calculated using such conservative assumptions. In addition, harsh radiation is not

concurrent with pressure, temperature, and humidity; therefore, although some material degradation may occur due to radiation, stress factors are not present to accelerate damage. Finally, most of the materials utilized for this cable are currently utilized and have demonstrated the ability to withstand the radiation levels for which they must be qualified.

4.5.1.8 Equipment Item No. 133 Cable Located Inside the Drywell Simplex, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to jualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components or similar items have been partially tested for environmental conditions.
- b. These components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2. This incident resulted in harsh environmental conditions.
- 4.5.1.9 Equipment Item No. 138A Cable Polyvinyl Chloride Jacket Located Outside Drywell General Electric, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis anl/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

a. Of the plant areas which could experience harsh pressure, temperature, and humidity, only the steam tunnel, isolation condenser pipe chase, torus compartment (near postulated HPCI break only), and RWCU rooms contain equipment which must function in 1 minute or less. Once equipment functions are completed, there would be no

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further active function required. In all cases except the torus compartment, the only cables entering the potential harsh environment area would terminate in that area. In the case of the torus compartment, other cabling could be in the vicinity of the HPCI line break; however, the torus compartment is so large that the harsh environment would dissipate almost instantly with valve closure. Radiation is not concurrent with other harsh conditions.

- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would be less than those calculated using such conservative assumptions. In addition, harsh radiation is not concurrent with pressure, temperature, and humidity; therefore, although some material degradation may occur due to radiation, stress factors are not present to accelerate damage. Finally, most of the materials utilized for this cable are currently utilized and have demonstrated the ability to withstand the radiation levels for which they must be gualified.
- 4.5.1.10 Equipment Item No. 1388 Cable Located Within the Drywell General Electric, Model Not Stated (Licensee reference not cited)

No qualification reference has been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components or similar items have been partially tested for environmental conditions.
- b. These components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2. This incident resulted in harsh environmental conditions.

4.5.1.11 Equipment Item No. 139 Cable Polyvinyl Chloride Jacket, Location Not Stated Simplex, Model Not Stated (Licensee reference not cited)

No qualification reference has been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Of the plant areas which could experience harsh pressure, temperature, and humidity, only the steam tunnel, isolation condenser pipe chase, torus compartment (near postulated HPCI break only), and RWCU rooms contain equipment which must function in 1 minute or less. Once equipment functions are completed, there would be no further active function required. In all cases except the torus compartment, the only cables entering the potential harsh environment area would terminate in that area. In the case of the torus compartment, other cabling could be in the vicinity of the HPCI line break; however, the torus compartment is so large that the harsh environment would dissipate almost instantly with valve closure. Radiation is not concurrent with other harsh conditions.
- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would be less than those calculated using such conservative assumptions. In addition, harsh radiation is not concurrent with pressure, temperature, and humidity; therefore, although some material degradation may occur due to radiation, stress factors are not present to accelerate damage. Finally, most of the materials utilized for this cable are currently utilized and have demonstrated the ability to withstand the radiation levels for which they must be gualified.
- 4.5.1.12 Equipment Item No. 140 Plastic Insulation and Jacket Located Outside Drywell Simplex, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts

thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Of the plant areas which could experience harsh pressure, temperature, and humidity, only the steam tunnel, isolation condenser pipe chase, torus compartment (near postulated HPCI break only), and RWCU rooms contain equipment which must function in 1 minute or less. Once equipment functions are completed, there would be no further active function required. In all cases except the torus compartment, the only cables entering the potential harsh environment area would terminate in that area. In the case of the torus compartment, other cabling could be in the vicinity of the HPCI line break; however, the torus compartment is so large that the harsh environment would dissipate almost instantly with valve closure. Radiation is not concurrent with other harsh conditions.
- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would be less than those calculated using such conservative assumptions. In addition, harsh radiation is not concurrent with pressure, temperature, and humidity; therefore, although some material degradation may occur due to radiation, stress factors are not present to accelerate damage. Finally, most of the materials utilized for this cable are currently utilized and have demonstrated the ability to withstand the radiation levels for which they must be qualified.
- 4.5.2 NRC Category IV.b

EQUIPMENT FOR WHICH QUALIFICATION DOCUMENTATION IN ACCORDANCE WITH THE GUIDELINES HAS NOT BEEN ESTABLISHED

The qualification of the following equipment items is deficient or inconclusive based upon our review of the documentation provided by the Licensee. This equipment is judged to have a high likelihood of operability for the specified environmental service conditions; however, complete and auditable records reflecting comprehensive qualification documentation have not been made available for review. Specific justification for interim plant operation should be prowided for each item.

4.5.2.1 Equipment Item No. 3A Motor Operated Valve Located in the NW and SW Corner Rooms Limitorque Model SMB-0-25 (Licensee References 18, 19, and 20)

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Licensee Reference 20 is a test report for Limitorque valve operators. This item has been placed in its most likely category pending review of the gualification data.

4.5.2.2 Equipment Item No. 3B Motor Operated Valve Located in the NW Corner Room Limitorque Model SMB (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 114°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.3 Equipment Item No. 4 Motor Operated Valve Located in the Secondary Containment Area Limitorque Model SMB-0-15 with Peerless AC Motor (Licensee References 18, 19, and 20)

Licensee Reference 20 is a test report for Limitorque value operators. This item has been placed in its most likely category pending review of the qualification data.

4.5.2.4 Equipment Item No. 5 Motor Operated Valve Located in the Secondary Containment Area Limitorque Model SMB-2-40 with Reliance AC Motor (Licensee Reference 7)

Licensee Reference 7 is a test report for a Limitorque value actuator for Class LE service outside primary containment. This item has been placed in its most likely category pending review of the qualification data.

Franklin Research Center A Division of The Franklin Inspirite 4.5.2.5 Equipment Item No. 6 Motor Operated Valve Located in the Torus Area Limitorque Model SMB-000 with Reliance AC Motor (Licensee Reference 7)

Licensee Reference 7 is a qualification type test report for a Limitorque valve actuator. The Licensee is has not yet established the test time. FRC notes that the Licensee's submittal indicates that the potential accident radiation exposure exceeds that in the test report.

The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environment qualification items. Although qualification data is not available for radiation, continued station operation is justified for the following reason:

This valve opens on low flow to provide a minimum flow line. Should the valve fail in the open position, coolant injection would be reduced but would still exist. Additionally radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long term cooling.

This item has been placed in its most likely category pending review of the qualification data.

4.5.2.6 Equipment Item No. 11 Stop Valve Located in the HPCI Rooms Manufacturer Not Stated, Model 178250H02D4 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee has indicated that the required operating period is 12 hours. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred

until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.7 Equipment Item No. 12 Motor Operated Valve Located in the HPCI Room Limitorque Model SMB-3 with Peerless DC Motor (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.8 Equipment Item No. 15 Motor Operated Valve Located in the HPCI Room Limitorque Model SMB-0 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.9 Equipment Item No. 16 Motor Operated Valve Located in the Steam Tunnel Limitorque Model SMB-3-80 with Peerless DC Motor (Licensee Reference 18)

Licensee Reference 18 is not a qualification document for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.10 Equipment Item No. 17 Motor Operated Valve Located in the HPCI Room Limitorque Models SMB-2, SMB-3, and SMB-4 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.11 Equipment Item No. 18 Motor Operated Valve Located in the HPCI Room Limitorque Model SMB-0 and SMB-000 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F

peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.12 Equipment Item No. 19 Solenoid Valves Located in the HPCI Room ASCO Model 830281F (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.13 Equipment Item No. 21 Flow Transmitter Located in the HPCI Room General Electric Model 4532K13001 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.14 Equipment No. 22 Pressure Transmitter Located in the HPCI Room General Electric Model 4532K11001 (Licensee References 19 and 21)

Licensee Reference 21 is a qualification report which will be reviewed later. This item has been placed in its most likely category pending review.

4.5.2.15 Equipment Item No. 24 Pressure Transmitter Located in the HPCI Room General Electric Model 50-551032CAAY1 (Licensee References 13, 19, and 21)

Licensee Reference 21 is a qualification report which will be reviewed later. This item has been placed in its most likely category pending review.

4.5.2.16 Equipment Item No. 26 Turbine Gland Seal Condensate Drain Pump Located in the HPCI Room General Electric Model 58225A3525 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.17 Equipment Item No. 27 Gland Steam Exhaust Fan Located in the HPCI Room General Electric Model 5BC74AB2193 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.18 Equipment Item No. 28 Motor Speed Changer Located in the HPCI Room General Electric Model GE5BC26AC389 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.19 Equipment Item No. 29 Motor Gear Unit Located in the HPCI Room General Electric Model 5CD14019A111620 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.20 Equipment Item No. 30 Oil Pump Motor Located in the HPCI Room General Electric Models 5CD218E252 and 5CD326E758 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F

peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.21 Equipment Item No. 31 HPCI Motor Control Signal Converter Located in the HPCI Room General Electric Model 357513TC108 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.22 Equipment Item No. 32 Level Switch Located in the HPCI Room Mercoid Model 123-2 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.23 Equipment Item No. 33 Level Switch Located in the HPCI Room Magnetrol Model 291-SP (Licensee References 18, 19, and 23)

Licensee Reference 23 is a test report. The data presented by the Licensee indicates that all qualification requirements except aging are satisfied. If the environmental stress remains negligible for this item

during the stated operating period of 12 days, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.24 Equipment Item No. 34 Flow Switch Located in the HPCI Room Barton Model 289 (Licensee References 18 and 19)

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Licensee Reference 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the QBE in order to conclude that the DPE environmental stress is negligible.

4.5.2.25 Equipment Item No. 35 Pressure Switch Located in the HPCI Room Static-O-Ring Model 6NN-AA21-VRR (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.26 Equipment Item No. 36 Pressure Switch Located in the HPCI Room Barksdale D2H-M150SS (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 da; s. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.27 Equipment Item No. 39 Motor Operated Valve Located Inside the Drywell Limitorque, Model Not Stated (Licensee References 20 and 24)

Licensee References 20 and 24 are test reports on Limitorque valve operators. The Licensee makes the following statements and commitments:

The test procedure required saturated atmosphere. Additional vendor information is being sought to resolve outstanding environmental qualification items, but humidity was not measured during the test. The test used saturated steam for temperature. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components are designed as redundant pairs, each separated from the other with only one subjected to a harsh environment.
- b. These components complete their function in a very short period of time and would not experience significant effects of increased environmental conditions in this short time period.
- c. These components undergo periodic functional testing to verify operability. This testing would identify age related degradation.
- d. These components or identical components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2.

This item has been placed in its most likely category pending review of the gualification data.

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4.5.2.28 Equipment Item No. 40A Motor Operated Valve Located in the Steam Tunnel Limitorque Model SMB-00-7.5 with Peerless DC Motor (Licensee Reference 18)

Licensee Reference 18 is not a qualification document for this item. The Licensee has indicated that the required operating period is 35 seconds. If the environmental stress remains negligible for this item during the stated operating period plus one hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F temperature is not a result of the design basis event in order to conclude that the DBE environmental stress is negligible.

4.5.2.29 Equipment Item No. 41 Differential Pressure Indicating Switch Located in the Secondary Containment Barton Model 278 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee notes that these sensors are used to detect a main steam line break in the steam tunnel and complete the's function within 1 minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.30 Equipment Item No. 42 Temperature Switch Located in the Steam Tunnel Fenwall Model 17002-40 (Licensee Reference 18)

Licensee Reference 18 is not a qualification test report; therefore, qualification documentation is deficient for this item. The Licensee notes that these sensors are used to detect a main steam line break in the steam tunnel and complete their function within 1 minute. If the environmental

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stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after %ebruary 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.31 Equipment No. 45 Motor Operated Valve Located in the NE and SE Corner Rooms Limitorque Models SMB-0-15, SMB-2-60, and SMB 2-40 (Licensee References 18, 19, and 20)

Licensee Reference 20 is a test report on Limitorque valve operators. This item is placed in its most likely category pending review of qualification data.

4.5.2.32 Equipment No. 46 Motor Operated Valve Located in the Torus Area Limitorque Models SMB-000-5, SMB-3-100, SMB-0-10, and SMB-4T-150 (Licensee References 18, 19, and 20)

Licensee Reference 20 is a test report on Limitorque valve operators. This item is placed in its most likely category pending review of gualification data.

4.5.2.33 Equipment No. 47 Motor Operated Valve Located in the NE and SE Corner Rooms Limitorque Models SMB-2-40, SMB-0, and SMB-1 (Licensee References 7, 18, and 19)

Licensee Reference 7 is a test report for a Limitorque valve actuator. This item has been placed in its most likely category pending review of qualification data.

4.5.2.34 Equipment No. 48 Motor Operated Valve Located in the SE Corner Room Limitorque, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documentation for this item. The Licensee has indicated that the required operating period is 25 seconds. If the environmental stress remains negligible for this item

during the stated operated period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.35 Equipment Item No. 49 Motor Operated Valve Located in the Secondary Containment Limitorque Model SMB-0-15 (Licensee References 18, 19, and 20)

Licensee Reference 20 is a test report on Limitorque valve motor operators. This item is placed in its most likely category pending review of qualification data.

4.5.2.36 Equipment Item No. 50 Motor Operated Valve Located in the Torus Area Limitorque Models SMB-5T-150 and SMB-2-60 (Licensee Reference 7)

Licensee Reference 7 is a test report for a Limitorque value actuator for Class LE service outside primary Containment. The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environmental qualification items. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Existing qualification data is within a factor of 2 of the calculated radiation dose.
- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would therefore be less than those calculated using such conservative assumptions.
- c. Other equipment similar in design to this equipment has successfully been qualified for environments in excess of the calculated requirement for this equipment.

4.5.2.37 Equipment Item No. 51 Motor Operated Valve Located in the Torus Area Limitorque Model SMB (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 40 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.38 Equipment Item No. 52 Motor Operated Valve Located Inside the Drywell Limitorque Models SMB-3 and SMB (Licensee Reference 18)

Licensee Reference 18 is not a qualification test report; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environmental qualification items. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components or similar items have been partially tested for environmental conditions.
- b. These components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2. This incident resulted in harsh environmental conditions.

4.5.2.39 Equipment Item No. 53 Pressure Transmitter Located in the NE and SE Corner Rooms General Electric Model GE/MAC 551 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts

thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long term cooling.

4.5.2.40 Equipment Item No. 55 Level Switch Located in the RHR Pump Room Magnetrol Model 249C-X-EP-SIMD4DC (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environmental stress remains negligible, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperarture is not a result of the DBE in order to conclude that the environmental stress 6 a to DBE is negligible.

4.5.2.41 Equipment Item No. 58

RHR Service Water Pump Motor Located in the RHR Pump Room General Electric Model 5K821167A31 (Licensee References 18 and 19)

Licensee References 13 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environmental stress remains negligible, FRC concludes that the qualification review on be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F temperature is not a result of the DBE in order to conclude that the environmental stress due to DBE in negligible.

4.5.2.42 Equipment Item No. 60 Room Cooler Located in the RHR Pump Room Manufacturer and Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environmental stress remains regligible, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.43 Equipment Item No. 61 Solenoid Valve Located in the Torus Area ASCO Model HT8316B14 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee Mas indicated that the required operating period is 15 seconds or less. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.44 Equipment Item No. 62A Solenoid Valve Located in the Torus Area Versa VPS-2402 and VGS-4422 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

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4.5.2.45 Equipment Item No. 63 Solenoid Valve Located in the Secondary Containment Versa VPS-2302 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

+.5.2.46 Equipment Item No. 64 Solenoid Valve Located in the Secondary Containment ASCO Model 8302026F (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.47 Equipment Item No. 65A Motor Operated Valve Located in the SE Corner Room Limitorque, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 25 seconds. If the environmental stress remains negible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

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4.5.2.48 Equipment Item No. 65B Motor Operated Valve Located in the NW Corner Room Limitorque, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 114° F peak temperature is not a result of the DBE in order to conclude that the environmental stress due to DBE is negligible.

4.5.2.49 Equipment Item No. 67 Position Switch Located in the Secondary Containment NAMCO Model Mark II D1200-G (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.50 Equipment Item No. 68 Motor Operated Valve Located in the Outside Drywell Limitorque Model SMB-000 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 15 seconds. If the environmenta' stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.51 Equipment Item No. 70 Motor Operated Dampers Located in the Secondary Containment Area Limitorque Model SMB (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.52 Equipment Item No. 80 Motor-Driven Pump Located in the RHR Pump Room General Electric Model 5K365AK169 (Licensee References 18 and 19)

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Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 30 days. If the environmental stress remains negligible for this ftem during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It must be shown that the peak temperature of 120°F is not due to the design basis event in order to conclude that the DBE stress is negligible.

4.5.2.53 Equipment Item No. 82 Room Cooler Fan Located in the HPCI Room Buffalo Forge Model G123-HV (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operation period is 12 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.54 Equipment Item No. 87 Solenoid Ball Valve Located in the Secondary Containment Area General Pneumatic Model 608KW106 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.55 Equipment Item No. 88 Squib Shear Valve Located in the Secondary Containment Area Pyrodyne, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. The Licensee is investigating the existence of qualification data with the manufacturer.

4.5.2.56 Equipment Item No. 89 Motor Operated Valve Located in the Drywell Limitorque SMB-1-40, SMB with Peerless AC Motor (Licensee References 20 and 24)

Licensee References 20 and 24 are test reports of Limitorque valve operators. This item has been placed in its most likely category pending review of the qualification data. 4.5.2.57 Equipment Item No. 91 Solenoid Valve Located in the Torus Area ASCO Model HT831614 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 20 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.58 Equipment Item No. 92 Motor Operated Valves Located in the Torus Area Limitorque Model SMB-000-5 with Peerless AC Motor (Licensee References 20 and 24)

Licensee References 20 and 24 are qualification type test reports for Limitorque valve operators. This item has been placed in its most likely category pending review of qualification data.

4.5.2.59 Equipment Item No. 93 Sclenoid Valves Located in the Secondary Containment Area ASCO Models HVA-90-405-2A, HVA-96-082A, WPBLX831636, and HVA-96-081A (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is less than 1 minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.60 Equipment Item No. 94 Level Switches Located in the Secondary Containment Area Magnetrol Model 402 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is less

than 1 minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.61 Equipment Item No. 95 Position Switches Located in the Torus Area NAMCO Model Mark II D1200G (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 20 seconds. If the environmental stress remains regligible for this item during this stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.62 Equipment Item No. 96 Solenoid Valves Located Outside the Drywell ASCO, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.63 Equipment Item No. 97 Solenoid Valve Located in the Outside Drywell ASCO Model SN-681055 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification

:eview can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.64 Equipment Item No. 98 Pressure Switches Located in the Secondary Containment Area Barksdale Model B2T-M12SS and B2T-A12SS (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 2 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presenced in Section 2.2.3 of this report.

4.5.2.65 Equipment Item No. 99 Level Indicating Switch Located in the Secondary Containment Area Yarway Models 4418C and 4418CE (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is less than 1 minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.66 Equipment Item No. 100 Position Switches Located in the RWCU Room Manufacturer and Model Number Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 5 seconds. If the environmental stress remains negligible for this item during the stated operating period plot 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. The Licensee is investigating the existence of qualification data with the manufacturer.

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4.5.2.67 Equipment Item No. 101 Motor Operated Valves Located in the Torus Area Limitorque Model SMB-2-40 (Licensee Reference 7)

Licensee Reference 7 is a test for Limitorque valve actuator for Class LE service outside primary containment. This item has been placed in the most likely category pending review of qualification data.

4.5.2.68 Equipment Item No. 102 Differential Pressure Indicating Switches Located in the Secondary Containment Barton Model 288 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 2 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC . criteria presented in Section 2.2.3 of this report.

4.5.2.69 Equipment Item No. 103 Radiation Element GM Tube Located in the Turbine Building General Electric DWG 194X927GI (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible. 4.5.2.70 Equipment Item No. 104 Solenoid Valves Located in the Reactor Building Versa/Barksdale Model VPS-2402 and VGS-4422D1H-A15055 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 10 minutes. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.71 Equipment Item No. 108 Switchgear Located in the Secondary Containment Area General Electric Models AMH 4.76-250 and AKD-5 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.72 Equipment Item No. 109A 480 V Motor Control Center Located in the Secondary Containment Area General Electric Model 7700 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak

temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.73 Equipment Item No. 114 4 kV Non-segregrated Bus Located in the Turbine Building Manufacturer and Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operation period is 30 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.74 Equipment Item No. 122 Motor Operated Valves Located in the Steam Tunnel Limitorque, Model SMB-00 with Peerless DC Motor (Licensee Reference 18)

Licensee Reference 18 is not a qualification document for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.75 Equipment Item No. 123 Position Switches Located in the NW Corner Room NAMCO Model Mark III D1200G (Licensee References 18 and 19)

Licenseee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee has indicated that the required operating period is less than 1

minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1983 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.76 Equipment Item No. 124 Differential Pressure Indicating Switches Located in the NW Corner Room Barton Model 288 (Licensee References 18, 19, and 26)

Licensee Reference 26 is a test report. Licensee Reference 18 is not a qualification document for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 114°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.77 Equipment Item No. 128 Pressure Switches Located in the NW Corner Room Barksdale Model B2T-A12SS (Licensee References 18, 19, and 28)

Licensee Reference 28 is a test report. Licensee References 18 and 19 are not qualification documents for this itom. The Licensee has indicated that the required operating period is less than 1 minute. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 114°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.5.2.78 Equipment Item No. 129 Position Switch Located in the RWCU Rooms NAMCO Model Mark II D1200G (Licensee References 18 and 19)

Licensee References 3 and 25 are not qualification documents for this item. The Licensee has indicated that the required operating period is less than 5 seconds. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.5.2.79 Equipment Item No. 134 Solenoid Valve Located in the NW Corner Room ASCO Model 830281F (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualifications documents for this item. The Licensee has indicated that the required operating period is 10 minutes. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC triteria presented in Section 2.2.3 of this report. It should be shown that the 114°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.6 NRC Category V EQUIPMENT WHICH IS UNQUALIFIED

The DOR Guidelines require that complete and auditable records reflecting a comprehensive qualification methodology and program be referenced and made available for review of all Class 1E equipment.

The qualification of the following equipment items has been judged to be deficient or inadequate, based upon our review of the documentation provided by the Licensee. The extent to which the equipment items fail to satisfy the criteria of the DOR Guidelines can be categorized as follows: (i) documentation reflecting qualification as specified in DOR Guidelines has not been made available for review, (ii) documentation reflecting qualification has been made available for review and is totally inadequate, or (iii) the documentation indicates that the equipment item has not successfully passed required tests. The following equipment items are therefore considered ungualified.

4.6.1 Equipment Item No. 1 Temperature Elements Located in the RWCU Room Manufacturer and Model Number Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee notes that, where these temperature switches are used for leak detection in the RWCU room, conditions are normally non-harsh. Immediately following a leak, the temperature will increase. As soon as the leak occurs, the switches will function, initiating system isolation within 1 minute.

4.6.2 Equipment Item No. 2 Motor-Driven Pumps Located in the NW Corner Room General Electric Models 5K6338XC23A and 5K6336XC193 (Licensee References 18 and 19)

Licensee References 18 and 19 are not test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

A contract will be issued for service to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long-term cooling.

4.6.3 Equipment Item No. 10 Pressure Switch Located In the NW and SW Corner Rooms Mercontrol Model DA-7043-804 (Licensee References 18 and 19)

Licensee References 18 and 19 are qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

The equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary; to assure long-term cooling.
4.6.4 Equipment Item No. 13 Motor Operted Valve Located in the Drywell Limitorque Model SMB-1 (Licensee Reference 7)

Licensee Reference 7 is a qualification test report for Limitorque valve actuator. We note that the test radiation dose is less than the postulated DBE radiation dose. The Licensee makes the following statements a.d commitments:

The equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reason:

This value is located inside drywell and is normally open. Following a postulated accident, it would remain open to allow steam flow to the HCPI turbine. Value operation would only be required to isolate the HPCI steam line. Three additional values are located on this steam line outside drywell to isolate the steam line. Since the harsh environment inside drywell is associated with an accident which would not affect environments or HPCI steam line pipe integrity outside drywell, the three outside drywell values would be capable of isolating the steam line.

4.6.5 Equipment Item No. 14 Motor Operated Valve Located in the Torus Area Limitorque Model SMB-1 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. This item has not been qualified for elevated temperature and pressure as required by the indicated service conditions.

4.6.6 Equipment Item No. 23 Temperature Switch Located in the HPCI Room United Electric Controls Model 38B (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. The Licensee states that these temperature switches detect a HPCI steam line break and, in the event of a leak, these switches will function and isolate the HPCI steam line. The Licensee concludes that, since the temperature associated with this event is within the range of routine

calibration, additional qualification data is not required. This is not a satisfactory argument since the switches will be exposed to the same temperatures as the sensing element portions of the switch.

4.6.7 Equipment Item No. 37 Solenoid Valve Located Inside Drywell Allied Controls-Gould Model 320X-39 and 320X-30 (Licensee Reference 18)

Licensee ' rence 18 is not a qualification test report; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components are designed as redundant pairs, each separated from the other with only one subjected to a harsh environment.
- b. These components complete their function in a very short period of time and would not experience significant effects of increased environmental conditions in this short time period.
- c. These components undergo periodic functional testing to verify operability. This testing would identify age related degradation.
- d. These components or identical components remain functional during the June 5, 1970 depressurization incident at Dresden Unit 2.
- 4.6.8 Equipment Item No. 38 Relief Valve and Solenoid Valve Located Inside the Drywell Dresser Industries Electromatic Type 1525VX and C5450-5 (Licensee References 18 and 15)

Licensee Reference 15 is a test report which does not adequately address operating time and aging. The Licensee makes the following statement:

The number of actuations which this component was subjected to during the test is considerably larger than the number of actuations during 12 days following the accident. Therefore, this component is considered qualified for the required operating time.

FRC does not concur with the Licensee's argument. The long 12-day period in a hostile environment can cause equipment degradations whether or not it is operated. 4.6.9 Equipment Item No. 40B Motor Operated Valve Located in the Steam Tunnel Limitorque Model SMB-00 with Peerless DC Motor (Licensee References 18 and 19)

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Licensee Reference 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environmental qualification items. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Existing qualification data is within a factor of 2 of the calculated radiation dose.
- b. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would therefore be less than those calculated using such conservative assumptions.
- c. Other equipment similar in design to this equipment has successfully been qualified for environments in excess of the calculated requirement for this equipment.
- 4.6.10 Equipment Item No. 43 Pressure Switch Located in the SE Corner Room Static-O-Ring Model 12NN-KK215-VX (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item.

The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continute station operation is justified for the following reasons:

Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to

radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long term cooling.

4.6.11 Equipment Item No. 44 Position Switch Located Inside the Drywell NAMCO Model EA-08011100 (No Licensee reference cited)

No qualification reference has been cited for this item. The Licensee makes the following statements and commitments:

This switch was in accessible for inspection. The manufacturer and model number will be established during the next outage permitting entry to the drywell. If the component is not qualified, a replacement part with qualification data will be purchased and installed during the first outage after received on site.

4.6.12 Equipment Item No. 56 Differential Pressure Indicating Switch Located in the NE and SE Corner Rooms Barton Model 289 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling. Additional coolant injection paths could be established, if necessary, to assure long term cooling.

4.6.13 Equipment Item No. 59 Differential Pressure Switch Located in the NE Corner Room Barton, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. the Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated. During the time available after stabilization of core cooling. Additional coolant injection paths could be established, if necessary, to assure long term cooling.

4.6.14 Equipment Item No. 62B Solenoid Valve Located in the Torus Area Versa Models VPS-2502, VGS-4522, and VGS-4422 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with jualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would therefore be less than calculated using such conservative assumptions.
- b. An alternate flow path is available to relieve torus vacuum in the event these components should fail.

4.6.15 Equipment Item No. 69 Electric Air Heater Located in the Secondary Containment E. L. Wiegland, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments.

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

4.6.16 Equipment Item No. 71 Exhaust Fan Located in the Secondary Contaiment Area New York Blower Model E4966 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic releas models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

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4.6.17 Equipment Item No. 72 Flow Transmitter Located in the Secondary Containment Area Leeds & Northrup Model 1912-3-21-0-0000-0300-0300 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic releas models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redur "ant system could be activated.

4.6.18 Equipment Item No. 73 Flow Transmitter Located in the Secondary Containment Area Foxboro Model 15A-1 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant endines trains. Also actual doses would be less than those calculated as agoinch conservative assumptions. Finally, should the operative ending pment suffer degradation due to radiation exposure, the state predundant system could be activated.

4.6.19 Equipment Item No. 74 Flow Switch Located in the Secondary Containment Area Mercoid Models DA-533-3 and DA-5332Rl (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

4.6.20 Equipment Item No. 75 Temperature Switch Located in the Secondary Containment Chromalox, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiaiton exposures to only one of two redundant equipment trains. Also, actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

4.6.21 Equipment Item No. 76 Local Control Panels Located in one Secondary Containment Area Harlo, Model DWG D12971SH30 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee states that this equipment is subjected to harsh radiation only, and will be reevaluated and/or shielded to reduce the radiation exposure to a non-harsh level. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases that occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also, actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

4.6.22 Equipment Item No. 77 Solenoid Valve Located in the Secondary Containment Area Versa/ASCO Model VWS-23028320A23 (Licensee References 18 and 19)

Licensee References 18 and 19 are not gualification test reports; therefore, gualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reason:

Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation relaeases that occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also, actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

4.6.23 Equipment Item No. 78 Temperature Element Located Inside the Torus Area Pall Trinity Micro 14-T-2H (Licensee Reference 19)

Licensee Reference 19 is not a qualification test report; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would therefore be less than those calculated using such conservative assumptions.

Other equipment similar in design to this equipment has successfully been qualified for environments in excess of the calculated requirement for this equipment.

4.6.24 Equipment Item No. 81 Fan Motors Located in the NE and NW Corner Rooms General Electric Models 5K213AK2476 and 5K184AL2191 (Licensee References 18 and 19)

Licensee References 18 and 19 are not gualification test reports, therefore, gualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

This equipment will be replaced with qualified equipment. Although qualification data is not available, continued station operation is justified for the following reasons:

Radiation doses were calculated using conservative, non-mechanistic models. Mechanistic release models would result in radiation releases that occur several hours after the postulated accident. During this time, action will be taken to shut down redundant systems beyond those needed for coolant injection. This would result in radiation exposures to only one of two redundant equipment trains. Also, actual doses would be less than those calculated using such conservative assumptions. Finally, should the operating equipment suffer degradation due to radiation exposure, the shut down redundant system could be activated.

During the time available after stabilization of core cooling, additional coolant injection paths could be established, if necessary, to assure long-term cooling.

4.6.25 Equipment Item No. 90 Motor Operated Valve Located in the RWCU Room Limitorque Model SMB with Peerless DC Motor (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environmental qualification items. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components are designed as redundant pairs, each separated from the other with only one subjected to a harsh environment.
- b. These components complete their function in a very short period of time and would not experience significant effects of increased environmental conditions in this short time period.
- c. These components undergo per odic functional testing to verify operability this testing would identify age related degradation.
- 4.6.26 Equipment Item No. 109B 480 V Motor Control Center Located in the Secondary Containment Area General Electric Model 7700 Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification test reports; therefore, qualification documentation is deficient for this item. The Licensee make the following statements and commitments:

This equipment is subjected to harsh radiation only, and will be relocated and/or shielded to reduce the radiation exposure to a non-harsh level. Although qualification data is not available, continued operation is justified for the following reasons:

a. Radiation doses were calculated using conservative non-mechanistic models. Mechanistic release models would result in radiation releases which occur several hours after the postulated accident. Actual doses would therefore be less than those calculated using such conservative assumptions.

- b. Dose to this equipment is caused by only one loop of a redundant piping system. Operator actions taken to shut down redundant systems will further reduce exposure to this equipment.
- 4.6.27 Equipment Item No. 121 Motor Operated Valve Located Inside the Drywell Limitorque Models SMB-2 and SMB-000 (Licensee reference not cited,

No qualification references have been cited for this item. The Licensee is looking for additional vendor information to resolve outstanding environmental qualification items.

4.6.28 Equipment Item No. 135 Electrical Penetration of the Drywell GE-NEBS, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

Additional vendor information is being sought to resolve outstanding environmental qualification items. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components or similar items have been partially tested for environmental conditions.
- b. These components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2. This incident resulted in harsh environmental conditions.
- 4.6.29 Equipment Item No. 141 Terminal Blocks Located in the Drywell Wall Allen Bradley, Model Not Stated (Licensee reference not cited)

No qualification references have been cited for this item. The Licensee makes the following statements and commitments:

A contract will be issued for services to qualify this equipment by analysis and/or testing, failing which the appropriate equipment or parts thereof will be replaced with qualified components. Although qualification data is not available, continued station operation is justified for the following reasons:

- a. These components or similar items have been partially tested for environmental conditions.
- b. These components remained functional during the June 5, 1970 depressurization incident at Dresden Unit 2. This incident resulted in harsh environmental conditions.

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4.7 NRC Category VI EQUIPMENT FOR WHICH QUALIFICATION IS DEFERRED

This section normally includes equipment items which have been addressed by the Licensee in the equipment environmental qualification submission; however, the qualification review of this equipment has been deferred by the NRC in accordance with criteria presented in Sections 2.2.3 and 2.2.5 of this report.

4.7.1 Equipment Item No. 20 Differential Pressure Indicating Switch Located in the HPCI Room Barton Model 288 (Licensee References 18 and 19

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2 2.3 of this report.

4.7.2 Equipment Item No. 25 Pressure Switch Located in the Secondary Containment Area Barksdale Model B2T-A12SS (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.3 Equipment Item No. 66 Pressure Switch Located in the Secondary Containment Area Static-O-Ring Model 12N-AA5-PP (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.4 Equipment Item No. 79 Damper Located in the Control Rooms No Manufacturer and Model Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.5 Equipment Item No. 85A Level Switch Located in Diesel Rooms 1/2 Magnetrol Model A-103F-EP/VP (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 12 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

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4.7.6 Equipment Item No. 110 120 V AC Reactor Protection Bus Located in the Electrical Equipment Room General Electric Type NAB, Style 2A, Plant H (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.7 Equipment Item No. 111 120/240 V AC Bus Located in the Electrical Equipment Room Cutler Hammer Model 6CF65505 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.8 Equipment Item No. 112 120/240 V AC Bus MMG Set Located in the Electrical Equipment Room General Electric Model 5L54404A22T30 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.9 Equipment Item No. 126 Supply Air Fan Located in the Control Room Trane Co. Model SO No. KALF575A (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.10 Equipment Item No. 127 Return Air Fan Located in the Control Room Joy Mfg. Model 38-21-1750 (Licensee References 18 and 19)

Licensee References 18 and 19 are not gualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.11 Equipment Item No. 130 Solenoid Valves Located in the Control Room Manufacturer and Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.12 Equipment Item No. 136 Water Chillers Located in the Control Room Trane Cc. Model 3E5H80 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.13 Equipment Item No. 137 Chilled Water Pump Located in the Control Room Ingersoll-Rand Model 0469-4154 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress ismains negligible, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.14 Equipment Item No. 83 Fan Motors Located in Diesel Room 1 Manufacturer and Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated the required operating period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.15 Equipment Item No. 84 Motor-Driven Pump Located in Diesel Room 1 General Electric Model 5K182BL315 (Licensee References 18 and 19)

Licensee References 18 and 19 are not gualification documents for this item. The Licensee has indicated the required operating period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria pres and in Section 2.2.3 of this report.

4.7.16 Equipment Item No. 85B Level Switches Located in Diesel Rooms 1 and 1/2 Magnetrol Model A-103F-EP/VF (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 30 days. If the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.17 Equipment Item No. 50 Solenoid Valve Located in Diesel Room 1 ASCO Model 8211789 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 30 days. If the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with JRC criteria presented in Section 2.2.3 of this report.

4.7.18 Equipment Item No. 105 Diesel Auxiliary Control Located in Diesel Room 1 Ideal Electric and Manufacturing Model S0 No. 267777 (Licensee References 18 and 19)

Licenses References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.19 Equipment Item No. 106 Excitation Cabinets Located in Diesel Room 1 Electromotive Div. of GM Model 9474 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this .tem. The Licensee has indicated that the required operating period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.20 Equipment Item No. 107 Diesel Generators Located in Diesel Rooms 1 and 1/2 Electromotive Div. of GM, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operating period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period plus 1 hour, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.21 Equipment Item No. 113 Engine Control Panel Located in Diesel Room 1 Electromotive Div. of GM, Model Not Stated (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operation period is 30 days. If the environmental stress : mains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.22 Equipment Item No. 115 D/G Secondary Control Panel Located in Diesel Room 1 Ideal Electric S.O. No. 267777 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operation period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.23 Equipment ftem No. 116 D/G Neutral Grounding Panel Located in Diesel Room 1 General Electric Model 208419-68P (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that the required operation period is 30 days. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.24 Equipment Item No. 117 Battery Chargers Located in the Battery Charger Room Gould Models GRF240T100X, GRF1200T100X, and GRF24S25F30X (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. If the environ ental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report. It should be shown that the 120°F peak temperature is not a result of the DBE in order to conclude that the DBE environmental stress is negligible.

4.7.25 Equipment Item No. 118 250 V DC Motor Control Center Located in the Battery Charger Room Cutler Hammer Model 6002H347B (Licensee References 18, 19, and 25)

Licensee Reference 25 is a test report for Class LE dc motor control. Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.26 Equipment Item No. 119 Batteries Located in the Battery Charger Room Gould Models FPS-25, FPR-13, and DPR-9 (Licensee References 18 and 19)

Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.

4.7.27 Equipment Item No. 120 DC Distribution Panel Located in the Battery Charger Room Cutler Hammer, Model Not Stated (Licensee References 18 and 19)

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Licensee References 18 and 19 are not qualification documents for this item. The Licensee has indicated that continuous operation is required. Since the environmental stress remains negligible for this item during the stated operating period, FRC concludes that the qualification review can be deferred until after February 1, 1981 in accordance with NRC criteria presented in Section 2.2.3 of this report.



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5. CONCLUSIONS

Our review of the qualification documentation and other information submitted by Commonwealth Edison Company for these equipment items and their applications in the Quad Cities 1 plant has resulted in the following categories:

NRC COmpliance with the DOR	Quantity Of
Category Guideline Requirements	Equipment Items
I.a Equipment Fully Satisfies All	
Applicable Requirements for	1
Life of the Plant	
I.b Equipment Does Not Meet All	
Applicable Requirements for	
Life of the Plant; However,	0
Deviations are Judged Acceptable	
II.a Equipment Fully Satisfies All	
Applicable Requirements for	
Less Than Plant Life	0
II.b Equipment Fully Satisfies All	
Applicable Requirements Provided	
That Specific Modifications are	
Made	0
II.c Equipment for Which the Licensee B	las
Not Provided Evidence of Full Comp	oli-
ance with the Guidelines, but which	ch is
Judged by FRC To Be Satisfactory f	for
Less Than Plant Life Based on Tota	11
EEQ Program Review	0
III Equipment is Exempt from	
Qualification	0
IV.a Equipment has Qualification	
Testing Scheduled	12
IV.b Equipment has High Likelihood	
of Operability; However, Proper	
Qualification Documentation	집 김 학생님은 감독을 걸렸다.
is Not Available	79
V Equipment is Unqualified	29
VI Qualification is Deferred	27

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In general, the major deficiencies that have been identified are shown in the summary review sheets at the end of the section.

The conclusions stated herein represent a summary of the results of the equipment environmental qualification evaluation conducted by FRC in accordance with the methodology presented in Section 3. The evaluation results are largely based on the available qualification documentation provided by the Licensee. The results of the review do not necessarily imply that the equipment is unreliable or unsafe or that it represents a significant plant safety issue; they do imply, however, that qualification documentation is inadequate and that additional information is required.

The Equipment Environmental Qualification Summary Forms that are presented on the following pages show the overall results of the FRC review. The entries on this form delineate the overall status of each specific equipment item with respect to compliance with the Guidelines criteria defined in Section 2. and the resultant qualification categories defined in Section 3. The following designations are used:

- X = A deficiency with respect to compliance with a Guideline requirement. Deficiencies result in equipment items categorized as unqualified or qualification not established.
- L = A limiting condition with respect to qualification in that the qualified life has not been established by the Licensee.
- 0 = NRC Qualification Category.
- R = Replacement of the equipment by the Licensee is planned.

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GUIDELINE REQUIREMENTS,	(DES	IGN	ATI	ONS	S:)	x	DE	FIC	IEN	CY.	-	LIM	ITI	VGC	ON	DITI	ON)		1
EVIDENCE OF QUALIFICATION	X	X		X	-		T	-	X	Γ	X	X	X	T	X	X	X	X	X	X
RELATIONSHIP TO TEST SPECIMEN	1	1	X		X	X	X		1	1	1		1	1	1	1	1	1	1	T
AGING DEGRADATION EVALUATED	1		T		1		1				1		1	T	1	1	1	1	1	T
	1	1	1		1	1	-	-	1	1	1	-	-	-	1	-	1	-	-	-
PROGRAM TO IDENTIFY AGING	1	-	1	-	-		1	-	1	-	1	-	1		1		1	1	1	-
QUAL, FOR STEAM EXPOSURE	1	1	1		1		1		-	1	1	-	1	-	1	-	1	-	1	1
PEAK TEMPERATURE ADEQUATE	1		1		1	1	1		-	1			1	X		1	1			1
PEAK PRESSURE ADEQUATE	1	1	1	-	-	-	1			-			1	T	1	-	1	T		1
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QUAL FOR CHEMICAL SPRAY													1		1					
QUAL. FOR RADIATION							1	X		X			1	X	1		1			
BETA RADIATION CONSIDERED														-	1					
TEST SEQUENCE			1			10											1			
TEST DURATION (1 HOUR + FUNCTION)												1					1			
QUANTITY OF EQUIPMENT	3	6	2	1	2	6	2	2	2	2	4	1	1	1	1	1	1	3	5	4
EQUIPMENT INSPECTED AT SITE													1	1	1					
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I-B. QUAL. BY JUDGEMENT							-						1		-					
II-A. QUAL. FOR < PLANT LIFE		1					1													
II-B. QUAL. PENDING MODIFICATION																				
II-C. QUAL. < PLANT LIFE/FRC REVIEW															1					
III. EXEMPT FROM QUAL.																				
IV-A. QUAL. TEST SCHEDULE								0	0	0										
IV-B. QUAL. NOT ESTABLISHED			0	0	0	0	0					0	0			0	0	0	0	0
V. EQUIP. NOT QUALIFIED	0	0									0			0	0					
VI. QUAL. IS DEFERRED																				
REPLACEMENT SCHEDULE											R			R		-				1

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EVIDENCE OF QUALIFICATION		X	X	X		1	X	X	X	X	X	X	X		X	X	X	X		
RELATIONSHIP TO TEST SPECIMEN							1		1						-	1				
AGING DEGRADATION EVALUATED							1			1				X			1		X	
QUALIFIED LIFE ESTABLISHED				1	-		1		1		1			X			1		×	
PROGRAM TO IDENTIFY AGING	1	1		1			1						1	×					X	
QUAL. FOR STEAM EXPOSURE	1				-	1			1								1			-
PEAK TEMPERATURE ADEQUATE	1	1			-											T	T			
PEAK PRESSURE ADEQUATE					1		1													
TEST DURATION ADEQUATE					X												1		X	
REQUIRED PRÓFILE ENVELOPED			1																X	-
QUAL, FOR SUBMERGENCE	1						1				1						1			
QUAL. FOR CHEMICAL SPRAY							1		1								1			
QUAL. FOR RADIATION	1								-								1			
BETA RADIATION CONSIDERED				-			1													
TEST SEQUENCE																	1			
TEST DURATION (1 HOUR + FUNCTION)																				
QUANTITY OF EQUIPMENT	2	1	1	16	1	4	T	1	1	1	2	1	1	4	1	1	2	3	5	1
EQUIPMENT INSPECTED AT SITE						1	1										1			
QUALIFICATION CATEGORY.						0	- C	ATE	GO	RY	DES	GN	ATIC	N						
I-A. QUAL. FOR PLANT LIFE	T						1													
I-B. QUAL. BY JUDGEMENT							1													
II-A. QUAL. FOR < PLANT LIFE																				
II-B. QUAL. PENDING MODIFICATION																				
II-C. QUAL. < PLANT LIFE/FRC REVIEW																				
III. EXEMPT FROM QUAL.															-					_
IV-A. QUAL. TEST SCHEDULE		101																		
IV-B. QUAL. NOT ESTABLISHED		0	0		0		0	0	0	0	0	0	0	0	0	0	0		-	0
V. EQUIP. NOT OWNLIFIED				0														0	0	
VI. QUAL. IS DEFERRED	0					0														
REPLACEMENT SCHEDULE	1																	R		

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GUIDELINE REQUIREMENTS.	(DES	IGN	ATI	ONS	5: X	(-	DE	FIC	EN	CY.		LIM	ITIN	GC	ONI	DITI	ON)		
EVIDENCE OF QUALIFICATION	×	×	×	X	×	X			1	×	T		X	X	X	X	X	X	X	X
RELATIONSHIP TO TEST SPECIMEN	1	1	-	1			X	×	X		X	X	1			1				T
AGING DEGRADATION EVALUATED	1	1			1				1		1	ľ.	1			-	-	-		T
	1	1	-	1	-	1	-			-	1	-	-	1	-			-		1
PROGRAM TO IDEN'TIFY AGING	1	-		-	1	1		-	-		-			1	-					1
QUAL. FOR STEAM EXPOSURE	1		-	1		1			-	-				1			-	-		-
PEAK TEMPERATURE ADEQUATE	1	1			1					1				1						1
PEAK PRESSURE ADEQUATE			1	1		1								1						
TEST DURATION ADEQUATE																				1
REQUIRED PROFILE ENVELOPED													1							
QUAL. FOR SUBMERGENCE										1	1									1
QUAL FOR CHEMICAL SPRAY																				
QUAL. FOR RADIATION											1									-
EETA RADIATION CONSIDERED			1								1									
TEST SEQUENCE																				
TEST DURATION (1 HOUR + FUNCTION)						-				1										
QUANTITY OF EQUIPMENT	1	1	16	16	2	1	8	8	6	1	2	4	1	2	4	6	3	2	3	4
EQUIPMENT INSPECTED AT SITE																				
QUALIFICATION CATEGORY,						0-	- C	ATE	GO	RY	DES	IGN	ATIC	NC						
I-A. QUAL. FOR PLANT LIFE														1						
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6. REFERENCES

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QUALIFICATION REFERENCES

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- 3. FSAR Table 8.2.3
- 4. FSAR Figures 5.2.15 and 5.2.16
- 5. FSAR Section 6.2.3.2
- 6. Special Report No. 12, Rev. 1, February 1975
- 7. Limitorque 600461-POCO3 Qualification Test Report
- 8. Limitorque 600426-BU009
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- 11. DV-145C3006 Qualification Design Verification
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- 15. PEP #42963 Test Dresser Relief Valve Actuator
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- 32. U.S. NRC Memorandum and Order (CLI-80-21) pursuant to the Petition for Emergency and Remedial Relief filed with the NRC on November 4, 1977.
- Commonwealth Edison response to NRC IE Bulletin 79-01B Environmental Qualification of Class LE Equipment for Quad Cities 1 and 2, dated November 1, 1980.
- NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-related Electrical Equipment," December 1979.
- 35. Memorandum for V. D. Thomas, NRC, through D. W. Hayes, NRC, from J. Hughes, NRC; Subject: Screening Review of Licensee Responses to IE Bulletin 79-01B and Summary of Inspections of Installed Systems at Quad Cities Unit 1 and 2 Facility - Docket No. 50-254; dated April 14, 1980.

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APPENDICES

APPENDIX A - ENVIRONMENTAL SERVICE CONDITIONS

The Licensee has provided detailed information concerning environmental zones and expected environmental service conditions in all locations within the plant. Figures A-1 and A-2 show the inside-containment profile envelopes provided by the Licensee.

Quad Cities 1 has a demineralized water spray system rather than a chemical spray system inside containment. This is considered in the Licensee's analysis.

The specific environmental service conditions corresponding to plant zones are shown in Tables A-1 through A-3.

The Licensee states that, where environmental conditions are maintained by HVAC equipment, the HVAC system is provided with redundant components and/or a backup power supply for reliable operation. Safety-related HVAC systems are provided for the following ireas:

- a. Control room, cable spreading room, battery room, computer room, and electrical equipment room.
- b. Standby diesel generator room.
- c. HPCI room.

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d. Low-pressure coolant injections corner rooms.

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FIGURE SUPPLIED BY THE LECTRO

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Table A-1

MAXIMUM ENVIRONMENTAL CONDITIONS INSIDE THE DRYWELL FOLLOWING THE POSTULATED LOCA/HELB

Temperature	Pressure	Relative Humidity	Containment Spray	Gamma Radiation	Submergence Elevation
281F	63 psia	100%	Demineralized water	1 day-4.3x10 ⁷ rads 30 day-1.0x10 ⁸ rads 1 year-1.1x10 ⁸ rads	583'-0"

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Table A-2

MAXIMUM ENVIRONMENTAL CONDITIONS OUTSIDE THE DRYWELL FOLLOWING THE POSTULATED HELB ACCIDENTS

Area	Pipe Break	Maximum Pressure (psia)	Maximum Temperature (°F)	Relative Humidity (%)
Torus compartment (region of postulated line break)	HPC1 steam RC1C Steam	27.0	242	100
Core spray/RCIC room	RCIC steam	Not evaluate required for	d - Equipment in RCIC steam line	this room not break
Sceam tunnel	Main steam Feedwater RCIC steam	27.0	242	100
RWCU heat exchanger and holding pump room	RWCU	Not evaluace valves requi will meet co conditions.	d - Only two con red to function. oncervatively ass	tainment isolation Qualification umed inside drywel
High-pressure heater bay	Main steam Feedwater	Not evaluate to function	d - No equipment is located in th	which is required is area.
Turbine building el 615'-6" north of Column G, between Columns 9 and 11 and 15 and 16	Main steam	Not evaluate to function	d - No equipment is located in th	which is required is area.

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Table A-2 (continued)

Maximum Maximum Relative Pressure Temperature Humidity Area Pipe Break (psia) (°F) (8) Not evaluated - No equipment which is required Reactor feed pump Feedwater room to function is located in this room. Turbine building Feedwater Not evaluated - No equipment which is required el 595'-0" to function is located in this area. area south of Unit 1 pump room and north of Unit 2 pump room Diesel generator room Feedwater Not evaluated - Qualification for the environment due to a postulated feedwater line break is not required since three diesels are available to provide emergency ac power.

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Table A-3

RADIATION ENVIRONMENTAL CONDITIONS OUTSIDE DRYWELL FOLLOWING THE POSTULATED LOCA MAXIMUM RADIATION SOURCES

			Integrated	Dose Levels	(rads)
Area	Source*		1 Day	30 Days	1 Year
Torus	SP		1.5x10 ⁷	3.2x10 ⁷	3.9x10 ⁷
Residual heat removal corner rooms	SP		2.4x10 ⁵	9.4x10 ⁵	1.7x10 ⁶
HPCI room	MS	•	6.6x10 ⁶	1.6x10 ⁷	1.7x10 ⁷
Core spray/RCIC rooms	MS		6.6x10 ⁶	1.6x10 ⁷	1.7x10 ⁷
Steam tunnel	MS		3.1x10 ⁵	8.5x10 ⁵	1.6x10 ⁶
Reactor building el 595'-0"	RW		2.5x10 ⁶	7.8x10 ⁶	1.4x10 ⁷
Reactor building el 623'-0"	CA		6.8x10 ⁵	1.6x10 ⁶	1.6x10 ⁶
Reactor building el 647'-6"	CA		6.8x10 ⁵	1.6x10 ⁶	1.6x10 ⁶
Reactor building el 666'-6"	CA		6.8x10 ⁵	1.6x10 ⁶	1.6x10 ⁶

- * SP = Supression pool liquid RW = Reactor water
 - MS = Reactor steam
 - CA = Containment airborne

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FIGURE SUBTRIED BY THE LOCAL D

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APPENDIX B - EQUIPMENT ITEM TABLE

This appendix contains the list of safety-related electrical items for the Quad Cities Nuclear Generating Station Unit 1 provided by the Licensee in its November 1, 1980 response to IE Bulletin 79-01B. This listing shows the equipment items by manufacturer and model number, plant location, and time required to function as identified by the Licensee.

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Quad Cities Unit 1

NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
1	Temperature Element No Manufacturer or Model No.	RWCU Room	1-6	18,19
2	Motor-Driven Pump General Electric 5K6338XC23A 5K6336XC153	NW Corner Room	7-9 190-193	18,19
3	Motor Operated Valve Limitorque/Peerless AC A: SMB-0-25 B: SMB	NW and SW Corner Rooms	10-12 483	18,19,20
4	Motor Operated Valve Limitorque/Peerless AC SMB-0-15	Secondary Containment	13-14	18,19,20
5	Motor Operated Valve Limitorque/Reliance AC SMB-2-40	Secondary Containment	15-18, 142-143	7
6	Notor Operated Valve Limitorque/Reliance AC SMB-000	Torus Area	19-21	7
7	Pressure Transmitter General Electric 4532K11001	NW and SW Corner Rooms	22-24	19,21
8	Flow Transmitter General Electric 4532K43001	NW and SW Corner Rooms	25-27	18,19
9	Flow Switch Barton 289	NW and SW Corner Rooms	28-30	18,19,22

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
10	Pressure Switch Mercontrol DA-7043-804	NW and SW Corner Rooms	31-34	18,19
11	Stop Valve No Manufacturer Stated 178250H02D4	HPCI Room	35	18,19
12	Motor Operated Valve Limitorque/Peerless DC SMB-3	HPCI Room	36	18,19
13	Motor Operated Valve Limitorque/Reliance AC SMB-1	Drywell	37,38	7
, 14	Motor Operated Valve Limitorque/Peerless DC Motor SMB-1	Torus Area	1	18,19 .
15	Motor Operated Valve Limitorque/Peerless DC Motor SMB-0	HPCI Room	40	18,19
16	Motor Operated Valve Limitorque/Peerless DC SMB-3-80	Steam Tunnel	41,42	18
17	Motor Operated Valve Limitorque/Peerless DC SMB-2 SMB-3 SMB-4	HPCI Poom	43,44,46	18,19
18	Motor Operated Valve Limitorque/Reliance DC SM3-0	HPCI Room	45,49-52	18,19
19	Solenoid Valve ASCO 830281F	HPCI Room	47-48, 53-54	18,19

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ITEM	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
	<u></u>			
20	Differential Pressure Indicating Switch Barton 288	HPCI Room	55-56	18,19
21	Flow Transmitter General Electric 4532Kl3001	HPCI Room	57	18,19
22	Pressure Transmitter General Electric 4532K11001	HPCI Room	58	18,19
23	Temperature Switch United Electric Controls 88B	HPCI Room	59-68	18,19
24	Pressure Transmitter General Electric 50-551032CAAY1	HPCI Room	69	18,19,21
25	Pressure Switch Barksdale B2T-Al2SS	Secondary Containment	70-72	18,19
26	Turbine Gland Seal Condensate Drain Pump General Electric 58225A3525	HPCI Room	73	18,19
27	Gland Steam Exhauster Fan General Electric 5BC74AB2193	HPCI Room	75	18,19
28	Motor Speed Changer General Electric GESBC26AC389	HPCI Room	75	18,19
29	Motor Gear Unit General Electric 5CD14019A111620	HPCI Room	76	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
30	Oil Pump Motor General Electric 5CD218E252 5CD326E758	HPCI Room	77-78	18,19
31	HPCI Motor Control Signal Converter General Electric 357513TC108	HPCI Room	79	18,19
32	Level Switch Mercoid 123-2	HPCI Room	80	18,19
33	Level Switch Magnetrol 291-5P	HPCI Room	81-86	18,19,23
34	Flow Switch Barton 289	HPCI Room	87	18,19
35	Pressure Switch Static-O-Ring 6NN-AA21-VRR	HPCI Room	88	18,19
36	Pressure Switch Barksdale D2H-M150SS	HPCI Room	89-90	18,19
37	Solenoid Valve Allied Controls-Gould 320X-39, 320X-30	Inside Drywell	91-96	18
38	Relief Valve and Solenoid Valve Dresser Industries 1525VX C5450-5	Inside Drywell	97-102	15,18
39	Motor Operated Valve Limitorque/Peerless AC Model Not Stated	Inside Drywell	103-104	20,24

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NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
40	Motor Operated Valve Limitorque/Peerless DC A: SMB-00-7.5 B: SMB-00	Steam Tunnel	159-160 105-106	18
41	Differential Pressure Indicating Switch Barton 278	Secondary Containment	107-116	18,19
42	Temperature Switch Fenwall 17002-40	Steam Tunnel	117-126	13
43	Pressure Switch Static-O-Ring 12NN-KK215-VX	SE Corner Room	235-237	18,19
44	Position Switch NAMCO EA-08011100	Inside Drywell	388-389	None given
45	Motor Operated Valve Limitorque/Peerless AC SMB-0-15 SMB-2-60 SMB-2-40	NE and SE Corner Rooms	127-134	18,19,20
46	Motor Operated Valve Limitorque/Peerless AC SMB-000-5 SMB-4T-150 SMB-3-100 SMB-0-10	Torus Area	135-136, 147-148, 152-155	18,19,20
47	Motor Operated Valve Limitorque/Reliance AC SMB-2-40 SMB-0 SMB-1	NE and SE Corner Rooms	194-197 137-138	7,18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
48	Motor Operated Valve Limitorque/Peerless AC No Model No.	SE Corner Room	139	18,19
49	Motor Operated Valve Limitorque/Peerless AC SMB-0-15	Secondary Containment	140-141	18,19,20
50	Motor Operated Value Limitorque/Reliance AC SMB-5T-150 SMB-2-60	Torus Area	144-146, 149-151	7
51	Motor Operated Valve Limitorque/Peerless DC SMB	Torus Area	156	18,19
52	Motor Operated Valve Limitorque/Reliance AC SMB-3 SMB	Inside	161-162, 157-158	18
53	Pressure Transmitter General Electric GE/MAC 551	NE and SE Corner Rooms	163-165, 186-189	18,19
54	Flow Transmitter General Electric GE/MAC 553	NE and SE Corner Rooms	166-170	18,19
55	Level Switch Magnetrol 249C-X-EP-SIMD4DC	RHR Pump Room	171-173	18,19
56	Differential Pressure Indicating Switch Barton 289	NE and SE Corner Rooms	174-176	18,19
57	Pressure Switch Mercoid GN-L-3	NE and SE Corner Rooms	177-182	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
58	RHR Service Water Pump General Electric 5K821167A31	RHR Pump Room	183-185	18,19
59	Differential Pressure Switch Barton No Model No.	NE Corner Room	198-200	18,19
60	Room Cooler No Manufacturer or Model No.	RHR Pump Room	201-203	18,19
61	Solenoid Valve ASCO HT8316B14	Torus Area	205-206,208, 214-215,216,226	18,19
62A	Solenoid Valve Versa VPS-2402 VGS-4422	Torus Area	207,209-213,	18,19
62B	Solenoid Valve Versa VPS-2502 VGS-4522 VGS-4422	Torus Area	218-220	18,19
63	Solenoid Valve Versa VPS-2302	Secondary Containment	217	18,19
64	Solenoid Valve ASCO 8302026F	Secondary Containment	221-225	18,19
65A	Motor Operated Valve Limitorque No Model No.	SE Corner Room	204	18,19
65B	Motor Operated Valve Limitorque No Model No.	NW Corner Room	490	18,19
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ITEM	EQUIPMENT ITEM	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
- ao.	DESCRIPTION			
66	Pressure Switches Static-O-Ring 12N-AA5-PP	Secondary Containment	247-250, 228-234	18,19
67	Position Switch NAMCO Mark II D1200-G	Secondary Containment	238-242	18,19
68	Motor Operated Valve Limitorque SMB-000	Outside Drywell	227	18,19
69	Electric Air Heater E. L. Wiegland No Model No.	Secondary Containment	251-253	18,19
70	Motor Operated Damper Limitorque SMB	Secondary Containment	254-259, 263-264	18,19
71	Exhaust Fan New York Blower E4966	Secondary Containment	260-262	18,19
72	Flow Transmitter Leeds & Northrug 1912-3-21-0-0000- 0300-0300	Secondary Containment	265-267	18,19
73	Flow Transmitter Foxboro 15A-1	Secondary Containment	268-270	18,19
74	Flow Switch Mercoid DA-533-3 DA-533-2Rl	Secondary Containment	277-279 271-273	18,19
75	Temperature Switch Chromalox No Model No.	Secondary Containment	274-276	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
76	Local Control Panel Harlo DWG D12971 SH.30	Secondary Containment	280-282	18,19
77	Solenoid Valve Versa/ASCO VWS-2302/ 8320A23	Secondary Containment	283-285	18,19
78	Temperature Element Pall Trinity Micro 14-T-2H	Inside Torus	243-246	19
79	Damper No Manufacturer or Model No.	Control Room	398-400	18,19
80	Motor Driven Pump General Electric 5K365AK169	RHR Pump Room	286-287	18,19
81	Fan Motor General Electric 5K213AK2476 5K18AL2151	NE and NW Corner Rooms	288-290,292-294	18,19
82	Room Cooler Fan Buffalo Forge Gl23-HV	HPCI Room	291	18,19
83	Fan Motor No Manufacturer No model No.	Diesel Room l	295-296	18,19
84	Motor-Driven Pump General Electric 5K182BL315	Diesel Room l	297-298	18,19
85A	Level Switch Magnetrol A-103F-EP/VP	Diesel Room 1/2	299	18,19

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	EQUIPMENT		CUDNITERAL DACE	OUNTTETCATION
ITEM	ITEM	LOCATION	REFERENCES	REFERENCES
<u>NO.</u>	DESCRIPTION			
85B	Level Switch	Diesel Room	302-303	18,19
	Magnetrol	1 and 1/2		
	A-103F-EP/VP			
86	Solenoid Valve	Diesel	300-302	18,19
	ASCO	Room 1		
	8211C89			
07	Solanoid Ball Value	Secondary	304-307	18,19
0/	Caperal Preumatic	Containment		
	608KW106			
	and chart Value	Secondary	308-311	18.19
33	Squib Shear Valve	Containment	500 511	
	No Model No	Concarinatio		
	NO NOGET NO.			
89	Motor Operated Valve	Inside	312-313,	20,24
	Limitorque/Peerless AC	Drywell	464-465	
	SMB-1-40			
	SMB			
90	Motor Operated Valve	RWCU Room	314-315	18,19
	Limitorque/Peerless DC			
	SMB			
01	Solenoid Value	Torus Area	316-319	18,19
27	ASCO			
	HT831614			
	Warner Operated Walve	Morne Area	322-324	20.24
92	Motor Operated Valve	TOLOD MEGA		
	SMB-000-5			
		2 .		13.10
93	Solenoid Valve	Secondary	331-334,330-341,	10,19
	ASCO	Containment	340-340	
	HVA-90-405-2A			
	WPBLX831030			
	HVA-96-081A			
94	Level Switch	Secondary	335-337	18,19
	Magnetrol	Containment		
	402			

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ITEM NO.	EQUIPMENT I TEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
95	Position Switches NAMCO Mark II D1200G	Torus Area	325-328	18,19
96	Solenoid Valve ASCO No Model No.	Outside Drywell	320	18,19
97	Solenoid Valve ASCO SN-681055	Outside Drywell	321	18,19
98	Pressure Switch Barksdale B2T-M12SS B2T-A12SS	Secondary Containment	347-351,365-367, 369,370	18,19
99	Level Indicating Switch Yarway 4418C 4418CE	Secondary Containment	352-364	18,19
100	Position Switch No manufacturer or Model No.	RWCU Room	368	18,19
101	Motor Operated Valve Limitorque/Reliance SMB-2-40	Torus Area	329-330	7
102	Differential Pressure Indicating Switch Barton 288	Secondary Containment	371-378	18,19
103	Radiation Element GM Tube General Electric DWG 194X927GI	Turbine Building	391-392	18,19
104	Solenoid Valve Versa/Barksdale VPS2402 VGS4422/D1H-A150SS	Reactor Building	393-395	18,19
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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
105	Diesel Auxiliary Control Ideal Electric & Manufacturing SO No. 267777	Diesel Room 1	404-406	18,19
106	Excitation Cabinet Electromotive Div. of GM 9474	Diesel . Room l .	407-409	13,19
107	Diesel Generator Electromotive Div. of GM No Model No.	Diesel Rooms 1 and 1/2	410-412	18,19
108	Switchgear General Electric AMH 4.76-230 AKD-5	Secondary Containment	413-416	18,19
109A	480 V Motor Control Center General Electric 7700	Secondary Containment	417-419	18,19
1098	480 V Motor Control Center General Electric 7700	Secondary Containment	436-441	18,19
110	120 V AC Reactor Protection Bus General Electric Type NAB, Style 2A Plant H	Electrical Equipment Room	420-421	18,19
111	120/240 V AC Bus Cutler Hammer 6CF55505	Electrical Equipment Room	422-423	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
112	120/240 V AC Bus MMG Set General Electric 5L54404A22T30	Electrical Equipment Room	424	18,19
113	Engine Control Panel Electromotive Div. of GM No Model No.	Diesel Room 1	425-427	18,19
114	4 kv Non-segregated Bus No Manufacturer or Model No.	Turbine Building	428-429	18,19
115	D/G Secondary Control Panel . Ideal Electric S.O. No. 267777	Diesel Room l	430-432	18,19
116	D/G Neutral Grounding Panel General Electric 208419-68P	Diesel Room l	433-435	18,19
117	Battery Charger Gould GRF240T100X GRF120T100X GRF24S25F30X	Battery Charger Room	442-443,449-450 458-461	18,19
118	250 V DC Motor Control Center Cutler Hammer 6002H347B	Battery Charger Room	444-447	18,19,25
119	DC Battery Gould FPS-25 FPR-13 DPR-9	Battery Charger Room	448,451,456-457	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
120	DC Distributor Panel Cutler Hammer No Model No.	Battery Charger Room	452-455,462-463	18,19
121	Motor Operated Valve Limitorque/Reliance AC SMB-2 SMB-00J	Inside Drywell	379-387	None given
122	Mccor Operated Valve Limitorque/Peerless DC SMB-00	Steam Tunnei	466-467	18
123	Position Switch NAMCO Mark II D1200G	NW Corner Room	342-344	18,19
124	Differential Pressure Indicating Switch Barton 288	NW Corner Room	470-472	18,19,26
125	Temperature Switch Fenwal 17002-40	NW Corner Room	473-482	18,19,27
126	Supply Air Fan Trane Co. SO No. KALF575A	Control Room	396	18,19
127	Return Air Fan Joy Mfg. 38-21-1750	Control Room	397	18,19
128	Pressure Switch Barksdale B2T-A12SS	NW Corner Room	484-487	18,19,28
129	Position Switch NAMCO Mark II D1200G	RWCU Room	390	18,19

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFERENCES	QUALIFICATION REFERENCES
130	Solenoid Valve No Manufacturer or Model No.	Control Room	403	18,19
131	Cable General Electric No Model No.	Not Stated	505-506	None given
132	Cable Simplex No Model No.	Outside Drywell	507-514	None given
133	Cable, Jacket Simplex No Model No.	Inside Drywell	503-504	None given
134	Solenoid Valve ASCO .830281F	NW Corner ,Room	468-469,488-489	18,19
135	Electrical Penetration GE-NEBS No Model No.	Drywell	517-520	None given
136	Water Chillers Trane Co. 3E5H80	Control Room	401	18,19
137	Chilled Water Pump Ingersoll-Rand 0469-4154	Con'tol Room	402	18,19
138A	Cable Polyvinyl Chloride Jacket General Electric No Model No.	Outside Drywell	491-492,499-502, 515-516	None given
138B	Cable General Electric No Model No.	Inside Drywell	497-498	Nor•given

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ITEM NO.	EQUIPMENT ITEM DESCRIPTION	LOCATION	SUBMITTAL PAGE REFLRENCES	QUALIFICATION REFERENCES
139	Polyvinyl Chloride Jacket Simplex No Model No.	Not stated	493-494	None given
140	Plastic Insulation and Jacket Simplex No Model No.	Outside Drywell	495-496	None given
141	Terminal Blocks Allen Bradley No Model No.	Drywell Wall	521-524	None given

APPENDIX C - SAFETY SYSTEMS FOR WHICH ENVIRONMENTAL QUALIFICATION IS TO BE ADDRESSED

The Licensee has submitted a list of safety-related systems which must function in order to mitigate the consequences of a design basis accident. This information was submitted in response to IE Bulletin 79-01B and was included in the Licensee's November 1, 1980 response.

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- Reactor Protection System
- · Core Spray System
- High-Pressure Coolant Injection System
- Auto Depressurization Syster, Main Steam System
- Residual Heat Removal/Containment Spray System
- Pressure Suppression System
- Standby Gas Treatment System
- Service Water System
- Diesel Oil Piping System
- Containment Isolation System*
- Control Rod Drive Hydraulic System
- Reactor (Nuclear Boiler) Recirculation System
- Process Radiation Monitoring System
- Reactor Building Ventilation System
- Control Room, HVAC
- · Standby Alternating Current Power
- · Standby Direct Current Power
- Reactor Core Isolation Cooling System (RCIC)
- General Use Electrical Equipment

*Containment isolation includes all components in various systems performing the containment isolation function.

APPENDIX D

EQUIPMENT ITEM CROSS-REFERENCE LIST

EQUIPMENT	FINAL TECHNICAL
ITEM NO.	EVALUATION REPORT SECTION
1	4.6.1
2	4.6.2
3A	4.5.2.1
3B	4.5.2.2
4	4.5.2.3
5	4.5.2.4
6	4.5.2.5
7	4.5.1.1
8	4.5.1.2
9	4.5.1.3
10	4.6.3
11	4.5.2.6
12	4.5.2.7
13	4.6.4
14	.4.6.5.
15	4.5.2.8
16	4.5.2.9
17	4.5.2.10
18	4.5.2.11
19	4.5.2.12
20	4.7.1
21	4.5.2.13
22	4.5.2.14
23	4.6.6
24	4.5.2.15
25	4.7.2
26	4.5.2.16
27	4.5.2.17
28	4.5.2.18
29	4.5.2.19
30	4.5.2.20
31	4.5.2.21
32	4.5.2.22
33	4.5.2.23
34	4.5.2.24
35	4.5.2.25
36	4.5.2.26
37	4.6.7
38	4.6.8
39	4.5.2.27

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EQUIPMENT	FINAL TECHNICAL
ITEM NO.	EVALUATION REPORT SECTION
40A	4.5.2.28
40B	4.6.9
41	4.5.2.29
42	4.5.2.30
43	4.6.10
44	4.6.11
45	4.5.2.31
46	4.5.2.32
47	4.5.2.33
48	4.5.2.34
49	4.5.2.35
50	4.5.2.36
51	4.5.2.37
52	4.5.2.38
53	4.5.2.39
54	4.5.1.4
55	4.5.2.40
56	4.6.12
57	4.5.1.5
58	4.5.2.41
59	4.6.13
60	4.5.2.42
61	4.5.2.43
62A	4.5.2.44
62B	4.6.14
63	4.5.2.45
64	4.5.2.46
65A	4.5.2.47
65B	4.5.2.48
66	4.7.3
67	4.5.2.49
68	4.5.2.50
69	4.6.15
70	4.5.2.51
71	4.6.16
72	4.6.17
73	4.6.18
74	4.6.19
75	4.6.20
76	4.6.21
77	4.6.22
78	4.6.23
79	4.7.4
80	4.5.2.52
81	4.6.24
9.2	4.5.2.53

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ITEM NO.EVALUATION REPORT SECTION83 $4.7.14$ 84 $4.7.15$ 85B $4.7.15$ 85B $4.7.16$ 86 $4.7.17$ 87 $4.5.2.54$ 88 $4.5.2.55$ 89 $4.5.2.56$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.57$ 93 $4.5.2.61$ 96 $4.5.2.61$ 97 $4.5.2.61$ 96 $4.5.2.65$ 100 $4.5.2.65$ 100 $4.5.2.65$ 100 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.66$ 103 $4.5.2.70$ 105 $4.7.19$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ 109A $4.5.2.73$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 120 $4.5.2.71$ 121 $4.5.2.71$ 122 $4.5.2.73$ 123 $4.5.2.73$ 124 $4.5.2.73$ 125 $4.2.1.1$ 126 $4.7.9$	EQUIPMENT	FINAL TECHNICAL
83 $4.7.14$ 84 $4.7.15$ $85B$ $4.7.16$ 86 $4.7.17$ 87 $4.5.2.54$ 88 $4.5.2.55$ 89 $4.5.2.56$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.57$ 92 $4.5.2.57$ 92 $4.5.2.57$ 93 $4.5.2.57$ 94 $4.5.2.63$ 97 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.66$ 100 $4.5.2.66$ 101 $4.5.2.61$ 102 $4.5.2.71$ 103 $4.5.2.71$ 104 $4.5.2.71$ 105 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ 1098 $4.6.26$ 110 $4.7.23$ 1	ITEM NO.	EVALUATION REPORT SECTION
83 $4.7.14$ 84 $4.7.15$ $85A$ $4.7.5$ $85B$ $4.7.16$ 86 $4.7.17$ 87 $4.5.2.51$ 89 $4.5.2.55$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.59$ 94 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.61$ 96 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.65$ 101 $4.5.2.65$ 102 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.68$ 103 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ 111 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.25$ 119 $4.7.26$ 120 $4.5.2.74$ 121 $4.5.2.75$ 122 $4.5.2.71$ 123 $4.5.2.75$ 124 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$		化学校 法法法法法 法律法法法法法法
84 $4.7.15$ $85A$ $4.7.16$ 86 $4.7.17$ 87 $4.5.2.54$ 88 $4.5.2.55$ 90 $4.5.2.56$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.57$ 92 $4.5.2.57$ 93 $4.5.2.57$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.63$ 98 $4.5.2.66$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.6.26$ 110 $4.7.6$ 111 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ $109B$ $4.6.26$ 110 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 122 $4.5.2.71$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	83	4.7.14
85A4.7.585B $4.7.16$ 86 $4.7.17$ 87 $4.5.2.54$ 88 $4.5.2.55$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.57$ 93 $4.5.2.59$ 94 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.66$ 90 $4.5.2.63$ 98 $4.5.2.66$ 100 $4.5.2.66$ 101 $4.5.2.66$ 102 $4.5.2.66$ 103 $4.5.2.67$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ 109A $4.5.2.71$ 110 $4.7.6$ 111 $4.7.6$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.5.2.71$ 121 $4.5.2.71$ 122 $4.5.2.71$ 133 $4.7.25$ 14 $4.5.2.73$ 15 $4.7.23$ 17 $4.7.24$ 18 $4.7.25$ 19 $4.5.2.75$ 121 $4.5.2.75$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$	84	4.7.15
85B $4.7.16$ 86 $4.7.17$ 87 $4.5.2.54$ 88 $4.5.2.55$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.53$ 93 $4.5.2.53$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.66$ 102 $4.5.2.66$ 103 $4.5.2.66$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ 109A $4.5.2.71$ 111 $4.7.6$ 111 $4.7.21$ 114 $4.7.21$ 115 $4.7.23$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	85A	4.7.5
36 $4.7.17$ 37 $4.5.2.54$ 38 $4.5.2.55$ 39 $4.5.2.56$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.53$ 93 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.64$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.66$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.7.23$ 115 $4.7.23$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.5.2.71$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	85B	4.7.16
37 $4.5.2.54$ 88 $4.5.2.55$ 90 $4.5.2.55$ 91 $4.5.2.57$ 92 $4.5.2.57$ 92 $4.5.2.57$ 93 $4.5.2.53$ 93 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.66$ 100 $4.5.2.66$ 101 $4.5.2.66$ 100 $4.5.2.66$ 101 $4.5.2.66$ 102 $4.5.2.66$ 103 $4.5.2.67$ 102 $4.5.2.66$ 103 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ 1098 $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.21$ 114 $4.7.22$ 116 $4.7.23$ 117 $4.7.26$ 120 $4.5.2.74$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$	86	4.7.17
88 $4.5.2.55$ 90 $4.5.2.57$ 91 $4.5.2.57$ 92 $4.5.2.57$ 92 $4.5.2.53$ 93 $4.5.2.53$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.66$ 102 $4.5.2.66$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ $109A$ $4.5.2.73$ 111 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.26$ 120 $4.5.2.74$ 121 $4.6.27$ 122 $4.5.2.75$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	87	4.5.2.54
89 $4.5.2.56$ 90 $4.6.25$ 91 $4.5.2.57$ 92 $4.5.2.53$ 93 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.65$ 101 $4.5.2.66$ 102 $4.5.2.66$ 103 $4.5.2.67$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$	88	4.5.2.55
90 $4.5.25$ 91 $4.5.257$ 92 $4.5.2.57$ 93 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.665$ 101 $4.5.2.67$ 102 $4.5.2.68$ 103 $4.5.2.67$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.7.23$ 115 $4.7.23$ 117 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	89	4.5.2.56
91 $4.5.2.57$ 92 $4.5.2.58$ 93 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.65$ 100 $4.5.2.65$ 101 $4.5.2.67$ 102 $4.5.2.68$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109B $4.6.26$ 110 $4.7.8$ 113 $4.7.21$ 114 $4.7.23$ 115 $4.7.23$ 116 $4.7.25$ 119 $4.7.26$ 120 $4.5.2.74$ 123 $4.5.2.74$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	90	4.6.25
92 $4.5.2.59$ 93 $4.5.2.59$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.63$ 99 $4.5.2.65$ 100 $4.5.2.67$ 102 $4.5.2.67$ 102 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.23$ 117 $4.7.26$ 120 $4.7.27$ 121 $4.5.2.75$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.5.2.75$ 122 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	91	4.5.2.57
93 $4.5.2.39$ 94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.63$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.5.2.71$ 108 $4.5.2.72$ 109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.7.23$ 117 $4.7.23$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.75$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$	92	4.5.2.58
94 $4.5.2.60$ 95 $4.5.2.61$ 96 $4.5.2.63$ 97 $4.5.2.63$ 98 $4.5.2.63$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.68$ 103 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.25$ 119 $4.7.26$ 120 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.21.1$ 126 $4.7.9$	93	4.5.2.59
35 $4.5.2.61$ 96 $4.5.2.62$ 97 $4.5.2.63$ 98 $4.5.2.64$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.68$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.21.1$ 126 $4.7.9$	94	4.5.2.00
96 $4.5.2.63$ 97 $4.5.2.63$ 98 $4.5.2.64$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.75$ 124 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	95	4.5.2.01
97 $4.5.2.63$ 98 $4.5.2.63$ 99 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.69$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109A $4.5.2.72$ 109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.23$ 117 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	90	4.5.2.62
90 $4.5.2.65$ 100 $4.5.2.66$ 101 $4.5.2.67$ 102 $4.5.2.69$ 103 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109A $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.7.23$ 115 $4.7.23$ 117 $4.7.25$ 119 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.71$ 123 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	97	4.5.2.05
99 $4.5.2.63$ 100 $4.5.2.67$ 101 $4.5.2.67$ 102 $4.5.2.69$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.72$ 109A $4.5.2.72$ 109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	30	4.5.2.65
100 $4.5.2.67$ 101 $4.5.2.67$ 102 $4.5.2.69$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	99	4.5.2.65
101 $4.5.2.69$ 103 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.75$ 124 $4.5.2.75$ 125 $4.2.1.1$ 126 $4.7.9$	101	4.5.2.60
102 $4.5.2.69$ 104 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.26$ 120 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	101	4.5.2.68
103 $4.5.2.70$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	102	4.5.2.69
104 $4.7.18$ 105 $4.7.18$ 106 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.5.2.74$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	103	4.5.2.70
103 $4.7.19$ 107 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.5.2.74$ 121 $4.6.27$ 122 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	105	4.7.18
103 $4.7.20$ 108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	105	4.7.19
108 $4.5.2.71$ $109A$ $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	107	4.7.20
109A $4.5.2.72$ $109B$ $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	108	4.5.2.71
109B $4.6.26$ 110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	1094	4.5.2.72
110 $4.7.6$ 111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	109B	4.6.26
111 $4.7.7$ 112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	110	4.7.6
112 $4.7.8$ 113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	111	4.7.7
113 $4.7.21$ 114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	112	4.7.8
114 $4.5.2.73$ 115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	113	4.7.21
115 $4.7.22$ 116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.7.9$	114	4.5.2.73
116 $4.7.23$ 117 $4.7.24$ 118 $4.7.25$ 119 $4.7.26$ 120 $4.7.27$ 121 $4.6.27$ 122 $4.5.2.74$ 123 $4.5.2.75$ 124 $4.5.2.76$ 125 $4.2.1.1$ 126 $4.7.9$	115	4.7.22
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	116	4.7.23
118 4.7.25 119 4.7.26 120 4.7.27 121 4.6.27 122 4.5.2.74 123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	117	4.7.24
119 4.7.26 120 4.7.27 121 4.6.27 122 4.5.2.74 123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	118	4.7.25
120 4.7.27 121 4.6.27 122 4.5.2.74 123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	119	4.7.26
121 4.6.27 122 4.5.2.74 123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	120	4.7.27
122 4.5.2.74 123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	121	4.6.27
123 4.5.2.75 124 4.5.2.76 125 4.2.1.1 126 4.7.9	122	4.5.2.74
124 4.5.2.76 125 4.2.1.1 126 4.7.9	123	4.5.2.75
125 4.2.1.1 126 4.7.9	124	4.5.2.76
126 4.7.9	125	4.2.1.1
	126	4.7.9

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EQUIPMENT	FINAL TECHNICAL
ITEM NO.	EVALUATION REPORT SECTION
127	4.7.10
128	4.5.2.77
129	4.5.2.78
130	4.7.11
131	4.5.1.6
132	4.5.1.7
133	4.5.1.8
134	4.5.2.79
135	4.6.28
136	4.7.12
137	4.7.13
138A	4.5.1.9
138B	4.5.1.10
139	4.5.1.11
140	4.5.1.12
141	4.6.29